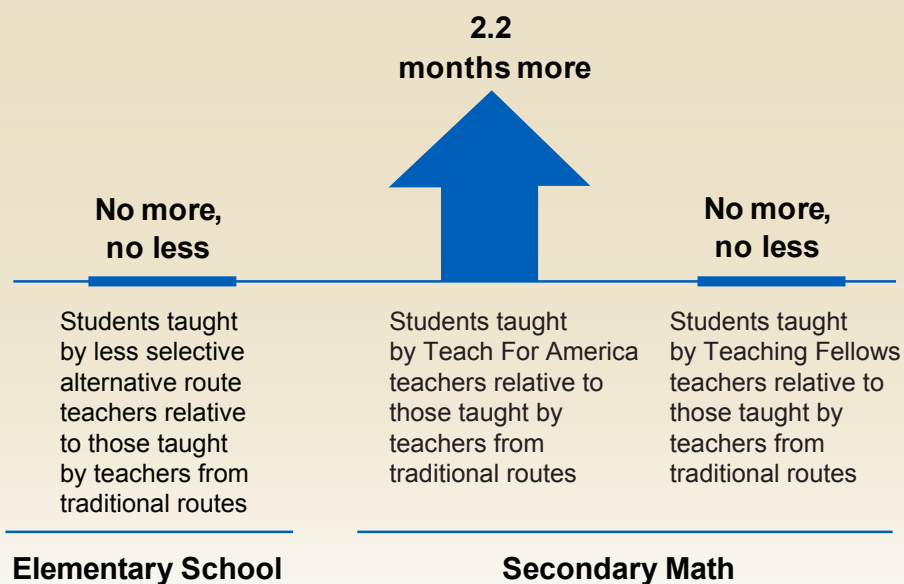


## ADDRESSING TEACHER SHORTAGES IN DISADVANTAGED SCHOOLS: LESSONS FROM TWO INSTITUTE OF EDUCATION SCIENCES STUDIES

### Students' additional months of learning



Recent studies from the Institute of Education Sciences evaluated teachers who entered teaching via two highly selective alternative routes—Teach For America and the Teaching Fellows programs—and less selective alternative routes that accept nearly all applicants. Elementary school students taught by teachers from less selective alternative routes had similar test scores to their peers taught by teachers from traditional routes, as did students of secondary math teachers from Teaching Fellows programs. Students of secondary math teachers from Teach For America outperformed their peers taught by teachers from traditional routes by 0.06 standard deviations, or the equivalent of an additional 2.2 months of school.

Schools serving low-income students struggle to attract effective teachers, particularly in science and math. In response to these staffing difficulties, states have tried to lower the barriers to becoming a teacher by establishing *alternative routes to certification*. These routes enable teachers to begin teaching before completing all the requirements for certification and, in many cases, require less education coursework than traditional teacher preparation routes in the same states. Currently, as many as two-fifths of new teachers enter the profession through alternative routes. Most programs providing alternative routes to certification admit most applicants, although a few, including Teach For America and the Teaching Fellows programs, are highly selective, admitting fewer than 15 percent of applicants.<sup>1</sup>

Despite their growing prevalence, alternative routes to teacher certification remain controversial. Proponents argue that alternative routes increase the number of effective teachers by reducing the time and expense required to become a teacher and eliminating burdensome education coursework requirements. However, critics have raised concerns that teachers from alternative routes are not as well prepared for the classroom as teachers who followed the traditional route, completing university-based education coursework and supervised student teaching before beginning their first teaching jobs.<sup>2</sup>

To provide evidence on the effectiveness of teachers from alternative routes to certification, the U.S. Department of Education’s Institute of Education Sciences (IES) sponsored two large, multistate random assignment studies.<sup>3</sup> Together, the two studies, which were conducted by Mathematica Policy Research, provide a portrait of teachers from a diverse set of alternative route programs, across a range of grade levels. The first study examined the effectiveness of *elementary school teachers from less selective alternative routes*. The second study examined the effectiveness of *secondary math teachers from two highly selective alternative routes*, Teach For America and the Teaching Fellows programs. Both studies also explored whether any specific teacher characteristics or preparation program features were associated with effective teaching, to help guide efforts to improve teacher preparation programs and teacher effectiveness.

