

CAVEAT

RE: The following information is from Alisa Chapman, PhD, UNC-GA

UNC teacher quality research analysis found supplemental masters' degrees have the following effects (2010 portals analysis):

- (p. 49) High School Mathematics: Positive significant effect of 10.3% of a standard deviation
- (p. 51) High School English 1: Positive significant effect 3.2% of a standard deviation

The educational effect for high school mathematics and English in this analysis is fairly large. The size of the effect is roughly the difference in a brand new teacher versus a 5th year teacher. Several positive effects of supplemental masters' degrees are identified in this analysis are positive but not significant.

The mathematics effect that was found in the UNC system report is similar to what Dan Goldhaber & Dominic Brewer reported in their national study of 10th grade teachers and students in a national sample.

Also, the 2011 results of National Assessment of Educational Progress found that students who performed higher on mathematics and reading had teachers with master's degrees. The NAEP randomly selects students from NC to participate in the assesement/

While 2006 and 2007 research completed by Clotfelter, Ladd, and Vigdor finds no positive impacts of NC teachers with master's degrees, please note that they only correlate math and reading scores in grades 3, 4, and 5 with undifferentiated math degrees.

Portal Report:

Teacher Preparation and Student Test Scores
in
North Carolina

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THE UNIVERSITY
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Portal Report:
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by

Gary T. Henry, UNC–Chapel Hill

Charles L. Thompson, East Carolina University

Kevin C. Bastian, UNC–Chapel Hill

C. Kevin Fortner, UNC–Chapel Hill

David C. Kershaw, UNC–Chapel Hill

Kelly M. Purtell, UNC–Chapel Hill

Rebecca A. Zulli, UNC–Chapel Hill

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Table of Contents

Executive Summary	i
Introduction	1
Portal Assignments	4
Study Data and Methods	7
Findings	9
<i>UNC Trained Teachers</i>	9
<i>Out of State Undergraduate Prepared Teachers</i>	11
<i>Teach For America</i>	11
<i>Teaching Fellows</i>	11
<i>Other Teacher Influences on Student Achievement</i>	13
Conclusion	14

Figures:

Figure 1: Distribution of Teachers by Portal, 2008	2
Figure 2: All North Carolina Public School Teachers	3
Figure 3: Recently Hired Teachers in North Carolina Classrooms	4

Tables:

Table 1: Portal Definitions	5
Table 2: Portal Assignment Data Sources	7
Table 3: High School: UNC Undergraduate Prepared Teachers' Effects on Test Score Gains vs. Teachers from Other Portals	9
Table 4: Middle School: UNC Undergraduate Prepared Teachers' Effects on Test Score Gains vs. Teachers from Other Portals	10
Table 5: Elementary School: UNC Undergraduate Prepared Teachers' Effects on Test Score Gains vs. Teachers from Other Portals, Elementary School	10
Table 6: Effects of Teach For America Corps Members	11
Table 7: Effects of Teaching Fellows and Other Scholarships	13
Table 8: Effects of Other Teacher Characteristics	14

Appendix:

Data, Methods, and Results	A.1
<i>Data Sources and Data Construction</i>	A.1
<i>Matching Procedures</i>	A.3
<i>Observations</i>	A.4
<i>Outcome Variables</i>	A.5
<i>Control Variables</i>	A.6
<i>Estimation Methods</i>	A.8

Appendix Tables:

Table A.1: Test Score, Student, and Teacher Counts for Analysis Data Set	A.5
Table A.2: Control Variables Used in the Impact Models	A.6
Table A.3: Elementary Portals – Math	A.9
Table A.4: Elementary Portals – Reading	A.11
Table A.5: Middle School Portals – Math	A.13
Table A.6: Middle School Portals – Reading	A.15
Table A.7: Middle School Portals – Algebra I	A.17
Table A.8: Middle School Portals – Science	A.19
Table A.9: High School Portals – Overall	A.21
Table A.10: High School Portals – Math	A.23
Table A.11: High School Portals – English I	A.25
Table A.12: High School Portals – Science	A.27
Table A.13: High School Portals – Social Studies	A.29
Table A.14: Elementary Portals Counts: Total Effects	A.31
Table A.15: Middle School Portals Counts: Total Effects	A.31
Table A.16: High School Portals Counts: Total Effects	A.32
Table A.17: Portal Decision Rules	A.33

Executive Summary

In the past two decades, teacher shortages, dissatisfaction with the achievement of U.S. students compared to their peers in other countries, and persistent inequalities in educational outcomes have led to considerable diversification in the ways that teachers are prepared to enter classrooms. Traditionally, most teachers have been prepared through four year college or university programs that combine courses in the subject matter to be taught, how to teach, how students learn, and “foundations” of education along with practice teaching in a K-12 school. Now there are numerous routes that still include an undergraduate degree, but sometimes defer preparation on curriculum, instruction, learning, and other aspects of education until after a teacher begins teaching. North Carolina has been actively engaged in adapting teacher certification requirements to fill the demand for teachers and improve the diversity and performance of the teacher workforce in the state. With the wide array of ways that individuals enter teaching, we ask and answer the following question: Are some methods of preparing teachers more effective than others in terms of their students’ test score gains?

In this study, we focus on 12 “portals,” or entryways into teaching in North Carolina public schools. The twelve represent different combinations of formal education and other preparation to teach. For teachers who are fully certified to teach prior to entering the classroom, we group teachers by the type of provider from which they received their highest degree: University of North Carolina institutions, a North Carolina private college or university, or an out of state college or university, and by the type of their highest degree: undergraduate or graduate. Teachers who entered through these six portals supplied about 77 percent of the North Carolina teacher workforce in 2007-08. In addition to these sources, there are several alternative routes of entry, including Teach For America, the Visiting International Faculty Program, and other lateral entry programs. These alternative entry teachers accounted for approximately 16 percent of NC teachers in 2007-08. In addition, we have identified slightly more than 1 percent of NC teachers who completed the education coursework and practice teaching required for initial licensure after earning an undergraduate degree but before beginning to teach. These “licensure only” programs of study are offered at both UNC and non-UNC institutions.

This study benchmarks the performance of teachers from undergraduate preparation programs at fifteen UNC institutions against the performance of teachers who entered through the 11 other portals of entry into North Carolina public schools. The study was commissioned by leaders of the UNC system to assess the contribution of the public institutions to student performance in the state’s K-12 system. The UNC undergraduate portal is the dominant traditional source of teachers in NC, supplying 32 percent of the teacher workforce. We compare the performance of UNC traditional undergraduate programs to the 11 other portals in terms of the amount of value added to student test scores on two elementary grades assessments (reading and mathematics), four middle grades assessments (reading, mathematics, Algebra I, and science), and four sets of

high school assessments (English I, mathematics, science, and social studies) as well as high school assessments overall. Overall a total of 11 comparisons are analyzed.

Overall, we find that UNC undergraduate prepared teachers, who constitute nearly 1/3 of the North Carolina teacher workforce, perform near the middle of the pack, better in 14 comparisons, worse in 9, and similarly to teachers from other portals in 74 comparisons. On balance, teachers from private colleges and universities in North Carolina perform similarly to UNC prepared undergraduates. Teachers prepared as undergraduates in NC private institutions lag their UNC counterparts in high school mathematics but private prepared graduate degree holders outperform them in three, in high school science by a wide margin. UNC graduate prepared teachers perform neither better nor worse than their undergraduate counterparts.

The major divide in teacher quality is not between teachers from public versus private NC institutions, but between UNC prepared undergraduates on the one hand and teachers from out of state and lateral entry teachers on the other. Undergraduate prepared teachers from out of state, who comprise nearly 1/4 of the North Carolina teacher workforce, perform worse than UNC undergraduate prepared teachers in 5 out of 11 comparisons. In particular, they are less effective in elementary school reading and mathematics, where they are the *largest source* of teachers with less than five years of experience in North Carolina. Lateral entry teachers, who comprise 15 percent of the NC teacher workforce, perform worse in high school, where these teachers are highly concentrated, including social studies, mathematics, and on average, across all high school subjects.

In contrast to these portals whose performance lags UNC prepared teachers, Teach For America corps members outperform them 5 of the 9 times they can be reliably compared. Teach For America teachers are chosen competitively from applicants graduating from top colleges and universities, provided with intensive training during the summer before entering the classroom, and supported through ongoing professional development during their two years in the program. Teach For America corps members make up a scant 0.3 percent of the North Carolina teacher workforce.

Another carefully selected group of teachers, North Carolina Teaching Fellows receive scholarships to a dozen UNC and two private universities. Teaching Fellows perform better in 3 and worse in 1 out of 11 comparisons with other UNC undergraduate prepared teachers. On balance, they outperform their UNC prepared peers, but by a substantially smaller margin than do Teach For America teachers.

The final and in some ways most important finding of this study is that first year teachers perform worse than those with four years of experience in 10 out of 11 comparisons, and in their second year as teachers perform worse in 6 out of 11 comparisons. To provide perspective, we estimated that elementary students taught math by a first year teacher lose the equivalent of 21

days of schooling when compared to similar students taught by teachers with four years of experience.

In summary, taking all comparisons into account, UNC undergraduate prepared teachers perform near the middle of the pack but slightly better than teachers from several other sources.

Undergraduate prepared teachers from out of state lag their UNC prepared counterparts in elementary reading and mathematics, the very grade levels and subjects where they are most heavily concentrated. Lateral entry teachers similarly underperform UNC undergraduate prepared teachers where they are most heavily concentrated – in high schools.

In contrast, Teach For America teachers outperform UNC undergraduate prepared teachers, in some cases by wide margins. But Teach For America is a very small program, contributing only three tenths of one percent of all North Carolina public school teachers. Even if it were ten times as large as it is now, Teach For America would supply only 3% of NC teachers. Although scaling up the program while maintaining its present quality standards would help improve overall North Carolina public school performance marginally, importing some key features of TFA into UNC teacher preparation programs might well have a larger total impact. Other teacher preparation programs might best regard Teach For America as a small, instructive natural experiment from which they have much to learn rather than as a threat to their share of the teacher preparation market. In particular, the strong professional development and support TFA offers its members during their two-year term of service might inform their efforts to improve the performance of teachers early in their careers, a period of serious weakness for teachers from all sources.

In the main body of this report, we explain why research on the effectiveness of the teacher workforce in North Carolina is so important to revitalizing the state's progress in student achievement, which has lagged in recent years. We describe the portals through which individuals enter teaching and how we categorized the 190,692 credentialed teachers employed in North Carolina public schools between 2000-01 and 2007-08. In Section III, we describe how we obtained and organized 1.6 million test scores as well as the methods used for the analysis. Section IV lays out our findings in greater detail. Finally, in Section V, we summarize the study findings and suggest some principles to guide evidence-based innovation in preparing teachers for the state's public schools.

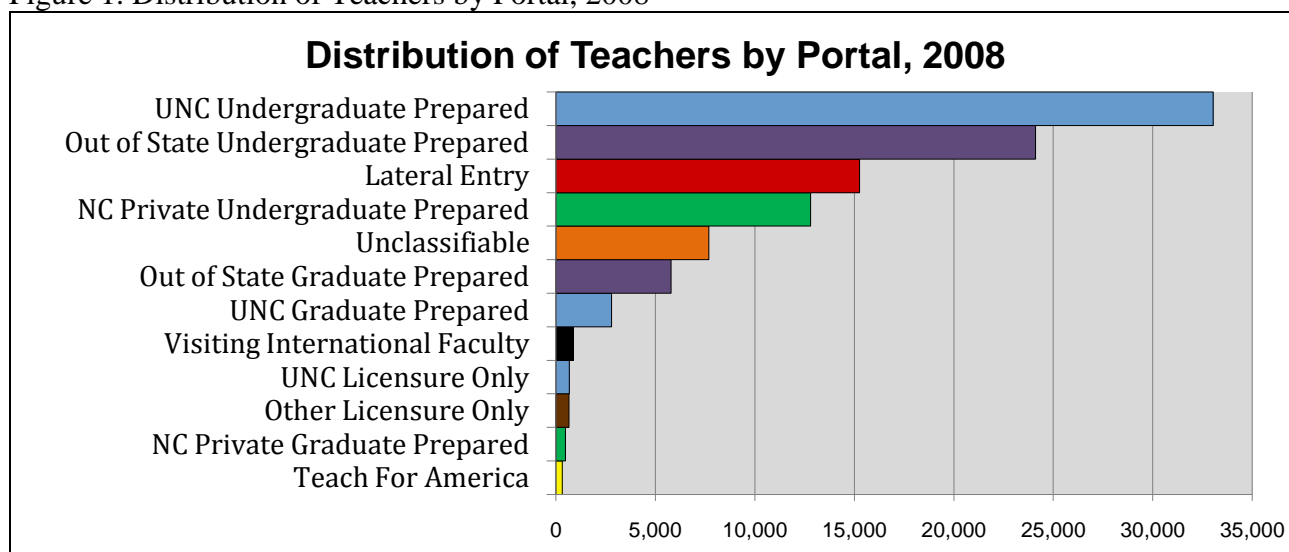
Introduction

The purpose of this study was to compare the relative effectiveness of teachers who entered North Carolina public schools through a dozen different routes or “portals,” as indexed by their students’ test score gains. Through these comparisons, we sought to “benchmark” the contributions of the UNC system’s undergraduate teacher preparation programs against those of other types of preparation. The recent proliferation of portals through which teachers enter the profession and the objective of strengthening the University’s contribution to K-12 student learning led to the question: Are teachers from some sources more effective than others? And more specifically, are UNC institutions preparing effective teachers compared to the other sources of teachers?

Questions of the *effectiveness* of teachers who enter NC classrooms through a given portal cannot be entirely separated from the *number* of teachers who enter through that portal. Portals through which large numbers of teachers enter NC classrooms can have a larger positive or negative impact on K-12 education performance than portals that prepare few teachers. State education policy makers may wish to scale up portals that contribute especially effective teachers and/or to encourage other programs to identify, pilot adoption, and evaluate the features which account for those portals’ success. By the same token, policy makers and educators making hiring decisions may wish to reduce reliance on sources whose teachers perform less well, or where feasible, to call for improvement in preparation programs that supply teachers through those portals.

