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Examining the Relationship Between Teacher Candidate Characteristics and Teacher Workforce Entry

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by

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DISSERTATION

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DEDICATION

To my family: My children, Felix and Matilda: you weren't here at the start of this journey, but I'm so glad you're here at the end. You bring new meaning and purpose to my work in education. I've always believed in the importance of providing the best education possible to all children, but now I'm doing it for you two. My husband, Theodore: you've been with me every step of the way for the last twenty years, giving me support or space as I needed it, and holding everything together for us all. Thank you for building this life with me.

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ABSTRACT

This study aims to look for relationships between the characteristics and experiences of teacher candidates while in the program and their subsequent workforce entry after leaving the program. A hierarchical logistic regression was conducted on five blocks of variables: demographics, entry academic variables, program academic variables, completion variables, and experience variables, with employment in a New Mexico public school as the dependent variable. The rate of completers working in NM public schools was much higher than expected, 73% compared to 55%. Only the block of completion variables was significantly related to entering the workforce. A few individual variables were also significantly related, with New Mexico residents more likely to work in NM public schools, Early Childhood completers less likely to work in NM public schools, and completers who passed all licensure exams on the first attempt less likely to work in NM public schools than those who failed at least one exam.

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Introduction

Across the country, news outlets are reporting on the teacher shortage crisis that is afflicting the nation (Grabenstein, 2022; Jones, 2023; Lieberman, 2022; Turner & Cohen, 2023; Wong, 2022). States are struggling to find enough teachers to fill their classrooms and schools. A recent study (Nguyen et al., 2022) found tens of thousands of teaching positions vacant in the 2021-2022 school year. Additionally, approximately five percent of positions were filled by underqualified teachers. This shortage causes schools to cancel courses or hire substitutes and underprepared teachers to fill the gap, which then seriously harms student achievement (Podolsky et al., 2019).

In exploring the nationwide teacher shortage, Nguyen et al. (2022) found that while the overall trend showed a national shortage of teachers, the shortage was much worse in some states than others. Of the 38 states with recent teacher vacancy data, vacancy rates range from 0.43 vacancies per 10,000 students to 69 vacancies per 10,000 students. New Mexico's teacher shortage data shows 38 vacant teaching positions per 10,000 students, far above the national average of 15 vacant positions per 10,000 students. This ranks New Mexico fifth in the nation for teacher vacancies (Nguyen et al., 2022).

New Mexico's struggles with teacher vacancies are not new. The SOAR Institute began publishing an annual report on teacher vacancies in 2015 when they recognized a need to start systematically identifying and tracking the unfilled vacancies in schools across the state (Trujillo, 2015). Since then, the problem has gotten worse, with vacancies rising from 1,054 in the 2019 report (Boren, 2019) to 1,344 in the 2022 report (Boren, 2022).

Teacher Shortage

Sutcher et al. (2019) defines a teacher shortage as "an inadequate quantity of qualified individuals willing to offer their services under prevailing wages and conditions" (p. 4). This definition contains two key components: the individuals must be qualified to teach, and the individuals must be willing to teach under current conditions. Typically, these components lead the teacher shortage discussion in two directions: a focus on the qualified teachers who are no longer willing to teach and are leaving the profession, and a focus on the reduction in the number of individuals who choose to prepare to become teachers.

The first component is a matter of teacher attrition. In general, teachers due to retire account for about a third of teachers leaving the profession, with the remaining two-thirds leaving pre-retirement (Sutcher et al., 2019). These teachers who leave the profession before they are able to retire generally leave due to school employment decisions, life changes, or dissatisfaction with the teaching profession.

The second component is a matter of recruitment into the teaching professions, starting with teacher preparation programs. The number of college students completing degrees in teacher preparation has gone down significantly in the last fifty years. One analysis found that almost 200,000 education degrees were awarded in 1970, while fewer than 90,000 were awarded in 2019 (King & James, 2022). Additionally, in just the last ten years, the number of undergraduate teacher preparation degrees has decreased 35%. Similarly, a national survey of American college freshmen found that only 4.2% of freshmen in Fall 2019 chose a teacher preparation major, in contrast to 2007 when 9.2% of freshmen chose teacher preparation majors (Stolzenberg et al., 2020). This decrease

means that the number of qualified teachers in the country has dropped significantly, contributing to the teacher shortage.

This focus on the beginning and end of the teacher pipeline ignores a potential leak in the pipeline: not all individuals who complete teacher preparation programs go on to enter the teacher workforce. This point in the pipeline is difficult to track and measure, so estimates of the workforce entry rate are imprecise and vary. Some older estimates found that 70% to 90% of new completers begin teaching in their first year after completing a teaching preparation program (Darling-Hammond, 2000). These estimates found that entry rates are higher for completers from alternative post-baccalaureate programs, and lower for completers from undergraduate programs. A more recent analysis of undergraduate completers estimated that 75% enter the classroom within four years of completing a teacher preparation program (Sutcher et al., 2019). Additionally, it appears that at times of high demand in the teacher job market, the percentage of teachers who are hired directly out of a preparation program goes up (Darling-Hammond & Sykes, 2003).

In New Mexico, evidence indicates that the entry rate for newly prepared teachers is much lower than the national average. A 2018 report from the New Mexico Public Education Department (New Mexico Public Education Department, 2018) found that the percent of completers overall who entered the New Mexico teacher workforce in the first three years after program completion was 62.2%, with individual preparation program rates ranging from 46% to 85%. Additionally, institutions with both undergraduate and alternative programs averaged 57%, while those with only alternative programs averaged 74%.

Overview of the Literature

Recently, some researchers have looked into what happens between completing a teacher preparation program and entering the teacher workforce as an in-service teacher. Cowan, et al., found in 2016 that the number of teachers completing teacher preparation programs has steadily increased since the 1980s, but that only about half of those teachers end up teaching in a classroom. Another study (Goldhaber et al., 2022) found that two-thirds of teacher candidates who complete their teacher preparation program and receive their teaching license go to work as public school teachers within five years of completing student teaching. This suggests that problem is more complex than simply not preparing enough teachers, and that the solution is likely much more complex as well.

This study aims to explore the question of who will enter the teaching workforce upon completion of their teacher preparation program by looking at the relationships between candidate characteristics and experiences during teacher preparation, and their eventual entry into the teacher workforce.

There are a lot of factors that might influence a candidate's pathway from teacher preparation program to in-service teacher. Given the exploratory nature of this study, the variables included are chosen based on both what existing data are available and what variables have a plausible conceptual relationship with the outcome. Most of these variables have been studied at some point in the teacher pipeline, from entry into a post-secondary education through the retention and performance of experienced teachers in the profession. However, most of these factors have not been looked at specifically for the transition into the profession, and none of them have been studied in New Mexico specifically.

Teacher Preparation Variables

The teacher preparation variables that may be related to teacher workforce entry can be grouped into three categories of variables based on how they relate to the candidate. The first category is candidate demographic variables, which includes race and ethnicity, gender, and age, as well as first-generation status, socio-economic status, and whether they are from New Mexico. The second category is academic performance variables, which includes ACT scores, Grade Point Averages, course grades, course assessment scores, and licensure test scores. The third category is program experience, which includes program characteristics, field experience placement characteristics, and cooperating teacher rating.

Candidate Demographics

This section examines what we do and do not know about the relationship between demographic characteristics and entry into the teaching workforce. Demographic characteristics play a key role in both college success and the teaching profession. For example, as a group, teachers are known for being overwhelmingly White and female, with both men and people of color underrepresented (Redding & Nguyen, 2020). New teachers entering the profession tend to be young (Goldhaber et al., 2022). Teachers also are more likely than most other professions to choose to work close to where they grew up (Reininger, 2012).

Other demographic characteristics come into play when considering college success. Students who have high financial-need, students without a family history of college, and students who transfer from community colleges all struggle to complete college at higher rates than students without these additional barriers.

Gender. Teaching has traditionally been considered a female profession with only small shifts in recent years. In 1988, 77% of teachers were female, while in 2012, 74% of teachers were female (Redding & Nguyen, 2020). Female candidates are more likely to enter a teacher preparation program (Wallace & Gagen, 2020), as well as to persist in teacher preparation programs (Kim & Corcoran, 2018). At the other end of the pipeline, female teachers also have higher attrition and are more likely to leave the profession (Borman & Dowling, 2008). However, there doesn't seem to be any evidence that female completers are more or less likely to continue in the pipeline to becoming teachers.

Race/Ethnicity. Teaching has also traditional been a profession that lacks racial and ethnic diversity. Even today, nationwide, the teaching workforce is primarily White, even in communities of color (Wallace & Gagen, 2020). Nationwide, in 1988, 87% of teachers were White, compared to 80% in 2012 (Redding & Nguyen, 2020). The pattern for race and ethnicity is similar to that of gender, with White candidates more likely to enter a teacher preparation program (Wallace & Gagen, 2020), as well as to persist in teacher preparation programs (Kim & Corcoran, 2018). At the other end of the pipeline, White teachers also have higher attrition and are more likely to leave the profession (Borman & Dowling, 2008). However, in this case, evidence has been found that race and ethnicity are influential in the hiring process, with employers preferring to hire White completers (Goldhaber et al., 2014). Additionally, completers of color are more likely to have a non-teaching position in the education system for their first year after completion, compared with White completers (Goldhaber et al., 2022).

Age. When compared with older completers, younger completers are more likely to enter the teaching workforce immediately after completing student teaching (Goldhaber et al., 2022). This may be due to a preference from employers to hire younger teachers (Goldhaber et al., 2014). However, following the pattern of White, female teachers, younger teachers are also more likely to leave the teaching profession (Borman & Dowling, 2008).

New Mexico Resident. More than other professions, teachers show a preference for teaching in communities that are close to where they grew up (Reininger, 2012). Additionally, candidates who complete their student teaching experience in the same district where they grew up and attended school plan to stay in that same district, and plan to stay in the profession longer than those who do not have that match (Ronfeldt, 2012).

Financial Need. Financial need is related to how long college students take to complete a four-year degree, with students under financial stress more likely to take longer than four years to complete the degree (Letkiewicz et al., 2014). Additionally, a longitudinal study of men in the 1980s found that students with higher educational debt were more likely to take jobs with higher pay (Minicozzi, 2005), which may indicate that college graduates are more likely to take a job outside their field if the pay is higher.

First-Generation. When a student is a part of the first-generation in their family to achieve a college degree, it influences the student's ability to navigate the college experience. Many teacher candidates are first-generation college students, meaning they are likely to be less prepared for navigating the college experience than candidates with family members who have gone before them (Gallavan & Benson, 2014). Additionally,

first-generation candidates have lower college completion rates and lower licensure rates (Haselkorn & Fideler, 1996).

Transfer Status. Students who begin their college experience elsewhere, then transfer to a different university to finish their degree may have a different experience than students who complete their degree entirely at one school. Approximately half of students who complete undergraduate degrees attended a community college at some point in their college career (Maliszewski Lukszo & Hayes, 2020). The difficulty in transferring between community college and a four-year institution is well-documented in the phenomenon of "transfer shock," in which student GPAs drop after transferring (Ishitani, 2008). Students who transfer as juniors or seniors have higher persistence rates than students who transfer as freshmen. Additionally, students who maintain higher GPAs after transferring also have higher persistence rates.

Academic Measures

The impact of academic measures on teacher preparation and teacher performance has been studied unevenly. Most of the measures have been looked at regarding program completion or teacher quality, but often not for workforce entry. The earliest measures, such as college entrance examinations and high school GPA, tend to be predictive of overall college success, with the same pattern showing in teacher preparation programs specifically. Measures that are often required at admission to the program are generally evaluated only for ability to predict program success, or occasionally teacher performance once employed, although one study found that GPA at entry to the teacher preparation program was unrelated to rate of employment in the first two years after completion (Van Overschelde & López, 2018). Even measures like the Teacher

Licensure Entrance Examinations that are required for licensure tend to be studied only for their ability to predict the next set of licensure assessments, not successful entry into the profession or success within the profession.