## Key Lessons Learned

- **Teachers who enter teaching through alternative routes to certification can help fill teacher shortages in hard-to-staff schools and subjects without reducing student achievement.** Elementary school teachers from less selective alternative routes were neither more nor less effective than similarly experienced teachers from traditional routes. Secondary math teachers from highly selective routes were at least as effective as, and in some cases more effective than, teachers from traditional routes, despite the fact that the teachers from highly selective routes had less experience, on average, than their counterparts from traditional routes.
- **Coursework taken while teaching may decrease teachers’ effectiveness.** Although not definitive because they are based on nonexperimental analyses, both studies found that teachers who took coursework while teaching were less effective than teachers who did not take coursework. These findings suggest that taking coursework while teaching may divert teachers’ time and energy from their classrooms.
- **It is difficult to predict teacher effectiveness at the time of hiring.** Although not definitive because they are based on nonexperimental analyses, both studies found that few teacher characteristics or credentials that can be easily observed during hiring predict teacher effectiveness. Similarly, with the exception of Teach For America, the teachers’ route into teaching did not predict their effectiveness in the classroom. These findings suggest that policies setting restrictions on the routes through which individuals can enter teaching or the academic credentials that they must acquire are unlikely to improve the quality of instruction.

## Background on Alternative Routes to Certification

The growth in alternative route programs has led to considerable variety in the way teachers are recruited and trained. For the purpose of this brief, the traditional route to certification is defined as one that requires candidates to complete all requirements for certification, including education coursework and supervised student teaching, before beginning their first teaching job. Some traditionally certified teachers complete an undergraduate major in education, whereas others major in a different field but complete a university-based teacher certification program.

Unlike the traditional route to certification, alternative routes allow teachers to complete some certification requirements while they are teaching. Beyond this commonality, alternative route programs vary greatly.<sup>4</sup> Some of these programs are sponsored by colleges or universities (many of which also operate traditional certification programs). Others are sponsored by school districts seeking to address their particular staffing needs. Still others are sponsored by private nonprofit organizations or consortia of different types of organizations.

Requirements for the amount and content of coursework also vary substantially across alternative routes, reflecting wide variation in state policies for these programs. Some states require similar hours of coursework for alternative and traditional routes, whereas others require considerably less coursework for alternative route programs. Finally, the timing of required coursework also varies. Most states require that teachers in alternative routes complete a substantial amount of coursework before they enter the classroom, but some do not require the completion of any coursework before teaching begins.

Another key dimension on which alternative route programs vary is selectivity. The vast majority of alternative route programs are not highly selective and admit most applicants.<sup>5</sup> However, a small proportion of programs are highly selective, with screening procedures and admissions requirements that limit program acceptance. The two largest and best known highly selective alternative route programs are Teach For America and the Teaching Fellows programs affiliated with TNTP (formerly The New Teacher Project).<sup>6</sup> The two programs have many similarities: (1) their mission (providing high quality teachers to disadvantaged schools); (2) the degree of selectivity (both admit less than 15 percent of applicants nationwide); (3) the selection procedures (a full-day screening event with an interview, sample teaching, and writing exercises); and (4) training (a five- to seven-week summer training program before the first teaching job).

One distinction between Teach For America and the Teaching Fellows programs is that Teach For America asks candidates to commit to only two years of teaching (although it supports their remaining longer), whereas the Teaching Fellows programs seek candidates likely to continue teaching long term. Teach For America's two-year commitment has led to criticism that teachers from the program will leave the profession before accumulating valuable experience that would improve their effectiveness. However, Teach For America suggests that requiring only a limited initial commitment attracts outstanding individuals into the profession who might not otherwise become teachers at all.

## Two Random Assignment Studies

Given the continuing controversy surrounding alternative routes to certification and the need to learn more about successful methods for recruiting and training effective teachers, IES sponsored two random assignment studies of the effectiveness of teachers from different routes to certification, summarized in Table 1. The studies measured effectiveness using student achievement test scores.

The first study focused on elementary school teachers from less selective alternative routes, comparing their effectiveness with that of teachers from traditional routes in the same grades and schools. The study included only teachers with five or fewer years of teaching experience, in order to compare teachers with similar experience levels. The study also sought to provide evidence on the burdens and benefits of coursework required for teacher certification by separately examining the effectiveness of teachers from alternative route programs requiring high and low amounts of coursework.