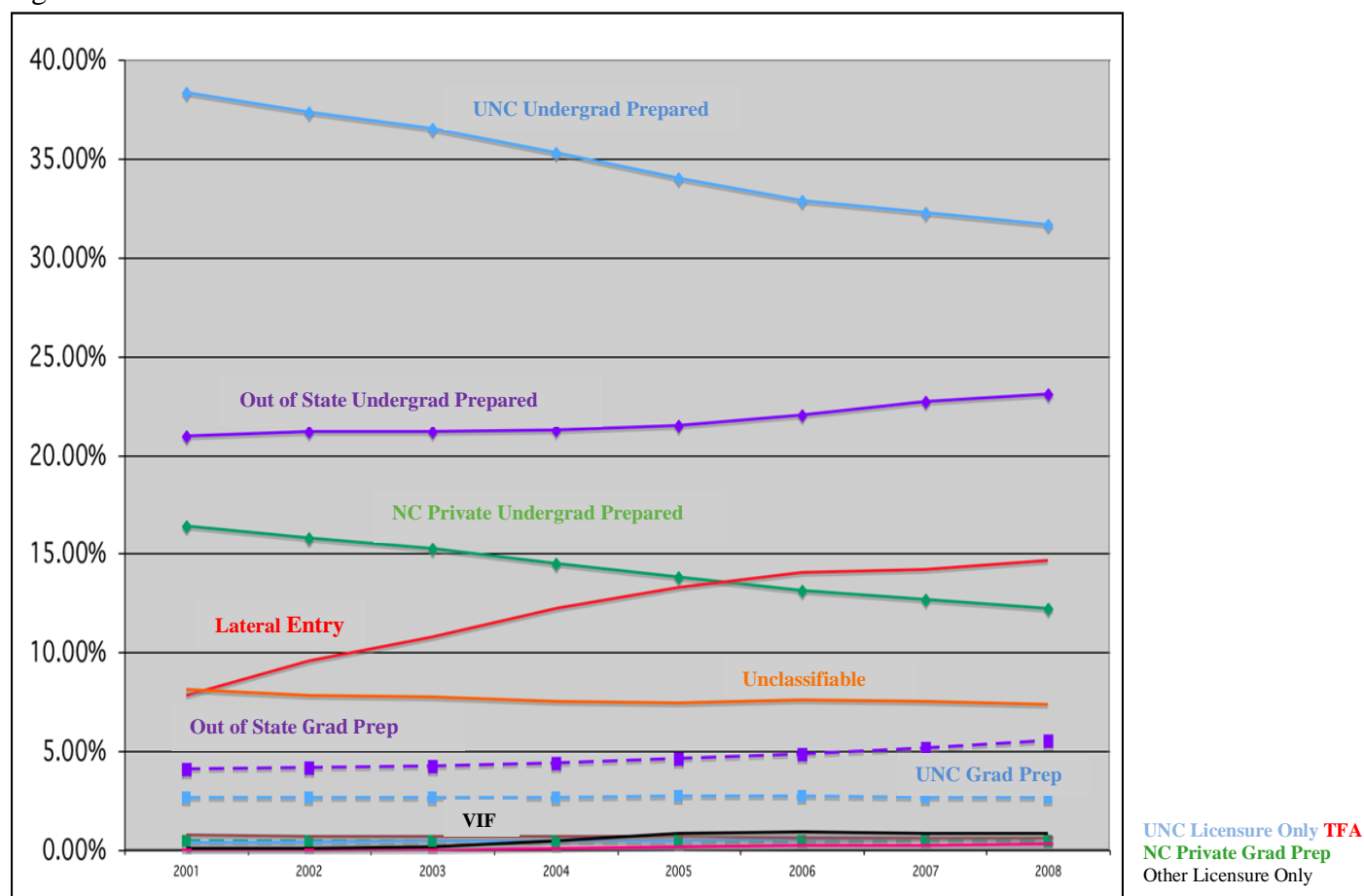
In Figure 1, we display the number of North Carolina teachers employed in 2007-08 that came through each of the 12 portals. In total, the UNC system supplied approximately 36,494 teachers, including those prepared through UNC undergraduate prepared (32%), UNC graduate prepared (3%), and UNC licensure only programs (0.6%). North Carolina private colleges and universities have supplied over 13,000 teachers, or about 13 percent of the workforce. Perhaps surprisingly, nearly 30,000 North Carolina teachers were prepared in another state, with 23 percent of the workforce coming from out of state with undergraduate degrees and going directly into NC classrooms. Over 16,000 teachers – more than 16 percent of the workforce – had originally begun teaching before completely meeting the state’s requirements for teacher licensure. For 7,685 teachers, data fields critical for assignment into a portal was either missing or invalid rendering them unclassifiable into one of our 11 substantive portals.

Figure 1. Distribution of Teachers by Portal, 2008



Examining the trends in how teachers were prepared in North Carolina since the turn of the 21st century is instructive. In Figure 2, which displays the portals through which NC teachers entered by year, we can see that the percentage of UNC undergraduate prepared teachers has declined significantly. The percentage of undergraduate prepared teachers from North Carolina private institutions has declined during the period as well. The percentages of teachers prepared out of state as undergraduates and lateral entry teachers increased during the period.

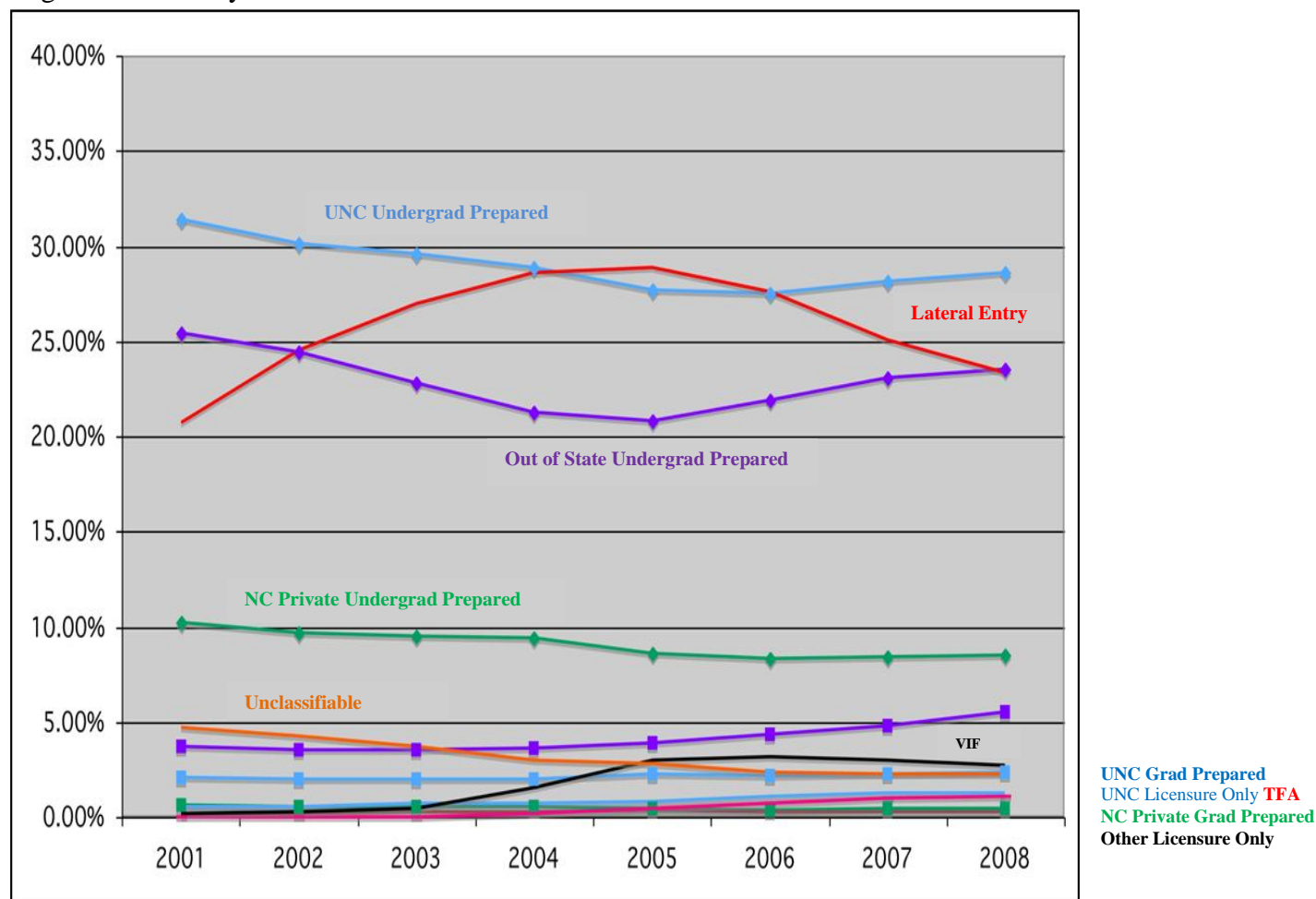
Figure 2. All North Carolina Public School Teachers



In Figure 3, we narrow our focus to teachers with less than five years of experience. This gives us an idea about how teachers who entered the classroom more recently have been prepared. In addition, we focused the performance comparisons exclusively on these teachers because the impact of teacher preparation relative to other factors (such as professional development and on-the-job learning) is probably greatest during these early years. Other research on teacher pathways has concentrated on teachers in their first two or three years on the job, but we expanded the focus to five years in order to assess the relative performance of each portal after the teachers had a few years to develop their skills. Figure 3 indicates that the percentages of recently hired UNC undergraduate prepared teachers and teachers from out of state were declining during the early years of the decade but have been increasing for the past four years. In the case of the UNC undergraduate prepared teachers, this is likely due to the higher productivity goals that were established for UNC teacher preparation programs in recent years. The distinct trend in lateral entry teachers (excluding Teach For America corps members and Visiting International Faculty) is also quite striking. The share of relatively new lateral entry teachers increased in the first part of the decade from approximately 21 percent to 29 percent of the workforce but subsequently declined to about 23 percent in 2007-08. The decline may reflect

either a reduction in the number of people from other walks of life who became interested in teaching careers, a NC schools' and districts' preference for teachers from other portals, or both.

Figure 3. Recently Hired Teachers in North Carolina Classrooms



In the next section, we detail how we assigned North Carolina teachers to these portals.

Portal Assignment

In previous research we compared the impact of teacher preparation at University of North Carolina (UNC) system institutions to one combined category of all other sources of teachers in North Carolina (Henry, Thompson, Fortner, Zulli, & Kershaw, 2010). This allowed us to broadly evaluate the effectiveness of UNC teacher preparation programs, but not to assess how teachers from other specific sources were performing. To facilitate this examination, we went into greater detail for this report by classifying public school teachers in North Carolina into one of twelve categories, which we refer to as portals. Assignments to portals are based on the last degree, set of courses, or other preparation that a person acquired before entering the teaching

profession. As distinguished from a pathway or route that continues to unfold after an individual begins teaching, a portal is an unchanging characteristic that captures the qualifications of individuals on the day they first entered the classroom. For example, teachers who entered through the lateral entry portal can later be reclassified as fully certified when they complete all their requirements for certification. For the purpose of our study, these individuals retained their classification as lateral entry since that is the portal through which they entered teaching. Through analyses based on this fixed trait we were able to better understand the relationship between particular types of teacher preparation and their students' achievement.

Four fundamental questions structured our portal classification scheme. First, was the teacher fully qualified – that is, had she met all requirements for initial or continuing licensure when she entered the classroom? Second, if so, was the individual's qualification based on a set of education-related courses taken after earning an undergraduate degree ("licensure only") or upon earning an education degree which itself constituted the basis for licensure? Third, if a degree, what type – undergraduate or graduate – did the individual hold when entering a NC classroom? And finally, if fully qualified and degree-holding, from what type of institution: UNC, NC private college or university, or out of state – did the person earn the degree? With these questions as a guide, we created twelve different, mutually exclusive portal categories that pinpointed how a person entered the teaching profession. A full listing of our twelve portal categories, where the first six represent traditional teacher preparation and the next five alternative certification, were as follows: UNC Undergraduate Prepared, UNC Graduate Prepared, North Carolina Private Undergraduate Prepared, North Carolina Private Graduate Prepared, Out of State Undergraduate Prepared, Out of State Graduate Prepared, UNC Licensure Only, Other Licensure Only, Teach For America, Visiting International Faculty, Lateral Entry, and unclassifiable. (See Table 1 for definitions of each portal).

Table 1. Portal Definitions

Teacher Portal	Definition
1. UNC Undergraduate Prepared	A North Carolina public school teacher who completed the requirements for initial licensure at a UNC institution by earning (a) a Bachelor's degree in education or (b) a Bachelor's degree in another major while simultaneously completing the necessary education-related coursework, before beginning teaching, including Teaching Fellows.
2. UNC Graduate Prepared	A North Carolina public school teacher who earned a graduate degree from a UNC system institution and qualified for an initial license before beginning teaching, including Teaching Fellows.
3. NC Private Undergraduate Prepared	A North Carolina public school teacher who completed the requirements for initial licensure at a private (independent) institution in North Carolina by earning (a) a Bachelor's degree in education or (b) a Bachelor's degree in another major while simultaneously completing the necessary education-related coursework, before beginning teaching, including Teaching Fellows.

Table 1. Portal Definitions continued

Teacher Portal	Definition
4. NC Private Graduate Prepared	A North Carolina public school teacher who earned a graduate degree from a private (independent) North Carolina institution and qualified for an initial license before beginning teaching.
5. Out of State Undergraduate Prepared	A North Carolina public school teacher who completed the requirements for initial licensure at an out of state institution by earning a Bachelor's degree before beginning teaching.
6. Out of State Graduate Prepared	A North Carolina public school teacher who earned a graduate degree from an out of state university and qualified for an initial license before beginning teaching.
7. UNC Licensure Only	A North Carolina public school teacher who, after earning a Bachelor's degree at any public or private institution in any state, then separately completed the education-related requirements for teacher licensure at a UNC system institution, before beginning teaching.
8. Other Licensure Only	A North Carolina public school teacher who, after earning a Bachelor's degree at any public or private institution in any state, then separately completed the education-related requirements for initial teacher licensure at a non-UNC system institution, before beginning teaching.
9. Teach For America	A North Carolina public school teacher who began teaching in NC after earning a Bachelor's degree but before completing the remaining requirements for initial licensure and did so through the Teach For America program.
10. Visiting International Faculty	A North Carolina public school teacher who entered teaching in NC through the Visiting International Faculty program.
11. Lateral Entry	A North Carolina public school teacher who entered the profession prior to completing requirements for initial licensure (Teach For America corps members excluded).
12. Unclassifiable	A North Carolina public school teacher who cannot be classified into one of the portals above on the basis of available evidence.

In order to categorize North Carolina public school teachers into one of the portals listed above, we relied on administrative datasets from three sources (See Table 2). First, institutional data from the University of North Carolina General Administration identified UNC prepared teachers at the undergraduate, graduate, and licensure only level. Second, Teach For America provided us a dataset of their corps members in North Carolina. And third, we utilized the teacher education, licensure audit, and certified salary files from the North Carolina Department of Public Instruction (NCDPI). From these datasets we employed several key pieces of information to classify individuals into portals. First, we calculated the year an individual began teaching from the NCDPI certified salary file. Second, using the NCDPI licensure audit file, we identified the basis for a teacher's original teaching license, which established whether they were fully qualified when they started teaching. And last, using either the UNC graduated student data files or the NCDPI teacher education file, we determined an individual's graduation year, degree type (undergraduate or graduate), and degree origin (UNC constituent institution, North Carolina private university, or an out of state institution). If an individual earned multiple degrees prior to entering the classroom, we categorized her according to the one most proximate to beginning

teaching. Putting all these variables together, we categorized North Carolina public school teachers into a portal. Several examples will illustrate this process.

- 1) If an individual completed an undergraduate degree in a teacher education program at a UNC institution, and then entered the teaching profession without any further degrees or training, we placed them into the first portal, UNC undergraduate prepared.
- 2) If a person earned an undergraduate degree at a North Carolina private university, but then completed a graduate degree at an out of state institution and was fully qualified prior to beginning teaching, we placed her into the sixth portal, out of state graduate prepared.
- 3) If a person had a basis for her original teaching license indicating she was not fully certified when first entering the classroom and was not included on the lists of Teach For America corps members or Visiting International Faculty (VIF), we placed her into our eleventh portal, lateral entry.

Table 2. Portal Assignment Data Sources

Data Source
1. UNC General Administration Undergraduate Degree File
2. UNC General Administration Graduate Degree File
3. UNC General Administration Licensure Track Completers File
4. NCDPI Licensure Audit File
5. NCDPI Teacher Education File
6. NCDPI Certified Salary File
7. Teach For America North Carolina Corps Members File

Finally, we placed individuals into the unclassifiable portal in three situations: 1) they did not have a college graduation year in the datasets, 2) their highest degree earned prior to entering teaching was less than a Bachelor's degree, or 3) administrative data recorded the person teaching more than one year prior to her graduation year. Fortunately, few of these teachers were part of the analysis sample, due to their greater years of experience or assignment to non-tested subjects. For a more complete description of the portal decision rules, see Table A.17 in the Appendix to this report.

Study Data and Methods

The primary purpose of this study was to estimate the effect of the preparation that teachers received prior to beginning teaching on their students' test scores. In addition to the data used to classify each teacher into her portal, as described above, data on students, teachers, and schools for the four year period, 2004-05 through 2007-08, were assembled for this study. We linked students and teachers using actual class rosters, which allowed us to match students to approximately 93% of individual instructors over the four-year period. Also, we matched students' test scores to their prior test scores, which allows us to estimate the additional learning

or “value added” during each of the academic years being studied. Finally, numerous other student, teacher, and school characteristics were merged into these files and used in the analysis to adjust for factors other than the portal preparation that may affect student achievement.