Once admitted to the program, academic measures are generally evaluated for their ability to predict teacher quality and performance once working as a teacher. Unsurprisingly, candidates who perform well while student teaching are likely to become teachers who perform well while teaching. However, the highest performing teachers are also more likely to leave the profession for better paying careers, which may be related to the initial decision of whether to enter the teaching profession or to pursue a more lucrative career upon completion of the teacher preparation program.

When hiring, employers show the most interest in measures from the end of the teacher preparation program, such as the licensure assessments and degree GPA. Additionally, when employers host student teachers and are able to see candidates perform in the classroom, they show a preference for teachers who score high on their student teaching observations.

Pre-program Academic Measures

College Entrance Examinations. College entrance exam scores do seem to be indicative of academic preparedness, with ACT scores predicting overall academic success in college (Hepworth et al., 2018). In the early 2000s, several states determined that the SAT could be substituted for the Praxis Entrance Exam, as it was similarly predictive of success in a teacher preparation program (Jacobson, 2004). One study in Ireland (Corcoran & O'Flaherty, 2017) found that the Leaving Certificate, their version

of a college entrance examination, is predictive of success in a teacher preparation program.

High School GPA. High school grade point average (GPA) is also a component of academic preparedness, again predicting overall academic success in undergraduate degrees (Hepworth et al., 2018). Specifically for teacher preparation students, high school GPA was found to be predictive of the ability to retain a scholarship by maintaining a minimum college GPA (Trant et al., 2015).

College Grade Point Average at Program Entry. While high school grade point average has not been studied regarding success in teacher preparation, GPA at the time students are admitted to the teacher preparation program has been found to be predictive of academic success at completion of the teacher preparation program (Corcoran & O'Flaherty, 2017; Garza et al., 2016). Additionally, higher grades at program entry predict a greater likelihood of persisting in the teacher preparation program (Kim & Corcoran, 2018). In contrast, higher entry GPA has not been found to be related to higher rates of employment one or two years after completion. There was, however, a puzzling effect on the rate of certifications, with candidates with GPAs below 2.75 and candidates with GPAs above 3.0 receiving licensure at a significantly higher rate than those with GPAs between 2.75 and 3.0 (Van Overschelde & López, 2018).

Teacher Preparation Entrance Examinations. Many states require teacher candidates to pass a set of licensure examinations assessing basic academic skills in reading, writing, and mathematics in order to be admitted to a teacher preparation program. Candidates who struggled to pass these were found to also struggle to pass their content tests later in the program (Gitomer et al., 2011). However, entrance examinations

have been found to not be predictive of later performance in student teaching, and only minimally predictive of college GPA at program completion (Mikitovics & Crehan, 2002).

Program Academic Measures

Performance in Field Experience. Candidates who score higher on their field observations are more likely to enter the teaching workforce (Bartanen & Kwok, 2021; Vagi et al., 2019). Bartanen and Kwok (2021) found that this is a small relationship in general but becomes a much stronger relationship when candidates are hired by the same school where they completed their student teaching. Vagi et al. (2019) found that the relationship holds even after controlling for demographic characteristics and academic achievement. Candidate performance on field experience observations has also been shown to be correlated with teacher performance on classroom observations (Corcoran & O'Flaherty, 2018), as well as with retention in the profession (Vagi et al., 2019). On the other hand, one study found that high-ability teachers are more likely to choose to exit the teaching profession in favor of higher-paying jobs outside the profession (Han, 2021). Expected salary may also be a factor for some completers who are choosing whether to enter the teaching profession and earn a smaller salary or pursue another career pathway that may pay better.

Performance in Preparation Courses. High grades in general are predictive of persisting in and completing teacher preparation programs (Kim & Corcoran, 2018), and employers show a preference for teachers with high grades when hiring (Boyd et al., 2013). However, there is very little information on how performance in an individual course is related to the teacher pipeline.

Completion Academic Measures

Degree Grade Point Average at Program Completion. As stated above, employers show a preference for teachers with high grades when hiring (Boyd et al., 2013). Additionally, GPA may have an indirect relationships with workforce entry, as candidates with high GPAs may be more likely to be placed in advantaged schools for student teaching, and students in advantaged placements are more likely to be hired (Krieg et al., 2016).

Teacher Licensure Assessment – Content and Professional Knowledge Scores. Completers with higher test scores are more likely to enter the teaching workforce immediately after completing their teacher preparation program (Goldhaber et al., 2022). Teachers who scored high on their licensure exams are more likely to be employed by the school where they did their student teaching (Goldhaber et al., 2014). Additionally, employers prefer to hire teachers with strong certification test scores (Boyd et al., 2013). However, once hired, teachers with strong academic records are more likely to change which schools they are teaching at (Boyd et al., 2011).

Licensure Assessment Multiple Attempts. Candidates cannot be licensed in New Mexico without passing a series of assessments. However, for those who do meet this requirement, some meet it easily, while others struggle to pass the tests and require multiple attempts to pass the tests. Although recent policy has put emphasis on the ability of a completer to pass all licensure assessments on their first attempt, there seems to be little research on the significance or predictiveness of this measure. One study found that the number of attempts required to pass the Essential Academic Skills tests was

predictive of candidates passing the content exams, with each subsequent attempt lowering the overall probability of ever passing (Gitomer et al., 2011).

Experience Measures

A candidate's experience in a teacher preparation program likely has a strong impact on their likelihood of entering the teaching profession, as it will impact both their feeling about the profession, and their preparedness for the profession. Programs that prepare candidates in hard-to-staff teaching fields help to prepare candidates for the needs of the employers. Characteristics of the field experience placement site will affect the candidates' initial teaching experiences in the classroom, which may change their perception of the profession. Additionally, teachers perform better when their initial teaching jobs match their student teaching experiences, which may influence the jobs that they seek out or the employers' perceptions of them.

Program Type. Teachers who are licensed in "difficult to staff" areas, such as math, science, or special education, are more likely to be employed, compared to teachers licensed in other areas (Bardelli & Ronfeldt, 2021; Goldhaber et al., 2014).

Program Level. Teacher preparation programs generally fit into two categories: traditional and alternative. Alternative pathways are intended to be accelerated, with less coursework and shorter student teaching. Additionally, candidates in traditional programs report better alignment between coursework and field experience, and gain more from their student teaching (Matsko et al., 2022). Traditional candidates are more likely to plan for a long career in teaching, but alternative candidates are more likely to prefer to teach "minoritized student populations."

Placement Racial/Ethnic Diversity. One study found that when applying for jobs, most teachers show no preference regarding the racial and ethnic make-up of the school. However, White teachers had a preference for schools with a smaller percentage of minority students (Boyd et al., 2013). Additionally, teachers seem to be more effective when the student demographics of their student teaching placement match those of the school where they are employed (Goldhaber et al., 2017).

Additional Placement Characteristics. Characteristics of the field placement site may influence the likelihood that a candidate will enter the teaching workforce. For example, teacher candidates who do their student teaching in suburban settings are more likely to enter the teaching workforce (Goldhaber et al., 2014), and teachers show a preference for working in suburban schools (Boyd et al., 2013). Additionally, teachers prefer to work in schools with low poverty levels (Boyd et al., 2013), which may be influenced by the poverty level of the school where they complete their student teaching.

Cooperating Teacher Evaluation Rating. The cooperating teacher in the classroom where a candidate does student teaching has a huge influence on both the quality and the environment of the preparation. Completers who did their student teaching with cooperating teachers who scored high on classroom observations and student test scores tended to also score high in the same areas during their first year of teaching (Ronfeldt et al., 2018). Additionally, candidates who believed that their cooperating teacher was high quality were both more likely to report feeling prepared to teach, and more likely to report strong teacher efficacy once they were teaching (Ronfeldt et al., 2013).

Placement Match. Teacher candidates are matched to their student teaching field placements based on what they intend to teach when they begin their career. However, some candidates are able to find better fits than others. While it seems plausible that the candidate's satisfaction with their placement match would impact their likelihood of entering the teaching profession, there does not seem to be any research into this question. The closest question that has been studied is how well the field placement for student teaching matches the environment of the first teaching job. When their first job is a close match in terms of school type, grade level, and demographics, teachers perform better (Krieg et al., 2022), and feel more confident and better prepared to teach (French, 2020).

Current Study

Overall, much of the research about teacher workforce entry covers related points in the pipeline, such as teacher preparation program entry, college completion, and teacher retention, as well as related measures such as teacher quality. Very little of the research specifically addresses how these factors relate to whether or not completers from teacher preparation programs will go on to enter the teacher workforce. This study aims to use the data available to address this specific point in the teacher pipeline, hoping to shed light on who does and does not enter the teaching workforce after completing a teacher preparation program.

Research Questions

What are the relationships between student characteristics and experiences and teacher workforce entry in New Mexico?

1. What is the relationship between student demographic variables and workforce entry?
2. What is the relationship between student academic variables at program entry and workforce entry?
3. What is the relationship between student academic variables during the program and workforce entry?
4. What is the relationship between student academic variables at program completion and workforce entry?
5. What is the relationship between student experience variables and workforce entry?

Methods

Participants

The participants in this study were students who completed a teacher preparation program at the University of New Mexico between 2014-2015 and 2018-2019. This date range was selected to look at students who completed their program prior to the COVID-19 pandemic, which is assumed to have influenced both teacher preparation and teacher workforce entry enough to no longer fit the same model. The final dataset consisted of 1,082 students.

Sampling

All students who completed a teacher preparation program (Elementary, Secondary, Special Education, Early Childhood, Physical Education) in the 2014-2015, 2015-2016, 2016-2017, 2017-2018, or 2018-2019 academic years were included in the sample.

Measures

Demographic Measures

Student demographics are self-reported by students when they first apply to attend the university. Students may choose to update their gender and race/ethnicity throughout their time at the university. All demographics are stored in Banner, the university's official system for institutional records. With the exception of the Financial Need variable, demographic variables do not have any missing values.

Gender. Student gender was collected from official institutional records using the latest response. In the specified time-frame, official institutional records only allowed for two genders. Female completers were coded as "0", Male completers were coded as "1".

Race/Ethnicity. Student race and ethnicity were collected from official institutional records using the student's latest response. The university follows federal guidelines for reporting race and ethnicity. Ethnicity has two response categories that are mutually exclusive: Hispanic and non-Hispanic. Race has five response categories that allow for multiple responses: American Indian, Asian, African-American, Native Hawaiian/Pacific Islander, White. For the most complete information, each racial and ethnic category was included as a separate variable, to allow for completers who identify in more than one category.

There were only four completers who identified as Native Hawaiian/Pacific Islander, with two of them also identifying as Asian. The remaining two were aggregated together with the Asian category, and the Native Hawaiian/Pacific Islander category was removed. There were only two completers who identified as US Non-Resident. Both of those completers ended up being removed during the examination of multivariate outliers, so the US Non-Resident category was also removed.

For the missing data imputation process, the variables were coded such that completers who identify in the category were coded as "1" and completers who did not identify in the category were coded as "0". For the logistic regression analysis, the variables were effect-coded such that completers who identify in the category were coded as "1" and completers who did not identify in the category were coded as "-1".

Degree Year. Degree academic year was calculated from the semester in which the student completed their degree. Summer was included at the end of the academic year.

Age at admission. Student age was calculated from the birthdate stored in official institutional records. To standardize age between cohorts, age was calculated based on the first day of their first semester in the teacher preparation program.

New Mexico Resident. Student state of residence at the time of applying to attend UNM was collected. It was dichotomized to New Mexico Resident (1) and Non-Resident (0).

Financial Need. Student financial need was collected from the Financial Aid Office through the FAFSA application. Completers who did not complete a FAFSA application did not have data about their financial need status and were coded as missing data.

