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MATHEMATICA
Policy Research, Inc.

**An Evaluation of
Secondary Math Teachers
From Two Highly
Selective Routes to
Alternative Certification -
Addendum**

***Part A: Supporting
Statement for Paperwork
Reduction Act Submission***

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PART A: SUPPORTING STATEMENT FOR PAPERWORK REDUCTION ACT SUBMISSION

This package requests clearance for data collection activities to support a rigorous evaluation of secondary math teachers who have entered teaching through highly selective routes to alternative certification (HSAC). This evaluation is being conducted by the Institute of Education Sciences (IES), National Center for Education Evaluation, U.S. Department of Education (ED); it is being implemented by Mathematica Policy Research, Inc. (MPR) and its partners—Chesapeake Research Associates LLC and Branch Associates.

The objective of the evaluation is to estimate the impact on secondary student math achievement of teachers who obtain certification via HSAC routes compared with teachers who receive certification through traditional or less selective alternative certification routes. The evaluation design is an experiment in which the researchers will randomly assign secondary school students to a treatment or control group. The treatment group will be taught by an HSAC teacher and the control group will be taught by a non-HSAC teacher. Both teachers must teach the same math class at the same level under the same general conditions at the same school. We will compare student math achievement between the treatment and control groups to estimate the impact of HSAC teachers.

This is the second submission of a two-stage clearance request. The package was submitted in two stages because the study schedule required that district and school recruitment begin before all the data collection instruments were developed and tested. The first package requested approval for recruitment of schools, a teacher background form, a pilot of the student assessment, and the random assignment of students. In this package, we are requesting approval for:

- A teacher survey and collection of teacher contact information
- A teacher math content knowledge assessment—the Praxis II series math subject test—to be administered to teachers who were not required to take this test for certification
- A form for all teachers—whether they took the Praxis II series math subject test to obtain certification or just for this study—to provide consent for the Educational Testing Service (ETS) to release their scores on this assessment to the study team
- Parent/guardian consent forms for the administration of a math assessment to high school students and the collection of school records on middle and high school students
- Collection of school records data on student characteristics and scores on state or district math assessments
- A student math assessment and students' assent for taking the assessment

- A protocol for semi-structured interviews of HSAC program administrators

This package provides a detailed discussion of the procedures for these data collection activities and copies of the forms and instruments.

A. JUSTIFICATION

1. Circumstances Necessitating Collection of Information

a. Statement of Need for a Rigorous Evaluation of HSAC Teachers

The specific legislation authorizing this data collection is Section 9601 of the Elementary and Secondary Education Act of 1965 (ESEA), which permits ESEA program funds to be used to evaluate activities that are authorized under this act. The No Child Left Behind Act of 2001 (NCLB), which reauthorized ESEA, emphasizes the importance of teacher quality in improving student achievement. Title II, Part A of ESEA—the Improving Teacher Quality State Grants program—provides nearly \$3 billion a year to states to prepare, train, and recruit high-quality teachers, especially in the areas of mathematics and science. The purpose of Title II, Part A is to help states and local school districts improve student achievement through strategies for improving teacher quality and increasing the number of highly qualified teachers. One allowable use of Title II, Part A funds is “carrying out programs that establish, expand, or improve alternative routes for state certification of teachers and principals, especially in the areas of mathematics and science.” Teachers who have not yet obtained full state certification can meet the highly qualified teacher requirements of NCLB if they are participating in an alternative route to certification program and demonstrate satisfactory progress toward full state certification (Title I: Improving the Academic Achievement of the Disadvantaged, Final Regulations, 34 CFR Part 200.56, December 2, 2002).

In response to the increasing teacher shortages faced by many school districts, 47 states have established alternative routes to certification that allow teachers to begin teaching before completing all of the training required for certification. While most teachers still follow traditional certification routes, an increasing number of teachers are entering the profession through alternative certification routes. By some estimates, about one-third of any given year’s teachers have entered the profession via alternative certification routes (Feistritzer and Chester 2002).

Many alternative certification programs are not very selective and accept most of their applicants. However, some are highly selective, requiring applicants to undergo challenging interviews and a rigorous screening process and rejecting many or even most of their applicants. Teachers from these highly selective alternative certification programs have often been seen as a way to fill teacher shortages, especially in the areas of math and science (Ingersoll 2003; Boyd et al. 2006). The number of new teachers entering teaching through HSAC programs has grown rapidly since the founding of Teach For America, the first HSAC program, in 1990.

Despite the rising number of HSAC teachers, policymakers lack rigorous research evidence about the effectiveness of HSAC teachers in improving student achievement, particularly at the

secondary level. To date, there has been one experimental study of HSAC teachers at the elementary level (Decker et al. 2004). Several well implemented nonexperimental studies have findings that suggest students of HSAC teachers at the secondary level perform at least as well and sometimes slightly better on mathematics achievement tests than students of traditionally certified teachers (Boyd et al. 2006; Kane et al. 2006; Xu et al. 2008). However, the nonexperimental methods used by these studies leave open the possibility that any observed differences in student achievement may be due to factors other than the HSAC teachers.

This evaluation is thus essential to determining whether efforts to place high-quality alternatively certified teachers in classrooms are, in fact, having a measurable impact on student achievement. This study aims to fill the knowledge gap by focusing on secondary teachers from the two largest and most well-known HSAC programs: (1) Teach For America (TFA), and (2) the Teaching Fellows programs and similar programs by other names, fostered by The New Teacher Project (TNTP). TFA recruits recent graduates of some of the nation's most prestigious colleges. TNTP-affiliated programs focus on highly accomplished people who began their careers in other fields, but want to become teachers. For the feasibility study for this evaluation, we conducted an extensive search for HSAC programs and identified five smaller HSAC programs. We have excluded those smaller programs from our sample because they provide only about 100 teachers per year (across all subjects and grade levels), compared with over 16,000 teachers provided by TFA and TNTP.

The study focuses on math at the secondary level for four reasons. First, secondary math teacher shortages are widespread, so there is a high demand for HSAC teachers in this area. Second, the United States lags behind many other industrialized countries in secondary math achievement, suggesting a need for evidence on ways to enhance math achievement at this level. Third, some have argued that HSAC teachers are most effective at teaching the more advanced technical courses, such as secondary math. Fourth, a previous rigorous study found that TFA elementary teachers produced greater achievement gains in math than other teachers in the same grades and schools, but there were no differences in reading (Decker et al. 2004).

b. Research Questions

The primary research question of the evaluation is:

- What is the impact on student math achievement of secondary school HSAC math teachers compared with non-HSAC teachers?

The evaluation also will address the following secondary research questions:

- What is the impact of secondary math TFA teachers compared with non-HSAC teachers? What is the impact of secondary math TNTP-affiliated teachers compared with non-HSAC teachers?

- What is the impact of middle school HSAC math teachers? What is the impact of high school HSAC math teachers?
- To what extent do HSAC teachers differ in their educational backgrounds, experience, and math content knowledge from other math teachers in the same schools?
- How does the impact of HSAC teachers vary with their educational backgrounds, experience, and math content knowledge?
- How do HSAC programs recruit, train, and support secondary school math teachers?

c. Study Design

To answer the primary and secondary research questions, this study will use an experimental design in which students in the same school are randomly assigned to either a class that is taught by an HSAC teacher or a class that is taught by a non-HSAC teacher. The teachers in this “classroom match” must teach the same subject at the same level under the same general circumstances (for example, the same number of teachers in the classroom) in the same school. Students randomly assigned to an HSAC teacher comprise the treatment group; those randomly assigned to a non-HSAC teacher comprise the control group.