The dataset was limited to teachers with five years of experience or less in each year, which resulted in a dataset with 1.6 million test scores, over 900,000 students, and nearly 20,000 teachers, which is broken out in greater detail in Appendix, Table A.1.

For all of the analyses, students’ test scores were used as the outcome variables, including End-of-Grade (EOG) test scores in reading and mathematics for 2005-06 to 2007-08 for elementary grades (3-5); EOG test score outcomes in reading and mathematics and End-of-Course (EOC) Algebra I test scores for 2004-05 to 2007-08 and 8th grade science test scores for 2007-08 for middle school grades (6-8); and all ten EOC tested subjects (English I, Algebra I, Algebra II, Geometry, Biology, Chemistry, Physical Science, Physics, US History, and Civics & Economics) for 2004-05 to 2007-08 when available for high school grades (9-12). In total, the performance of teachers in each other portal is compared to teachers prepared in the UNC undergraduate portal on 11 types of test scores, making 121 possible comparisons. However, when any portal had 10 or fewer teachers who taught students taking a particular test, the most frequent of which was 8th grade science, the effect estimates were not considered reliable and were therefore not reported.

For this study, we chose models that allowed us to isolate the effect of the teacher entry portals on student achievement by controlling for the influence of several student, classroom, teacher, and school variables. We explain why multi-level value-added models were selected with a rich set of covariates over other types of models in the Appendix. The effects of each portal compared to UNC undergraduate prepared teachers were estimated using the SAS Proc Mixed software program. All models are value-added year-to-year models in that prior year test scores for each individual student along with numerous variables adjust or control for differences in students, classrooms, teacher’s experience and out-of-field assignments, and schools are included in the models. In total, 29 variables were used as covariates, including variables that indicate whether a student changed schools between or within the school year. In the Appendix, Table A.2 provides a list of the specific control variables included for models utilized in the analysis of portal impacts. In models that were implemented to assess the impacts of NC Teaching Fellows and additional credentials received by the teacher after beginning teaching, we include whether the teacher was in the NC Teaching Fellows program and whether she received a graduate degree or National Board Certification after beginning teaching, and her Praxis II scores average, respectively.

The average difference in each portal for each type of test, presented in the next section, compares the average increase in test scores of students taught by teachers from one of 11 portals to the average increase in test scores of the reference group, UNC undergraduate prepared teachers. The Appendix describes the study data and methods more completely.

Findings

UNC Trained Teachers. The primary focus of this report was to assess how UNC undergraduate prepared teachers performed compared to teachers who entered the classroom through each of the other 11 portals. Overall, we found that UNC undergraduate prepared teachers perform at the “middle of the pack.” Of the 97 comparisons made, students taught by these teachers performed better in 14 comparisons, worse in 9, and not significantly different in 74 comparisons. As shown in Table 3, undergraduate prepared teachers consistently performed better than teachers from three other portals in high school overall, five other portals in mathematics, and three other portals in social studies. In high school overall as well as in English I and science, UNC undergraduate prepared teachers performed worse than teachers from Teach For America and NC Private Graduate Prepared. Out of state undergraduate prepared teachers, lateral entry teachers, and VIF teachers do worse than UNC undergraduates in high school overall, mathematics, and in the case of the first two, in social studies as well.

Table 3. High School: UNC Undergraduate Prepared Teachers’ Effects on Test Score Gains vs. Teachers from Other Portals

Teacher Portals	Overall	Math	English I	Science	Social Studies
UNC Graduate Prepared	--	--	--	--	--
NC Private Undergrad Prepared	--	Worse	--	--	--
NC Private Graduate Prepared	Better	--	Better	Better	--
Out of State Undergrad Prepared	Worse	Worse	--	--	Worse
Out of State Graduate Prepared	--	--	--	--	Worse
UNC Licensure Only	--	NR	--	--	--
Other Licensure Only	--	NR	NR	NR	NR
Teach For America	Better	Better	Better	Better	--
Visiting International Faculty	Worse	Worse	--	--	NR
Lateral Entry	Worse	Worse	--	--	Worse
Unclassifiable	--	Worse	--	--	--

NR = Not reported because fewer than 10 teachers from the portal found in this cell; -- lines indicate that the portal was neither better nor worse than UNC undergraduate portal.

As shown in Table 4 (on the next page), for the middle school grades (6-8) UNC undergraduate prepared teachers were significantly different than the other portals twice. Teach For America corps members outperformed UNC undergraduates in middle school mathematics. UNC licensure only teachers were outperformed by UNC undergraduate prepared teachers in middle school mathematics. Clearly, the different portals are more similar in terms of effectiveness in teaching middle school than demonstrated in high school, which may have to do with the fact that test score increases decline dramatically in grades 6-8.

Table 4. Middle School: UNC Undergraduate Prepared Teachers' Effects on Test Score Gains vs. Teachers from Other Portals

Teacher Portals	Math	Reading	Algebra I	8 th Grade Science
UNC Graduate Prepared	--	--	NR	NR
NC Private Undergrad Prepared	--	--	--	NR
NC Private Graduate Prepared	NR	NR	NR	NR
Out of State Undergrad Prepared	--	--	--	--
Out of State Graduate Prepared	--	--	--	--
UNC Licensure Only	--	Worse	NR	NR
Other Licensure Only	NR	NR	NR	NR
Teach For America	Better	--	NR	NR
Visiting International Faculty	--	--	--	NR
Lateral Entry	--	--	--	--
Unclassifiable	--	--	NR	NR

In elementary grades (Table 5), UNC undergraduate prepared teachers outperformed out of state teachers in both mathematics and reading, but lagged Visiting International Faculty teachers in reading. Out of state teachers represent 32% of the teachers (with less than five years of experience), the largest percentage of teachers from any portal teaching tested subjects in NC elementary grades and a much higher proportion than the percentage of out of state teachers in the total NC teacher workforce (23%). Students who are taught elementary mathematics by out of state teachers lose the equivalent of 6.1 days of schooling in comparison to those taught by UNC undergraduate prepared teachers. Except as noted, UNC undergraduate prepared teacher perform similarly to teachers who entered NC schools through other portals.

Table 5. Elementary School: UNC Undergraduate Prepared Teachers' Effects on Test Score Gains vs. Teacher from Other Portals

Teacher Portals	Math	Reading
UNC Graduate Prepared	--	--
NC Private Undergrad Prepared	--	--
NC Private Graduate Prepared	--	--
Out of State Undergrad Prepared	Worse	Worse
Out of State Graduate Prepared	--	--
UNC Licensure Only	--	--
Other Licensure Only	--	--
Teach For America	--	--
Visiting International Faculty	--	Better
Lateral Entry	--	--
Unclassifiable	--	--

Out of State Undergraduate Prepared Teachers. As shown in the preceding tables, out of state undergraduate prepared teachers performed significantly worse than UNC undergraduate prepared teachers in five comparisons: high school overall, high school math, high school social studies, elementary mathematics, and elementary reading. They performed no differently in the other six comparisons. This pattern of lower performance among out of state undergraduate prepared teachers is especially noteworthy because they make up nearly 1/4 of the teacher workforce in NC schools.

Teach For America. The portal that most consistently outperformed UNC undergraduate prepared teachers was Teach For America (TFA), a small, selective program that provides intensive summer training and continued professional development to their corps members. Teach For America corps members outperformed UNC undergraduate prepared teachers in five of nine comparisons and perform no differently in the other four comparisons. Their positive effects were concentrated in high school and middle school subjects. Their positive effects on middle school mathematics were particularly large. In fact, the TFA coefficient on middle school mathematics translates into an advantage equivalent to approximately half a year of learning. Although TFA has strong and consistent positive effects on student test scores, it is important to note that corps members make up only .3% of the teacher workforce in NC schools.

Table 6. Effects of Teach For America Corps Members

	Teach For America Coefficients	Teach For America as Compared to UNC Traditional
High School Overall	0.172*	Better
High School Math	0.139*	Better
High School English	0.085*	Better
High School Science	0.222*	Better
High School Social Studies	0.079	No difference
Middle School Math	0.148*	Better
Middle School Reading	0.024	No difference
Middle School Algebra	NR	NR
Middle School Science	NR	NR
Elementary Math	0.042	No difference
Elementary Reading	0.040	No difference

NC Teaching Fellows. NC Teaching Fellows are selected through a highly competitive process run by the North Carolina Public School Forum, a non-profit education policy think tank created to bring greater harmony as well as new policy ideas to major actors and organizations on the North Carolina public education scene. Teaching Fellows receive scholarships and extra learning opportunities at selected public and private universities across the state. When

compared to other UNC undergraduate prepared teachers, Teaching Fellows perform better in high school overall, middle school mathematics and elementary school mathematics. Notably, Teaching Fellows are two times more likely to teach in high school than in middle or elementary grades, and in high school Teaching Fellows outperformed traditional UNC undergraduate prepared teachers. Teaching Fellows lag other UNC undergraduate prepared teachers' performance in middle school reading.

The latter finding may reflect the ambiguity of the North Carolina Standard Course of Study for middle school language arts. Lacking clear guidance on precisely what they should teach, individual teachers tend to teach what they value and enjoy most, and Teaching Fellows may tend to teach topics and skills that do not match up well to the End-of-Grade assessments in reading at the middle grades. For example, some teachers may emphasize the literary elements of the Standard Course of Study (e.g., symbolism, mood, character development, etc.) while others place more emphasis on basic matters of reading comprehension. Thus, this negative effect may reflect a difference in what is taught rather than how well it is taught. There are a number of other scholarship programs that produce smaller numbers of teachers in the state, including the NC Millennium Teacher Scholarship, Future Teachers of NC Scholarship, and Prospective Teacher Scholarship. When examining their performance, we found that they perform better than other UNC undergraduate prepared teachers in elementary school mathematics and reading, but no differently in all other subjects.

A primary goal of the Teaching Fellows and other scholarship programs is to increase the number of teachers prepared through public and private undergraduate programs within the state. When individuals prepared through teacher education programs within North Carolina are unavailable, school districts fill teaching positions with teachers from other sources, such as out of state trained teachers and teachers with lateral entry licenses. To examine the difference between Teaching Fellows and Other Scholarships to these 'other teachers' we compared teachers from these scholarship programs to teachers who entered the profession from a route other than in-state (public and private) undergraduate or graduate programs. Results from these comparisons indicate that Teaching Fellows outperform these 'other teachers' in four areas (high school overall, high school mathematics, high school social studies, and elementary school mathematics) and perform worse than 'other teachers' in one subject, middle school science (See Table 7, on the next page.) There were no differences in other subjects or grades. Teachers trained through other in-state scholarship programs outperformed 'other teachers' in elementary math, and performed no differently in any of the middle and high school comparisons.

Table 7. Effects of Teaching Fellows and Other Scholarships

	Comparisons with UNC Undergraduate Prepared Teachers		Comparisons with “Other Teachers” †		
	Teaching Fellows to Other UNC Traditionally Prepared Teachers	Non-TF Scholarship Holders** to Other UNC Traditionally Prepared Teachers	Teaching Fellows to Other Teachers	Non-TF Scholarship Holders** to Other Teachers	All Public & Private NC Prepared Teachers to Other Teachers
High School Overall	0.019*	-0.014	0.039*	0.017	0.018*
High School Math	0.020	-0.012	0.061*	0.033	0.036*
High School English	0.005	-0.013	0.011	-0.007	0.004
High School Science	0.020	0.010	0.038	0.014	0.014
High School Social Studies	0.021	-0.021	0.048*	0.004	0.028
Middle School Math	0.024*	0.019	0.018	0.014	-0.007
Middle School Reading	-0.021*	-0.022	-0.010	-0.014	0.010
Middle School Algebra I	0.026	-0.067	0.055	-0.039	0.010
Middle School Science	-0.110	-0.035	-0.149*	-0.015	0.002
Elementary Math	0.032*	0.072*	0.044*	0.070*	0.013*
Elementary Reading	0.000	0.029*	0.007	0.029	0.007

†Note: “Other Teachers” include lateral entry (including TFA & VIF), out of state, licensure only, and unclassifiable teachers.

** Non-TF Scholarships include NC Millennium Teacher Scholarship, Future Teachers of NC Scholarship, and Prospective Teacher Scholarship.

Other Teacher Influences on Student Achievement. In analyses for this report, we also estimated the association between other covariates and student test scores. The most consistent finding was that inexperienced teachers are less effective than teachers with more years in the classroom. As shown in Table 8, first year teachers are less effective in 10 out of 11 subjects. Second year teachers are less effective in 6 of the 11 subjects. These differences are quite substantial. For example, in elementary school mathematics, students taught by first year teachers lose an equivalent of 21 days of schooling. In middle grades mathematics, in part because students annual test scores gains are about one half of the gains they achieve in elementary grades, the loss associated with having a first year teacher is approximately 47 days. These findings apply to all teachers without regard to which portal they entered teaching through.

Although teacher experience had the most consistent pattern of effects on student achievement, we also found that a number of other characteristics were associated with student test score increases. Specifically, in high school overall, mathematics, English I and science as well as middle school reading and mathematics, teachers who were teaching in the subject and grade which they were specifically prepared to teach performed better than teachers teaching ‘out-of-field’. In two comparisons, High school mathematics and English I, teachers who obtained a supplementary graduate degree after they began their teaching career outperformed teachers without a supplementary graduate degree. Teachers who earned National Board Certification did not perform better or worse than teachers who did not earn one in any of the 11 comparisons.

Because our analyses were limited to only teachers in their first five years of teaching, National Board Certified teachers were not common, as most teachers do not obtain this until later in their teaching careers. Prior analyses including teachers with the full range of experience show that students taught by teachers who had obtained National Board Certification performed better than students taught by other teachers. Lastly, we found that teachers who scored higher on their Praxis II exams, taken at the end of their teacher preparation performed better in 7 of the 11 comparisons and were no different in the other four. For specifics on these comparisons, see Table 8 below.

Table 8. Effects of Other Teacher Characteristics

	Infield	1st YR	2nd YR	3rd YR	4th YR	MA	NBC	PRX
HS Overall	Better	Worse	Worse	--	--	--	--	Better
HS Math	Better	Worse	Worse	--	--	Better	--	--
HS English I	Better	Worse	--	--	--	Better	--	Better
HS Science	Better	Worse	--	--	--	--	--	Better
HS Social Studies	--	Worse	--	--	--	--	--	Better
MS Math	Better	Worse	Worse	--	--	--	--	Better
MS Reading	Better	Worse	Worse	--	--	--	--	--
MS Algebra I	--	Worse	--	--	--	--	--	--
8 th Grade Science	--	--	--	--	Better	--	NR	--
ES Math	--	Worse	Worse	Worse	--	--	--	Better
ES Reading	--	Worse	Worse	Worse	Worse	--	--	Better

Conclusion

In this study of the impact of teacher preparation on student achievement in North Carolina schools, we found that UNC undergraduate prepared teachers, who constitute nearly 1/3 of the North Carolina teacher workforce, perform near the middle of the pack, better in 14 comparisons, worse in 9, and similarly to teachers from other portals in 74. On balance, teachers from private colleges and universities in North Carolina perform similarly to UNC undergraduate prepared, with NC private undergraduate prepared lagging their UNC counterparts in high school mathematics but with NC private graduate prepared outperforming them in three high school subjects, in one case (high school science) by a wide margin. UNC graduate prepared graduates perform neither better nor worse than their undergraduate counterparts.