The second study focused on secondary (middle and high school) math teachers from two highly selective alternative route programs—Teach For America and the Teaching Fellows programs. It compared the effectiveness of teachers from each program separately with the effectiveness of secondary math teachers from either traditional or less selective alternative routes in the same grades and schools. This study included both novice and experienced teachers in order to examine concerns that Teach For America teachers are less effective than their more experienced counterparts from other programs because they remain in teaching for fewer years, on average. The study focused on secondary math because schools often have difficulty finding qualified teachers in this area.

**Table I. Summary of IES Studies of Alternative Routes to Certification**

	<b>The Less Selective Alternative Route Study<sup>a</sup></b>	<b>The Highly Selective Alternative Route Study<sup>b</sup></b>
Type of Teachers	Elementary school	Secondary math
Certification Route of Focal Teachers	Less selective alternative routes	Teach For America or Teaching Fellows programs
Certification Route of Comparison Teachers	Traditional routes	Traditional or less selective alternative routes
Experience of Teachers	Fewer than 6 years	No restrictions
School Years	2004–2005 and 2005–2006	2009–2010 and 2010–2011
Outcome(s) of Interest	End-of-year reading and math scores	End-of-year math scores
Number of Study Participants	2,600 students, 174 teachers, 63 schools, 20 districts, and 7 states	<ul style="list-style-type: none"> <li>• Teach For America sample: 4,753 students, 135 teachers, 45 schools, 11 districts, and 8 states</li> <li>• Teaching Fellows sample: 4,116 students, 153 teachers, 44 schools, 9 districts, and 8 states</li> </ul>
Main Findings	Elementary school teachers from less selective alternative routes were neither more nor less effective than teachers from traditional routes	<ul style="list-style-type: none"> <li>• Secondary math teachers from Teach For America were more effective than teachers from other routes</li> <li>• Secondary math teachers from Teaching Fellows programs were neither more nor less effective than teachers from other routes</li> </ul>

<sup>a</sup> Constantine, Jill, Daniel Player, Tim Silva, Kristin Hallgren, Mary Grider, and John Deke (2009). *An Evaluation of Teachers Trained Through Different Routes to Certification, Final Report* (NCEE 2009-4043). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Available at [<http://ies.ed.gov/pubsearch/pubsinfo.asp?pubid=NCEE20094043>].

<sup>b</sup> Clark, Melissa A., Hanley S. Chiang, Tim Silva, Sheena McConnell, Kathy Sonnenfeld, Anastasia Erbe, and Michael Puma. (2013). *The Effectiveness of Secondary Math Teachers from Teach For America and the Teaching Fellows Programs* (NCEE 2013-4015). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Available at [<http://ies.ed.gov/pubsearch/pubsinfo.asp?pubid=NCEE20134015>].

Both studies used an experimental design, under which students in a given grade and school were randomly assigned to a teacher from the route being studied (less selective alternative route, Teach For America, or Teaching Fellows program) or a teacher in the same school and grade who pursued a route to certification other than each study's focal route. Random assignment, widely considered the gold standard of research design in impact evaluations, ensured that the types of students assigned to teachers in the same grade and school were similar on average at the start of the school year. This in turn enabled the studies to attribute any differences in student performance at the end of the year to the effectiveness of the teachers, rather than to underlying differences between the students or school contexts in which they taught.

Both studies included schools that hired teachers from the alternative routes being studied, could meet the study design requirements, and were willing to participate. Consistent with the types of schools in which teachers from alternative routes typically teach, the schools in the study samples served more economically

disadvantaged populations than the typical public school nationwide. In addition, the study schools were predominantly in large urban districts, reflecting study recruitment strategies focused on districts most likely to have large concentrations of teachers from the alternative routes being studied.

To help guide principals' and districts' hiring decisions and policymakers' and programs' efforts to improve teacher preparation, both studies examined factors associated with teacher effectiveness. For instance, the studies explored factors often considered in districts' policies and principals' hiring decisions—such as college major, master's degree completion, completed education coursework, and test scores—and examined whether these factors could accurately predict a teacher's effectiveness in the classroom. Because these analyses relied on nonexperimental methods, the results can suggest some characteristics of effective teachers, but cannot provide conclusive evidence about whether any of these characteristics *caused* higher student achievement.