Random assignment is considered the “gold standard” for social policy evaluations because it, more than any other approach, minimizes the chance that any observed differences in outcomes between the study groups are due to unmeasured, pre-existing differences between members of the groups being studied. To determine whether an experimental evaluation of HSAC teachers would be feasible, MPR staff visited 28 purposively selected schools and concluded that under certain circumstances random assignment of students to HSAC and non-HSAC teachers was possible and that it was feasible to conduct an experimental evaluation of HSAC teachers (Clark et al. 2008).

The ability of the study to detect policy-relevant differences between the treatment and control groups depends, in large part, on the sample sizes. The study aims to include 450 classrooms matches or about 900 classes. Assuming an average of 20 students per class, the study will include approximately 18,000 students. We expect that these matching classrooms will include about 150 pairs of teachers (300 teachers), 112 schools, and 20 districts.

To examine the separate impacts of TFA and TNTP-affiliated programs, we will aim to include roughly equal numbers of teachers from both types of programs. To examine the separate impact of middle and high school HSAC teachers, we will aim to include roughly equal numbers of middle and high school teachers.

Districts, schools, and classes/teachers will be selected purposively based on the feasibility of their participation in an experimental evaluation and their willingness to participate. All districts that expect to employ secondary math teachers from TFA or TNTP programs in the study school year (2009-2010) are eligible to participate in the study. We will prioritize districts with HSAC programs that have been in operation for three years or more, and districts with a

larger number of HSAC secondary math teachers. These districts are likely to include Baltimore, Miami, New York City, Philadelphia/Camden, the San Francisco Bay Area, and Washington, D.C.

A school is eligible to participate in the study if it: (1) is a public secondary school (and so contains at least one of the grades 6-12) and (2) will have at least one set of two matching classrooms—one taught by an HSAC teacher and one taught by a non-HSAC teacher—in the 2009-2010 school year and it is possible to randomly assign students to the classes. To participate in the study, teachers of both classes must teach the same math class at the same level under the same general circumstances. We expect that it will be feasible to randomly assign the students to the classes most frequently when the classes are taught during the same class period, as this is the least disruptive to schools' schedules. For example, a match could be formed if there was a first period Algebra I class taught by an HSAC teacher and a first period Algebra I class taught by a non-HSAC teacher. Schools will be prioritized, like districts, to maximize recruiting success, targeting the largest schools and those identified with the most potentially eligible HSAC teachers.

d. Recruitment of Districts and Schools

To identify districts with HSAC teachers, we will request from TFA and TNTP programs the names of current HSAC program participants and alumni who are teaching secondary math, by region, district, and school. After prioritization of the districts, we will begin to contact and recruit the districts. School recruitment will begin when districts grant us permission to begin contacting schools directly. We will contact those schools that we expect will employ HSAC math teachers during the study school year. As part of the school recruitment process, we will initially screen schools for eligibility and willingness to participate, and we will confirm the eligibility of teachers during in-person visits.

e. Data Collection Needs

To address the study's research questions, data will be required on students, teachers, schools, and HSAC programs.

Students. The key outcome of interest for this evaluation is the students' math achievement at the end of the 2009-2010 school year. For middle school students, we will collect the spring 2010 test scores from state- or district-administered math assessments rather than administering an assessment. As not all high school students take state- or district-administered math assessments, and the tests that are administered to high school students are often not well aligned to the course material they are taught, high school students will be administered an Northwest Evaluation Association (NWEA) in-class adaptive, computerized math assessment in spring 2010. The assessment will measure each student's level of knowledge in the math course he or she is taking—Algebra I, Algebra II, Geometry, or a general math course.

Information on students' demographic and socioeconomic characteristics and on their math test scores prior to the study school year will be used both to describe the students in the study

and to use as covariates in regression models to develop more precise impact estimates. These data will be obtained from students’ school records.

Teachers. To examine how HSAC and non-HSAC teachers differ, teachers will be administered a survey in spring 2010 to collect information about their educational and professional background and the training and support they receive over the 2009-2010 school year. To ensure that we are able to administer the teacher survey to teachers who have left the school during the school year, we will administer a teacher contact form in fall 2009. The contact form will collect mailing address, telephone number, and e-mail address information from the teachers.

A key difference between HSAC and non-HSAC teachers may be their knowledge of the subject matter they teach. To explore the differences in math knowledge of the treatment and control teachers in our sample, we will obtain study teachers’ scores on a teacher math content knowledge assessment.

HSAC Programs. To understand how HSAC programs prepare people for teaching, the team will conduct semi-structured telephone interviews with the administrators of all the programs attended by teachers in the study.

f. Data Collection Activities

Exhibit 1 summarizes the data collection activity (in chronological order). A brief description of each activity is provided after Exhibit 1.

The first stage of this package requested clearance for the pilot study of the student assessment, teacher background form, and the collection of classroom rosters for random assignment, including the initial rosters, lists of late enrolled students, and updated classroom rosters. The remaining data collection activities—collecting the teacher contact form, requesting the teachers take a math assessment and release the scores directly to MPR, requesting student records, administering a teacher survey, obtaining parent/guardian consent for the student’s participation in the study, administering a math assessment to high school students, and interviewing HSAC program administrators—are part of this clearance request.

EXHIBIT 1

DATA COLLECTION PLAN

Schedule	Activity	Respondent	Mode
Spring 2009 (completed)	<i>Pilot Study of Student Math Assessment^a</i> Students will participate in pilot administration of NWEA General Math, Algebra I, Algebra II, and Geometry assessments	High school students in General Math, Algebra I, Algebra II, and Geometry classes	Computer adaptive assessment

Exhibit 1 (continued)

Schedule		Activity	Respondent	Mode
Spring - Summer 2009; Fall 2009 - Spring 2010	<i>Teacher Background Form^a</i>	During school recruitment visit, request teachers (or principals on behalf of teachers) complete form to confirm their route to certification. Also request information from any replacement teacher during the 2009-2010 school year.	Teachers (or principals)	Hard copy
Spring - Summer 2009	<i>Classroom rosters^a</i>	Obtain classroom rosters of students in 2009/10 school year to randomly assign students to either HSAC or non-HSAC classrooms	School staff	Electronic or hard copy
Fall 2009 (first two weeks of fall semester)	<i>List of late enrolling students^a</i>	Obtain names of students who enroll in school after initial random assignment has been conducted	School staff	Electronic or hard copy
Fall 2009	<i>Teacher contact form</i>	Obtain personal contact information from study teachers to enable contact if teacher leaves the study school prior to spring data collection	Teachers	Hard copy
Fall 2009	<i>Teacher math assessment and consent form to release scores to MPR</i>	Request teacher take the ETS Praxis math subject test and obtain consent to obtain score from ETS	Teachers in states that don't require it for certification Consent form requested from all teachers	Praxis hard copy assessment
Fall 2009	<i>Consent forms for school records data collection and for testing (high schools only)</i>	School records: consent not required by Federal law; obtain passive consent if district requires consent High school math assessment: passive consent, unless district requires active consent	Parents and legal guardians of students	Hard copy