In North Carolina, the major divide in teacher performance is not between teachers from public versus private NC institutions, but between UNC prepared undergraduates on the one hand and teachers from out of state and lateral entry teachers on the other. Undergraduate prepared teachers from out of state, who comprise nearly 1/4 of the North Carolina teacher workforce,

perform worse than UNC undergraduate prepared teachers in 5 out of 11 comparisons. In particular, they are less effective in elementary school reading and mathematics, where they tend to be concentrated. Lateral entry teachers, who comprise 15 percent of the NC teacher workforce, perform worse in high school mathematics and social studies in particular and on average across all high school subjects, where they are concentrated.

In contrast to these portals whose performance lags UNC undergraduate prepared teachers, Teach For America corps members outperformed UNC undergraduate prepared teachers in 5 of the 9 comparisons. Teach For America teachers are chosen competitively from applicants graduating from top colleges and universities, provided with intensive training during the summer before entering the classroom, and supported through ongoing professional development during their two years in the program. Teach For America corps members make up only 0.3 percent of the North Carolina teacher workforce. Another carefully selected group of teachers, North Carolina Teaching Fellows receive scholarships to a dozen UNC and two private universities. Teaching Fellows perform better in 3 and worse in 1 out of 11 comparisons with other UNC undergraduate prepared teachers. On balance, they outperform their UNC undergraduate prepared peers, but by a substantially smaller margin than do Teach For America teachers.

A very important finding of this study is that students taught by beginning teachers are on average at a disadvantage compared to those taught by more experienced teachers. First year teachers perform worse than those with four years of experience in 9 out of 11 comparisons, and in their second year as teachers perform worse in 5 out of 11 comparisons. To provide perspective, we estimated that elementary students taught mathematics by a first year teacher learn the equivalent of 21 days of schooling less than similar students taught by teachers with four years of experience.

In summary, taking all comparisons into account, UNC undergraduate prepared teachers perform near the middle of the pack but slightly better than teachers from several other sources. Undergraduate prepared teachers from out of state lag their UNC undergraduate prepared counterparts in elementary reading and mathematics, the very grade levels and subjects where the out of state teachers are most heavily concentrated. Similarly, lateral entry teachers underperform UNC undergraduate prepared teachers where they are most heavily concentrated – in high schools.

In contrast, Teach For America teachers outperform UNC undergraduate prepared teachers in five out of nine comparisons, in some cases by wide margins. But Teach For America is a very small program, contributing only three tenths of one percent of all North Carolina public school teachers. Even if it were ten times as large as it is now, Teach For America would supply only 3% of NC teachers.

Scaling up Teach For America in North Carolina while maintaining its present quality standards would help improve overall public school performance, but because of the limited size of the program, the effects on the state's performance would be marginal. However, importing some key features of TFA into UNC teacher preparation programs, after they have been piloted and evaluated, might well have a larger total impact.

Other teacher preparation programs might best regard Teach For America as a small, instructive natural experiment from which they have much to learn rather than as a threat to their share of the teacher preparation market. A few characteristics of Teach For America represent potentially transferrable innovations. While the applicants are generally strong academically, they are selected based on soft skills such as perseverance, leadership, their ability to engage students, as well as, their college academic performance and service involvement. Teach For America corps members also practice teaching during the summer prior to entering the classroom in the grade and subject they will be assigned to teach the following fall. New corps members develop their plan to meet the objectives of the NC Standard Course of Study with advice and support of experienced teachers just before the school year begins.

In addition, new corps members are assigned to their schools with other corps members to create a cohort within the school. All corps members are observed by TFA program directors, who have experience teaching in the grades and subjects the corps members are currently teaching, and provided with immediate constructive feedback on ways to improve their teaching. Finally, they receive strong professional development and support from TFA during their two-year term of service that is focused on improving their teaching skills, especially remedying their weaknesses. These types of practices should be considered for pilot testing with strong evaluations to see if the practices that are piloted actually improve the performance of teachers early in their careers, a period of serious weakness for teachers from all portals.

Taken all together, these findings suggest some ways in which the University of North Carolina may take ownership and responsibility for "evidence based" policies and program improvements that could improve student achievement in K-12 public schools in North Carolina. We believe that three routes to improving achievement are possible, including (1) improve existing UNC teacher preparation programs; (2) develop, pilot & evaluate innovations in UNC teacher preparation programs; and (3) increase UNC productivity where other large portals perform worse.

As an example of innovations that might be developed, piloted and rigorously evaluated, this study can be used to identify specific groups of teachers such as those from lower performing portals that might benefit from remedies such as training to teach the NC Standard Course of Study or observing and providing frequent and actionable feedback to beginning teachers that could be addressed through UNC programs. Such programs might include summer institutes in which beginning teachers plan their objectives week-by-week for teaching the North Carolina Standard Course of Study for the grade(s) and subject(s) they are being assigned to teach the

following year. The institutes could be organized through the UNC institutions, delivered on their campuses during the summertime, and facilitated by those familiar with the “backward planning” process and experienced with the content and effective ways of teaching the specific grade(s) and subject(s). Other programs may be developed for partnering with a network of school districts to observe and provide feedback to each of the network’s beginning teachers or targeting beginning teachers from lower performing portals.

These summer institutes or beginning teacher feedback programs as well as other innovative interventions could be developed, piloted, and evaluated in coordination with K-12 education partners many of whom have a long standing involvement with educational innovations in North Carolina, such as the NC Public School Forum, National Board of Professional Teaching Standards, and Teach For America. The capacity to evaluate the effectiveness of these pilots or other innovations has been constructed in large part through the data bases and analytic capacities that have been developed and used for this study. In addition, the current partners for this research plan more intensive analyses of the effects of teacher preparation processes on student achievement in North Carolina in an effort to provide more specific guidance, grounded in solid evidence concerning ways that are most likely to improve student achievement and renew the state’s educational progress.

Appendix

Data, Methods, and Results

Data Sources and Dataset Construction

Data for the analysis of the effects of teachers entering through different portals went well beyond those necessary to classify a teacher into a portal to include many variables on other factors that may influence student achievement but which are beyond the control of individual teachers or their teacher preparation programs – data on students, teachers, and schools. These data covered a four year period, the 2004-05 through 2007-08 school years. Data sources included the North Carolina General Administration, the Public School Forum of North Carolina, and the North Carolina Department of Public Instruction (NCDPI). The North Carolina General Administration provided course enrollment and program completion information on individuals that attended universities within the University of North Carolina system who later went on to be paid in certified positions within North Carolina public schools. Data from the Public School Forum of North Carolina identified individuals that received scholarship support through the NC Teaching Fellows program. NCDPI provided a wealth of detailed information on student course enrollment and attendance, student achievement on End-of-Grade and End-of-Course examinations, licensure information for certified personnel working within NC public schools, compensation of certified personnel, and detailed expenditure data at the school level for all local education agencies across the state.

Before linking records and assembling them into a data set for statistical analysis, the research team considered a variety of potential analysis methods and statistical packages to determine which best fit our decision criteria: feasibility, fairness, accuracy, consistency, and transparency. While value-added models (models that consider a student's prior test performance as a component of current achievement) are currently considered the most appropriate method for analysis of educational outcomes involving student test scores, a number of different types of value added models exist.¹ The models fall into three general categories: (1) year-to-year value added models with controls for student, classroom, and school characteristics; (2) year-to-year value added student fixed effects models; and (3) multiple year value added models.

(1) The first type of value added model generally uses multilevel modeling to isolate the effects of individual student, teacher, classroom, school and school district characteristics. These models always include one or more prior test score for each student. All students in the study population who have test scores available from consecutive years can be included in the estimates of effects.

(2) The second type of model controls for all characteristics of students that do not change during the study period. Instead of comparing students to each other, fixed effects use the student as their own control to examine the effects of changes in resources or experiences on the student over time. This is done by subtracting each student's mean standardized score across

¹ In this section, we draw on material originally prepared for Henry, Thompson, Fortner, Purtell, Zulli, and Kershaw (2010) Technical Report: The Impact of Teacher Preparation on Student Learning in North Carolina Public Schools.

years from her/his annual score. Students who do not experience changes in the experiences of interest for a particular study are not included in the estimates of the effects of those experiences. For the current study, this means that students who always (or never) experience teachers prepared by the UNC constituent institutions would be omitted from the estimates of the average effects of teacher preparation programs. In addition, only students with three consecutive years of test scores could be included in the study.

(3) The third type of value added model uses all available test scores to estimate each teacher's contribution to the variation in their students' test scores. These models commonly estimate the effects of teachers on students beginning in the year the teacher taught the student and each year thereafter. Individual teachers' contributions to each of their students' test scores are aggregated and then compared to the average effects for teachers in the same grade and the same subject. These estimates of teachers' effectiveness are based on the extent to which they consistently exceed or fall below the averages for their grade and subject. This type of value added model requires at least three test scores for any student to be included, minimizes any problems from missing data, and sets expectations for each student's gains in the same way without regard to differences in their individual characteristics, or the characteristics of their classrooms, schools, or school districts.

Currently, a great deal of time and effort is being devoted to assessing which type of model is the best for making educational impact estimates. In addition, new techniques are being developed, such as the analysis of individual student achievement growth over time that may provide better approaches in the future. All three types of models have some substantial strengths and some limitations or weaknesses. Since our purpose was to provide accurate estimates of the differences between UNC traditional undergraduate prepared teachers and the other portals, we evaluated each type of value added model using five criteria: feasibility, fairness, accuracy, consistency, and transparency. In the end, we elected to use year-to-year value added models with extensive controls for several reasons:

1. Value added models (VAM) with student fixed effects, which compare students to only their own test scores in the same subject (either reading or mathematics), can only be estimated in the third through eighth grade. UNC teacher preparation programs train their graduates for high school as well as elementary and middle schools. We intended to assess impacts on high school End-of-Course test scores as well as 3rd through 8th grade scores, and for this purpose, the accuracy and feasibility of fixed effect and multiple year random effects models are much less well established. Therefore, to achieve consistency across the grade levels, we preferred VAM models using extensive controls.
2. A fair assessment of program effects should eliminate, to the greatest extent possible, choices that are beyond the control of the program that can have an effect on the achievement of students taught by their graduates. In consultation with University of North Carolina administrators and Deans of the system's schools of education, we decided to control for the choices that their graduates had made about which schools and what students they would teach. Thus, estimates of a program's effectiveness should not

be affected if their graduates choose to teach in underperforming schools with high concentrations of poverty. This required that we develop and use an extensive set of controls for student, classroom, and school characteristics. These controls do not mean that adjustments for student or school differences are automatic, nor necessarily set different expectations for different students or schools. It does mean that if the evidence indicates that differences between students or schools are systematically related to students' test score gains, then year-to-year value added models with extensive controls will take those differences into account when estimating the effects of teacher preparation programs.

3. In addition, we determined that it might be unfair to credit some teachers with test score increases of their students in the years after they had left their classes, as is done in multiple year value added models, and not to credit other teachers, such as 8th grade teachers of reading and mathematics, whose students do not complete End-of-Grade tests in these subjects in high school.

As a result of these and other considerations, we elected to use year-to-year multilevel, value added models with extensive controls. We believe these models are as feasible, fair, accurate, consistent, and transparent as any we could currently use. Nevertheless, we will continue to assess our methods, and hope to contribute to the ongoing research to develop and improve modeling capacities.

Matching Procedures

One key to the estimates of portal differences is accurate information on which teacher taught which students a given course during a given year. NCDPI's data on student course enrollment included class rosters on which students and teachers were identified which were used to link teachers to their more detailed characteristics such as years of experience, license type, and teaching portal. We linked these records through an automated computerized process for most matches, but completed the matching process through hand-matching, which allows us to accomplish links between teachers and students for approximately 93% of individual instructor names over the four year period.

Having made reliable connections between students and teachers, we then focused on a series of matches between students in a given year and their prior year test performance. For elementary students, testing occurs at the beginning of grade 3 in both reading and math in most years. For some years during the time period under study, grade 3 pretests were only conducted in one subject. Elementary school models contain an average of the student's prior year test (or grade 3 pre-test) performance in reading and math or a single subject if only one score was available. For middle grades models, prior year student scores for both math and reading are included in the analysis models. Finally, for high school End-of-Course testing analysis we used the student's performance on 8th grade End-of-Grade exams in both reading and math to establish a student's prior performance level. Matching procedures which consider the student's first name, last

name, date of birth, and student's CIPPID (Carolina Institute of Public Policy Identification Number²) link students' current year test scores to prior test score performance.

The research team also utilizes CIPPID matching to link teacher characteristics across differing data sources or files to establish a teacher's characteristics in a given year of the analysis. We merged roster data with teacher characteristics data and finally with school level data to create data sets suitable for use in SAS software implementing value added models with extensive controls.

Observations

After matching student roster entries to prior test scores and merging in teacher characteristics based on roster matches, we limited the dataset to teachers with five years of experience or less in each year. The decision to limit analysis to teachers with five years or less experience is based on our desire to achieve a balance between limiting the number of years of experience based on the expectation that as teachers gain more experience, their initial training becomes less important to their classroom behaviors and considering that teachers from different portals may develop their teaching prowess at different rates when they begin teaching. Removing teachers with more than five years of experience from the dataset left over 1.6 million complete test records for analysis. This analysis included over 900,000 students and 20,000 unique teachers over the four year time period in all analyzed grades.

² The Carolina Institute for Public Policy Identification Number is a randomly generated number that replaces a specific 'student_id' or NCWISE id number allowing consistency for numeric comparisons without maintaining data files containing student SSN numbers.

Table A.1. Test Score, Student, and Teacher Counts for Analysis Data Set

	Total Test Scores	Total Students	Total Teachers
High School			
High School – All Subjects	514,870	339,873	5,688
Middle School			
Algebra 1 Test Scores	19,150		
Science	22,570		
Reading	276,606		
Math	251,371		
All Subjects		371,224	6,388
Elementary School			
Reading	234,264		
Math	238,151		
All Subjects		227,919	7,864
Total Counts	1,556,982	939,016	19,940

Note: Middle and high school models include 4 years of data (2004-2005 through 2007-2008); elementary school models include three years (2005-2006 through 2007-2008).

Note: Student counts do not reflect unique students over time, but rather, unique students within each level of schooling.

Outcome Variables

Students' current and prior test score performance are based on grade 3 pre-test scores, End-of-Grade test scores, and End-of-Course scores standardized within subject, grade, and year. Standardization involves subtracting the statewide mean score on a test from a student's actual (scale) score and dividing the remainder by the standard deviation of scores for that test in that year. Thus, a standardized score of zero on a test is equivalent to the average score for that subject in that year. A student with standardized scores of zero in two successive years has gained in achievement as much as the average student. Differing achievement levels based on model variables indicate how students with certain characteristics or assigned to certain types of teachers move in the test score distribution compared to similar students in similar schools.

Elementary grades (3 – 5) models include EOG test scores in reading and mathematics for the years 2005-06 to 2007-08. In middle grades (6 – 8), EOG test score outcomes in reading, mathematics, and Algebra I were analyzed for the years 2004-05 to 2007-08. Science EOG testing began in 2007-08, and models were implemented for that school year only. High school grades (9 – 12) analyses included test observations across all ten EOC tested subjects: English I, Algebra I, Algebra II, Geometry, Biology, Chemistry, Physical Science, Physics, US History, and Civics & Economics. English I and mathematics analyses are included across all four years, 2004-05 to 2007-08. Science courses were excluded from the analysis for 2005-06 due to test piloting during that year, and social studies tests were included in analyses for years 2005-06 to 2007-08 due to piloting in the first year of the study. In models where all subjects are included, individual test indicator variables adjust for subject differences between student outcomes. Algebra I serves as the reference subject in models for all subjects and for mathematics only.

Biology is the reference subject for science-specific models, and US History serves as the reference subject in models of high school social studies achievement. Subject-specific models allow comparisons of effectiveness across a subject by subject basis, revealing differences which may be concealed when portal effectiveness across all subjects combined is conducted.