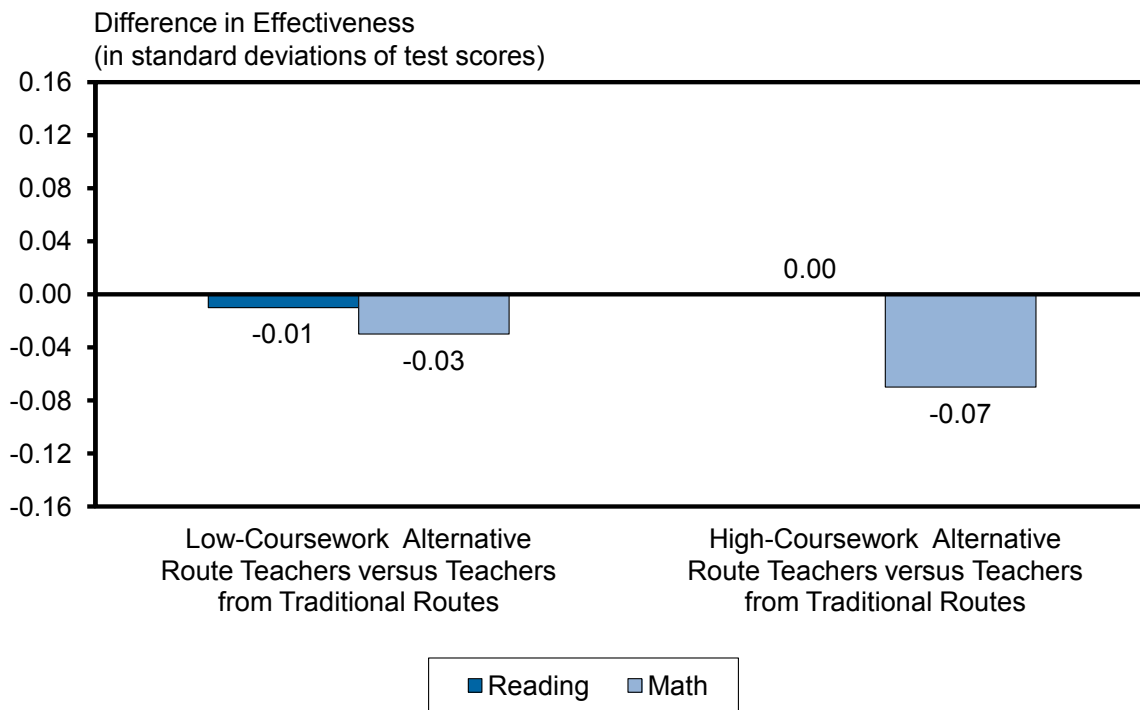
Although the studies provide an important opportunity to learn about the effectiveness of teachers from alternative routes to certification and their preparation experiences, a few considerations should be kept in mind when interpreting the results. First, the findings of both studies provide information on the relative effectiveness of teachers who follow different routes to certification rather than on the effectiveness of the programs themselves. The types of people who enter teaching through a highly selective route might be very different from those who enter through less selective alternative routes, who could in turn be very different from those who enter via traditional routes: the studies do not disentangle the effects of the teachers' background characteristics from the effects of the programs. In addition, the findings are for those schools included in the studies.

### **Teachers from Alternative Routes Can Help Fill Teacher Shortages in Hard-to-Staff Schools and Subjects Without Reducing Student Achievement**

Both studies found that *teachers from alternative routes were at least as effective as, or in some cases more effective than, teachers from traditional routes* in the disadvantaged schools that they served. Students of teachers from alternative routes scored, on average, at least as high on an achievement test at the end of the school year as students of teachers from traditional routes.

*Elementary school teachers from less selective alternative route programs in the studied schools were neither more nor less effective than teachers from traditional route programs.* This finding was true for alternative route teachers from both high- and low-coursework programs and for students' scores in both reading and math (Figure 1). As shown in the figure, although average differences in reading and math scores were generally negative, they were not statistically significant.