Completers who qualified for Pell Grants were categorized as High Need (1). Completers who did not qualify for Pell Grants were categorized as Low Need (0).

First-Generation. Student's status as a first-generation college student was not able to be collected from Banner, so it was not included in the study.

Transfer Status. Students who had transferred into the university were coded as Transfer (1), while completers who began as freshmen (or at the beginning of their graduate program) were coded as Non-Transfer (0).

Entry Academic Measures

ACT score. During the timeframe of this data, students who began college as first-time freshmen were required to submit an ACT or SAT score in their application. However, students who transferred in from a different institution or started as graduate students were not required to submit ACT or SAT scores. ACT and SAT scores were collected from official institutional records (Banner) for all completers who had

submitted it. For completers who submitted both an ACT and an SAT score, only the ACT score was used.

ACT scores were found for 688 completers. An additional 49 completers had only SAT scores. Their scores were converted to the concordant ACT score using the Official 2018 Concordance tables between the SAT and ACT (https://collegereadiness.collegeboard.org/ educators/higher-ed/scoring/concordance). The total percent of completers missing an ACT score was 32%.

High School GPA. High school grade point average (GPA) is only collected for first-time freshmen. Completers who transferred in from a different institution or started as graduate students were not required to submit high school GPA. It was collected from Banner.

High School GPA scores were found for 258 completers. High School GPA was missing for 76% of observations.

Teacher Licensure Basic Skills Assessments – Score at First Attempt. In the timeframe of this study, all teachers in the state were required to pass licensure tests in order to be licensed. Three of those tests, called Basic Skills Assessments, were required at admission to the program.

Prior to 2015, the Basic Skills Assessment was administered by the state of New Mexico and consisted of a single test called the New Mexico Teacher Assessment (NMTA) Basic Skills with three competencies, Reading, Writing, and Math. In 2015, the state changed to the National Evaluation Series (NES) Assessments, which broke the Basic Skills Assessments into three separate tests, called Essential Academic Skills (EAS). The three tests were EAS I: Reading, EAS II: Writing, and EAS III: Math. The

NMTA tests were scored from 100 to 300, with a score of 240 or higher required to pass each test. The NES tests were also scored from 100 to 300, with a score of 220 or higher required to pass each test. The score from the first attempt on each test was used in the analysis.

All six assessments were included. There were 538 scores for each of the NMTA Basic Skills tests, with 50% of scores missing. EAS I: Reading had 396 scores (63% missing), EAS II: Writing had 413 scores (62% missing), and EAS III: Math had 395 scores (63% missing). 34 completers attempted both the NMTA Basic Skills test and one or more of the EAS tests.

College Grade Point Average at Program Entry. College GPA at the time of application is a component of the program application. It was calculated from Banner, based on the student's GPA at the start of the first semester in which the student was enrolled in the teacher preparation program. Scores were found for 1,028 completers, with 5% of scores missing.

Program Academic Measures

Lesson Planning Scores – First and Last. All programs assess students on lesson planning, however in the time frame of this study, each program used a different rubric to assess it and rubrics changed over time. Students practice lesson planning throughout the program, and lesson plans are scored by course instructors. As the timing and number of lesson plans varied by program and time, only the scores from the completers' first and last lesson plans within the program were included. Scores were standardized by calculating a z-score for each candidate based on the mean and standard deviation of all completers who were assessed on the same rubric. This measure is not

generalizable, but it does provide information on how well the completers performed in relation to their peers.

For the first lesson plan, 522 completers had scores, with 52% missing. For the final lesson plan, 639 completers had scores, with 41% missing. When completers had only a single lesson plan score, the course and timing within the course were examined to determine if the score was collected closer to the beginning or the end of the program.

Field Observation Scores – First and Last. All programs assess students by observing them while they teach a lesson during their student teaching, however, during the timeframe of this study, each program used a different rubric to assess it and rubrics have changed over time. Students are observed while teaching throughout their field experience, with observations conducted and scored by cooperating teachers and university supervisors. Scores from the completers' first and last observations with each assessor (cooperating teacher and university supervisor) were included. Scores were standardized by calculating a z-score for each candidate based on the mean and standard deviation of all students who were assessed on the same rubric. This measure is not generalizable, but it does provide information on how well the completers performed in relation to their peers.

For the first observation, 725 completers had scores from their cooperating teacher (33% missing) and 696 completers had scores from their university supervisor (36% missing). For the last observation, 743 completers had scores from their cooperating teacher (31% missing) and 792 completers had scores from their university supervisor (27% missing). When completers had only a single observation score, the

course and timing within the course were examined to determine if the score was collected closer to the beginning or the end of the program.

Methods Courses Grade Point Average. All teacher candidates complete one or more courses in teaching methods, covering how to teach their content. The course grades for all methods courses were averaged together to form a single methods course GPA. The GPA followed the university registrar's grade point scale, with 0 for an F and 4.33 for an A+. Methods courses were found for 986 completers, with 9% of GPAs missing.

Completion Measures

Time to Degree. The number of years between a student's admission to the program and completion of the program was calculated to determine time to degree. In a few cases, completers were admitted to the program in the same semester that they graduated, resulting in a time to degree of zero. All completers had a time to degree calculated.

Degree Grade Point Average at Program Completion. College GPA at the time of graduation is collected in transcripts. It was pulled from Banner, based on the student's GPA at the end of the final semester of the teacher preparation program. Only one student was missing a GPA at program completion.

Teacher Licensure Assessments – Content Knowledge: Fail First Attempt. In the time frame of this study, all programs required one or more standardized assessment of content knowledge. These tests were usually taken after completing the degree. Prior to 2015, the New Mexico Teacher Assessments (NMTA) were used. In 2015, the state changed to the National Evaluation Series (NES) Assessments. The NMTA tests were

scored from 100 to 300, with a score of 240 or higher required to pass a test. The NES tests were also scored from 100 to 300, with a score of 220 or higher required to pass the test during the years 2015 and 2016. In 2017, the cut score for several tests was raised by 1 to 12 points.

Content Knowledge test scores were collected from Banner, where student scores were stored if the student sent official scores to the institution, as well as from the New Mexico Public Education Department Educator Preparation Program Dashboard, which provides data on completers who completed a degree and have since worked for the NM PED. Passing status was calculated based on the appropriate cut score at the time of the test. Completers who failed one or more Content Knowledge tests were scored as "1", while completers who passed all Content Knowledge tests on their first attempt were scored as "0".

There were 807 completers who had attempted at least one Content Knowledge test, with data missing for 25% of completers.

Teacher Licensure Assessment – Professional Knowledge Score: Fail First Attempt. In the time frame of this study, all programs required one or more standardized assessment of professional knowledge (Assessment of Professional Knowledge: Elementary, Assessment of Professional Knowledge: Secondary, and Assessment of Professional Knowledge: Early Childhood.). These tests were usually taken after completing the degree. Prior to 2015, the New Mexico Teacher Assessments (NMTA) were used. In 2015, the state changed to the National Evaluation Series (NES) Assessments. The NMTA tests were scored from 100 to 300, with a score of 240 or higher required to pass a test. The NES tests were also scored from 100 to 300, with a

score of 220 or higher required to pass the test during the years 2015 and 2016. In 2017, the cut score for several tests was raised by 1 to 12 points.

Professional Knowledge test scores were collected from Banner, where student scores were stored if the student sent official scores to the institution, as well as from the NM PED EPP Dashboard, which provides data on completers who completed a degree and have since worked for the NM PED. Passing status was calculated based on the appropriate cut score at the time of the test. Completers who failed one or more Professional Knowledge tests were scored as "1", while completers who passed all Professional Knowledge tests on their first attempt were scored as "0".

There were 797 completers who had attempted at least one Professional Knowledge test, with data missing for 26% of completers.

Experience Measures

Program Type. There are five teacher preparation program areas in the college: Elementary Education, Secondary Education, Special Education, Early Childhood Multicultural Education, and Physical Education Teacher Education. Each program results in certification for a different type of license. These five program areas were contrast coded for inclusion in the analysis.

All completers had a program assigned. There were 596 completers in Elementary Education (45% of the sample), 228 completers in Secondary Education (21% of the sample), 150 completers in Special Education (14% of the sample), 80 completers in Early Childhood (7% of the sample), and 28 completers in Physical Education (3% of the sample).

Program Level. Elementary Education, Secondary Education, and Special Education all offer both a traditional undergraduate degree and a master's degree with alternative route to licensure. For the master's degree with alternative route to licensure program, the licensure certification portion of the program is completed first with the understanding that some students will exit after completing the licensure portion and will not stay to complete the master's degree. In those cases, completion is determined by a transcript review. Completers enrolled in a traditional program were coded as "0", while completers enrolled in an alternative program were coded as "1".

All completers had a level assigned. There were 882 traditional completers (82% of the sample) and 200 alternative completers (18% of the sample).

Placement Variables. While most completers had a single field placement, some changed placement mid-program, or had more than one placement as a requirement of the program. In those cases, the last placement of their final semester was used for this analysis. Some completers had a placement of "Other", which meant no information was available about the placement. Some completers had no record of a placement. Demographic information about the field placement schools was retrieved from the Elementary/Secondary Information System at the National Center for Education Statistics (*National Center for Education Statistics*, 1996). Demographic trends appeared to be relatively stable over time, so data was retrieved for the 2020-2021 school year for all field placements.

Placement Rural/Urban. The location of the candidate's student teaching placement was coded to indicate level of Rural or Urban based on the federal

categorization. The scale has 12 levels, with lower numbers indicating more urban and higher numbers indicating more rural.

There were 831 completers with information about the rural/urban classification of their placement, with 23% of the data missing.

Placement School Size. The number of completers enrolled at the placement school in the academic year of the placement was included as a continuous variable. There were 827 completers with data on the size of their placement, with 24% of the data missing.

Placement Racial/Ethnic Diversity. To quantify the racial and ethnic diversity of the placement school, the percent of the school population who identify as non-White was recorded. Higher numbers indicate more diversity, while lower numbers indicate less diversity. There were 813 completers with data on the diversity of their placement, with 25% of the data missing.

Placement Poverty Level. The poverty level of the placement school was measured using the percentage of students who qualified for free or reduced lunch. Higher numbers indicate greater levels of poverty, while lower numbers indicate lower levels of poverty. There were 827 completers with data on the poverty level of their placement, with 24% of the data missing.

Cooperating Teacher Evaluation Rating. Teachers provided their state teacher evaluation rating when signing up to participate as cooperating teachers. The evaluation has five levels: Ineffective (1), Minimally Effective (2), Effective (3), Highly Effective (4), Exemplary (5). There were 639 completers with a rating for their cooperating teacher, with 41% of data missing.

Placement Match. Placement match data was not available to include in the study.

Dependent Variable

The outcome variable was whether or not a student is employed as a licensed teacher in a New Mexico public school in any year after completion of their teacher preparation program, 2015-2016 through 2022-2023. Teaching in a NM public school was considered a successful outcome (1), while not teaching in a NM public school was considered unsuccessful (0). Completers working in positions that do not require a full teaching license were considered to not be teaching.

It is possible for completers to be successfully employed as teachers in schools outside New Mexico, in private schools, or in Bureau of Indian Education schools, however, data on these completers is unavailable, so they are coded as not employed as teachers in New Mexico.

Analysis

This study used hierarchical logistic regression to evaluate how student characteristics and experiences relate to entry into the teacher workforce in New Mexico. Logistic regression is used to analyze which variables contribute to predicting a dichotomous variable. In this case, the dichotomous variable is whether the student has become a teacher in a public school in NM: Yes (1) or No (0).

Data Preparation

Prior to conducting the regression, observations were evaluated for inclusion in the analysis. For each variable, histograms were used to examine distributions for outliers. When outliers were observed, the data was checked for errors. There were a small number of cases where the outlier was found to be a data entry error (ex: a GPA of 0 was entered instead of a missing value).