Exhibit 1 (continued)

Schedule	Activity	Respondent	Mode
Fall 2009 Early Spring 2010 Spring 2010	<i>Classroom roster checks^a</i>	Verify the students enrolled in study classes	School staff Electronic or hard copy
Spring 2010	<i>Teacher survey</i>	Collect data on training and support received by teachers during school year	Teachers Web, hard copy, telephone reminder
Spring 2010	<i>High school student math assessment and student assent</i>	Measure high school student math achievement in current math course and request student assent prior to assessment	Students NWEA computer adaptive assessment
Spring 2010 – Initial request Summer 2010 - Collect data	<i>Student records data collection</i>	Collect the following data Spring 2006-2010 math standardized test score data Student characteristics data for school year 2009-2010	District or school staff Electronic or hard copy
Spring 2010	<i>HSAC program administrators</i>	Collect information on HSAC programs' recruiting, selection, placement, training, and support strategies for secondary school math teachers	HSAC program administrators Telephone semi-structured interviews

^a Clearance requested in prior OMB package submission; package was cleared on 6/7/09.

Teacher Contact Form. We will administer a teacher contact form at the beginning of the 2009-2010 school year and whenever a new teacher joins a study classroom (Appendix A). This form will request detailed contact information for each teacher in the study. The information collected by the form will be used to contact teachers who leave the school during the study school year so we can ask them to complete the teacher survey in the spring.

Teacher Math Assessment. In fall 2009, we will administer the ETS Praxis Middle School Mathematics (0069) test to teachers in grades 6-8 and the Praxis Content Knowledge in Mathematics (0061) test to teachers in grades 9-12 based on whether the state required teachers to pass these tests for certification (see Exhibit 2). In the states where we will not administer the Praxis math subject test, we will collect the scores that study teachers obtained when they took the test. These two hour long tests include both the math content we expect study teachers to be teaching as well as some more advanced content. Both tests cover numbers and operations, algebra and functions, geometry and measurement, data analysis, statistics, and probability. The Content Knowledge in Mathematics test also covers trigonometry, calculus, and matrix algebra Teachers will be administered the paper-and-pencil test at a school or site in their district (Appendix B). All teachers will be asked to sign a *teacher consent form* to allow the study team to obtain the teacher's test score directly from ETS (Appendix B).

EXHIBIT 2

DECISION RULES FOR ADMINISTERING THE
PRAXIS II SERIES MATH SUBJECT TESTS

STATE CERTIFICATION REQUIREMENTS	ADMINISTER OR ACCEPT
High School Teachers	
State requires Praxis 0061 test	Accept extant test score for Praxis 0061 test
State does not require Praxis 0061 test	Administer Praxis 0061 test
Middle School Teachers	
State requires Praxis 0061 test only	Accept extant test score for Praxis 0061 test
State requires Praxis 0069 test only	Accept extant test score for Praxis 0069 test
State requires Praxis 0061 or 0069 test	Accept extant test score for Praxis 0061 or Praxis 0069 test
State requires neither Praxis 0061 nor Praxis 0069 test	Administer Praxis 0069 test

Parent Consent for High School Student Math Assessment and Middle and High School Student Records Data Collection. Federal rules permit the U.S. Department of Education and its designated agents to collect student demographic and existing achievement data from schools and districts without prior parental or student consent. Since this study will not involve administering a math assessment to middle school students, parental consent for these students is not required by federal law. To maximize response rates and minimize burden on schools and parents, we prefer to follow federal rules and forgo consent for middle school students and use passive consent for the high school student math assessment. However, we will comply with whatever procedures the school districts deem appropriate for middle and high school students, including obtaining active consent for all students if necessary.

In fall 2009, all students for whom passive or active consent is required will be asked to take home a consent form and/or notification letter to their parents or guardians (Appendix C). These documents will be translated into other languages as needed. The documents will inform parents and guardians that their child’s classroom has been selected for a national study of HSAC teachers, that participation in the study is voluntary, and that it will involve schools/districts providing characteristics and test score data for their child. For the high school students, the consent documents will indicate that students will be asked to complete a standardized math assessment in class at the end of the school year. The consent documents will also specify that the information collected will be kept confidential and will only be reported in aggregate. The consent documents are modeled after documents we have used in other evaluations.

If *passive* consent is acceptable to school districts for some or all students, the letters will ask parents to call MPR if they do not want their child to participate in the study. Some districts, however, may require *active* consent. If this is the case, the consent form will ask parents and guardians to permit their child to participate in the study by returning a signed consent form to

their children's school. If parents or guardians do not return a signed consent form, their child will be excluded from the study.

To comply with the requirements of the Chicago public school district, we will use active parental consent. We will also modify the consent form to inform parents that they can call MPR to obtain their child's test scores and to request permission to provide their child's test score to the teacher (Appendix C).

Student Records Data Collection. We will request standardized math test scores for all students for spring 2006 through spring 2010. We will also request data on student characteristics for school year 2009-2010, including sex, race/ethnicity, date of birth, grade, whether they are repeating a grade, whether they are eligible to receive free or reduced-price school lunch, whether they are an English language learner, and whether they have an individual education plan (IEP) or 504 plan. We will request these data first from the district. If the data are not available from the district, we will request the data from the schools. To collect these data, we will send the district or school a letter that will specify the data requested, the students in the study, and alternative ways to submit the data (Appendix D).

Teacher Survey. Teachers will be asked to complete a 30-minute survey in spring 2010, at the end of the study school year (Appendix E). This survey will ask about the college they attended, their college major and minor, any math-related coursework, and previous math-related work experience; the content and timing of certification-related coursework; training, mentoring, and coaching experiences during the school year; and student teaching experience. Teachers will have the option of completing the teacher survey online, using a self-administered paper questionnaire, or via telephone.

Student Math Assessment. At the end of the 2009-2010 school year, high school students will be asked to take the Northwest Evaluation Association (NWEA) end-of-course math test for the course they are taking—General Math, Algebra I, Algebra II, or Geometry. The NWEA assessment is adaptive—the difficulty of the questions presented to the student adapts to the student's performance on prior questions—and so can precisely measure student achievement. The test is taken on a computer.

Some students will be absent on testing day, move to another class during the school year, or leave the school. We will attempt to test all high school students except those who move out of the district. We will ask school officials to allow students who have switched classes to attend the regularly scheduled test session. We will ask students who cannot attend the regularly scheduled test session, have switched schools but stayed in the district, or have dropped out of school to take the test on a Saturday at a central community location, such as a library.

Student Assent for High School Student Math Assessment. Prior to beginning the test, each student will be asked to read a question that asks for his or her assent to take the test (Appendix F). The student will agree to participate in the assessment by checking the appropriate box. Any students who choose not to participate in the assessment will be asked to sit or read quietly at their desk while their classmates continue with the test, or will engage in another activity outside of the classroom as deemed appropriate by the teacher or school.