Control Variables

Table A.2 provides a list of the specific control variables included for models utilized in the analysis of portal impacts. We refined our student level variables to incorporate indicators for three types of student mobility that were not included in prior analysis of the effects of different routes into teaching (Henry, Thompson, Fortner, Purtell, Zulli, and Kershaw, 2010). These variables were added due to a particular concern of UNC education deans that was substantiated in some prior research assessing variation in students' test scores. Structural mobility refers to student moves necessary due to the grade level structure of a school, i.e. moving to 6th grade in a middle school consisting of grades 6 to 8. Other between year mobility refers to student mobility where a student tests in a school in the current year (that does not require structural moves) and her prior year test score is from a different school. Finally, within year mobility is based on membership (enrollment) data and identifies within year movers as those that were enrolled for at least one week less than most other students within a school. Other individual student level control variables include prior test scores, the average ability of a student's peers within a classroom, number of days absent during the school year, race/ethnicity, free or reduced lunch status, parental education level (when available), gifted or disabled status, LEP status, overage or underage for grade level, and grade.

Table A.2. Control Variables Used in the Impact Models

Student	Classroom & Teacher	School
1. Prior test scores (reading & math) 2. Classmates prior test scores (peer effects) 3. Days absent 4. Structural mobility 5. Other between year mobility 6. Within year mobility 7. Race/ethnicity 8. Poverty 9. Parental education 10. Gifted 11. Disability 12. Currently limited English proficient 13. Previously limited English proficient 14. Overage for grade (held back or retained at least once) 15. Underage for grade (promoted two grades) 16. Grade level	17. Years of experience 18. Teaching infield 19. Number of students 20. Advanced curriculum 21. Remedial curriculum 22. Heterogeneity of prior achievement within classroom 23. Additional: Teaching Fellows & Other Teacher Scholarships 24. Supplemental Graduate, NBC, Praxis II	25. School size (ADM) 26. Suspension rate 27. Violent acts per 1,000 students 28. Total per pupil expenditures 29. District teacher supplements 30. Racial/ethnic composition Concentration of poverty

All models include teacher controls for years of experience (based on compensation data from NCDPI) and whether or not the teacher is teaching ‘in-field’. The in-field designation is based on both the type of license held by a teacher and the subject area of the license. To be considered in-field, a teacher must hold an initial or continuing license in an area appropriate for the subject specified in the student roster file. For example, a teacher with a continuing license in Elementary Education would be considered an in-field teacher when teaching any subject in grades K through 6. A teacher with an initial license in Secondary Social Studies would only be considered an in-field teacher in this analysis when teaching US History or Civics & Economics. Teachers with provisional or emergency licenses are not considered in-field regardless of area.

For this analysis we also include, in some models, indicator variables for teachers who received a Teaching Fellows stipend (based on data from the North Carolina Public School Forum) or other teaching-related scholarships (based on data from the North Carolina General Administration). In addition, we code teachers as holding a supplemental graduate degree if they obtained a graduate degree after they began teaching. Teachers who hold a graduate degree when entering a classroom are coded as having a supplemental graduate degree only if they obtain an additional graduate degree after they begin teaching. This distinction allows us to properly estimate the benefit to students of having a teacher who obtains a graduate degree after she enters the classroom and prevents confusion between the impact of a graduate degree and a teacher’s portal characteristics. In some models, we also include a teacher’s National Board Certification status (NBC) and her standardized performance on any Praxis II or post-baccalaureate tests (GRE, etc.). The latter is an average of standardized score on all scores on any teacher test taken after graduation that were included in the licensure files provided by NCDPI. These variables are not included in our initial models designed to estimate the impact of teachers entering through different portals, but only in separate models designed to tell us whether required post-training variables accurately index teachers’ effectiveness and whether teachers who achieve National Board Certification early in their career are more effective than otherwise similar teachers.

For classrooms, we include controls for the number of students per classroom and the variability in prior achievement within classrooms, the latter reflecting the homogeneity versus heterogeneity of students’ entering skill levels. Models for middle and high school grades also include controls for classes labeled as remedial or advanced (e.g., Honors or AP). At the school level, models incorporate controls for school size, two indicators of orderliness in the school (suspensions per 100 students and violent acts per 1,000 students), total per pupil expenditures, average teacher supplement within districts, school level racial/ethnic composition, and the concentration of poverty within schools.

Estimation Method

Estimates of portal effects are based on comparisons with the reference group, UNC undergraduate prepared teachers. The model coefficients provide estimates of the average difference in student achievement between teachers trained in traditional UNC undergraduate programs and those in the specified portal, controlling for the rich array of other variables discussed above. Where fewer than ten teachers were included in models of portal effects, coefficients are not reported. The equation used to estimate the effect of the teacher portals is:

$$Y_{ijst} = \beta_0 + \beta_1 Y_{it-n} + \beta_2 Portal_2 + \dots + \beta_{12} Portal_{12} + \gamma_x X_{ijs} + \gamma_z Z_{js} + \gamma_w W_s + \mu_i + \varepsilon_j + \theta_s$$

Where Y_{ijst} is a student's test score, specifically student i in classroom j in school s at time t ;

$\beta_2 \dots \beta_{12}$ provide estimates of the average effect of the 11 portals (excluding the reference group, UNC undergraduate prepared teachers);

$Portal_2 \dots Portal_{12}$ are indicator variables that equal 1 if the teacher entered teaching through that portal and 0 if not;

Y_{it-n} represents a prior test score or scores;

X_{ijs} represents a set of individual student controls;

γ_x is the estimate of the average effect of each individual student controls;

Z_{js} represents a set of classroom controls;

γ_z is the estimate of the average effect of each classroom control;

W_s represents a set of school controls;

γ_w is the estimate of the average effect of each school control;

and μ_i , ε_j , and θ_s are disturbance terms representing unexplained variation at the individual, classroom, and school levels, respectively.

The remainder of the Appendix displays the coefficients from each of the models using the specification above and described in the report.

Table A.3. Elementary Portals - Math

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Teacher Preparation Portals	Coefficient	Coefficient	Coefficient
UNC Graduate Prepared	0.017	0.016	0.023
NC Private Undergraduate Prepared	0.001	0.004	0.006
NC Private Graduate Prepared	-0.065	-0.051	-0.058
Out of State Undergraduate Prepared	-0.023*	-0.022*	-0.016*
Out of State Graduate Prepared	-0.008	-0.000	-0.001
UNC Licensure Only	0.020	0.024	0.028
Other Licensure Only	-0.050	-0.080*	-0.043
Teach For America	0.042	0.029	0.049
Visiting International Faculty	0.017	0.013	0.024
Lateral Entry	-0.014	-0.010	-0.008
Unclassifiable	-0.021	-0.019	-0.015
Teacher Characteristics			
Infield teaching	0.010	0.015*	0.010
First year teacher	-0.081*	-0.081*	-0.081*
Second year teacher	-0.029*	-0.028*	-0.029*
Third year teacher	-0.015*	-0.016*	-0.016*
Fourth year teacher	-0.012	-0.011	-0.012
Teaching Fellows	---	---	0.032*
Other scholarships	---	---	0.072*
Supplemental Graduate Degree	---	0.009	---
NBC	---	0.028	---
Praxis II performance (Std.)	---	0.036*	---
Student Characteristics			
Average prior grade EOG scores (Std.)	0.693*	0.693*	0.693*
Average peer test score (prior grade)	0.043*	0.037*	0.043*
Days absent	-0.008*	-0.008*	-0.008*
Structural move	-0.033	-0.032	-0.032
Within year move	-0.061*	-0.059*	-0.062*
Underage student based on grade	0.078*	0.072*	0.078*
Overage student based on grade	-0.114*	-0.115*	-0.114*
Academically or intellectually gifted	0.283*	0.285*	0.283*
Disabled student	-0.054*	-0.052*	-0.054*
Free lunch	-0.036*	-0.036*	-0.036*
Reduced lunch	-0.022*	-0.020*	-0.022*
Lunch status missing	0.002	0.005	0.002
Parent education less than high school	-0.019*	-0.017*	-0.019*
Parent education some college	0.027*	0.027*	0.027*
Parent education college graduate	0.092*	0.097*	0.092*
Black	-0.190*	-0.188*	-0.190*
Hispanic	0.018*	0.027*	0.018*

Table A.3. Elementary Portals – Math continued

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Student Characteristics	Coefficient	Coefficient	Coefficient
Multiracial	-0.068*	-0.068*	-0.068*
American Indian	-0.063*	-0.048*	-0.064*
Asian	0.162*	0.166*	0.163*
Male	0.092*	0.093*	0.092*
LEP services recipient	-0.030*	-0.031*	-0.030*
Previous LEP services recipient	0.047*	0.040*	0.047*
Classroom Characteristics			
Students per classroom	-0.002*	-0.002*	-0.002*
Classroom ability dispersion	0.079*	0.081*	0.079*
School Characteristics			
School size (per 100)	-0.014*	-0.019*	-0.014*
School size squared	0.001*	0.001*	0.001*
Total per-pupil expenditures (\$100s)	0.000	-0.000	0.000
Average teacher supplement (\$100s)	0.001*	0.001*	0.001*
Short-term suspension rate (per 100 students)	-0.001*	-0.001*	-0.001*
Violent acts rate (per 1000 students)	-0.001	-0.003*	-0.001
Free and reduced lunch mean	-0.000	-0.000	-0.000
Black mean	-0.000	0.000	-0.000
Hispanic mean	0.001*	0.001	0.001*
Multiracial mean	-0.005*	-0.006*	-0.005*
American Indian mean	0.000	0.001	0.000
Asian mean	0.003*	0.003*	0.003*
Intercept	0.056	0.071	0.051

Note: Teachers with less than 5 years experience in 2005-06, 2006-07 & 2007-08 school years.

**Indicates a given coefficient is significant at the .05 level.*

Table A.4. Elementary Portals - Reading

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Teacher Preparation Portals	Coefficient	Coefficient	Coefficient
UNC Graduate Prepared	-0.009	-0.013	-0.007
NC Private Undergraduate Prepared	-0.002	-0.001	-0.001
NC Private Graduate Prepared	-0.058	-0.057	-0.057
Out of State Undergraduate Prepared	-0.013*	-0.018*	-0.012*
Out of State Graduate Prepared	-0.004	-0.002	-0.003
UNC Licensure Only	0.026	0.030*	0.028
Other Licensure Only	-0.035	-0.047	-0.034
Teach For America	0.040	0.039	0.041
Visiting International Faculty	0.029*	-0.005	0.030*
Lateral Entry	-0.010	-0.007	-0.009
Unclassifiable	-0.006	-0.004	-0.005
Teacher Characteristics			
Infield teaching	0.001	0.001	0.001
First year teacher	-0.048*	-0.053*	-0.048*
Second year teacher	-0.026*	-0.028*	-0.026*
Third year teacher	-0.023*	-0.024*	-0.023*
Fourth year teacher	-0.012*	-0.014*	-0.012*
Teaching Fellows	---	---	0.000
Other scholarships	---	---	0.029*
Supplemental Graduate Degree	---	-0.011	---
NBC	---	-0.003	---
Praxis II performance (Std.)	---	0.008*	---
Student Characteristics			
Average prior grade EOG scores (Std.)	0.703*	0.704*	0.703*
Average peer test score (prior grade)	0.036*	0.032*	0.036*
Days absent	-0.001*	-0.001*	-0.001*
Structural move	-0.062*	-0.060*	-0.062*
Within year move	-0.032*	-0.035*	-0.032*
Underage student based on grade	0.060*	0.063*	0.060*
Overage student based on grade	-0.114*	-0.116*	-0.114*
Academically or intellectually gifted	0.179*	0.179*	0.179*
Disabled student	-0.166*	-0.164*	-0.166*
Free lunch	-0.068*	-0.067*	-0.068*
Reduced lunch	-0.044*	-0.046*	-0.044*
Lunch status missing	-0.008	-0.010	-0.008
Parent education less than high school	-0.055*	-0.055*	-0.055*
Parent education some college	0.035*	0.032*	0.035*
Parent education college graduate	0.092*	0.093*	0.092*
Black	-0.140*	-0.140*	-0.140*
Hispanic	-0.025*	-0.024*	-0.025*

Table A.4. Elementary Portals – Reading continued

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Student Characteristics	Coefficient	Coefficient	Coefficient
Multiracial	-0.042*	-0.041*	-0.042*
American Indian	-0.090*	-0.076*	-0.090*
Asian	-0.041*	-0.045*	-0.042*
Male	-0.073*	-0.072*	-0.073*
LEP services recipient	-0.193*	-0.193*	-0.193*
Previous LEP services recipient	-0.011	-0.015	-0.011
Classroom Characteristics			
Students per classroom	0.000	0.000	0.000
Classroom ability dispersion	0.062*	0.063*	0.063*
School Characteristics			
School size (per 100)	-0.016*	-0.019*	-0.016*
School size squared	0.001*	0.001*	0.001*
Total per-pupil expenditures (\$100s)	0.000	0.000	0.000
Average teacher supplement (\$100s)	-0.0004*	-0.001*	-0.0004*
Short-term suspension rate (per 100 students)	-0.001*	-0.001*	-0.001*
Violent acts rate (per 1000 students)	-0.001	-0.000	-0.001
Free and reduced lunch mean	-0.001*	-0.001*	-0.001*
Black mean	0.0003*	0.0004*	0.0003*
Hispanic mean	0.000	0.000	0.000
Multiracial mean	-0.000	-0.001	-0.000
American Indian mean	0.000	0.000	0.000
Asian mean	0.002*	0.002*	0.002*
Intercept	0.153*	0.167*	0.151*

Note: Teachers with less than 5 years experience in 2005-06, 2006-07 & 2007-08 school years.

**Indicates a given coefficient is significant at the .05 level.*

Table A.5. Middle School Portals - Math

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Teacher Preparation Portals	Coefficient	Coefficient	Coefficient
UNC Graduate Prepared	0.013	0.017	0.016
NC Private Undergraduate Prepared	-0.007	-0.001	-0.003
NC Private Graduate Prepared	NA	NA	NA
Out of State Undergraduate Prepared	-0.007	-0.008	0.000
Out of State Graduate Prepared	0.012	0.026	0.020
UNC Licensure Only	-0.009	0.002	-0.002
Other Licensure Only	NA	NA	NA
Teach For America	0.148*	0.146*	0.155*
Visiting International Faculty	0.005	-0.041	0.011
Lateral Entry	0.003	0.001	0.010
Unclassifiable	-0.045	-0.034	-0.039
Teacher Characteristics			
Infield teaching	0.023*	0.015	0.023*
First year teacher	-0.080*	-0.078*	-0.079*
Second year teacher	-0.018*	-0.021*	-0.018*
Third year teacher	-0.009	-0.013	-0.008
Fourth year teacher	0.011	0.011	0.011
Teaching Fellows	--	--	0.024*
Other scholarships	--	--	0.019
Supplemental Graduate Degree	--	0.018	--
NBC	--	0.041	--
Praxis II performance (Std.)	--	0.011*	--
Student Characteristics			
Prior grade math score (Std.)	0.591*	0.593*	0.592*
Prior grade reading score (Std.)	0.127*	0.128*	0.127*
Average peer test score (prior grade)	0.114*	0.112*	0.113*
Days absent	-0.005*	-0.005*	-0.005*
Structural student mobility	-0.024*	-0.022*	-0.024*
Moved since prior year	-0.004	-0.001	-0.004
Within year move	-0.055*	-0.056*	-0.055*
Within year move missing	0.003	0.003	0.003
Underage student based on grade	0.041*	0.045*	0.041*
Overage student based on grade	-0.066*	-0.068*	-0.066*
Academically or intellectually gifted	0.149*	0.149*	0.149*
Disabled student	-0.057*	-0.057*	-0.057*
Free lunch	-0.009*	-0.008*	-0.009*
Reduced lunch	-0.005	-0.004	-0.005
Lunch status missing	0.001	0.001	0.001

Table A.5. Middle School Portals – Math continued

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Student Characteristics	Coefficient	Coefficient	Coefficient
Parent education less than high school	-0.025*	-0.026*	-0.025*
Parent education some college	0.025*	0.025*	0.025*
Parent education college graduate	0.062*	0.061*	0.062*
Parent education missing	0.043*	0.037*	0.043*
Black	-0.084*	-0.083*	-0.084*
Hispanic	0.003	0.006	0.003
Multiracial	-0.026*	-0.027*	-0.026*
American Indian	-0.038*	-0.035*	-0.038*
Asian	0.094*	0.095*	0.094*
Male	0.018*	0.018*	0.018*
LEP services recipient	0.001	-0.003	0.001
Previous LEP services recipient	0.050*	0.047*	0.050*
Classroom Characteristics			
Students per classroom	-0.001	-0.001	-0.001
Classroom ability dispersion	0.008	0.012	0.008
Advanced Curriculum	0.016*	0.017*	0.016*
Remedial Curriculum	-0.011	-0.016	-0.011
School Characteristics			
School size (per 100)	0.006	0.008	0.006
School size squared	-0.001	-0.001*	-0.001
Total per-pupil expenditures (\$100s)	0.000	0.000	0.000
Average teacher supplement (\$100s)	0.000	0.000	0.000
Short-term suspension rate (per 100 students)	-0.00031*	-0.00031*	-0.00031*
Violent acts rate (per 1000 students)	0.000	0.000	0.000
Free and reduced lunch mean	0.000	0.000	0.000
Black mean	0.000	0.000	0.000
Hispanic mean	0.000	0.001	0.000
Multiracial mean	-0.003	-0.005*	-0.003
American Indian mean	-0.001	0.001	-0.001
Asian mean	0.003*	0.003*	0.003*
Intercept	0.052	0.046	0.045

Note: Teachers with less than 5 years experience in 2004-05, 2005-06, 2006-07 & 2007-08 school years.