Correlations

Correlations were then calculated among the continuous variables to look for strong relationships between variables. Figure 1 below shows the correlation matrix of all continuous variables in the dataset. The lower triangle contains Pearson's r for each bivariate correlation. The upper triangle contains a visualization of the correlations. The strongest relationships appear to be mostly between variables that would be expected to show a correlation. For example, the strongest correlation is between the NMTA Math test and the EAS Math test (0.78), and the next strongest correlation is between the NMTA Writing test and the EAS Writing test (0.68). All of the standardized tests were correlated with each other, including all six basic skills tests and the ACT. Even though

there were clearly relationships between the variables, none of them were strong enough to justify removing a variable from the analysis.

Multivariate Outliers

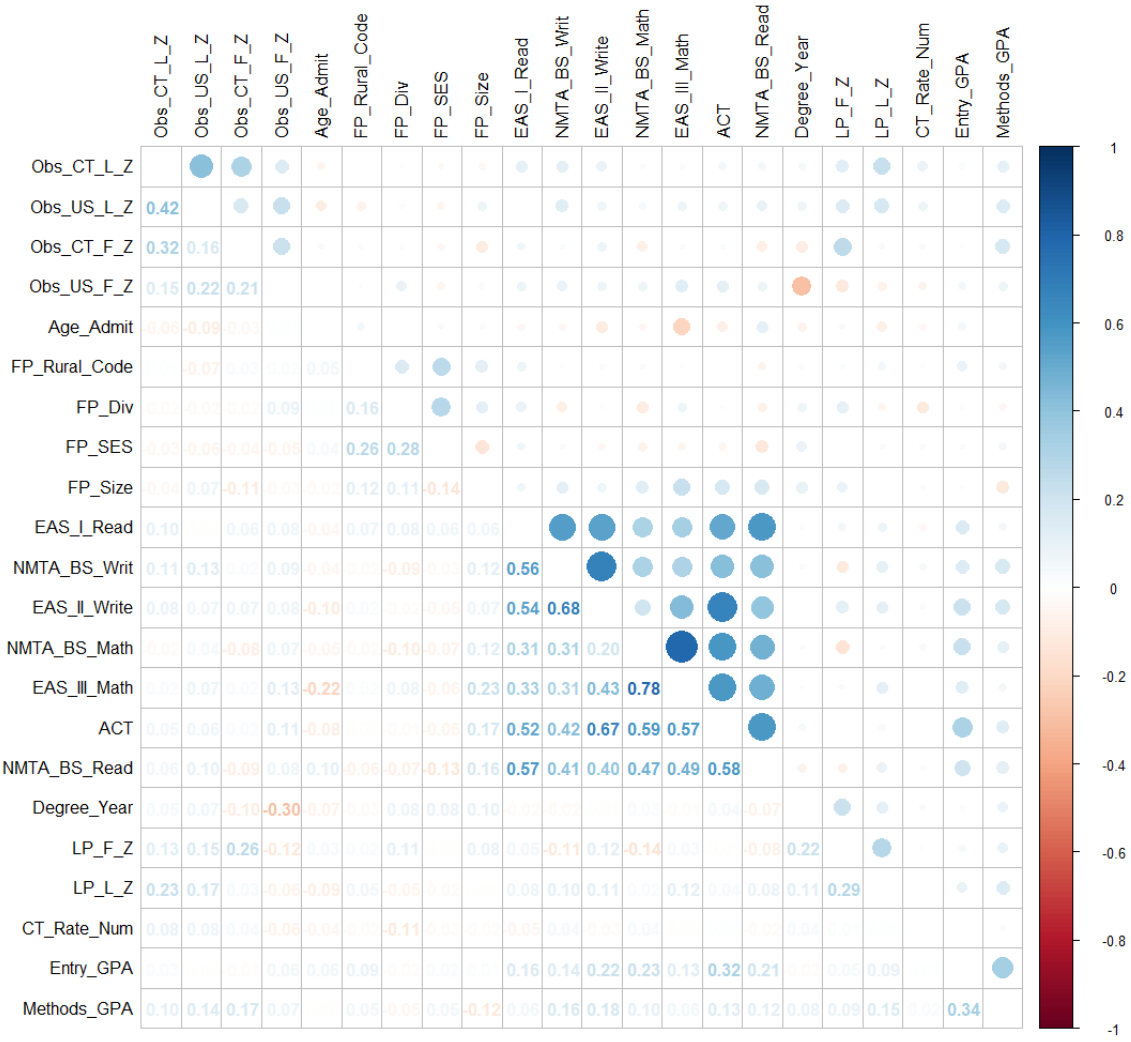
The next step was to look for multivariate outliers. Given the large amount of data missing from the dataset with values missing from almost every completer, it was impossible to run the diagnostic test on the original data. A single imputation was run using the Multiple Imputations by Chained Equations (MICE) package in R (van Buuren & Groothuis-Oudshoorn, 2011) to fill in the holes and allow for an analysis of missing data. This single imputation was used to fill in the missing values to create a completed dataset. That completed dataset was then used to calculate Mahalanobis Distances for each observation. The flagged observations were carefully examined to determine if they were flagged due to dataset, or due to the imputed data. The observations with real data were removed from the analysis. Nine values were removed, including the only two completers who were categorized as US Non-Resident, which eliminated the category from the final dataset.

Missing Data Assumptions

Overall, 20% of the data in the dataset was missing. Out of 43 variables, data was missing from 25 variables, ranging from a single value to 76% of values missing. Additionally, only two completers had complete data, with the other 1,080 completers missing one or more values. The missing data was examined for patterns that might indicate that the data is not missing at random. Figure 2 below shows which values are missing and which are observed for the entire dataset, with the dark portions indicating observed values and the light portions indicating missing values. The chart is sorted by

Figure 1

Correlation matrix



Note: The lower triangle contains Pearson's r for bivariate correlations between all continuous variables in the dataset. The upper triangle contains a visualization of the correlations, with larger, darker dots representing stronger correlations.

Degree Term, such that earlier completers are at the top of the chart, and later completers at the bottom. The variables with the most missing data are on the left, and the variables with the least missing data are on the right. There were a few patterns noticeable in the data. In many variables, the later years had more data, while the earlier years had more missing values. Additionally, the switch from the NMTA Basic Skills assessments to the EAS assessments was clearly visible. In both cases, the relationship between Degree Term and missing data seemed unlikely to affect the relationship between the variables. Overall, the assumption that the data is Missing At Random seemed reasonable.

Imputation of Missing Data

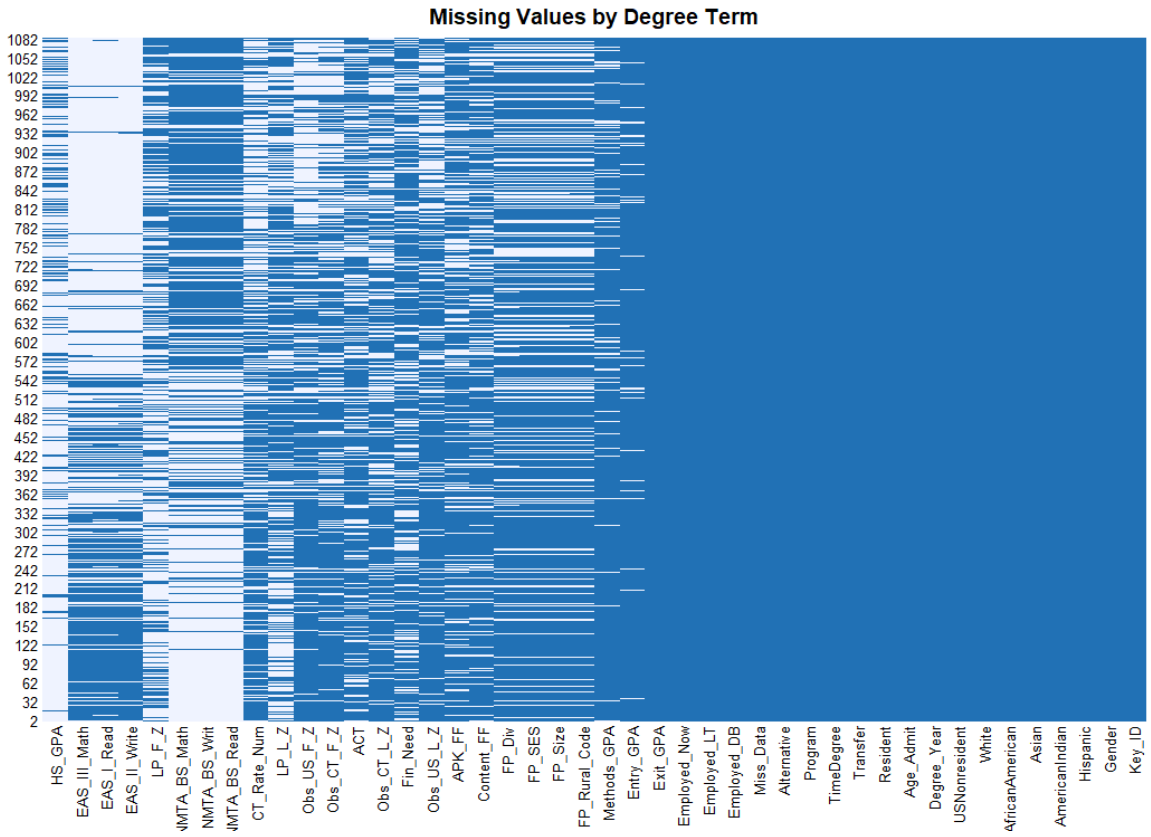
The Multivariate Imputation through Chained Equations (MICE) package in R (van Buuren & Groothuis-Oudshoorn, 2011) was used to impute the missing data in the dataset. The imputation process ran twenty separate imputations with twenty iterations each. Convergence of the imputations was assessed by examining the plots of the mean and standard deviation of the imputed values for each iteration across each imputation. All variables appeared to converge. The MICE package was then used to create twenty completed datasets with the imputed data replacing the missing values. These completed datasets were then ready to be used for data analysis.

Hierarchical Logistic Regression

The MICE package was used once again to run the data analysis, running it separately for each imputed dataset, and then pooling the results to form a single set of output. A hierarchical logistic regression was used to enter the variables into the model in five stages. This analysis allowed each category of variables to be entered into the model separately so that their contribution to the overall model can be accounted for. In

Figure 2

Missing Values by Degree Term



Note: Dark portions of the chart indicate observed values while light portions indicate missing values.

particular, this allows a separate examination of the Experience variables, which are the variables that the institution has the greatest influence over. Examining the specific relationships with the experience variables after accounting for all other variables isolates the relationships in areas that the programs may want to change to improve the rate of completers who teach in New Mexico public schools.

The first block entered the demographic variables: Gender, Race/Ethnicity, NM Resident, Age at admission, Financial Need, and Degree Year. The second block added in the Entry Academic variables: High School GPA, ACT Score, Entry GPA, and the six Basic Skills scores. The third block added in the Program Academic variables: Methods GPA, the four observation scores, and the two lesson planning scores. The fourth block included the Completion variables: Completion GPA, Tine to Degree, Content Test Score, Professional Knowledge Score, and Passed all tests on first attempt. The fifth block added in the Experience variables: Program type, Program Level, Rural/Urban Placement, Placement School Size, Placement Diversity, Placement Poverty level, and CT Evaluation Rating.

Each block added in a new category of variables to the previous model. The multivariate Wald test was used to compare each new model to the null model with no independent variables to determine if the full model fits better than the null. The Wald test was also used to compare the newest model with the previous model to see if it was a better fit. A type I error rate of .05 was used to establish statistical significance. Odds ratios for statistically significant independent variables were interpreted.