**Figure 1. Elementary Teachers from Alternative Routes Were Neither More Nor Less Effective than Their Counterparts from Traditional Routes**

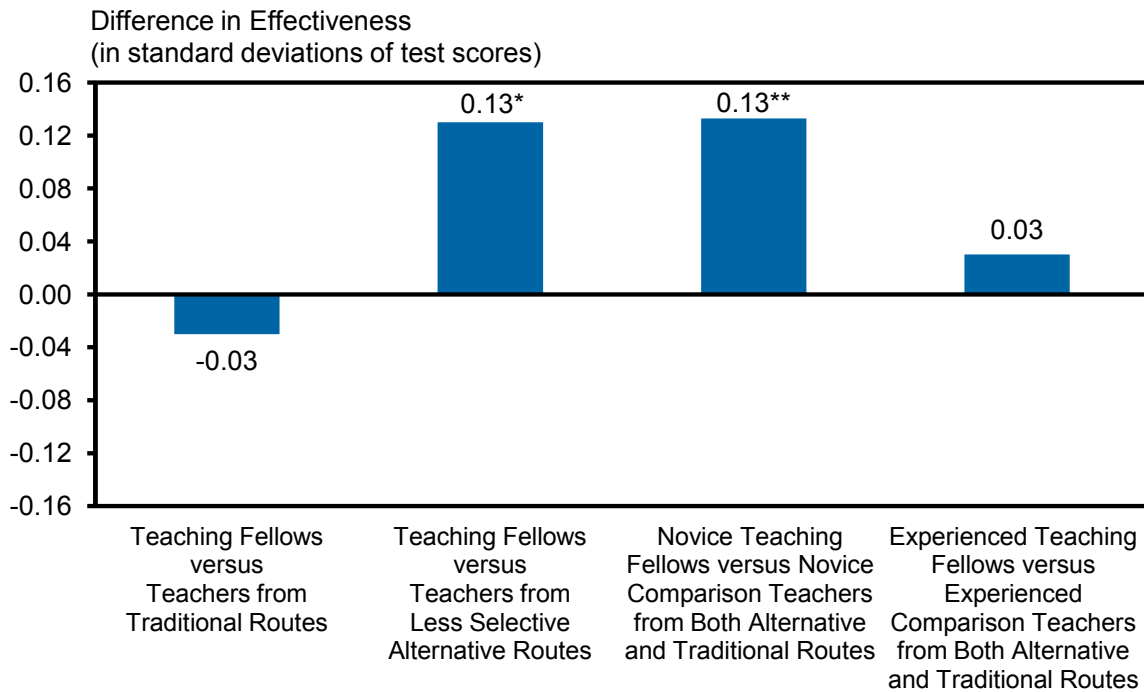


Note: None of the differences is significantly different from zero at the 0.05 level based on a two-tailed test.

Source: Constantine et al. (2009).

*Secondary math teachers from Teaching Fellows programs in the studied schools were at least as effective overall as their counterparts from other routes (less selective alternative or traditional), and were more effective in some cases (Figure 2). Students of Teaching Fellows had end-of-year math scores similar to those of students taught by teachers from traditional routes in the same grades and schools and had significantly higher scores than students of teachers from less selective alternative routes (by 0.13 standard deviations, or about 5.2 months of learning). Similarly, students of novice Teaching Fellows (those with fewer than four years of experience) outperformed students of other novice teachers (from both traditional and less selective alternative routes) by 0.13 standard deviations, whereas students of experienced Teaching Fellows performed about the same as students of experienced teachers from other routes.*

**Figure 2. Secondary Math Teachers from the Teaching Fellows Programs Were at Least as Effective as Their Counterparts from Other Routes**