*Indicates a given coefficient is significant at the .05 level.

Table A.6. Middle School Portals - Reading

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Teacher Preparation Portals	Coefficient	Coefficient	Coefficient
UNC Graduate Prepared	-0.011	-0.006	-0.015
NC Private Undergraduate Prepared	0.005	0.003	0.001
NC Private Graduate Prepared	NA	NA	NA
Out of State Undergraduate Prepared	-0.008	-0.007	-0.014*
Out of State Graduate Prepared	0.008	0.015	0.003
UNC Licensure Only	-0.035*	-0.037*	-0.041*
Other Licensure Only	NA	NA	NA
Teach For America	0.024	0.023	0.018
Visiting International Faculty	0.014	-0.026	0.009
Lateral Entry	-0.004	-0.007	-0.010
Unclassifiable	-0.011	-0.014	-0.017
Teacher Characteristics			
Infield teaching	0.009*	0.009*	0.010*
First year teacher	-0.030*	-0.030*	-0.030*
Second year teacher	-0.013*	-0.015*	-0.013*
Third year teacher	-0.005	-0.005	-0.005
Fourth year teacher	0.003	0.002	0.003
Teaching Fellows	--		-0.021*
Other scholarships	--		-0.022
Supplemental Graduate Degree	--	0.007	--
NBC	--	0.057	--
Praxis II performance (Std.)	--	-0.003	--
Student Characteristics			
Prior grade math score (Std.)	0.188*	0.187*	0.188*
Prior grade reading score (Std.)	0.551*	0.551*	0.551*
Average peer test score (prior grade)	0.071*	0.068*	0.071*
Days absent	-0.002*	-0.002*	-0.002*
Structural student mobility	-0.013*	-0.010*	-0.013*
Moved since prior year	0.000	0.000	0.000
Within year move	-0.031*	-0.029*	-0.031*
Within year move missing	0.008	0.002	0.008
Underage student based on grade	0.034*	0.035*	0.034*
Overage student based on grade	-0.059*	-0.059*	-0.059*
Academically or intellectually gifted	0.116*	0.118*	0.116*
Disabled student	-0.116*	-0.119*	-0.116*
Free lunch	-0.044*	-0.044*	-0.044*
Reduced lunch	-0.033*	-0.032*	-0.033*
Lunch status missing	-0.020*	-0.020*	-0.020*

Table A.6. Middle School Portals – Reading continued

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Student Characteristics	Coefficient	Coefficient	Coefficient
Parent education less than high school	-0.047*	-0.049*	-0.047*
Parent education some college	0.035*	0.035*	0.035*
Parent education college graduate	0.066*	0.066*	0.066*
Parent education missing	0.049*	0.049*	0.048*
Black	-0.085*	-0.087*	-0.085*
Hispanic	0.014*	0.018*	0.014*
Multiracial	0.001	-0.001	0.001
American Indian	-0.047*	-0.058*	-0.047*
Asian	-0.006	-0.002	-0.005
Male	-0.050*	-0.051*	-0.050*
LEP services recipient	-0.124*	-0.130*	-0.124*
Previous LEP services recipient	0.003	0.004	0.003
Classroom Characteristics			
Students per classroom	0.000	0.000	0.000
Classroom ability dispersion	0.023*	0.019*	0.023*
Advanced Curriculum	0.008	0.005	0.008
Remedial Curriculum	-0.028*	-0.026*	-0.027*
School Characteristics			
School size (per 100)	0.000	-0.001	0.000
School size squared	0.000	0.000	0.000
Total per-pupil expenditures (\$100s)	0.000	0.000	0.000
Average teacher supplement (\$100s)	0.000008*	0.000	0.000009*
Short-term suspension rate (per 100 students)	-0.001*	-0.00048*	-0.001*
Violent acts rate (per 1000 students)	-0.00046*	-0.001*	-0.00076*
Free and reduced lunch mean	0.000	0.000	0.000
Black mean	0.000481*	0.001*	0.00048*
Hispanic mean	0.001*	0.001	0.001*
Multiracial mean	0.004*	0.005*	0.004*
American Indian mean	-0.001*	-0.001	-0.001*
Asian mean	0.000	0.000	0.000
Intercept	0.064	0.063	0.068

Note: Teachers with less than 5 years experience in 2004-05, 2005-06, 2006-07 & 2007-08 school years.

*Indicates a given coefficient is significant at the .05 level.

Table A.7. Middle School Portals – Algebra I

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Teacher Preparation Portals	Coefficient	Coefficient	Coefficient
UNC Graduate Prepared	NA	NA	NA
NC Private Undergraduate Prepared	0.030	0.046	0.023
NC Private Graduate Prepared	NA	NA	NA
Out of State Undergraduate Prepared	-0.013	-0.015	-0.009
Out of State Graduate Prepared	-0.139	-0.090	-0.132
UNC Licensure Only	NA	NA	NA
Other Licensure Only	NA	NA	NA
Teach For America	NA	NA	NA
Visiting International Faculty	-0.131	-0.086	-0.129
Lateral Entry	-0.025	-0.025	-0.021
Unclassifiable	NA	NA	NA
Teacher Characteristics			
Infield teaching	0.024	0.028	0.025
First year teacher	-0.108*	-0.104*	-0.110*
Second year teacher	-0.060	-0.027	-0.061
Third year teacher	-0.058	-0.048	-0.062
Fourth year teacher	-0.014	-0.012	-0.016
Teaching Fellows	--	--	0.026
Other scholarships	--	--	-0.067
Supplemental Graduate Degree	--	-0.018	--
NBC	--	0.030	--
Praxis II performance (Std.)	--	-0.009	--
Student Characteristics			
Prior grade math score (Std.)	0.674*	0.679*	0.674*
Prior grade reading score (Std.)	0.151*	0.152*	0.151*
Average peer test score (prior grade)	0.020	0.005	0.019
Days absent	-0.010*	-0.010*	-0.010*
Structural student mobility	0.934*	0.845*	0.935*
Moved since prior year	0.012	0.015	0.012
Within year move	-0.074*	-0.077*	-0.074*
Within year move missing	-0.037	-0.052	-0.037
Underage student based on grade	0.124*	0.111*	0.124*
Overage student based on grade	-0.106*	-0.102*	-0.106*
Academically or intellectually gifted	0.139*	0.138*	0.139*
Disabled student	0.046	0.051	0.046
Free lunch	0.012	0.014	0.012
Reduced lunch	0.007	0.007	0.007
Lunch status missing	0.078*	0.072*	0.078*

Table A.7. Middle School Portals – Algebra I continued

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Student Characteristics	Coefficient	Coefficient	Coefficient
Parent education less than high school	-0.073*	-0.061	-0.073*
Parent education some college	0.005	0.016	0.006
Parent education college graduate	0.044*	0.057*	0.044*
Parent education missing	0.094*	0.104*	0.094*
Black	-0.076*	-0.075*	-0.076*
Hispanic	0.013	0.008	0.013
Multiracial	-0.002	-0.003	-0.002
American Indian	0.051	0.052	0.051
Asian	0.134*	0.137*	0.134*
Male	-0.012	-0.010	-0.012
LEP services recipient	0.117*	0.112*	0.117*
Previous LEP services recipient	0.066	0.065	0.066
Classroom Characteristics			
Students per classroom	-0.003	-0.004	-0.003
Classroom ability dispersion	0.068	0.089	0.064
Advanced Curriculum	NA	NA	NA
Remedial Curriculum	NA	NA	NA
School Characteristics			
School size (per 100)	0.028	0.027	0.028
School size squared	-0.001	-0.002	-0.002
Total per-pupil expenditures (\$100s)	0.001	0.000	0.001
Average teacher supplement (\$100s)	0.000	0.000	0.000
Short-term suspension rate (per 100 students)	0.000	0.000	0.000
Violent acts rate (per 1000 students)	-0.002	-0.002	-0.002
Free and reduced lunch mean	-0.002	-0.002	-0.002
Black mean	-0.003*	-0.002	-0.003*
Hispanic mean	-0.001	-0.002	-0.001
Multiracial mean	-0.020	-0.019	-0.021
American Indian mean	-0.003	0.001	-0.003
Asian mean	0.000	-0.002	0.000
Intercept	-0.725	-0.685	-0.723

Note: Teachers with less than 5 years experience in 2004-05, 2005-06, 2006-07 & 2007-08 school years.

*Indicates a given coefficient is significant at the .05 level.

Table A.8. Middle School Portals - Science

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Teacher Preparation Portals	Coefficient	Coefficient	Coefficient
UNC Graduate Prepared	NA	NA	NA
NC Private Undergraduate Prepared	NA	NA	NA
NC Private Graduate Prepared	NA	NA	NA
Out of State Undergraduate Prepared	0.023	0.067	-0.004
Out of State Graduate Prepared	0.048	0.055	0.022
UNC Licensure Only	NA	NA	NA
Other Licensure Only	NA	NA	NA
Teach For America	NA	NA	NA
Visiting International Faculty	NA	NA	NA
Lateral Entry	-0.048	0.039	-0.072
Unclassifiable	NA	NA	NA
Teacher Characteristics			
Infield teaching	-0.009	0.019	-0.015
First year teacher	-0.061	0.027	-0.064
Second year teacher	-0.016	0.068	-0.018
Third year teacher	0.043	0.044	0.044
Fourth year teacher	0.062*	0.095*	0.063*
Teaching Fellows	--	--	-0.110
Other scholarships	--	--	-0.035
Supplemental Graduate Degree	--	0.093	--
NBC	--	NR	--
Praxis II performance (Std.)	--	0.010	--
Student Characteristics			
Prior grade math score (Std.)	0.274*	0.279*	0.274*
Prior grade reading score (Std.)	0.400*	0.395*	0.400*
Average peer test score (prior grade)	0.034*	0.030*	0.034*
Days absent	-0.004*	-0.004*	-0.004*
Structural student mobility	0.217*	0.142	0.220*
Moved since prior year	0.060*	0.072*	0.060*
Within year move	-0.066*	-0.024	-0.067*
Within year move missing	-0.201	-0.472*	-0.209
Underage student based on grade	0.089*	0.101*	0.089*
Overage student based on grade	-0.082*	-0.096*	-0.082*
Academically or intellectually gifted	0.175*	0.179*	0.175*
Disabled student	-0.022	-0.010	-0.022
Free lunch	-0.048*	-0.054*	-0.048*
Reduced lunch	-0.021	-0.029	-0.021
Lunch status missing	-0.095	-0.081	-0.095

Table A.8. Middle School Portals –Science continued

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Student Characteristics	Coefficient	Coefficient	Coefficient
Parent education less than high school	-0.014	-0.026	-0.014
Parent education some college	0.002	0.007	0.002
Parent education college graduate	0.046*	0.044*	0.046*
Parent education missing	0.139*	0.122*	0.138*
Black	-0.247*	-0.253*	-0.247*
Hispanic	-0.079*	-0.094*	-0.079*
Multiracial	-0.066*	-0.088*	-0.066*
American Indian	-0.161*	-0.181*	-0.161*
Asian	-0.008	-0.060*	-0.008
Male	0.223*	0.228*	0.223*
LEP services recipient	-0.067*	-0.038	-0.067*
Previous LEP services recipient	-0.060*	-0.066	-0.060*
Classroom Characteristics			
Students per classroom	0.000	0.001	0.001
Classroom ability dispersion	-0.030	-0.014	-0.028
Advanced Curriculum	0.081*	0.145*	0.081*
Remedial Curriculum	0.128	0.188	0.128
School Characteristics			
School size (per 100)	0.013	0.015	0.012
School size squared	-0.001	-0.001	0.000
Total per-pupil expenditures (\$100s)	0.001*	0.001	0.001*
Average teacher supplement (\$100s)	0.000	-0.001	0.000
Short-term suspension rate (per 100 students)	0.000	0.000	0.000
Violent acts rate (per 1000 students)	-0.001	0.001	-0.001
Free and reduced lunch mean	-0.003*	-0.005*	-0.003*
Black mean	-0.001	-0.001	-0.001
Hispanic mean	0.001	0.004	0.001
Multiracial mean	0.012*	0.010	0.012*
American Indian mean	-0.003*	0.000	-0.003*
Asian mean	0.002	0.004	0.003
Intercept	-0.004	-0.069	0.014

Note: Teachers with less than 5 years experience in 2004-05, 2005-06, 2006-07 & 2007-08 school years.

*Indicates a given coefficient is significant at the .05 level.