The influence of the missing data was also evaluated. The Fraction of Missing Information (FMI) was calculated for each variable to estimate how much of the total

variance is attributable to variation in imputed values between imputed datasets. Many of the variables had high FMI values, indicating that the imputed values were quite unstable and varied a lot between imputations.

Power Analysis

A post-hoc power analysis was conducted to determine if the study had enough power to find meaningful effects of each variable. Given the lack of literature on these specific relationships, a small effect size was used in the calculation, using the recommended odds ratio small effect of 1.68 (Chen et al., 2010) for dichotomous variables. For variables with multiple levels or continuous variables, the effect size was scaled such that the effect was expected for a single standard deviation, or a spread of scores based on the standard deviation.

The R package retrodesign (Gelman & Carlin, 2014) was used to calculate power for each variable separately, using the standard error and degrees of freedom calculated in the hierarchical logistic regression.

Results

Descriptives

This study is the first time that students who have completed a teacher preparation program at UNM have been examined in detail, so the details of their characteristics and measures provide new insights about who is completing these programs and how they are performing.

The first number of note is the overall rate of workforce entry for teacher preparation completers in this time period. Out of 1,082 completers, 789 were working for a New Mexico Public Education Department school as a licensed teacher at some point in the timeframe of the study. This resulted in a New Mexico public school workforce entry rate of 73%, with 27% of completers not working for a NM PED school at all, or working in a position that did not required a full teaching license (for example, substitute teacher, athletic coach, or educational assistant).

Demographic variables

With the exception of Financial Need, all of the demographic variables are collected in Banner for all students who attend the university. This means that the data was available for all completers. Overall, the dataset matched the expected demographics of the college. The sample was overwhelmingly female, and the majority of completers identified with at least one non-White racial or ethnic category. Most of the completers were residents of New Mexico, and most had high financial need. They were also older than the traditional age of undergraduate students. Table 1 shows the details of the descriptive statistics for the Demographic variables for the original data.

Table 1

Descriptive Statistics of Demographic Variables

Variable	N Observed	% Missing	% of Variable	% Working	% Not Working
Gender	1,082	0%			
Female (0)	860		79%	72%	28%
Male (1)	222		21%	75%	25%
Race/Ethnicity	1,082	0%			
Hispanic	490		45%	74%	26%
American Indian	96		9%	68%	32%
Asian	33		3%	67%	33%
African American	31		3%	61%	39%
White	780		72%	74%	26%
US Nonresident	2		0%	50%	50%
NM Resident	1,082	0%			
Resident (1)	950		88%	74%	26%
Non-Resident (0)	132		12%	65%	35%
Financial Need	764	29%			
High Need (1)	673		88%	74%	26%
Low Need (0)	91		12%	82%	18%
Degree Year	1,082	0%			
2014-2015	298		28%	70%	30%
2015-2016	235		22%	74%	26%
2016-2017	203		19%	76%	24%
2017-2018	166		15%	77%	23%
2018-2019	180		17%	69%	31%

Variable	N Observed	% Missing	Mean	SD	Working Mean	Not Working Mean
Age at Admission	1,082	0%	24.5	8.4	24.5	24.6

The majority of the sample (79%) was female. Female completers had slightly lower rates of entering the workforce compared to male completers, 72% compared to 75%.

The majority of the sample (72%) identified as White, although only 43% of the sample identified as only White. The next largest group was Hispanic completers, with 45% of the sample identifying as Hispanic and 34% of the sample identifying as only Hispanic. Completers who identify in these two groups have higher rates of workforce entry (74%) than the other groups (61-68%).

Eighty-eight percent of the sample were residents of New Mexico at the time of admission to the university, and residents had higher rates of workforce entry than non-residents (74% to 65%).

For Financial Need, 29% of the data was missing. For the 764 completers with data, 88% had high financial need. Those with low financial need were more likely to enter the workforce (82% to 74%).

When looking at Degree Year, there are more completers from earlier years than later years (298 in 2014-2015 compared to 180 in 2018-2019). This trend is consistent with overall enrollment trends in higher education and in teacher preparation specifically. Workforce entry rates vary between completion years, with the lowest rate in 2018-2019 at 69% and the highest rate in 2016-2017 at 77%.

Completers' average age at admission to their teacher preparation program was 24.5, with almost no difference between those who entered the teaching workforce and those who did not (24.5 compared to 24.6).

Entry Academic Measures

The entry academic measures consist of measures from high school (ACT score and high school GPA), as well as measures required for admission to the program (Program Entry GPA and Basic Skills Assessment scores). For the high school measures, much of the data was missing, but overall, the sample scored close to the national average on the ACT, and had a B-average in high school. The average GPA was higher for program entry, around a B+. For the Basic Skills Assessments, most of the completers had scores on at least one version of the test, and all but one of the tests had an average score that was above the cutoff for passing. Transfer status was also included to look at whether completers began their college degree at UNM, or transferred in credits from another institution. The majority of completers did not transfer in. Table 2 shows the details of the descriptive statistics for the Entry Academic Measure variables for the original data.

The majority of completers did have ACT scores, with only 32% missing. The average ACT score for the sample was 21.4, with a slightly lower mean (21.3) for those who entered the workforce than those who did not (21.6).

High School GPA was the variable missing the most data with 76% missing. For the completers that did have data, the average was 3.15. Completers who entered the workforce had slightly lower high school GPAs than those who did not, 3.13 compared to 3.24.

Almost all completers had program entry GPAs, with only 5% of the data missing. Overall, they had an average GPA of 3.37. Completers who entered the workforce had very similar entry GPAs to those who did not, 3.37 compared to 3.38.

Table 2

Descriptive Statistics of Entry Academic Variables

Variable	N Observed	% Missing	% of Variable		% Working	% Not Working
Transfer	1,082	0%				
Transfer (1)	210		19%		74%	26%
Non-Transfer (0)	872		81%		73%	27%
Variable	N Observed	% Missing	Mean	SD	Working Mean	Not Working Mean
ACT	737	32%	21.4	4.0	21.3	21.6
High School GPA	258	76%	3.15	0.56	3.13	3.24
Program Entry GPA	1,028	5%	3.37	0.61	3.37	3.38
NMTA BS: Reading	538	50%	273.9	19.8	273.8	274.4
NMTA BS: Writing	538	50%	238.6	25.1	239.5	236.1
NMTA BS: Math	538	50%	275.3	22.8	275.4	275.2
EAS I: Reading	396	63%	246.8	29.9	247.0	246.1
EAS II: Writing	413	62%	229.0	28.3	229.8	226.3
EAS III: Math	395	63%	241.7	36.9	240.8	244.8

Only half of the sample had scores on the NMTA Basic Skills assessments. As the three components of the assessment are administered as one test, any completer who had scores for one component had scores for all three components. On average, they scored the highest on the Math component (275.3) and the lowest on the Writing component (238.6). This was the only Basic Skills assessment with an average score below the passing cutoff of 240. For the Math and Reading components, completers scored similarly whether they entered the workforce or not, but for the Writing component, those who entered the workforce scored higher than those who did not (239.5 compared to 236.1), although neither group had an average passing score above the passing cutoff.

About 37% of the sample had scores on the NES EAS assessments, with a few more Writing scores than Math or Reading. On average, they scored the highest on the EAS I: Reading test (246.8) and the lowest on the EAS II: Writing test (229.0). For the EAS I: Reading test, completers scored similarly whether they entered the workforce or not. For the Writing test, those who entered the workforce scored higher than those who did not (229.8 compared to 226.3), while for the EAS III: Math test, those who entered the workforce scored lower than those who did not (240.8 compared to 244.8).

Information on whether a completer began at UNM as a freshman or transferred credits from another institution was available for all completers. Most completers did not transfer in to UNM, with only 19% of completers transferring. Workforce entry was similar between the two groups, with 74% of those who transferred entering the workforce, compared to 73% of those who did not transfer.

Program Academic Measures

The Program Academic Measures were all collected while completers were enrolled in their teacher preparation programs. Most of the completers had methods courses on record to calculate a GPA, but many were missing scores from some or all of their observations and lesson plan assignments. Methods course GPAs were quite high, just below an A-average. Scores for both observations and lesson plans showed that when compared to the mean of all similar assessments, students scored below average at the beginning of their program and above average at the end of their program, and Cooperating Teachers scored slightly higher than University Supervisors. Table 3 shows the details of the descriptive statistics for the Program Academic Measure variables for the original data.

Almost all completers had Methods Course GPAs, with only 9% of the data missing. Overall, they had an average GPA of 3.91. Completers who entered the workforce had slightly higher Methods GPAs than those who did not, 3.92 compared to 3.89.

Each of the observation measures is missing about a third of scores (27% to 36%). As these means are calculated using z-scores, they are near zero, with the first observation means below zero, and the last observation means above zero. For both the first and last observations, the Cooperating Teachers score higher than University Supervisors, -0.14 compared to -0.50 on the first observation and 0.43 compared to 0.30 on the last observation. Completers who entered the workforce had higher observation scores than those who did not (between 0.13 and 0.15 points higher), except for the final observation by the US, where scores were very similar between the two groups.

Table 3

Descriptive Statistics of Program Academic Variables

Variable	N Observed	% Missing	Mean	SD	Working Mean	Not Working Mean
Methods GPA	986	9%	3.91	0.28	3.92	3.89
First Observation: CT	725	33%	-0.14	0.98	-0.10	-0.24
Last Observation: CT	743	31%	0.43	0.96	0.47	0.32
First Observation: US	696	36%	-0.50	0.96	-0.50	-0.52
Last Observation: US	792	27%	0.30	0.95	0.33	0.20
First Lesson Plan	522	52%	-0.21	0.92	-0.19	-0.27
Last Lesson Plan	639	41%	0.12	0.99	0.16	-0.01

More data was missing from the lesson planning scores than the observation scores, 52% from the first lesson plan and 41% from the last lesson plan. The lesson plan scores were also calculated using z-scores, so the mean of the first lesson plan was below zero (-0.21) and the mean of the last lesson plan was above zero (0.12). Completers who entered the workforce had higher lesson plan scores than those who did not, with the first lesson plan averaging -0.19 for those who entered the workforce compared to -0.27 points for those who did not, and the last lesson plan averaging 0.16 for those who entered the workforce compared to -0.01 for those who did not.

Completion Measures

The completion measures are all collected at the end of the program. Two of the measures, time to degree and Exit GPA, are directly related to status as a completer, so the data is collected by the college. The other two measures are collected after the degree has been completed, so some of the data is missing. On average, it takes just over three years to complete a teacher preparation degree after being admitted to the degree program, and the average GPA is just above a B-average. The majority of completers do pass all of their licensure assessments on the first attempt, with higher rates of success for the professional knowledge tests than the content tests. Table 4 shows the details of the descriptive statistics for the Completion Measure variables for the original data.

Content test scores were available for 75% of completers. The majority of completers passed all of their content tests on their first attempt, with 32% of completers failing at least one test on the first attempt. Workforce entry was lower for those who

Table 4

Descriptive Statistics of Completer Variables

Variable	N Observed	% Missing	% of Variable		% Working	% Not Working
Content Tests: Fail 1st Attempt	807	25%				
Fail Any (1)	262		32%		88%	12%
Pass All (0)	545		68%		82%	18%
Professional Knowledge: Fail 1st Attempt	797	26%				
Fail Any (1)	159		20%		91%	9%
Pass All (0)	638		80%		82%	18%
Variable	N Observed	% Missing	Mean	SD	Working Mean	Not Working Mean
Time to Degree	1,082	0%	3.12	1.59	3.09	3.20
Exit GPA	1,081	0%	3.60	0.40	3.59	3.61

passed all tests on the first attempt, with 82% of those who passed all first attempts entering the workforce, compared to 88% of those who failed at least one test.