HSAC Program Administrator Interviews. Semi structured interviews will be conducted with HSAC regional program administrators in spring 2010. The interview protocol will collect information on the strategies used to recruit, select, place, train, and support secondary math teachers (Appendix G).

g. Analysis

The study will estimate overall impacts and impacts for subgroups, including TFA teachers, TNTP teachers, middle school teachers, and high school teachers. We will investigate the extent to which differences in effectiveness are correlated with differences in educational background, experience, and math content knowledge between the HSAC and non-HSAC teachers. To understand how the impact of HSAC teachers varies with their characteristics, we will estimate the impact of teachers defined by certain characteristics, including years of experience.

h. Study Timeline

The study is expected to be completed in four years. The experimental evaluation will be implemented in the 2009-2010 school year. A report on the study findings will be available in spring 2012.

2. Purposes and Uses of Data

Information will be collected by Mathematica Policy Research, Inc. and its partners, Chesapeake Research Associates LLC and Branch Associates, under contract with ED [contract number ED-04-CO-0112 (09)].

The information collected by the *teacher contact form* will be used to contact study teachers who leave the school during the school year so that we can ask them to complete the teacher survey in the spring. This information will increase the response to the teacher survey.

The *teacher math assessment* will measure differences in math knowledge between the HSAC and non-HSAC teachers. These data will be used to describe the differences in math content knowledge between HSAC and non-HSAC teachers and to analyze the relationship between teacher math content knowledge and student achievement at the secondary level. The *teacher consent form* will be used to allow the study team to obtain the teachers' test scores directly from ETS, thus reducing the burden on the teachers and increasing the proportion of teachers for whom we have scores.

The *parent consent forms* for the student math assessment and student records data collection will be used to identify students who are permitted by their parents to participate in the study.

Data collected by the *teacher survey* will be used to describe the teachers and to analyze how the impact of HSAC teachers varies with their educational backgrounds and work experiences.

The scores obtained from the *high school student math assessment* and the *2010 state or district math assessment scores* collected from administrative records will be used to measure the key outcome of interest—student math achievement. Administering the *math assessment to high school students* is necessary because districts are not required by NCLB to test students in grades 9 through 12 annually. Moreover, the tests they do administer are often not specific to a particular course and so may not detect differences in student achievement. However, when available, we will collect 2010 scores on district or state assessments for high school students so we can compare the findings from the district/state assessment and the assessment we administer.

The *school records data* on student characteristics and scores on prior years' state or district math assessments will be used to describe the student sample and to improve the precision of the impact estimates by including these characteristics as covariates in the impact estimation models. They can also be used to confirm that random assignment has been well implemented, creating treatment and control groups with similar characteristics. We will request data on state or district assessments as far back as spring 2006 to ensure that we have prior test scores for all high school students, including those in 12th grade who may have taken their last district/state assessment in 8th grade.

The information collected from the *interviews with the HSAC program administrators* will be used to understand the teacher preparation programs in the study and provide detailed contextual information to interpret findings on the impacts of HSAC teachers.

The study findings as a whole will be used to inform the efforts of national, state, and local policymakers, districts, schools, and parents to improve student outcomes. This information will help guide school districts in their teacher hiring decisions. The study results may also provide policymakers with information on how to improve secondary math achievement in the United States. Math achievement can have a meaningful impact on the future economic well-being of students, with research confirming a correlation between student achievement on standardized tests at the secondary level with post high school earnings (Murnane et al. 1995; Murnane et al. 2001; Lazear 2003; Deke and Haimson 2006). Knowledge of the HSAC teachers' effectiveness will help teacher preparation and certification program developers to design programs that have the best chance of improving student outcomes.

Findings will be presented in a report in spring 2012. In addition, the data collected by the evaluation will be submitted to ED as restricted-use data files that will serve as a valuable resource for other researchers to further examine this issue.

3. Use of Technology to Reduce Burden

For each data collection task, we have selected the form of technology that enables us to obtain reliable information in an efficient way that minimizes respondent burden.

The *teacher math assessments*—the Praxis Middle School Mathematics (0069) test and the Praxis Content Knowledge in Mathematics (0061) test—are administered only as pencil and paper instruments and will be administered by MPR at a school or a site in the teacher's district. The Praxis (0069) assessment will be administered to only middle school teachers in states that do not require this test for certification. High school teachers in states that do not require the

Praxis (0061) test for certification will be administered this test. ETS will have the option of providing us the score data in electronic or in hard copy format.

At the beginning of the school year, we will request that teachers complete a hard-copy *teacher contact form* and *consent to release assessment scores forms*. To minimize burden, we will deliver the forms in person to the teachers if we are at the school at that time and teachers will then have the opportunity to complete it quickly and hand it to the researchers in person. Otherwise, we will mail the forms to the teachers at their schools and they will have the option of returning the forms to MPR by mail or fax.

To maximize access, as not all parents will have access to email, the *parent consent forms* will be available in hard copy format. We will request that teachers ask their students to give the consent documents to their parents and in the case of active consent forms, to return signed forms to their teachers. The consent document will list a telephone number which parents can call to ask questions about the study.

Districts and schools providing *student records and test score data* can provide the records in whatever format is least burdensome. They will have the option of delivering the data electronically, as well as submitting hard-copy documents that already exist. We will provide clear instructions on the data requested.

The *teacher survey* will be administered as a web-based survey; teachers will also have the option of completing a self-administered paper questionnaire or completing the survey by telephone. The online survey will enable teachers to complete the survey at a location and time of their choice, and its automatic editing system will reduce the level of response errors. We will set up a toll-free telephone number and electronic mail address so that teachers can easily contact researchers with questions they may have.

The *high school student math assessment* is a computerized adaptive test developed by NWEA. We have selected this assessment to minimize the burden on students. Adaptive tests have been found to be more efficient (taking less time to complete) and decrease the possibility of floor or ceiling effects (Rock and Pollack 2002). The assessment adapts the test questions to a student's ability level until the student's achievement level is precisely estimated. The test begins with a question (presented on the computer screen) that is at the middle range of difficulty for the course material. If the student answers the question correctly, the next question presented will be more difficult. If the question is answered incorrectly, the next question presented will be easier. This process continues until a final assessment score is determined. The math assessment has been thoroughly tested (NWEA 2003).

We will administer the math assessment in a group setting to all students whose parents have not explicitly refused to allow their children to participate. Students will benefit from the guidance of a test administrator and proctor who will be present to administer the student math assessment, explain directions, and answer questions. MPR will provide laptop computers to administer the assessment. The laptops are battery powered, and we will have a computer technician available during the assessment to address any technology problems. Teachers will be asked to stay during the testing but they will not be required to administer the assessment.

For the middle school students, we have sought to avoid imposing additional burden by using test scores from administrative school records in place of administering a student math assessment.

Interviews with the HSAC program administrators will be conducted by telephone, which will allow us flexibility to schedule the interviews at their convenience.

4. Efforts to Avoid Duplication of Effort

No other experimental evaluation of HSAC math teachers at the secondary school level has been conducted. To date, there has been only one experimental evaluation of HSAC teachers that studied teachers at the elementary level (Decker et al. 2004). Although there have been nonexperimental studies (such as Boyd et al. 2006; Kane et al. 2006; Xu et al. 2008), the findings are mixed and the nonexperimental methods used by these studies leave open the possibility that observed differences in student achievement might be due to underlying differences between the students taught by the HSAC and non-HSAC teachers rather than to true causal effects of the HSAC teachers themselves.