Table A.9. High School Portals – Overall

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Teacher Preparation Portals	Coefficient	Coefficient	Coefficient
UNC Graduate Prepared	0.022	0.006	0.015
NC Private Undergraduate Prepared	-0.016	-0.015	-0.017
NC Private Graduate Prepared	0.088*	0.092*	0.098*
Out of State Undergraduate Prepared	-0.026*	-0.021*	-0.021*
Out of State Graduate Prepared	-0.014	0.011	-0.011
UNC Licensure Only	-0.034	-0.043*	-0.034
Other Licensure Only	-0.001	0.082*	0.063
Teach For America	0.172*	0.167*	0.166*
Visiting International Faculty	-0.078*	-0.028	-0.089*
Lateral Entry	-0.023*	-0.013	-0.017*
Unclassifiable	-0.044	-0.038	-0.041
Teacher Characteristics			
Infield teaching	0.027*	0.014*	0.029*
First year teacher	-0.113*	-0.114*	-0.109*
Second year teacher	-0.044*	-0.050*	-0.043*
Third year teacher	-0.019	-0.015	-0.015
Fourth year teacher	-0.011	-0.016	-0.013
Teaching Fellows	--	--	0.019*
Other scholarships	--	--	-0.014
Supplemental Graduate Degree	--	0.026	--
NBC	--	0.045	--
Praxis II performance (Std.)	--	0.027*	--
Student Characteristics			
Prior grade math score (Std.)	0.370*	0.371*	0.371*
Prior grade reading score (Std.)	0.316*	0.316*	0.318*
Average peer test score (prior grade)	0.131*	0.130*	0.130*
Days absent	-0.007*	-0.007*	-0.007*
Structural student mobility	0.020*	0.023*	0.028*
Moved since prior year	0.014	0.012	0.012
Moved since prior year missing	0.014*	0.023*	0.033*
Within year move	-0.067*	-0.061*	-0.062*
Within year move missing	-0.131	-0.132	-0.126
Underage student based on grade	0.098*	0.103*	0.097*
Overage student based on grade	-0.080*	-0.079*	-0.079*
Academically or intellectually gifted	0.116*	0.118*	0.112*
Disabled student	-0.030*	-0.035*	-0.033*
Free lunch	0.004	0.004	0.004
Reduced lunch	0.002	0.002	0.002
Lunch status missing	0.025*	0.022*	0.047*
Parent education less than high school	0.008	0.007	0.008
Parent education some college	0.030*	0.031*	0.032*
Parent education college graduate	0.030*	0.032*	0.033*
Parent education missing	0.013*	0.013*	0.005

Table A.9. High School Portals – Overall continued

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Student Characteristics	Coefficient	Coefficient	Coefficient
Black	-0.097*	-0.095*	-0.096*
Hispanic	0.003	0.007	0.004
Multiracial	-0.012*	-0.006	-0.011
American Indian	-0.068*	-0.059*	-0.070*
Asian	0.045*	0.045*	0.042*
Male	0.052*	0.051*	0.052*
LEP services recipient	-0.046*	-0.048*	-0.052*
Previous LEP services recipient	0.048*	0.037*	0.052*
Algebra 2	-0.373*	-0.358*	-0.364*
English 1	0.059*	0.050*	0.055*
Geometry	-0.267*	-0.256*	-0.260*
Biology (Science model reference group)	-0.020	-0.023*	-0.012
Chemistry	-0.563*	-0.536*	-0.541*
Physical Science	0.235*	0.234*	0.233*
Physics	-0.998*	-0.985*	-0.948*
Civics and Economics	-0.035*	-0.034*	-0.031*
US History	-0.092*	-0.085*	-0.094*
Classroom Characteristics			
Students per classroom	-0.002*	-0.002*	-0.002*
Classroom ability dispersion	0.041*	0.044*	0.037*
Advanced curriculum	0.135*	0.134*	0.136*
Remedial curriculum	0.018	0.031	0.009
School Characteristics			
School size (per 100)	0.0002*	0.0001*	0.0002*
School size squared	0.000*	0.000*	0.000*
Total per-pupil expenditures (\$100s)	0.000	0.000	0.000*
Average teacher supplement (\$100s)	0.000	0.000	0.000
Short-term suspension rate (per 100 students)	0.000	0.000	0.000
Violent acts rate (per 1000 students)	-0.001*	-0.001*	-0.001*
Free and reduced lunch mean	0.000	0.000	0.000
Black mean	0.000	0.000	0.000
Hispanic mean	0.001	0.001	0.002*
Multiracial mean	0.002	0.002	0.004
American Indian mean	0.000	0.000	0.000
Asian mean	-0.001	-0.001	-0.001
Intercept	-0.200*	-0.177*	-0.232*

Note: Teachers with less than 5 years experience in 2004-05, 2005-06, 2006-07 & 2007-08 school years.

*Indicates a given coefficient is significant at the .05 level.

Table A.10. High School Portals – Math

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Teacher Preparation Portals	Coefficient	Coefficient	Coefficient
UNC Graduate Prepared	0.057	0.063	0.057*
NC Private Undergraduate Prepared	-0.049*	-0.054*	-0.047*
NC Private Graduate Prepared	0.051	0.060	0.050
Out of State Undergraduate Prepared	-0.057*	-0.048*	-0.051*
Out of State Graduate Prepared	-0.045	0.004	-0.040
UNC Licensure Only	NA	NA	NA
Other Licensure Only	NA	NA	NA
Teach For America	0.139*	0.161*	0.145*
Visiting International Faculty	-0.082*	-0.013	-0.078*
Lateral Entry	-0.033*	-0.034*	-0.028*
Unclassifiable	-0.169*	-0.204*	-0.164*
Teacher Characteristics			
Infield teaching	0.034*	0.017	0.034*
First year teacher	-0.123*	-0.117*	-0.124*
Second year teacher	-0.048*	-0.052*	-0.049*
Third year teacher	-0.032	-0.019	-0.033*
Fourth year teacher	0.010	0.019	0.009
Teaching Fellows	--	--	0.020
Other scholarships	--	--	-0.012
Supplemental Graduate Degree	--	0.103*	--
NBC	--	0.154	--
Praxis II performance (Std.)	--	0.006	--
Student Characteristics			
Prior grade math score (Std.)	0.561*	0.567*	0.561*
Prior grade reading score (Std.)	0.103*	0.101*	0.103*
Average peer test score (prior grade)	0.131*	0.129*	0.130*
Days absent	-0.008*	-0.008*	-0.008*
Structural student mobility	0.036*	0.032*	0.036*
Moved since prior year	0.004	0.001	0.004
Moved since prior year missing	-0.022*	-0.013	-0.022*
Within year move	-0.065*	-0.061*	-0.065*
Within year move missing	-0.093	-0.142	-0.093
Underage student based on grade	0.079*	0.074*	0.079*
Overage student based on grade	-0.089*	-0.088*	-0.089*
Academically or intellectually gifted	0.129*	0.133*	0.129*
Disabled student	-0.033*	-0.039*	-0.033*
Free lunch	0.023*	0.022*	0.023*
Reduced lunch	0.015*	0.012*	0.015*
Lunch status missing	-0.001	-0.010	-0.001
Parent education less than high school	-0.001	-0.002	-0.001
Parent education some college	0.002	0.000	0.002
Parent education college graduate	0.014*	0.013*	0.014*
Parent education missing	-0.007	-0.008	-0.008

Table A.10. High School Portals – Math continued

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Student Characteristics	Coefficient	Coefficient	Coefficient
Black	-0.088*	-0.084*	-0.088*
Hispanic	0.004	0.010	0.004
Multiracial	-0.021*	-0.014	-0.021*
American Indian	-0.042*	-0.046*	-0.042*
Asian	0.096*	0.098*	0.097*
Male	0.000	-0.002	0.000
LEP services recipient	0.040*	0.037*	0.040*
Previous LEP services recipient	0.029	0.014	0.029
Algebra 2	-0.373*	-0.372*	-0.373*
English 1	--	--	--
Geometry	-0.267*	-0.263*	-0.268*
Biology (Science model reference group)	--	--	--
Chemistry	--	--	--
Physical Science	--	--	--
Physics	--	--	--
Civics and Economics	--	--	--
US History	--	--	--
Classroom Characteristics			
Students per classroom	-0.002*	-0.003*	-0.002*
Classroom ability dispersion	0.070*	0.059*	0.069*
Advanced curriculum	0.234*	0.237*	0.234*
Remedial curriculum	0.126*	0.117*	0.126*
School Characteristics			
School size (per 100)	0.0002*	0.0002*	0.0002*
School size squared	0.000*	0.000*	0.000*
Total per-pupil expenditures (\$100s)	0.000	0.000	0.000
Average teacher supplement (\$100s)	0.000	0.000	0.000
Short-term suspension rate (per 100 students)	0.000	0.000	0.000
Violent acts rate (per 1000 students)	0.000	-0.001	-0.001
Free and reduced lunch mean	0.000	-0.001	0.000
Black mean	-0.001*	-0.001	-0.001*
Hispanic mean	0.002	0.002	0.002
Multiracial mean	0.001	0.001	0.002
American Indian mean	0.000	-0.001	0.000
Asian mean	0.000	0.002	0.000
Intercept	-0.095*	-0.071	-0.099*

Note: Teachers with less than 5 years experience in 2004-05, 2005-06, 2006-07 & 2007-08 school years.

*Indicates a given coefficient is significant at the .05 level.

Table A.11. High School Portals – English I

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Teacher Preparation Portals	Coefficient	Coefficient	Coefficient
UNC Graduate Prepared	0.006	0.002	0.000
NC Private Undergraduate Prepared	0.000	-0.001	-0.004
NC Private Graduate Prepared	0.041*	0.020	0.030
Out of State Undergraduate Prepared	-0.015	0.001	-0.016
Out of State Graduate Prepared	-0.019	-0.011	-0.008
UNC Licensure Only	0.008	-0.001	0.002
Other Licensure Only	NA	NA	NA
Teach For America	0.085*	0.059*	0.070*
Visiting International Faculty	-0.031	-0.025	-0.016
Lateral Entry	0.007	0.001	0.003
Unclassifiable	-0.027	-0.043	-0.037
Teacher Characteristics			
Infield teaching	0.018*	0.016*	0.016*
First year teacher	-0.032*	-0.031*	-0.028*
Second year teacher	-0.020	-0.014	-0.016
Third year teacher	-0.005	-0.003	-0.005
Fourth year teacher	-0.012	-0.011	-0.009
Teaching Fellows	--	--	0.005
Other scholarships	--	--	-0.013
Supplemental Graduate Degree	--	0.032*	--
NBC	--	-0.059	--
Praxis II performance (Std.)	--	0.011*	--
Student Characteristics			
Prior grade math score (Std.)	0.218*	0.220*	0.217*
Prior grade reading score (Std.)	0.494*	0.492*	0.494*
Average peer test score (prior grade)	0.080*	0.075*	0.078*
Days absent	-0.005*	-0.005*	-0.005*
Structural student mobility	-0.066*	-0.068*	-0.069*
Moved since prior year	-0.016	-0.028	-0.028
Moved since prior year missing	0.044	0.057*	0.035
Within year move	-0.042*	-0.038*	-0.048*
Within year move missing	-0.119	-0.060	-0.127
Underage student based on grade	0.065*	0.070*	0.058*
Overage student based on grade	-0.096*	-0.096*	-0.096*
Academically or intellectually gifted	0.129*	0.130*	0.134*
Disabled student	-0.181*	-0.185*	-0.180*
Free lunch	-0.036*	-0.036*	-0.034*
Reduced lunch	-0.033*	-0.034*	-0.034*
Lunch status missing	-0.023	0.012	0.005
Parent education less than high school	-0.021*	-0.022*	-0.023*
Parent education some college	0.046*	0.048*	0.047*
Parent education college graduate	0.035*	0.037*	0.036*
Parent education missing	-0.026*	-0.023*	-0.028*

Table A.11. High School Portals – English I continued

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Student Characteristics	Coefficient	Coefficient	Coefficient
Black	-0.067*	-0.067*	-0.068*
Hispanic	0.003	0.000	0.000
Multiracial	-0.008	-0.003	-0.009
American Indian	-0.078*	-0.068*	-0.079*
Asian	-0.025*	-0.029*	-0.022*
Male	-0.138*	-0.136*	-0.137*
LEP services recipient	-0.154*	-0.154*	-0.153*
Previous LEP services recipient	0.014	0.009	0.007
Algebra 2	--	--	--
English 1	--	--	--
Geometry	--	--	--
Biology (Science model reference group)	--	--	--
Chemistry	--	--	--
Physical Science	--	--	--
Physics	--	--	--
Civics and Economics	--	--	--
US History	--	--	--
Classroom Characteristics			
Students per classroom	0.001*	0.002*	0.001*
Classroom ability dispersion	0.033*	0.019	0.039*
Advanced curriculum	0.094*	0.093*	0.097*
Remedial curriculum	-0.019	-0.020	-0.007
School Characteristics			
School size (per 100)	0.0001*	0.000	0.000*
School size squared	0.000*	0.000*	0.000*
Total per-pupil expenditures (\$100s)	0.001*	0.001*	0.001*
Average teacher supplement (\$100s)	0.000	0.000*	0.000
Short-term suspension rate (per 100 students)	0.000*	0.000*	0.000*
Violent acts rate (per 1000 students)	0.000	0.000	0.000
Free and reduced lunch mean	-0.001*	-0.001*	-0.001*
Black mean	0.001*	0.001*	0.001*
Hispanic mean	0.002*	0.001	0.002*
Multiracial mean	0.014*	0.015*	0.013*
American Indian mean	0.000	0.000	0.000
Asian mean	0.001	0.002	0.001
Intercept	-0.036	0.009	-0.016

Note: Teachers with less than 5 years experience in 2004-05, 2005-06, 2006-07 & 2007-08 school years.

*Indicates a given coefficient is significant at the .05 level.

Table A.12. High School Portals – Science

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Teacher Preparation Portals	Coefficient	Coefficient	Coefficient
UNC Graduate Prepared	0.008	0.032	0.010
NC Private Undergraduate Prepared	0.005	0.087*	0.009
NC Private Graduate Prepared	0.163*	0.183*	0.164*
Out of State Undergraduate Prepared	-0.012	0.027	-0.006
Out of State Graduate Prepared	0.014	0.008	0.020
UNC Licensure Only	-0.103	-0.041	-0.097
Other Licensure Only	NA	NA	NA
Teach For America	0.222*	0.326*	0.228*
Visiting International Faculty	0.011	0.067	0.017
Lateral Entry	-0.019	0.009	-0.012
Unclassifiable	-0.037	-0.038	-0.029
Teacher Characteristics			
Infield teaching	-0.003	-0.017	-0.004
First year teacher	-0.101*	-0.086*	-0.100*
Second year teacher	-0.027	-0.019	-0.027
Third year teacher	-0.005	-0.003	-0.006
Fourth year teacher	-0.009	-0.020	-0.009
Teaching Fellows	--	--	0.021
Other scholarships	--	--	-0.021
Supplemental Graduate Degree	--	0.012	--
NBC	--	0.006	--
Praxis II performance (Std.)	--	0.059*	--
Student Characteristics			
Prior grade math score (Std.)	0.414*	0.415*	0.414*
Prior grade reading score (Std.)	0.311*	0.315*	0.311*
Average peer test score (prior grade)	0.085*	0.080*	0.085*
Days absent	-0.008*	-0.008*	-0.008*
Structural student mobility	-0.050*	-0.051*	-0.050*
Moved since prior year	0.041*	0.035*	0.041*
Moved since prior year missing	0.025*	0.035*	0.025*
Within year move	-0.087*	-0.091*	-0.087*
Within year move missing	-0.327	-0.404*	-0.326
Underage student based on grade	0.128*	0.134*	0.128*
Overage student based on grade	-0.075*	-0.072*	-0.075*
Academically or intellectually gifted	0.110*	0.108*	0.110*
Disabled student	0.014	0.008	0.014
Free lunch	0.011*	0.016*	0.011*
Reduced lunch	0.018*	0.026*	0.018*
Lunch status missing	0.017	0.002	0.017
Parent education less than high school	0.009	0.009	0.009
Parent education some college	0.034*	0.036*	0.034*
Parent education college graduate	0.033*	0.037*	0.033*
Parent education missing	0.012	0.006	0.012

Table A.12. High School Portals – Science continued

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Student Characteristics	Coefficient	Coefficient	Coefficient
Black	-0.134*	-0.133*	-0.134*
Hispanic	-0.015	-0.020	-0.015
Multiracial	-0.017	-0.006	-0.017
American Indian	-0.085*	-0.075*	-0.085*
Asian	0.054*	0.061*	0.054*
Male	0.119*	0.119*	0.119*
LEP services recipient	-0.032	-0.025	-0.032
Previous LEP services recipient	0.067*	0.060*	0.067*
Algebra 2	--	--	--
English 1	--	--	--
Geometry	--	--	--
Biology (Science model reference group)	1.012*	1.013*	1.012*
Chemistry	0.478*	0.503*	0.478*
Physical Science	1.263*	1.261*	1.263*
Physics	--	--	--
Civics and Economics	--	--	--
US History	--	--	--
Classroom Characteristics			
Students per classroom	-0.004*	-0.004*	-0.004*
Classroom ability dispersion	0.058*	0.078*	0.057*
Advanced curriculum	0.127*	0.126*	0.127*
Remedial curriculum	-0.040	-0.038	-0.040
School Characteristics			
School size (per 100)	0.000*	0.000	0.000*
School size squared	0.000*	0.000*	0.000*
Total per-pupil expenditures (\$100s)	0.000	0.000	0.000
Average teacher supplement (\$100s)	0.000*	0.000	0.000*
Short-term suspension rate (per 100 students)	0.000	0.000	0.000
Violent acts rate (per 1000 students)	-0.002*	-0.002*	-0.002*
Free and reduced lunch mean	0.001	0.001	0.001*
Black mean	-0.001	0.000	-0.001
Hispanic mean	-0.003	-0.005*	-0.003
Multiracial mean	0.014*	0.022*	0.014*
American Indian mean	0.000	-0.002	0.000
Asian mean	-0.004	-0.005	-0.004
Intercept	-1.203*	-1.126*	-1.210*

Note: Teachers with less than 5 years experience in 2004-05, 2005-06, 2006-07 & 2007-08 school years.