Professional knowledge test scores were available for 74% of completers. The majority of completers passed all of their professional knowledge tests on their first attempt, with 20% of completers failing at least one test on the first attempt. Workforce entry was lower for those who passed all tests on the first attempt, with 82% of those who passed all first attempts entering the workforce, compared to 91% of those who failed at least one test.

All completers had a time to degree calculated. Overall, they took an average of 3.12 years to complete their degree. Completers who entered the workforce had slightly shorter degree times than those who did not, 3.09 compared to 3.20.

Almost all completers had Exit GPAs, with only one completer missing an Exit GPA. Overall, they had an average GPA of 3.60. Completers who entered the workforce had slightly lower Exit GPAs than those who did not, 3.59 compared to 3.61.

Experience Measures

The experience measures are collected during the program, particularly field experience. Two of the measures, Program Area and Program Level, are directly related to status as a completer, so the data is collected by the college. The remaining measures are collected from field experience records, which are not always complete, leading to some missing data. More than half of the completers were in an Elementary Education program, and the majority of completers were in traditional programs. About a quarter of completers did not have field experience records. Overall, field experience generally occurred in schools that were highly diverse. Cooperating Teachers were mostly rated at

Effective or higher. Table 5 shows the details of the descriptive statistics for the Experience Measure variables for the original data.

All completers had information on their teacher preparation program. The majority of completers were from Elementary Education (55%). Secondary Education was the next largest program with 21% of completers, followed by Special Education (14%), Early Childhood (7%), and Physical Education (3%). The percent of completers who entered the workforce was similar for four of the programs, around 75%. Early Childhood had a much lower rate of entering the workforce at only 49%.

All completers had data on their program level. The majority of completers were from traditional programs (82%). Completers from Alternative programs were more likely to enter the workforce, 75% compared to 72%.

About 75% of completers had a record of their field placement, but not all placements had full details available. The placement's rural/urban status was most complete, with only 23% of the data missing. The average score for rural/urban status was 4.0, indicating placements were more urban than rural. Completers who entered the workforce had slightly more urban placements than those who did not, 4.0 compared to 4.2. Placement size had 24% of the data missing, with an average school size of 624.6 students. Completers who entered the workforce were placed at slightly larger schools than those who did not, 630 students compared to 610 students. Placement diversity had 25% of the data missing. The average diversity level was 79% of students were non-White, which was consistent for both completers who entered the workforce and those who did not. Placement poverty level had 25% of the data missing. The average poverty level was 41% of students qualified for free- or reduced-lunch. Completers who entered

Table 5

Descriptive Statistics of Experience Variables

Variable	N Observed	% Missing	% of Variable	% Working	% Not Working
Program Area	1,082	0%			
Elementary Education	596		55%	73%	27%
Secondary Education	228		21%	77%	23%
Special Education	150		14%	77%	23%
Early Childhood	80		7%	49%	51%
Physical Education	28		3%	75%	25%
Program Level	1,082	0%			
Alternative (1)	200		18%	75%	25%
Traditional (0)	882		82%	72%	28%

Variable	N Observed	% Missing	Mean	SD	Working Mean	Not Working Mean
Placement Rural/Urban	831	23%	4.0	3.6	4.0	4.2
Placement Size	827	24%	624.6	496.1	629.8	610.3
Placement Diversity	813	25%	0.79	0.16	0.79	0.79
Placement Poverty	827	24%	0.41	0.10	0.40	0.42
CT Rating	639	41%	3.6	0.7	3.6	3.6

the workforce were placed at schools with slightly lower levels of poverty than those who did not, 40% compared to 42%.

Cooperating teacher rating was missing for 41% of completers. The average cooperating teacher rating was 3.6, halfway between “Effective” and “Highly Effective”. This was consistent for both completers who entered the workforce and those who did not.

Hierarchical Logistic Regression

The hierarchical logistic regression was used to enter the variables into the model in five blocks. Each block was added to the previous model, then the new model was analyzed. Each model was then compared to the null model and the previous model.

Block 1

The first block entered the demographic variables: Gender, Race/Ethnicity, Degree Year, Age at Admission, New Mexico Resident, and Financial Need. Table 6 shows the detailed estimates from the first block of variables in the first model. Overall, the model with the first block of variables was not significantly different from the null model, $W(10) = 1.489$, $p = 0.138$. Looking at individual variables, the variable NM Resident was significantly different from zero, $z = 2.035$, $p = 0.042$. The odds-ratio for the estimate was 1.511, indicating that completers who began the program as residents of New Mexico were one and a half times more likely to stay in New Mexico and enter the teaching workforce than those who did not.

The Fraction of Missing Information (FMI) values were quite low in this block, which is expected given that almost none of the variables had missing values.

Table 6

Model 1: Block 1 - Demographics

term	estimate	SE	df	FMI	z-value	p-value
(Intercept)	-45.980	99.836	1053.5	0.007	-0.461	0.645
Gender	0.160	0.180	1048.6	0.009	0.890	0.374
Hispanic	0.057	0.078	1057.4	0.004	0.727	0.467
American Indian	-0.111	0.134	1055.0	0.006	-0.834	0.404
Asian	-0.148	0.200	1045.9	0.011	-0.738	0.461
African American	-0.309	0.206	1054.0	0.006	-1.498	0.134
White	0.046	0.093	1053.6	0.007	0.494	0.621
Degree Year	0.023	0.049	1053.2	0.007	0.466	0.641
Age Admit	-0.001	0.009	1054.4	0.006	-0.099	0.921
NM Resident	0.413	0.203	1058.4	0.003	2.035	0.042*
Financial Need	-0.531	0.310	93.9	0.427	-1.711	0.090**
Model Comparison		df1	df2	dfcom	Wald	p-value
Model 0 to Model 1		10	1031.4	1062	1.489	0.138

* indicates significant at alpha = 0.05, ** indicates significant at alpha = 0.10

Block 2

The second model added in Block 2, the Entry Academic variables: High School GPA, ACT Score, Entry GPA, and the six Basic Skills scores. Table 7 shows the detailed estimates from the second block of variables as added in to the second model. The second model with both the first and second blocks of variables was not significantly different from the null model, $W(20) = 0.651$, $p = 0.873$, or the first model, $W(10) = 0.487$, $p = 0.898$. Additionally, none of the individual variables were significant.

The FMI values were quite high in this block, with all but one variable estimating 50% or more of the total variance for these variables was due to the variation in imputed values between the imputed datasets.

Block 3

The third model added in the third block with the Program Academic variables: Methods GPA, the four observation scores, and the two lesson planning scores. Table 8 shows the detailed estimates from the third block of variables as added in the third model The third model with the first three blocks of variables was not significantly different from the null model, $W(27) = 0.731$, $p = 0.838$, or the second model, $W(7) = 1.121$, $p = 0.350$. None of the individual variables were significant.

The FMI values were quite high in this block, with all but two variables estimating 50% or more of the total variance for these variables was due to the variation in imputed values between the imputed datasets.

Table 7

Model 2: Add in Block 2 - Entry Academics

term	estimate	SE	df	FMI	z-value	p-value
(Intercept)	-30.823	132.221	128.7	0.356	-0.233	0.816
HS GPA	0.160	0.626	19.1	0.910	0.256	0.801
Entry GPA	-0.070	0.167	127.7	0.358	-0.418	0.677
ACT	-0.011	0.046	48.0	0.609	-0.229	0.820
Transfer	0.062	0.315	53.8	0.574	0.197	0.845
NMTA BS Read	-0.002	0.012	26.5	0.807	-0.190	0.851
NMTA BS Writ	0.007	0.007	36.1	0.701	1.004	0.322
NMTA BS Math	0.014	0.016	22.3	0.865	0.853	0.403
EAS I Read	0.001	0.009	22.6	0.861	0.074	0.942
EAS II Write	0.004	0.009	27.7	0.792	0.403	0.690
EAS III Math	-0.014	0.013	20.0	0.897	-1.119	0.276
Model Comparison		df1	df2	dfcom	Wald	p-value
Model 0 to Model 2		20	516.1	1052	0.651	0.873
Model 1 to Model 2		10	254.7	1052	0.487	0.898

Table 8

Model 3: Add in Block 3 - Program Academics

term	estimate	SE	df	FMI	z-value	p-value
(Intercept)	41.200	154.586	92.2	0.430	0.267	0.790
Methods GPA	0.349	0.351	201.9	0.271	0.994	0.322
Obs CT First	-0.033	0.116	73.0	0.489	-0.280	0.780
Obs CT Last	0.122	0.139	49.7	0.598	0.875	0.386
Obs US First	0.044	0.154	34.5	0.716	0.286	0.777
Obs US Last	0.085	0.126	65.1	0.520	0.677	0.501
LP First	0.177	0.165	35.3	0.709	1.076	0.289
LP Last	0.084	0.122	48.5	0.606	0.691	0.493
Model Comparison		df1	df2	dfcom	Wald	p-value
Model 0 to Model 3		27	593.4	1045	0.731	0.838
Model 2 to Model 3		7	296.2	1045	1.121	0.350

Block 4

The fourth model added in the fourth block with the Completion variables: Completion GPA, Time to Degree, Content Test Fail First Attempt, and Professional Knowledge Fail First Attempt. Table 9 shows the detailed estimates from the fourth block of variables as added in to the fourth model. The fourth model with the first four blocks of variables was not significantly different from the null model, $W(31) = 0.842$, $p = 0.714$. However, the fourth model was significantly different from the third model, $W(4) = 2.623$, $p = 0.036$. Looking at individual variables within the block, the only significant variable is APK Fail First, or failing a first attempt on a professional knowledge test, $z = 2.034$, $p = 0.049$. The odds-ratio for this variable is 2.326, indicating that those who struggle to pass the professional knowledge tests are more than twice as likely to enter the teaching workforce than those who pass all assessments on the first attempt. A similar trend is seen on the content test, but it is not statistically significant, $z = 1.866$, $p = 0.069$.

The FMI values were high in this block, with the two significant variables estimating 50% or more of the total variance for these variables was due to the variation in imputed values between the imputed datasets.

Block 5

The fifth model added in the fifth block with Experience variables: Program Type, Program Level, Rural/Urban Placement, Placement School Size, Placement Diversity, Placement Poverty level, and CT Evaluation Rating. Table 10 shows the detailed estimates from the fifth block of variables as added in to the fifth model. The fifth model with all five blocks of variables was not significantly different from the null model, $W(41) = 0.663$, $p = 0.948$, or the fourth model, $W(10) = 0.923$, $p = 0.512$.

Table 9

Model 4: Add in Block 4 - Completion Measures

term	estimate	SE	df	FMI	z-value	p-value
(Intercept)	203.447	163.916	96.6	0.419	1.241	0.218
Time to Degree	-0.026	0.058	278.2	0.218	-0.452	0.651
Exit GPA	-0.330	0.430	70.8	0.497	-0.767	0.446
Content Fail First	0.612	0.328	41.9	0.651	1.866	0.069**
APK Fail First	0.844	0.415	40.9	0.659	2.034	0.049*
Model Comparison		df1	df2	dfcom	W	p-value
Model 0 to Model 4		31	609.2	1041	0.842	0.714
Model 3 to Model 4		4	197.6	1041	2.623	0.036*

** indicates significant at alpha = 0.05, ** indicates significant at alpha = 0.10*

Table 10

Model 5: Add in Block 5 – Experience Measures

term	estimate	SE	df	FMI	z-value	p-value
(Intercept)	258.496	190.436	65.9	0.516	1.357	0.179
Alternative	0.709	0.548	30.7	0.756	1.295	0.205
Early Childhood	-1.183	0.545	43.1	0.642	-2.172	0.035*
Physical Education	0.566	1.412	23.0	0.854	0.401	0.692
Secondary Education	0.098	0.469	47.1	0.614	0.209	0.835
Special Education	0.401	0.485	39.7	0.668	0.826	0.414
FP Rural Code	-0.023	0.054	26.3	0.809	-0.423	0.676
FP Size	0.000	0.000	35.9	0.702	0.015	0.988
FP Div	0.675	0.955	38.5	0.678	0.707	0.484
FP SES	-0.125	1.719	30.5	0.758	-0.073	0.942
CT Rate Num	-0.083	0.230	31.3	0.748	-0.361	0.720
Model Comparison		df1	df2	dfcom	Wald	p-value
Model 0 to Model 5		41	605.2	1031	0.663	0.948
Model 4 to Model 5		10	269.6	1031	0.923	0.512

** indicates significant at alpha = 0.05, ** indicates significant at alpha = 0.10*

However, within the individual variables, there was one significant finding. The odds ratio for this estimate was 3.263, indicating that completers from the Early Childhood program were three times less likely to enter the workforce, $z = -2.172$, $p = 0.035$.