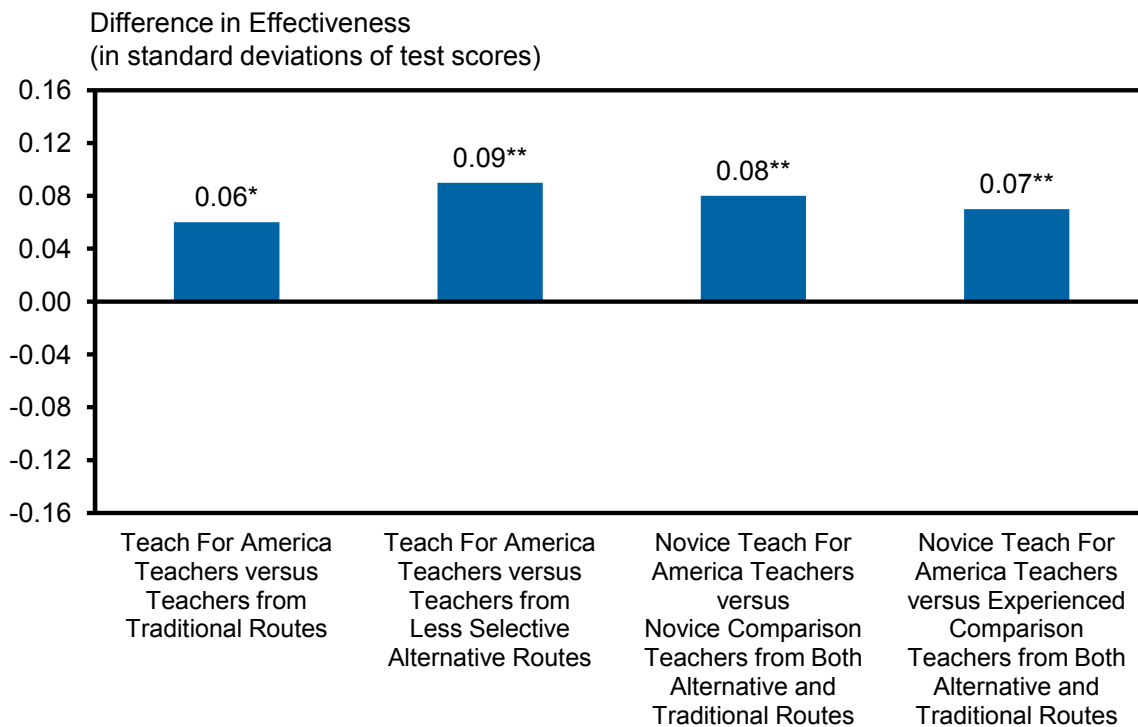
\*Difference is statistically significant at the 0.05 level based on a two-tailed test.

\*\*Difference is statistically significant at the 0.01 level based on a two-tailed test.

Source: Clark et al. (2013).

Finally, *secondary math teachers from Teach For America in the studied schools were more effective than their counterparts from other routes (traditional and less selective alternative), even taking into account the fact that the Teach For America teachers tended to be less experienced (Figure 3). Students of Teach For America teachers outperformed students of other teachers in the same grades and schools by a statistically significant margin on end-of-year math exams, whether the comparison teachers were from traditional routes (a difference of 0.06 standard deviations, or about 2.4 months of learning) or less selective alternative routes (a difference of 0.09 standard deviations, or about 3.6 months of learning). Similarly, students of Teach For America teachers in their first three years of teaching outperformed students of other novice teachers in the same grades and schools as well as students of more experienced teachers. This latter finding is particularly important given the fact that Teach For America requires only a two-year commitment.*

**Figure 3. Secondary Math Teachers from Teach For America Were More Effective than Their Counterparts from Other Routes**



\*Difference is statistically significant at the 0.05 level based on a two-tailed test.

\*\*Difference is statistically significant at the 0.01 level based on a two-tailed test.

Source: Clark et al. (2013).

## Coursework Taken While Teaching Was Associated with Decreased Teacher Effectiveness

Both studies found that teachers who took coursework *while teaching*, whether or not it was required for initial certification, were less effective than teachers who did not take coursework. Among the relatively inexperienced elementary school teachers studied, student scores in reading were significantly lower (by 0.13 standard deviations) among the teachers from less selective alternative routes who took coursework while teaching than among their counterparts from traditional routes who did not take coursework. Similarly, among the secondary math teachers studied, teachers who took more coursework during the school year were less effective by a statistically significant margin (with student test scores falling by 0.002 standard deviations for each additional 10 hours of coursework the teacher took during the school year), even among teachers with similar backgrounds and preparation. Both sets of findings were based on nonexperimental analyses, so they cannot provide definitive evidence that coursework taken while teaching reduced a teacher's effectiveness. The findings suggest that, rather than improving teaching skills, taking coursework while teaching might divert teachers' time and energy from their classrooms.