*Indicates a given coefficient is significant at the .05 level.

Table A.13. High School Portals – Social Studies

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Teacher Preparation Portals	Coefficient	Coefficient	Coefficient
UNC Graduate Prepared	0.005	-0.041	0.005
NC Private Undergraduate Prepared	-0.010	-0.010	-0.008
NC Private Graduate Prepared	0.018	-0.021	0.020
Out of State Undergraduate Prepared	-0.040*	-0.037	-0.034
Out of State Graduate Prepared	-0.056*	-0.064	-0.049
UNC Licensure Only	-0.016	-0.028	-0.009
Other Licensure Only	NA	NA	NA
Teach For America	0.079	0.036	0.086
Visiting International Faculty	NA	NA	NA
Lateral Entry	-0.042*	-0.021	-0.037*
Unclassifiable	-0.001	0.005	0.007
Teacher Characteristics			
Infield teaching	0.060*	0.054*	0.060*
First year teacher	-0.150*	-0.173*	-0.149*
Second year teacher	-0.038	-0.046	-0.037
Third year teacher	-0.017	-0.035	-0.017
Fourth year teacher	-0.008	-0.014	-0.008
Teaching Fellows	--	--	0.020
Other scholarships	--	--	0.010
Supplemental Graduate Degree	--	0.008	--
NBC	--	0.163	--
Praxis II performance (Std.)	--	0.043*	--
Student Characteristics			
Prior grade math score (Std.)	0.236*	0.235*	0.236*
Prior grade reading score (Std.)	0.445*	0.443*	0.445*
Average peer test score (prior grade)	0.124*	0.119*	0.123*
Days absent	-0.007*	-0.007*	-0.007*
Structural student mobility	-0.067*	-0.060*	-0.067*
Moved since prior year	0.019	0.021	0.019
Moved since prior year missing	0.045*	0.052*	0.045*
Within year move	-0.079*	-0.071*	-0.079*
Within year move missing	-0.325	-0.349	-0.324
Underage student based on grade	0.143*	0.153*	0.143*
Overage student based on grade	-0.063*	-0.065*	-0.063*
Academically or intellectually gifted	0.119*	0.126*	0.119*
Disabled student	0.044*	0.046*	0.044*
Free lunch	-0.001	-0.003	-0.001
Reduced lunch	-0.008	-0.006	-0.008
Lunch status missing	0.054*	0.055*	0.054*
Parent education less than high school	0.030*	0.027*	0.030*
Parent education some college	0.058*	0.058*	0.058*
Parent education college graduate	0.053*	0.053*	0.053*
Parent education missing	0.093*	0.085*	0.094*

Table A.13. High School Portals – Social Studies continued

	5 Year Total Effects Model	5 Year Controls 1 Model	5 Year Teaching Fellows Model
Student Characteristics	Coefficient	Coefficient	Coefficient
Black	-0.099*	-0.102*	-0.099*
Hispanic	0.034*	0.042*	0.034*
Multiracial	0.000	0.002	0.000
American Indian	-0.073*	-0.056*	-0.073*
Asian	0.027*	0.029*	0.027*
Male	0.198*	0.198*	0.198*
LEP services recipient	-0.043*	-0.055*	-0.043*
Previous LEP services recipient	0.067*	0.039	0.067*
Algebra 2	--	--	--
English 1	--	--	--
Geometry	--	--	--
Biology (Science model reference group)	--	--	--
Chemistry	--	--	--
Physical Science	--	--	--
Physics	--	--	--
Civics and Economics	0.067*	0.070*	0.067*
US History	--	--	--
Classroom Characteristics			
Students per classroom	-0.004*	-0.003*	-0.004*
Classroom ability dispersion	0.056*	0.047*	0.055*
Advanced curriculum	0.118*	0.120*	0.118*
Remedial curriculum	0.016	-0.003	0.016
School Characteristics			
School size (per 100)	0.0002*	0.000*	0.0002*
School size squared	0.000*	0.000*	0.000*
Total per-pupil expenditures (\$100s)	0.001*	0.001	0.001*
Average teacher supplement (\$100s)	0.000*	0.000*	0.000*
Short-term suspension rate (per 100 students)	0.000	0.000	0.000
Violent acts rate (per 1000 students)	-0.002*	-0.001*	-0.002*
Free and reduced lunch mean	-0.001	-0.001	-0.001
Black mean	0.000	0.001	0.000
Hispanic mean	0.003*	0.003	0.003
Multiracial mean	-0.008	-0.007	-0.009
American Indian mean	0.001	0.000	0.001
Asian mean	-0.003	-0.002	-0.003
Intercept	-0.416*	-0.378*	-0.420*

Note: Teachers with less than 5 years experience in 2004-05, 2005-06, 2006-07 & 2007-08 school years.

*Indicates a given coefficient is significant at the .05 level.

Table A.14. Elementary Portals Counts: Total Effects

	Elementary School 5yr Math	Elementary School 5yr Reading
Teacher Preparation Portals		
UNC Undergraduate Prepared	2,420	2,448
UNC Graduate Prepared	119	127
NC Private Undergraduate Prepared	1016	1022
NC Private Graduate Prepared	18	19
Out of State Undergraduate Prepared	2,457	2,484
Out of State Graduate Prepared	469	478
UNC Licensure Only	92	96
Other Licensure Only	33	33
Teach For America	45	49
Visiting International Faculty	170	168
Lateral Entry	617	641
Unclassifiable	211	211
Teaching Fellows	357	364
Other Scholarships	150	150

Table A.15. Middle School Portals Counts: Total Effects

	Middle School 5 Year Math	Middle School 5 Year Reading	Middle School 5 Year Algebra	Middle School 5 Year Science
Teacher Preparation Portals				
UNC Undergraduate Prepared	716	845	132	69
UNC Graduate Prepared	25	61	3	6
NC Private Undergraduate Prepared	177	187	15	9
NC Private Graduate Prepared	5	7	4	1
Out of State Undergraduate Prepared	661	782	127	86
Out of State Graduate Prepared	112	174	20	20
UNC Licensure Only	26	42	4	2
Other Licensure Only	8	8	1	1
Teach For America	39	65	8	1
Visiting International Faculty	101	81	17	7
Lateral Entry	1,140	1,438	159	138
Unclassifiable	46	87	9	8
Teaching Fellows	149	183	40	14
Other Scholarships	78	56	14	11

Table A.16. High School Portals Counts: Total Effects

	High School 5 Year Overall	High School 5 Year English	High School 5 Year Math	High School 5 Year Science	High School 5 Year Social Studies
Teacher Preparation Portals					
UNC Undergraduate Prepared	1,458	381	517	210	376
UNC Graduate Prepared	257	69	54	57	80
NC Private Undergraduate Prepared	372	94	140	44	106
NC Private Graduate Prepared	64	14	15	15	20
Out of State Undergraduate Prepared	868	182	313	181	217
Out of State Graduate Prepared	244	53	62	76	60
UNC Licensure Only	93	25	10	15	44
Other Licensure Only	18	4	4	10	1
Teach For America	88	24	21	24	20
Visiting International Faculty	93	14	47	34	1
Lateral Entry	2,057	504	689	637	342
Unclassifiable	76	17	17	17	27
Teaching Fellows	578	151	223	71	140
Other Scholarships	150	28	76	26	20

Table A.17. Portal Decision Rules

Portal	Data Source/Variables	Decision Rule
TP1: UNC Undergraduate Prepared	<p>UNC General Administration Data -Undergraduate degree graduation year -University attended -Education major -Education licensure</p> <p>DPI Certified Salary Data -Fiscal year minus teacher's years of experience to calculate first year teaching</p> <p>DPI Licensure Audit Data -Earliest basis code for licensure</p>	<p>Individuals were placed into the UNC Undergraduate Prepared portal if:</p> <ol style="list-style-type: none"> 1) They graduated with a Bachelor's degree from a UNC institution. 2) Their undergraduate degree is their highest degree prior to teaching 3) They have an education major or an education licensure from a UNC institution to indicate traditional training 4) Their first year teaching comes after their graduation year <p>Additional, amended rules to place individuals into the UNC Undergraduate Prepared portal:</p> <ol style="list-style-type: none"> 5) They graduated from a UNC school with an undergraduate degree prior to 1980 (too early for the UNC GA data) and their earliest basis code was a 1 or 2
TP2: UNC Graduate Prepared	<p>UNC General Administration Data -Graduate degree graduation year -University attended</p> <p>DPI Certified Salary Data - Fiscal year minus teacher's years of experience to calculate first year teaching</p> <p>DPI Licensure Audit Data -Earliest basis code for licensure</p>	<p>Individuals were placed into the UNC Graduate Prepared portal if:</p> <ol style="list-style-type: none"> 1) They graduated with a graduate degree from a UNC system school 2) Their most proximate degree prior to entering the profession is the UNC graduate degree 3) Their first year teaching comes after their graduate degree graduation year 4) Their earliest basis code is not lateral entry (A,B,C,E,L,R,7) <p>Additional, amended rules to place individuals into UNC Graduate Prepared portal:</p> <ol style="list-style-type: none"> 5) They graduated from a UNC school with a graduate degree prior to 1980 (too old for the UNC GA data) and their earliest basis code was a 1 or 2

Table A.17. Portal Decision Rules continued

Portal	Data Source/Variables	Decision Rule
TP3: NC Private Undergraduate Prepared	<p>DPI Education Data</p> <ul style="list-style-type: none"> -Undergraduate degree graduation year -University attended -Undergraduate degree level <p>DPI Certified Salary Data</p> <ul style="list-style-type: none"> - Fiscal year minus teacher’s years of experience to calculate first year teaching <p>DPI Licensure Audit Data</p> <ul style="list-style-type: none"> -Earliest basis code for licensure 	<p>Individuals were placed into the NC Private Undergraduate Prepared Portal if:</p> <ol style="list-style-type: none"> 1) They attended a NC private university and graduated with an Bachelor’s degree 2) Their undergraduate degree is their highest degree prior to teaching 3) Their first year teaching comes after their graduation year 4) Their earliest basis code is not lateral entry (A,B,C,E,L,R,7)
TP4: NC Private Graduate Prepared	<p>DPI Education Data</p> <ul style="list-style-type: none"> -Graduate degree graduation year -University attended -Graduate degree level <p>DPI Certified Salary Data</p> <ul style="list-style-type: none"> - Fiscal year minus teacher’s years of experience to calculate first year teaching <p>DPI Licensure Audit Data</p> <ul style="list-style-type: none"> -Earliest basis code for licensure 	<p>Individuals were placed into the NC Private Graduate Prepared Portal if:</p> <ol style="list-style-type: none"> 1) They graduated with a graduate degree from a NC private university 2) Their most proximate degree prior to entering the profession is the NC private graduate degree 3) Their first year teaching comes after their graduate degree graduation year 4) Their original basis code is not lateral entry (A,B,C,E,L,R,7)

Table A.17. Portal Decision Rules continued

Portal	Data Source/Variables	Decision Rule
<p>TP5: Out of State Undergraduate Prepared</p>	<p>DPI Education Data -Undergraduate degree graduation year -University attended -Undergraduate degree level</p> <p>DPI Certified Salary Data - Fiscal year minus teacher’s years of experience to calculate first year teaching</p> <p>DPI Licensure Audit Data -Earliest basis code for licensure</p>	<p>Individuals were placed into the Out of State Undergraduate Portal if: 1) They attended an out of state university and graduated with a Bachelor’s degree 2) Their undergraduate degree is their highest degree prior to teaching 3) Their first year teaching comes after their graduation year 4) Their original basis code is not lateral entry (A,B,C,E,L,R,7)</p>
<p>TP6: Out of State Graduate Prepared</p>	<p>DPI Education Data -Graduate degree graduation year -University attended -Graduate degree level</p> <p>DPI Certified Salary Data - Fiscal year minus teacher’s years of experience to calculate first year teaching</p> <p>DPI Licensure Audit Data -Earliest basis code for licensure</p>	<p>Individuals were placed into the Out of State Graduate Prepared portal if: 1) They graduated with a graduate degree from an out of state university 2) Their most proximate degree prior to entering the profession is the out of state graduate degree 3) Their first year teaching comes after their graduate degree graduation year 4) Their original basis code is not lateral entry (A,B,C,E,L,R,7)</p>

Table A.17. Portal Decision Rules continued

Portal	Data Source/Variables	Decision Rule
TP7: UNC Licensure Only	<p>UNC General Administration Data -UNC licensure only completion year</p> <p>DPI Education Data -Graduation year</p> <p>DPI Certified Salary Data - Fiscal year minus teacher's years of experience to calculate first year teaching</p> <p>DPI Licensure Audit Data -Earliest basis code for licensure</p>	<p>Individuals were placed into the UNC Licensure Only portal if:</p> <ol style="list-style-type: none"> 1) They graduated with a Bachelor's or graduate degree from any in-state or out-of-state university 2) They completed licensure only work at a UNC institutions after (not concurrent with) earning their undergraduate or graduate degree, and before entering teaching 3) Their original basis code is not lateral entry (A,B,C,E,L,R,7)
TP8: Other Licensure Only	<p>DPI Education Data -Graduation year -University attended</p> <p>DPI Certified Salary Data - Fiscal year minus teacher's years of experience calculate first year teaching</p> <p>DPI Licensure Audit Data -Earliest basis code for licensure</p>	<p>Individuals were placed into the Other Licensure Only portal if:</p> <ol style="list-style-type: none"> 1) First year of teaching comes after graduation year 2) They have a degree from a North Carolina university 3) Their basis code indicates they received training out of state, but not a degree, between the time of their North Carolina degree and their entry into the classroom

Table A.17. Portal Decision Rules continued

Portal	Data Source/Variables	Decision Rule
TP9: Teach For America	Teach For America Data -Files from Teach For America identify North Carolina corps members	Individuals were placed into the Teach For America portal if: 1) They were North Carolina Teach For America corps members 2) They were not traditionally trained at a UNC institution prior to teaching
TP10: Visiting International Faculty	DPI Licensure Audit Data -Earliest basis code for licensure	Individuals were placed into the Visiting International Faculty portal if: 1) They have a basis code of F in the licensure audit file
TP11: Lateral Entry	DPI Certified Salary Data - Fiscal year minus teacher's years of experience to calculate first year teaching DPI Licensure Audit Data -Earliest basis code for licensure	Individuals were placed into the Lateral Entry portal if: 1) They were teaching prior to completion of an education degree or licensure program 2) Their original basis code from the DPI licensure audit data corresponds with lateral entry (A,B,C,E,L,R,7)
TP12: Unclassifiable	UNC General Administration Data -Graduation year -Completion of an education major or licensure DPI Education Data -Graduation year -Degree level DPI Certified Salary Data - Fiscal year minus teacher's years of experience to calculate first year teaching DPI Licensure Audit Data -Earliest basis code for licensure	Individuals were placed into the Unclassifiable portal if: 1) Based on the decision rules for the teaching portal categories above, data limitations prohibited them from being classified into any of the portals Examples: -Their education/degree level was less than a Bachelor's -They do not have a graduation year in the DPI education data -They were teaching more than one year prior to their graduation year, and they do not have a lateral entry basis code