The FMI values were high in this block, with all variables estimating 60% or more of the total variance for these variables was due to the variation in imputed values between the imputed datasets.

Power Analysis

The power analysis found power values ranging from 0.059 to 1.00. Table 11 details the calculated power and standard error for each variable. Overall, 25 variables had power values above 0.70, indicating that they likely had sufficient power, including four variables with power values of 1.0. Of those 25 variables, twenty had power values above 0.80.

In the Demographic Block, all of the variables except Financial Need had enough power to likely detect a small effect. In the Entry Academic Variables Block, Program Entry GPA and ACT both had sufficient power to detect an effect, along with all of the Basic Skills tests except NMTA Math. In the Program Academic Variables Block, only Methods GPA did not have sufficient power to detect a small effect. In the Completion Variables Block, only Time to Degree had sufficient power to likely detect a small effect. In the Experience Variables Block, only Field Placement Rural/Urban and Field Placement Size had adequate power to detect a small effect.

Table 11

Power Analysis Results

Block	Variable	Odds Ratio Effect Size	Standard Error	df	Power
Block 1: Demographics	Gender	1.68	0.180	1048.6	0.82
	Hispanic	1.68	0.078	1057.4	1.00
	American Indian	1.68	0.134	1055.0	0.97
	Asian	1.68	0.200	1045.9	0.74
	African American	1.68	0.206	1054.0	0.71
	White	1.68	0.093	1053.6	1.00
	Degree Year	1.17	0.049	1053.2	0.89
	Age Admit	1.08	0.009	1054.4	1.00
	Resident	1.68	0.203	1058.4	0.72
	Financial Need	1.68	0.310	93.9	0.38
Block 2: Entry Academic Variables	HS GPA	1.68	0.626	19.1	0.12
	Entry GPA	1.68	0.167	127.7	0.87
	ACT	1.17	0.046	48.0	0.91
	Transfer	1.68	0.315	53.8	0.36
	NMTA BS Read	1.03	0.012	26.5	0.78
	NMTA BS Writ	1.03	0.007	36.1	1.00
	NMTA BS Math	1.03	0.016	22.3	0.51
	EAS I Read	1.03	0.009	22.6	0.93
	EAS II Write	1.03	0.009	27.7	0.95
	EAS III Math	1.03	0.013	20.0	0.70
Block 3: Program Academic Variables	Methods GPA	1.68	0.351	201.9	0.31
	Obs CT First	1.68	0.116	73.0	0.99
	Obs CT Last	1.68	0.139	49.7	0.95
	Obs US First	1.68	0.154	34.5	0.90
	Obs US Last	1.68	0.126	65.1	0.98
	LP First	1.68	0.165	35.3	0.87
	LP Last	1.68	0.122	48.5	0.99
Block 4: Completion Variables	Time to Degree	1.43	0.058	278.2	1.00
	Exit GPA	1.68	0.430	70.8	0.22
	Content Fail First	1.68	0.328	41.9	0.33
	APK Fail First	1.68	0.415	40.9	0.22
Block 5: Experience Variables	Alternative	1.68	0.548	30.7	0.14
	Early Childhood	1.68	0.545	43.1	0.15
	Physical Education	1.68	1.412	23.0	0.06
	Secondary Education	1.68	0.469	47.1	0.19
	Special Education	1.68	0.485	39.7	0.18
	FP Rural Code	1.19	0.054	26.3	0.87
	FP Size	1.00	0.000	35.9	0.87
	FP Div	3.72	0.955	38.5	0.26
	FP SES	3.72	1.719	30.5	0.11
	CT Rate Num	1.68	0.230	31.3	0.58

Discussion

This study asked about the relationships between student characteristics and experiences and the transition to working as a public school teacher in New Mexico. Overall, it appears that there is little to no relationship between the data collected about a student in their time in a teacher preparation program and their career decisions following the completion of their program. The findings in this study confirmed two intuitive relationships, and identified one surprising relationship.

Research Questions

The research questions broke the student characteristics and experiences into five categories:

1. What is the relationship between student demographic variables and workforce entry?

Overall, the analysis found no relationship between student demographic variables and workforce entry. However, even though the block of variables was not statistically significant, there was a small finding that completers who were residents of New Mexico at the start of their teacher preparation program were more likely to stay in New Mexico and enter the teaching workforce. This finding makes logical sense, as it indicates that the completers who were established in New Mexico were more likely to want to stay in the state as they enter their careers, while those who came to New Mexico specifically to attend a teacher preparation program were more likely to leave New Mexico at the completion of the program. Additionally, this matches what prior research has found about teachers' preferences for living and working in the same communities in which they grew up (Reininger, 2012; Ronfeldt, 2012). This preference has been the basis

for a recent policy in New Mexico aimed at recruiting more teachers, specifically the Grow Your Own Teacher scholarship that supports Educational Assistants who wish to earn a teaching license in order to stay in the school and community in which they have established their lives.

2. ***What is the relationship between student variables at program entry and workforce entry?***

The analysis found no relationship between academic variables at the entrance to the program and teacher workforce entry. This is not surprising when considering that the mean differences between the groups was practically quite small, and the majority of the variables in the block were missing 50% or more of the data.

3. ***What is the relationship between student academic variables during the program and workforce entry?***

The analysis found no relationship between academic variables during the program and teacher workforce entry. However, this again is not surprising when considering that the mean differences between the groups were small, and the amount of missing data in this block was fairly high.

4. ***What is the relationship between student academic variables at program completion and workforce entry?***

The block of program completion variables was the only block to show a statistically significant difference in model fit. The primary finding in this analysis was that the completion measures, and only the completion measures, were significantly related to the outcome of whether a completer enters the teacher workforce in New Mexico. In examining the variables with the block, it is clear that this finding is primarily

driven by the measures that indicate whether a completer was able to pass all of the content and professional knowledge assessments on the first attempt. Surprisingly, it appears that completers who failed one or more assessments were more likely to enter the teaching workforce than those who passed all of their assessments on the first try.

This finding is contrary to much of the research on licensure tests. All of the prior research focused on the test scores themselves, rather than the number of attempts, but the implication may be the same. High test scores predict entering the teaching workforce directly from a teacher preparation program (Goldhaber et al., 2022). High scoring completers are more likely to be hired by the school at which they completed their field experience (Goldhaber et al., 2014), which is likely related to the preference of employers to hire completers with high test scores (Boyd et al., 2013). This research suggests that the completers who pass their assessments on their first attempt would be more likely to enter the workforce, not less likely.

However, the finding that teachers with strong test scores are more likely to change which schools they are teaching at (Boyd et al., 2011) may be related to the finding in the current study, in that completers with greater success on the assessments may have more options after completing their degrees, and so more of them choose to teach outside of New Mexico, teach outside the public school system, or pursue a career outside of teaching. Another explanation may be that those who needed to work harder in order to pass their assessments are more determined to become teachers, leading to higher rates of workforce entry. It is also possible that this relationship is due to an unknown relationship between multiple variables. For example, those who struggle on the licensure

assessments may also be more likely to come from small towns in New Mexico, which may make them more likely to stay in New Mexico and teach.

5. What is the relationship between student experience variables and workforce entry?

Overall, the analysis found that there is no relationship between academic variables at program completion and teacher workforce entry. However, within the block of variables, there was one minor significant finding: completers from the Early Childhood program were far less likely to teach in a New Mexico public school than the other programs. This finding is almost certainly an artifact of the way early childhood education is structured in New Mexico. Although recent legislation has greatly expanded the number of state-supported preschools, historically, preschools have been privately run and not a part of the public education system. Teachers with an Early Childhood Teaching License are certified to teach up through third grade, which means that some of them may end up in public elementary schools, but those that do teach the younger ages are far more likely to be teaching in private preschools. Additionally, the field of early childhood education is broader in terms of both the variety of school settings and the employment requirements to teach there. Early childhood education extends beyond a formal preschool setting into childcare centers and schools like Head Start. These other settings often require different levels of education and licensure than a public K-12 school. Early childhood is also one of the lowest paid areas of education. Together, these factors create an employment landscape that is quite different than that of the other licensure areas. Therefore, it is not surprising that so few of them are teaching in the New Mexico public education system.

Additional findings

Beyond the official research questions in this study, this study provided a new estimate of the proportion of completers who transition to working in New Mexico public schools, as well as an opportunity to learn more about the completers coming out of the UNM teacher preparation programs.

Workforce Entry Rate

One of the most notable findings in this study was that the rate of completers entering the workforce from UNM's teacher preparation programs was not as low as has been expected based on previous findings. In 2018, the New Mexico Public Education Department (New Mexico Public Education Department, 2018) found that only 62% of completers entered the New Mexico teacher workforce in the first three years, with UNM's rate of workforce entry at 55%. This study found that 73% of completers from UNM entered the workforce in the four to eight years following completion. This number is much higher than the previous estimate and is on the upper end of any of the estimates at that time. The 2018 estimate would put just over one out of two completers teaching in a classroom, while this estimate has nearly three out of four completers teaching. Additionally, if the Early Childhood program is excluded from this estimate, the number rises to 75%. Even without knowing what became of the remaining 27% of completers, this new statistic shows that a large majority of completers are actually entering the workforce and helping to fill the teaching vacancies in New Mexico.

Completer Portrait

Beyond the research questions, this study also serves to help fill in knowledge about who has completed these teacher preparation programs. A review of the

demographics shows us that the completers from UNM match some trends, like being overwhelmingly female, but not others, like being overwhelmingly White.

These trends are generally similar to the population of UNM students and college students in general. When looking at all UNM students, about 44% identify as Hispanic, similar to the 45% of completers in this study. This group of completers does have a larger percent identifying as American Indian: 9% compared to 6% overall for UNM students. There are also more completers identifying as only White: 43% compared to 33%. In the UNM student population, the lower portion of white students is compensated for with larger portions of students identifying as Asian (4% compared to 3% of completers) and non-resident students (5% compared to 0% of completers). Additionally, when comparing to national trends for teacher preparation programs, the proportion of completers identifying only as White is much lower than the national average of 64%.

These numbers are also notable compared to the population of students in New Mexico K-12 schools. The proportions of people identifying as American Indian are similar in the UNM completers and the K-12 students, 9% to 10%. The proportion of children identifying as Hispanic is much larger than the proportion of completers, however: 63% to 45%. The completer group had slightly larger proportions for Black completers than K-12 students (3% to 2%) and Asian completers to K-12 students (3% to 2%). Although the demographic composition of the completers does not yet match the demographics of the K-12 students in the state, the group is more diverse than the teaching profession has been historically. Additionally, the K-12 population in New Mexico has been growing more Hispanic and less White for the last few decades, so the proportion of people who identify as Hispanic is likely greater for those who are K-12

than those who are college-aged or older (*National Center for Education Statistics*, 1996).

The group of completers in the study is similar to the general UNM student population in their pre-program academic performance. The average high school GPA for UNM students is 3.44, a little higher than the 3.15 of the completer group. The mean ACT score for the completer group is 21.4, which slightly lower than the mean ACT score of 22 for UNM students, but higher than the national average ACT score of 19.