To the extent possible, we will use existing data for the study rather than duplicate data collection efforts. We are using test scores from the state- or district-administered student assessments, instead of administering an assessment, to measure math achievement for the middle school students. Because state assessments are often unavailable for high school students, or are poorly aligned with their courses, we will administer a math assessment to high school students. However, we will seek to collect the test scores for high school students on the 2010 state- or district-administered student assessments so that we can compare the findings for the state/district assessments and the assessments we administer for some students.

Only middle school teachers in states that do not require the Praxis 0061 or 0069 test for certification will be administered this test. Only high school teachers in states that do not require the Praxis 0061 test for certification will be asked to take this assessment. Teachers in states that do require the test for certification will not be asked to take the test again. Instead, we will obtain from ETS the teachers' scores on the test they took to obtain math certification.

The information collected from the teacher contact form, teacher consent form, student math assessments, teacher survey, parent consent forms, and HSAC program administrator interviews is not available elsewhere. No information will be collected from more than one source.

5. Methods of Minimizing Burden on Small Entities

The primary small entities for this study are the districts and schools in which the study teachers teach. For the data collection, burden is reduced for all study participants by requesting only the minimum information required to meet the study objectives. The burden on schools and districts has been minimized through the careful specification of information needs and restricting items for the administrative data collection. By administering the student assessment in class during one class session, we will not ask schools, which often have space limitations, to locate an additional room for the testing. We will provide a laptop computer for each student to

take the test as well as a secure server and a trained computer technician will be present in each school during testing.

The teacher assessment will be scheduled after school hours to minimize disruption to classes and teaching schedules. We will work closely with the schools to select the most convenient location to administer the teacher assessment. To minimize traveling time for the teachers, we will first explore the possibility of administering the teacher assessment at the school. If school policy or space constraints preclude this, we will identify a place to administer the test that is close to the school.

6. Consequences of Not Collecting Data

This evaluation is consistent with the goals of NCLB to raise student achievement by requiring that all teachers in core academic subjects be highly qualified. Despite the increasing use of HSAC teachers, there have been very few experimental studies on the effectiveness of HSAC teachers. Thousands of new teachers are hired every year from HSAC programs with little or no scientifically based evidence on whether these programs produce teachers who are likely to be effective in the classroom. In the absence of this evaluation, ED will not be able to gauge HSAC teachers' effects on student achievement. This study will thus be an important contribution to the policy debate. Its rigorous methodological design incorporating random assignment of students will ensure that highly credible evidence about the impact of HSAC teachers on student achievement is obtained.

The consequences of not collecting specific data items are discussed below.

- Without the information from the *teacher contact forms*, it will be more challenging to achieve a high response rate for the teacher survey.
- Without a *teacher math assessment*, we will not have the data necessary to describe the differences in math content knowledge between HSAC and non-HSAC teachers and to analyze the relationship between teacher math knowledge and student math achievement. While a National Mathematics Advisory Panel task group assigned to examine teacher education concluded that teacher math content knowledge is likely an important determinant of student achievement, it also emphasized the need for further research on the role of content knowledge in instructional effectiveness (U.S. Department of Education 2008a, 2008b). Without the signature on the teacher consent form to release the score from ETS, we would need to request the score directly from the teacher, reducing the response rate and increasing the burden on the teacher.
- Without the *student records data*, we will have to administer a math assessment to middle school students, in place of using their 2010 district/state math test scores, to measure student math achievement. Without the data on student characteristics, we will not be able to fully describe the study sample and verify the effectiveness of the random assignment. Prior years' math test scores together with data on student characteristics will also be used as covariates in regression models and so increase the precision of the impact estimates.

- Without the *teacher survey*, we will not have the data necessary to describe how HSAC and non-HSAC teachers differ and to analyze how student math achievement may vary with differences in teachers' characteristics, educational background, and work experience.
- Without the *high school math assessment*, we will not be able to obtain a valid measure of math achievement for high school students because, unlike middle schools, high schools are not required to administer a math assessment at every grade level. Moreover, existing high school math assessments tend to be poorly aligned with specific high school math courses (focusing instead on more general math knowledge), which would limit their ability to detect impacts on students' math achievement of a particular teacher in a particular course.
- Without the interviews with the *HSAC program administrators*, we will not be able to describe the HSAC programs through which the HSAC teachers are recruited, selected, trained, and supported.

7. Special Circumstances

There are no special circumstances involved with the data collection.

8. Federal Register Announcement and Consultation

a. Federal Register Announcement

A 60-day notice to solicit public comments was published in the *Federal Register* on February 24, 2009.

b. Consultations Outside the Agency

Professional counsel was sought from a number of experts during the feasibility study for this evaluation. In January 2008, MPR convened a meeting of a Technical Working Group, consisting of a broad range of researchers, to provide input on study design issues and the data collection plan. These individuals were:

- Brian Jacob, Walter H. Annenberg Professor of Education, Gerald R. Ford School of Public Policy, University of Michigan
- John Pane, Senior Scientist, RAND Corporation
- Michael Petrilli, Vice President for National Programs and Policy, Thomas B. Fordham Institute
- Jeffrey Smith, Professor of Economics, University of Michigan
- James Wyckoff, Professor of Economics, Rockefeller College, University of Albany

- Paul Decker, President, Mathematica Policy Research, Inc.
- John DeFlaminis, Practice Professor of Education, University of Pennsylvania Graduate School of Education

c. Unresolved Issues

There are no unresolved issues.

9. Payment or Gift to Respondents

We propose offering teachers \$5 total for completed *teacher contact* and *consent forms*. This small payment will compensate the teachers for the time they spend completing the forms and returning them to MPR. Obtaining these completed forms is key to obtaining a high response rate to the teacher survey and to obtaining Praxis math scores for a high proportion of the study teachers.

Payments will be given for participating in the teacher math assessment. Teachers will be offered \$120 payment to take the two-hour Praxis II series math subject test. A payment of \$60 per hour is necessary given the burden of the test. Taking the math assessment will require sustained concentration and may elicit anxiety about a low performance score. Furthermore, teachers will have to spend two hours to take the test out of their own personal time and may have to pay for child or other dependent care during that time. While we will try to schedule the assessment on a weekday after school hours, scheduling conflicts may demand that the assessment be scheduled for the weekend, thereby requiring teachers to make a special trip to the testing site. Teachers taking the teacher math assessment will lack the types of compensation for participation present in other studies conducted by the National Center for Education Evaluation (NCEE)—they will receive no professional development or curriculum intervention. The amount we propose is consistent with the guidelines for NCEE evaluation studies, prepared March 22, 2005, for a two-hour teacher assessment with high respondent burden.