## It Is Difficult to Predict Effective Teaching at the Time of Hiring

Consistent with much of the previous literature, both studies found that few teacher characteristics that can be easily observed during hiring predicted teacher effectiveness.<sup>7</sup> Both studies examined several characteristics of teachers and their preparation for teaching, including some that might play a role in district hiring policies or determining teacher salaries, and found few indications that these factors can predict who will be an effective teacher.

- **The amount of education coursework that elementary school teachers were required to complete for initial certification was not related to their effectiveness.** Although, as discussed earlier, coursework taken *while teaching* was associated with decreased teacher effectiveness, the total amount of coursework *required for initial certification* had no relation to how effective alternative route teachers were in comparison with traditional route teachers. Regardless of whether their programs required low or high amounts of education coursework, elementary school teachers who chose to enter teaching through less selective alternative routes were neither more nor less effective than their counterparts from traditional routes based on experimental analyses (see Figure 2). Additional, nonexperimental analyses directly relating teachers' hours of required coursework for certification to their students' test scores also indicated no relationship (Constantine et al. 2009).
- **Evidence on the relationship between math content knowledge and the teachers' effectiveness was mixed.** Nonexperimental analyses in both studies examined relationships between math content knowledge and teacher effectiveness. Having a degree in math or a math-related subject was not related to the performance of secondary teachers from highly selective alternative routes (Clark et al. 2013). The same study found that higher teacher math content knowledge might be related to higher student performance at the high school level. Students taught by teachers who had higher than average scores on the Praxis II Mathematics Content Knowledge Test (taken primarily by high school teachers) had higher math achievement (by 0.12 standard deviations) than those taught by teachers who scored lower than average. However, other analyses in the same study found no direct relationship between teachers' scores on the Mathematics Content Knowledge Test and the achievement of their students. In addition, the study found no relationship between teachers' performance on the Praxis II Middle School Mathematics Test and teacher effectiveness. In the study of elementary school teachers, there was no indication of any differences in the effectiveness of teachers from less selective alternative routes based on their Scholastic Assessment Test (SAT) scores (Constantine et al. 2009).
- **Few other characteristics examined were related to teacher effectiveness.** Among the secondary math teachers studied by Clark et al. (2013), effectiveness generally increased with years of teaching experience—in particular, from the first to second year of teaching and beyond the fifth year of teaching. However, effectiveness was unrelated to experience among the elementary school teachers studied by Constantine et al. (2009). Both studies examined other teacher characteristics that would be observable at the time of hiring. The less selective alternative route study looked at college selectivity and teachers' demographic characteristics. The highly selective alternative route study examined college selectivity, hours of math pedagogy training, and days of student teaching. None of these characteristics were related to teacher effectiveness on the basis of nonexperimental analyses in these studies.

Together, the findings of the two studies suggest that a teacher’s potential effectiveness in the classroom is not easily predicted at the time of hiring based on teacher characteristics that were measured in the studies such as college major and coursework completed. Given the effectiveness of Teach For America teachers relative to their counterparts from other routes, and the effectiveness of novice Teaching Fellows teachers relative to their novice counterparts from other routes, it is possible that these highly selective programs’ recruitment practices and in-depth screening procedures might more effectively identify successful teachers than relying on the easily observable characteristics that were measured in the two studies. However, there may be other teacher characteristics—beyond those considered during the selection of applicants into each route—that are also associated with effectiveness in the classroom and that were not measured in the two studies. Nonetheless, these findings indicate the difficulty of predicting who will be an effective teacher based on characteristics that are readily observable at the time of hiring, including the routes through which individuals can enter teaching or the academic credentials that they must acquire.