The average age at admission to the program was 24.5, which is higher than traditional college age. However, this number is consistent with the overall average age at UNM for undergraduate students, as UNM consistently has a large number of non-traditional age students in undergraduate programs. Additionally, these completers include both traditional students seeking a bachelor's degree and alternative students who have already earned a bachelor's degree. The average age for traditional students is slightly lower at 23.3, while the average age for alternative students is 29.88. The distribution of ages is also quite skewed, with both the traditional and alternative programs also include completers who were admitted to the program much later in life. The oldest traditional completer was admitted to the program at 67 years old, and the oldest alternative completer was admitted at 61 years old. When looking at the median instead of the mean, the overall median is 21 years old, with the median for traditional completers at 20 years old and the median for alternative completers at 27 years old.

Although almost none of the individual variables had a statistically significant relationship with workforce entry, examining the raw numbers can provide insight into possible future areas to explore. For example, a large majority (88%) of completers had

high financial need, and completers with high financial need entered the workforce at a lower rate (74%) than those with low financial need (82%). This could be an area where recent legislation increasing teacher salaries may have an impact on this trend.

It is also interesting to note where group differences were not observed. For example, the majority of the sample identified as White and/or Hispanic and both groups entered the workforce at the exact same rate. Additionally, there were only small differences in GPAs and test scores between those who entered the workforce and those who did not, and those differences do not seem to be practically meaningful.

Implications

The largest take-away from this study is that once teacher candidates have made it through the program to completion, they almost all have a similarly high probability of joining the workforce of teachers in New Mexico public schools, regardless of candidate demographics, pre-program and program academics, and experiences in the field. The few areas that suggest differences in that probability are generally encouraging. Completers who started their program as New Mexico residents are more likely to become teachers in New Mexico. This supports current efforts to recruit prospective teachers from the areas throughout the state that are in most need of teachers, increasing the likelihood that they will stay in the state and fill those needs. The finding that completers who have high financial need are less likely to become teachers is initially concerning, suggesting that they may be selecting higher paying careers. However, recent legislation that raised salaries for teachers throughout the state will likely address the needs of those completers directly, hopefully increasing their rates of workforce entry.

The differential entry rate for Early Childhood completers is likely explained by the existing system of early childhood schools in the state.

The final finding that completers who do not pass their assessments on the first attempt are more likely to teach in public schools in New Mexico is also encouraging. Even without understanding why such a relationship exists, it shows that struggling to meet these licensure requirements is not necessarily a deterrent for these completers, and that failing to pass on the first attempt does not mean that they will never meet the licensure requirements and be ineligible to enter the workforce. Recent legislation has removed these assessments from the licensure requirements, and this finding may be evidence supporting that decision.

These findings indicate that the teacher preparation programs at UNM are consistently successful at preparing completers to teach in public schools in New Mexico. These results provide support for recent efforts to recruit new teachers from within the state to get licensed and teach in their home communities, and suggest that the best way to reach these potential teachers is to offer teacher preparation to them in a way that allows them to attend school while staying in their home communities. They also suggest that the licensure assessments are generally not functioning as a gate to the profession, and students who succeeded in completing the teacher preparation program are not deterred by a struggle to pass the licensure assessments.

Looking at the broadest view of the study, the only block of variables that was a significantly better fit compared to the previous model was the block with the variables from the time of program completion. As this is the block that is temporally closest to entering the workforce, it makes sense that this would have the biggest impact on model

fit. Overall, however, none of the models were a noticeable improvement over the null model with no independent variables.

The many findings of no relationship in this study have several possible explanations. The first is that UNM's teacher preparation programs are adequately preparing and supporting all teacher candidates so that by the time they have completed the program, their next steps into the workforce are generally unconnected to the demographic and academic data that is collected by the university. The study had a large sample that should have had appropriate power to find an effect if it was there, so it is possible that there is no effect to find. Given that employment requires a mutually agreed upon match between the job seeker and the employer, there are numerous factors that may impact where a completer ends up that cannot be seen or measured by a teacher preparation program. Completers may have chosen not to teach in New Mexico public schools due to personal reasons, economic factors, family influences, or other unknown variables, all of which would be outside the realm of university data. Employers may hire based on prior relationships, recommendations, or personal bias, all of which would unknown to the teacher preparation program.

Another explanation is that these factors included in the study are important for understanding how teacher candidates enter the teacher workforce, but that the effects are not visible when only examining those who have successfully completed a teacher preparation program. Only half of students who declare a teacher preparation major as college freshmen successfully complete that degree within six years (UNM Office of Institutional Analytics, 2022). The remaining 50% of students may have dropped out, changed majors, changed universities, or are still persisting in the degree, and those

decisions may be influenced by these variables in the study in a way that cannot be seen here.

If many of the completers who do not enter the teaching workforce in New Mexico are simply entering the teaching workforce outside of New Mexico, the two groups may be similar enough that the important outcome to examine would be staying in New Mexico, not entering the workforce, which may again be related to variables outside the purview of a teacher preparation program.

Additionally, this study calculated a new estimate of workforce entry that leaves a much smaller portion of completers unaccounted for. Given that the study only accounts for teachers working in public schools in New Mexico, it is possible that a significant portion of the remaining 27% of completers have entered the workforce by teaching in another type of schools. The majority of the schools in the state of New Mexico are public schools, but 15% of the schools are either private schools or Bureau of Indian Education schools. Private and BIE schools do tend to be smaller than public schools, so they account for about 7% of the teachers in New Mexico (*National Center for Education Statistics*, 1996). Assuming that the even a small portion of the completers who did not go to work in a NM PED school are teaching in other school systems, then the proportion of completers who did not enter the workforce is even smaller. Unfortunately, this does mean that the subset of completers who are counted as not entering the workforce is likely to be quite muddy, as is it a combination of completers who did not enter the workforce for any number of reasons (personal, economic, academic, etc.) and those who did actually enter the workforce but did so outside of the scope of our measurement. This

may have contributed to the inability to find much relationship between the collected measures and the outcome.

Overall, the power analysis indicates that the majority of the variables had sufficient power to identify even a small effect if it had been present in the data. Interestingly, the one block of variables that was statistically significant had quite low power in three out of four variables, with the one variable with sufficient power, Time to Degree, having a power value of 1.00 and the other three with values of .3 and .2. The block of variables that was of most interest in this study, the experience variables, was quite underpowered with only two of the field experience variables having sufficient power. The remaining variables, including the program variables, all had quite low power. This indicates that there may still be an effect of program or experience on teacher workforce entry, but this study did not have sufficient power to find it.

Given that the study in general appears to have been sufficiently powered to find a small effect, it seems likely that overall conclusion that there are minimal relationships between completer variables and teaching in New Mexico public schools is the correct conclusion. It is possible that this study was unable to detect some relationships that were smaller than the effect size. However, effects smaller than those calculated here are unlikely to be practically meaningful in the work to understand who does and does not teach in New Mexico.

On the other hand, it is possible that there are in fact relationships between these variables and workforce entry, but that the data involved in this study was too problematic to find those relationships among the noise. Although the dataset was large with over a thousand completers, there was a large amount of data missing that was

highly influential on the variance of the variables, and several of the variables were inconsistent over time, between programs, or possibly too subjective to be valid and/or reliable. It may be that the same study conducted with higher quality data may result in stronger statistical relationships between the variables.

Strengths and Limitations

One strength of this study is that it investigates an under-researched area of the teacher pipeline, the transition from teacher preparation program to the teaching workforce. Although this particular study had minimal findings, it was an initial step toward understanding who does and does not transition from completing a teacher preparation program to teaching in a New Mexico public school. Additionally, none of the prior research in this area focused on the state of New Mexico, which is suffering from a larger teacher shortage than many other states, and has unique demographics and concerns. Another strength is that the study helps to provide a portrait of the population of completers from UNM. This portrait provides insight into both the students in the programs and the new teachers coming out of the programs to potentially enter the workforce. Even the missing data adds information about both areas where student data is limited at the institution, and where assessment data has been incomplete.

There are also several limitations to this study. The greatest limitation is that the quality of the data included turned out to be much lower than expected. Approximately 20% of the data was missing overall, with some variables missing more than half of their values. The vast majority of the variables included in the analysis were heavily impacted by the missing data, with high Fraction of Missing Information values found for almost all of the variables beyond the demographics block, indicating that most of the total

variance for these variables was due to the variation in imputed values between the imputed datasets. Even beyond the missing data, there were data quality issues. Some variables were based on data that changed from year to year and program to program, and depended on the subjectivity of the assessor. Other variables come from measures that changed over time and have become irrelevant to teacher preparation.

Even with high quality data, there are other limitations to this study. In particular, the time frame analyzed is no longer relatable to the current circumstances of teacher preparation in New Mexico. The years evaluated were selected specifically because they both allowed enough time to see whether teachers entered the workforce, and contained only cohorts who would have been able to complete their teacher preparation and enter the workforce before the start of the COVID-19 pandemic. Unfortunately, this means that since these cohorts left their programs, significant changes have occurred to the teaching landscape. The COVID-19 pandemic caused numerous changes to the job of teaching, which likely changed perceptions of both hiring and entering the workforce. The post-pandemic world that is emerging is changing yet again, such that past perceptions and preferences may not apply as employment decisions are being made. Additionally, the policies of the state government have shifted significantly in recent years, leading to a more supportive environment for teachers including significant increases in teacher pay. These changes have likely affected the population of students choosing to enter a teacher preparation program as well as the decisions of those who have completed one. All of these recent changes make it difficult to generalize any findings to current cohorts.

One final limitation is that the one significant finding of this study finds that the content and professional knowledge tests are related to workforce entry. The state of New

Mexico has changed licensure requirements to no longer mandate passing either content or professional knowledge assessments. This means that we will not be able to follow up on the relationship between these assessments and workforce entry with future cohorts.

Future directions

Although this study is limited in its findings and generalizability, it does serve as a preliminary step toward learning more about the role a teacher preparation program plays in teacher workforce entry. The findings of this study do provide a useful baseline to compare to when conducting future studies. Moving forward, there are several directions the research could take. With more resources, efforts could be made to track down the completers who are not working for public schools in New Mexico to determine if those who did not enter that particular workforce are perhaps still working as teachers but in private schools, reservation schools, or in other states. In a year or two, a replication of the same study using recent cohorts would likely involve cleaner data, and would be more relevant to the current state of teacher preparation and the teacher pipeline in New Mexico. Similarly, a study of cohorts who completed their program and entered the workforce before, during, and after the pandemic could provide some interesting insights into exactly how the changes to the education landscape during that time period have affected workforce entry.

Based on the specific finding in this analysis that New Mexico residents are more likely to enter the workforce, it may be informative to look more closely at the communities that completers are teaching in and how close they are to the communities that they came from and student taught in. The finding about attempts to pass the content and professional knowledge tests will be difficult to follow up on when the tests are no

longer in statute. However, the finding suggests that a closer analysis of these assessments, the attempts required to pass them, and the workforce outcomes of those completers could be illuminative.

Finally, given the higher than expected rate of workforce entry, it could be interesting to look at time line of workforce entry, and whether completers enter the workforce immediately after completion or if they tend to wait. Other pertinent questions would be whether those who entered the workforce are retained in the workforce, and whether those who enter the workforce are helping to fill the teacher shortage in the areas of high need.

Conclusion

The purpose of this study was to look into the teacher shortage from the perspective of an understudied point in the teacher pipeline: when completers have completed a teacher preparation program and enter the teaching workforce. This study found that the data collected about completers while they are in their teacher preparation program overall does not relate to whether or not they enter the teaching workforce. However, it also found that the overall rate of teacher workforce entry is higher than previously measured, which is encouraging for the teacher pipeline. Future research can look into the specifics of when, where, and how they do enter the pipeline, as well as looking into what happens to the completers who do not.

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