The payment of \$60 for each hour spent on the teacher assessment is consistent with payments in previous ED and non-ED studies. In ED's Mathematics Professional Development study, the incentive for a 60-minute test on mathematics teacher content knowledge was \$75 if they went to a central location to take the test and \$60 if they took the assessment at their own school. ED's Evaluation of Professional Development in Early Reading Instruction administered a 30-minute teacher knowledge assessment that was created for the study, the Reading Content and Practices Survey, and compensated the teachers \$30 for taking the survey. Response rates for the survey ranged from 91 to 97 percent across the three administrations. In the Longitudinal Study of Certification Programs conducted by the American Board for Certification of Teacher Excellence (ABCTE), teachers were asked to take a Praxis or ABCTE subject examination in secondary math, elementary education, or pedagogy (which ranged from 2 hours to 4 hours long). Teachers were paid \$100 for taking each test and up to an additional \$100 for performing well on the test. Of the convenience sample of 117 teachers who agreed to take one of these tests, 97 teachers completed a test, for a completion rate of 83 percent.

To express our appreciation for participation in the *high school student math assessment*, we propose offering a \$5 gift to participating students. The \$5 gift to students participating in the assessment is necessary because NCEE has found in other studies, such as the DC Choice study, that getting secondary students to take assessments seriously is a challenge, and we hope the payment will ameliorate that problem. Students who take the test at a Saturday make-up session will be offered \$25 for their time and travel expenses in addition to the \$5 gift offered to students who take the test in class.

We propose to pay teachers \$30 for a completed *teacher survey* as compensation for their time and effort. The teacher survey will require 30 minutes to complete and is therefore considered high burden. The \$30 incentive is consistent with the incentive amount approved by OMB for the Evaluation of the Impact of Teacher Induction Programs. In this study, teachers received \$30 to complete a baseline survey and permission form that averaged about 30 minutes to complete. For the 20 minute Induction Activities survey, which was administered three times within the first school year, teachers were offered \$20 for each survey. Response rates for these surveys averaged 90 percent.

The teacher and student payments are all within the incentive amounts suggested in the memo, "Guidelines for Incentives for National Center for Education Evaluation Impact Evaluations," prepared for OMB on March 22, 2005.

To explore whether incentives are effective in increasing the rate at which students return consent forms in active consent districts, we propose to conduct an incentive experiment. The experiment will investigate the effectiveness of two types of incentive. The first incentive is \$25 offered to classrooms that collect signed consent forms for at least 95 percent of their students. The second incentive is a \$5 gift card offered to each student who returns the signed consent form. Both types of incentives will be paid on the basis of returned forms, regardless of whether the parent provided consent. We based our decision to provide a \$5 gift card to students on two studies. In the Impact Evaluation of Mandatory Random Study Drug Testing (OMB Approval #1850-0818), students received a movie ticket (\$7 value) for the return of a completed consent form, regardless of the consent status. In the Evaluation of the Youth Transition Demonstration Projects (OMB Approval #0960-0687), youth received a \$10 Target gift card or Metrocard if they returned the consent form, regardless of consent status.

Schools in districts that require active consent will be randomly assigned to one of three groups:

1. Treatment 1: Classroom receives a \$25 incentive if 95 percent or more of the consent forms are returned and individual students are offered a \$5 gift card if they return the consent form.
2. Treatment 2: There is no classroom incentive; individual students are offered a \$5 gift card if they return the consent form.
3. Control. There is neither a class incentive nor a student financial incentive for returning the form.

In each group of schools, we will document the percentage of forms returned each week, starting with the week the forms are sent home with the students. Other procedures used to encourage the return of the forms not involving financial incentives will be similar in each group. Comparisons across groups of the number of forms returned each week will provide estimates of whether student or classroom incentives are effective and whether offering both student and classroom incentives is more effective than either student or classroom incentives alone. A power analysis concluded that we will be able to detect a difference by group of 14 percentage points or more in the rates at which the forms are returned, a difference much lower than found in previous experiments (Thompson 1984). The results of the experiment will be documented and presented to OMB.

Districts and schools will be offered nonfinancial compensation for participation in the data collection activities, including the distribution and collection of parental consent forms, facilitation of the administration of the student assessment, and collection of student records data. Many school administrators hunger for information about their students and teachers as well as evidence-based policy recommendations. When providing schools information from the study, it is paramount that we preserve the confidentiality of the study participants. Hence, we cannot offer schools *student-level* data on the results of the student math assessment that we will administer in the high schools as this would violate the students' confidentiality. Providing student scores aggregated by teacher may discourage teachers, and hence schools, from agreeing to participate in the study.

We will, however, offer high schools information on how their students performed on aggregate on each math test, in comparison to students in other schools within the district and to students nationally. If the school wishes, we could provide the mean and quartiles of scores for students who take each test (Algebra I, Algebra II, Geometry, and Basic Math) in their school along with the mean and quartiles of scores for all students in the district taking this test for our study (as long as there are more than two schools in the district). This would provide school administrators with information on how well their students are performing in his/her school compared to students in other similar schools. We could also provide the national norms for scores on each test by grade level that are constructed by NWEA. These data could be provided with the school and district data so that the school administrators can compare how well their students are performing compared with students in the same grade level nationwide.

We also will offer to notify schools when the results of the study are made public. By sending them a short summary of the results and a link to the study report, the participating schools can be among the first to know about the study findings.

10. Confidentiality of the Data

All data collection activities will be conducted in full compliance with ED regulations to maintain the confidentiality of data obtained on private persons and to protect the rights and welfare of human research subjects as contained in ED regulations.

The contractor will follow the policies and procedures required by the Education Sciences Reform Act of 2002, Title I, Part E, Section 183, which requires “[a]ll collection, maintenance, use, and wide dissemination of data by the Institute” to “conform with the requirements of

Section 552 of Title 5, United States Code, the confidentiality standards of Subsection (c) of this section, and Sections 444 and 445 of the General Education Provision Act (20 U.S.C. 1232g, 1232h).” These citations refer to the Privacy Act, the Family Educational Rights and Privacy Act, and the Protection of Pupil Rights Amendment.

In addition, the contractor will ensure that all individually identifiable information about students, their academic achievements, their families, and information with respect to individual schools shall remain confidential in accordance with Section 552a of Title 5, United States Code; the confidentiality standards of Subsection (c) of this section; and Sections 444 and 445 of the General Education Provision Act. Subsection (c) of Section 183 referenced above requires the Director of the Institute of Education Sciences to “develop and enforce standards designed to protect the confidentiality of persons in the collection, reporting, and publication of data.” Subsection (d) of Section 183 referenced above prohibits disclosure of individually identifiable information as well as making any publishing or communicating of individually identifiable information by employees or staff a felony.

Because this collection includes personally identifiable information, we are in the process of obtaining approval for a System of Records Notice (SORN), which will ensure the secure collection and storage of such information.

MPR and its subcontractors will protect the confidentiality of all information collected for the study and will use it for research purposes only. No information that identifies any study participant will be released. Further, personally identifiable data will not be entered into the analysis file and data records will contain a numeric identifier only. When reporting the results, data will be presented only in aggregate form so that individuals and institutions will not be identified. A statement to this effect will be included with all requests for data. The teacher contact form, teacher consent form, teacher survey, parent consent forms, and student assent statement will include a reminder about confidentiality protection in compliance with the legislation. When data are collected through telephone interviews, respondents will be reminded about the confidentiality protections, the voluntary nature of the survey, and their right to refuse to answer individual questions. Further, no individually identifiable information will be maintained by the study team. All members of the study team having access to the data will be trained on the importance of confidentiality and data security. All data will be kept in secured locations, and identifiers will be destroyed as soon as they are no longer required.