## Endnotes

<sup>1</sup> Information on difficulties faced by high-poverty schools in attracting effective math and science teachers is from: Ingersoll, Richard M., and David Perda. “The Mathematics and Science Teacher Shortage: Fact and Myth.” CPRE Research Report #RR-62. Philadelphia, PA: University of Pennsylvania, Consortium for Policy Research in Education, 2009. Ingersoll, Richard M., and Henry May. “The Magnitude, Destinations, and Determinants of Mathematics and Science Teacher Turnover.” *Educational Evaluation and Policy Analysis*, vol. 34, no. 4, 2012, pp. 435-464. Information on the proportion of teachers entering teaching through alternative routes is from: Feistritzer, C.E. “Profile of Teachers in the U.S. 2011.” Washington, DC: National Center for Education Information, 2011. Information on the proportion of applicants offered admission to Teach For America and the Teaching Fellows programs is from the IES study of secondary math teachers from Teach For America and the Teaching Fellows programs (Clark, Melissa A., Daniel W. Player, Alison Wellington, and Sheena McConnell. “An Evaluation of Secondary Math Teachers from Two Highly Selective Alternative Routes to Certification: Design Report.” Princeton, NJ: Mathematica Policy Research, December 22, 2009).

<sup>2</sup> Arguments that the coursework requirements of traditional routes are too burdensome can be found in: Hess, F.M. “Tear Down This Wall: The Case for a Radical Overhaul of Teacher Certification.” Washington, DC: Progressive Policy Institute, November 2001. Finn, C.E. “High Hurdles.” *Education Next*, vol. 3, no. 2, 2002, pp. 62–67. Arguments that teachers from alternative routes are not well-prepared for the classroom can be found in: Darling-Hammond, Linda. “Teaching and Knowledge: Policy Issues Posed by Alternate Certification for Teachers.” *Peabody Journal of Education*, vol. 67, no. 3, Spring 1990, pp. 123-154. Darling-Hammond, Linda. “How Teacher Education Matters.” *Journal of Teacher Education*, vol. 51, no. 3, May/June 2000, pp. 166-73.

<sup>3</sup> Constantine, Jill, Daniel Player, Tim Silva, Kristin Hallgren, Mary Grider, and John Deke (2009). *An Evaluation of Teachers Trained Through Different Routes to Certification, Final Report* (NCEE 2009-4043). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Clark, Melissa A., Hanley S. Chiang, Tim Silva, Sheena McConnell, Kathy Sonnenfeld, Anastasia Erbe, and Michael Puma. (2013). *The Effectiveness of Secondary Math Teachers from Teach For America and the Teaching Fellows Programs* (NCEE 2013-4015). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.

<sup>4</sup> Information in this paragraph on the different types of alternative route programs is from the IES study of elementary school teachers from less selective alternative routes to certification (Constantine et al. 2009). It is based on interviews with a representative sample of 54 less selective programs providing alternative routes to certification in 12 states from 2001 to 2004.

<sup>5</sup> Walsh, Kate, and Sandi Jacobs. “Alternative Certification Isn’t Alternative.” Washington, DC: Thomas B. Fordham Institute, September 2007. Mayer, Daniel P., Paul T. Decker, Steven Glazerman, and Timothy W. Silva. “Identifying Alternative Certification Programs for an Impact Evaluation of Teacher Preparation.” Cambridge, MA: Mathematica Policy Research, April 2003.

<sup>6</sup> Clark, Melissa A., Daniel W. Player, Alison Wellington, and Sheena McConnell. “An Evaluation of Secondary Math Teachers from Two Highly Selective Alternative Routes to Certification: Design Report.” Princeton, NJ: Mathematica Policy Research, December 22, 2009. Clark et al. (2009) found that, together, Teach For America and the Teaching Fellows programs provided 99 percent of all secondary math teachers from highly selective routes in the 2007–2008 school year.

<sup>7</sup> Hanushek, Eric, and Steven Rivkin. “Teacher Quality.” In *Handbook of the Economics of Education*, edited by E. Hanushek and F. Welch. Amsterdam: North-Holland, 2006.

**For more information on the two reports, please visit:**

<http://ies.ed.gov/pubsearch/pubsinfo.asp?pubid=NCEE20094043>

**and**

<http://ies.ed.gov/pubsearch/pubsinfo.asp?pubid=NCEE20134015>



*This brief was prepared for NCEE by Melissa Clark, Sheena McConnell, Jill Constantine, and Hanley Chiang of Mathematica Policy Research under contract number ED-04-CO-0112/0009, Project Officer, Elizabeth Warner. Lessons learned are based on findings from two previously released IES reports: “An Evaluation of Teachers Trained Through Different Routes to Certification,” and “The Effectiveness of Secondary Math Teachers from Teach For America and the Teaching Fellows Programs.”*