The following safeguards will be employed by MPR to carry out confidentiality assurances during the study:

- All employees at MPR sign a confidentiality pledge emphasizing its importance and describing their obligation.
- Access to identifying information on sample members is limited to those who have direct responsibility for providing and maintaining sample locating information. At the conclusion of the research, these data are destroyed.
- Identifying information is maintained on separate forms and files, which are linked only by sample identification number.

- Access to the file linking sample identification numbers with the respondents' ID and contact information is limited to a small number of individuals who have a need to know this information.
- Access to the hard-copy documents is strictly limited. Documents are stored in locked files and cabinets. Discarded materials are shredded.
- Computer data files are protected with passwords, and access is limited to specific users. Especially sensitive data are maintained on removable storage devices that are kept physically secure when not in use.

The Privacy Act of 1974 applies to this collection. MPR will make certain that all surveys are held strictly confidential, as described above, and that in no instance will responses be made available except in tabular form. Under no condition will information be made available to school personnel. District and school staff responsible for assisting MPR in the data collection will be fully informed of MPR's policies and procedures regarding confidentiality of the data.

In addition, the following verbatim language will appear on all letters, brochures, and other study materials:

Per the policies and procedures required by the Education Sciences Reform Act of 2002, Title I, Part E, Section 183, responses to this data collection will be used only for statistical purposes. The reports prepared for this study will summarize findings across the sample and will not associate responses with a specific district or individual. We will not provide information that identifies you or your district to anyone outside the study team, except as required by law. Any willful disclosure of such information for nonstatistical purposes, without the informed consent of the respondent, is a class E felony.

11. Additional Justification for Sensitive Questions

Some teachers may consider their contact information personal, but this information is necessary to ensure that we are able to administer the teacher survey to teachers who leave their school during the school year.

The test score data collected by the teacher assessment may be considered sensitive because of the potential for school administrators to use these data improperly to evaluate the quality of the teachers. To protect the confidentiality of these data, we will not link the scores to personal identifiers and these data will be accessible only to the study team.

The teacher survey will contain background questions on teachers' education level, institutions at which they received their degree(s), race, ethnicity, and age. Some teachers may consider this information sensitive. However, data on these topics are important to collect because they will help us understand the differences between HSAC and non-HSAC teachers and how the impact of HSAC teachers varies with their characteristics. Questions used to obtain

personal background information have been asked frequently in other surveys and the teachers who participated in the pretest of the survey did not consider these questions to be sensitive.

Test scores and some other demographic information about the students may be sensitive. Test score data is essential for this evaluation because student math achievement is the primary outcome of interest. Demographic information is important to control for differences in the characteristics of students in the classes that may have arisen by chance. The consent form will address the collection of test scores and school records. In all districts except for Chicago Public School District, only the study team will have access to these data. Individual test scores will not be given to students, parents, teachers, schools, or districts. However, at the request of the Chicago Public School District, we will provide teachers in Chicago access to the test scores of students in their classes (with proper parental consent) and parents will have the opportunity to obtain their child's scores. In the Chicago Public School District, parents will have the opportunity to request a copy of their child's test score and to opt-out of providing their child's test score to their child's teacher.

All teacher and student data collected will be kept confidential and reported in aggregate form only.

12. Estimates of Hour Burden

Exhibit 3 provides an estimate of time burden. The total reporting burden for the data collection effort covered by this clearance request is 10,397 hours. The total estimated annual direct hour burden estimate for the data collection activities discussed under the first OMB submission for this study is 1,185 hours. Adding the 10,397 burden hours from this clearance request will increase the total estimated direct annual burden for the study to 11,582 hours.

- The district and/or the school may take up to 8 hours completing our data request. We assume that the study will include 20 districts.
- The teacher contact and consent forms together will take 5 minutes to complete. Based on past experience, a 95 percent response rate is expected for these forms. Hence, we expect that 285 (95 percent of 300) teachers will complete the forms.
- We expect that we will be able to collect existing Praxis math subject test scores for 15 percent of the teachers, based on the proportion of study teachers that is employed in states that require the test for certification. Of the remaining 85 percent of the teachers, we expect that 90 percent of these teachers will take the teacher math assessment. In total, we expect that we will administer the test to 230 (90 percent of 85 percent of 300) study teachers. Teachers will have up to 2 hours to complete the assessment.
- The teacher survey is 30 minutes long and a 90 percent response rate is anticipated.
- The majority of the burden hours are for administering the high school student test in spring 2010. We assume that 8,100 (90 percent of 9,000) high school students in the study will participate in the assessment. A total of 60 minutes has been allotted per test administration, which includes the time taken for the provision of assent.

- The interviews with the HSAC program directors are expected to last 45 minutes. We expect interviews will occur with 24 program directors.

EXHIBIT 3

BURDEN IN HOURS TO RESPONDENTS

Activities	Number of Respondents	Number of Responses Per Respondent	Total Number of Responses	Average Burden Hours Per Response	Total Burden Hours
Burden for Initial Data Collection Activities^a					1,185
Burden for Added Data Collection Activities					10,397
Districts					
Student records data	20	1	20	8.0	160
Teachers					
Teacher contact and consent forms	285	1	285	0.08	24
Teacher math assessment	230	1	230	2.00	460
Teacher survey	270	1	270	0.50	135
Students/Parents					
Parental consent forms	18,000	1	18,000	0.08	1,500
Student math assessment (including assent)	8,100	1	8,100	1.00	8,100
HSAC Program Directors					
Interviews	24	1	24	0.75	18
Total Direct Burden					11,582

^a Includes a teacher background form, a pilot of the student assessment, and the random assignment of students. These data collection activities are described in the previous OMB package approved on 6/7/09.

13. Estimate of Total Annual Cost Burden to Respondents or Recordkeepers

There are no direct costs to individual participants. Exhibit 4 presents estimates of indirect costs to the respondents. The only indirect cost to respondents is the cost of their time, which totals \$96,778.

EXHIBIT 4

COST BURDEN TO RESPONDENTS

Activities	Number of Respondents	Number of Responses Per Respondent	Average Burden Hours Per Response	Average Hourly Cost per Response	Total Cost Burden
Districts					
Student records data	20	1	8.0	\$50	\$8,000
Teachers					
Teacher contact and consent forms	285	1	0.08	\$34	\$808
Teacher math assessment	230	1	2.00	\$34	\$15,640
Teacher survey	270	1	0.50	\$34	\$4,590
Students/Parents					
Parental consent forms	18,000	1	0.08	\$7	\$10,500
Student math assessment (including assent)	8,100	1	1.00	\$7	\$56,700
HSAC Program Directors					
Interviews	24	1	0.75	\$30	\$540
Total Cost Burden					\$96,778

14. Estimates of Annualized Cost to the Federal Government

The estimated cost to the federal government for the study—including recruiting districts and schools, designing and administering all data collection instruments, processing and analyzing the data, and preparing reports—is \$8,087,800. Recruiting, data collection, and reporting activities will be carried out over approximately four years (fall 2008 to summer 2012). Thus, the average annual cost of data collection and analysis is \$2,021,950.

15. Reasons for Program Changes or Adjustments

Due to the added data collection activities, there will be a program change of 10,397 hours, increasing the total burden for the study to 11,582 hours. These data collection activities include a teacher contact form, a high school student math assessment, a test of teacher math content knowledge, a teacher consent form, a teacher survey, collection of student records data, parent consent forms for the student math assessment and student records data collection, student assent form, and interviews with HSAC program directors.

16. Tabulation, Publication Plans, and Time Schedules

We discuss plans for analysis and publication, and the timeline for the study in the following subsections.

a. Tabulation Plans

To estimate the impact of HSAC teachers on secondary student math achievement for the full evaluation, we will treat each classroom match as a separate “mini-experiment.” For each classroom match, we will compare the average end-of-year math assessment score of students randomly assigned to the class taught by the HSAC teacher to the average score of those assigned to the non-HSAC teacher—the difference in average scores will provide an estimate of the HSAC teacher’s impact in that particular classroom match. We will then average the impact estimates across all classroom matches in the study to come up with an overall estimate of the HSAC teachers’ impact on secondary student math achievement.

Primary Impact Analysis. Due to random assignment, the differences in mean outcomes in each classroom match will provide an unbiased estimate of the impact of HSAC teachers. However, the precision of the estimates can be improved by controlling for student-level baseline characteristics that may explain some of the differences in achievement, such as sex, race, free/reduced price lunch eligibility, special education status, whether the student is an English language learner, and prior math achievement. We will therefore estimate the following model of student math achievement for student i in classroom match j :

$$(1) \quad Y_{ij} = P_j + X'_{ij}\beta + T'_{ij}\delta + \varepsilon_i$$

where Y_{ij} is the outcome math test score of student i in classroom match j , P_j is a vector of classroom match indicators, X_{ij} is a vector of student-level baseline characteristics, T_{ij} is an indicator for whether the student was in the HSAC teacher’s class in classroom match j , ε_i is a random-error term that represents the influence of unobserved factors on the outcome, and β and δ are vectors of parameters to be estimated. Because the randomization is done within classroom matches within schools, and schools may differ from each other in student compositions, the model includes a vector of classroom match indicators, P_j , to control for differences in the average student characteristics between classroom matches and schools. If a sufficient number of classroom matches contain three teachers instead of two, the estimated standard errors will account for clustering of students within classroom.

The vector δ represents the experiment-level impacts of the HSAC teachers in each classroom match that can then be aggregated to estimate the overall HSAC impact. The simplest and perhaps most intuitively appealing way to aggregate these impacts is to calculate an equally weighted average of the classroom match-level impacts. In this way, each classroom match will have an equal influence on the overall impact estimate. As a specification check, we will also explore alternative weighting schemes that have the potential to provide greater statistical efficiency and test the robustness of the findings, including giving greater weight to more precisely estimated classroom match-level impacts and weighting proportionally to the size of the sample in each classroom match.

Subgroup Analyses. In addition to estimating the overall impact of HSAC teachers on secondary student math achievement, we will conduct a limited number of subgroup analyses. Specifically, we will separately estimate the impact of TFA and TNTP teachers, middle and high school HSAC teachers, and novice and experienced HSAC teachers. To calculate subgroup impacts, the classroom match-level impact estimates will be aggregated for each relevant subgroup. For example, to calculate the subgroup impacts for high school and middle school teachers, the impact estimates from experiments in high schools will be aggregated separately from those from the experiments in middle schools. While we will test the statistical significance of the impact for each subgroup, we will not test the significance of differences between subgroups (for instance, between TFA and TNTP teachers), as the sample will not provide adequate statistical power for these comparisons.

Non-Experimental Analysis. If we find that HSAC teachers are more effective than non-HSAC teachers, policymakers will want to understand the reasons they are more effective. To shed light on this, we will investigate whether there are particular observable teacher characteristics that are correlated with the impacts. Because the effects of the teacher characteristics cannot be separated from the HSAC recruiting model experimentally, we will rely on non-experimental methods for this exploratory analysis.

For the non-experimental analysis, we will estimate variations of Equation 1 that introduce within-experiment differences in teacher characteristics:

$$(2) \quad Y_{ij} = P_j + X'_{ij}\beta + T'_{ij}\delta + C'_{ij}\gamma + \varepsilon_i$$

where C_{ij} represents a vector of observable characteristics of student i 's teacher, γ is a vector of parameters to be estimated, and all other variables are defined as above. Since these models include classroom match-level fixed effects, the coefficients in vector γ represent the correlations between the within-match differences in teacher characteristics and the within-match differences in student outcomes. These exploratory analyses will be guided in large part by differences between HSAC and non-HSAC teachers that are observed through the teacher survey and that have been hypothesized to influence student achievement. For example, HSAC teachers are often perceived to be different from non-HSAC teachers in their subject knowledge, the selectivity of their undergraduate colleges, and their experience, all of which have been connected to student achievement in prior research (Clotfelter et al. 2007). Therefore, using data from the teacher survey and teacher math knowledge assessments (if the option is exercised), we will examine how the differences between the HSAC teachers and the non-HSAC teachers along these dimensions are correlated with student outcomes.

Non-Response and Crossovers. Although, we will take steps to minimize the amount of missing data, some student non-response for this evaluation is inevitable. This non-response may lead to biased impact estimates if the non-response is correlated with math achievement and whether the student was assigned to an HSAC teacher. To address this, we will use propensity score matching and create non-response weights that appropriately weight those for whom we have outcome math test scores, so that the weighted sample of students with nonmissing data is representative of the full sample. In addition, some students who are assigned to an HSAC teacher may crossover into a class with a non-HSAC teacher or vice versa. Including crossover

students might bias the impact estimates by attributing the performance of the HSAC teacher to a non-HSAC teacher and vice versa. We can adjust the estimates for these crossovers using the students' assignment status as an instrumental variable for having an HSAC teacher (Angrist et al. 1996).

b. Publication Plans

The draft of the final report will be prepared during the third year of the study—by June 2011. The report will be written in a style and format accessible to policymakers and research-savvy practitioners. A revised draft will be prepared by August 2011. The final report, which will address peer-review comments, will be prepared by April 2012.

c. Schedule

The timeline for the evaluation is shown in Exhibit 5.

17. Approval Not to Display the Expiration Date for OMB Approval

Approval not to display the expiration date for OMB approval is not requested.

18. Exception to the Certification Statement

No exceptions to the certification statement are requested or required.

EXHIBIT 5

TIMELINE FOR THE STUDY

Activity	Time Period
Recruit districts and schools	Fall 2008-spring 2009
Administer teacher background form	Spring 2009-Spring 2010
Pilot of student assessment	Spring 2009
Conduct random assignment	Spring 2009 – fall 2009
Collect teacher contact form and teacher consent form	Fall 2009
Conduct teacher math assessment	Fall 2009
Collect consent forms for testing	Fall 2009
Administer teacher survey	Spring 2010
Administer high school math assessment with student assent	Spring 2010
Conduct HSAC program administrator interviews	Spring 2010
Collect school records data	Summer 2010
Draft report	June 2011
Final report	April 2012

ED = U.S. Department of Education

HSAC = highly selective routes to alternative certification.

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