B. COLLECTIONS OF INFORMATION EMPLOYING STATISTICAL METHODS

(1) Potential Respondent Universe and Any Sampling Selection Method to be Used

1.1. Potential Universe and Sampling Selection

The universe of cases for the original study is defined as all Alabama public schools with at least one grade of fourth through eighth in the three regions that are beginning to receive the AMSTI intervention in Year 1 (2006-2007), along with all classrooms, teachers, and students in those schools at these grade levels in Year 1. The regions are each defined by their MASTER site; the three MASTER sites are the University of Alabama-Montevallo, the University of Alabama-Tuscaloosa and Troy University. These regions were chosen for the study based on practicality, that is, these regions were offered AMSTI for the first time in school year 2006-2007. Within these three regions, all 382 existing public schools were invited to apply for AMSTI participation. Of these, 106 schools applied for AMSTI, from which, a convenience sample of 40 schools was selected. The 40 schools were then paired on the basis of grade configuration, math scores, percent of students qualifying for free lunch, and the percent of minority students. Schools with only grades K-3 or 9-12 were excluded, as well as a small number that had previously been accepted into AMSTI before the random assignment process for the study could be set up. A coin toss determined which school in the pair would receive the AMSTI intervention, the other school going into the control group.

Within the 40 schools, there were approximately 174 treatment teachers, 150 control teachers, 6,565 treatment students and 5,568 control students in the relevant grade levels (4-8) during the 2005-06 school year. These represent the potential universe for data collection. Table 1 details the participant numbers and the selection methods for the study as a whole and for each type of data collection.

The participants for the replication study will be selected in the exact same manner from the Jackson State University and the Wallace regions, which are slated to begin receiving the AMSTI intervention in 2007-2008.

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Table 1
Sampling Selection Methods

Universe of Available Cases	Number to be Selected	Selection Method	Expected Response Rate
■ All schools applying for AMSTI	106	40 Treatment – 20 Control – 20 Grade 4 – 21 Grade 5 – 26 Grade 6 – 23 Grade 7 – 22 Grade 8 – 18	Purposive: Grades K-3 and 9-12 excluded plus those previously selected for AMSTI. Then within each region schools were selected based on their similarity to regional demographics. Random selection of treatment vs. control schools from among the 40.	100%
■ Treatment Teachers ■ Control Teachers	174 150	174 150	All math and science teachers in grades 4-8.	At least 90% At least 90%
Trainer observations/trainer logs	52	17	The sample consisting of all trainers from three regions assigned to math and science at grade levels 5 and 7 were selected to account for the overall quality of training provided by the region.	100%
Teacher (training participant) pre-post retrospective survey	324	210	Universe of all teachers of grade 5 and grade 7 math and science [4 per school x 20 schools] who attend the training. Grade 5 and 7 teachers were selected to correspond to the sample of trainers and to correspond to the grade levels where both science and mathematics achievement data are available.	At least 90%
Teacher/classroom observations	324	42 (20 AMSTI and 20 control schools plus 2 additional teachers)	Teachers will be chosen at random from a stratified sample (seven strata: grades 4, 5, 6, 7, and 8 math, grades 5 and 7 science) so that data are generalizable to all math grades and grade 5 and grade 7 science teachers and correspond to student achievement, trainer log and training participant data.	At least 90%
Teacher interviews	Year One	84 (observed teachers plus a stand alone teacher in each AMSTI and control school)	Teachers will be chosen at random from a stratified sample (seven strata: grades 4, 5, 6, 7, and 8 math, grades 5 and 7 science) so that data are generalizable to all math grades and grade 5 and grade 7 science teachers and correspond to student achievement, trainer log and training participant data.	At least 90%
Principal interviews	Year One	40	It is necessary to sample the universe of principals in AMSTI and control schools to determine level of implementation in each of the schools in the study.	At least 90%

1.2. Analytic Techniques

We will use statistical methods appropriate for the analysis of group randomized trials. These include, but are not limited to, analysis of covariance and hierarchical linear modeling. Methods will be geared to measuring differences between treatment and control schools in terms of student- and teacher-level outcomes.

The techniques will reflect three general types of analyses. The first will compare the performance of students in the two conditions each year within each grade level. We will compute mean differences and adjust the standard error to account for the clustering of students in upper-level units. The second will compare growth trajectories over time for individuals in the two conditions. Piecewise growth models will be used for this. The third will look at changes over time within a grade-level. The first two types of analyses compare the performance of units randomized to the two conditions, thereby yielding unbiased estimates of causal impacts. The third type of analysis is quasi-experimental and involves examining whether the introduction of the intervention coincides with changes in performance at a grade level. As with all quasi-experiments, we will rule out plausible rival hypotheses for the observed trends.

We will perform both combined and subgroup analyses. The subgroups are identified at the student- and teacher-levels (i.e., below the level of randomization.) This allows us to subdivide the sample and do these analyses without compromising statistical power.

Outcomes will be measured across several grade-levels. For student outcomes, if scales are not vertically aligned, we will perform separate analyses within each grade level and then combine results after transforming the effect estimates so that they are on a common scale (e.g., in terms of standard deviation units).

(2) Procedures for Collection of Information

Much of the data collection will cover the full universe. Teacher data, in the form of surveys, are to be collected on all 324 teachers. All principals will be surveyed and interviewed at each of the 40 schools. For parts of the implementation study, however, classroom observations and interviews will involve only a sample of the teachers.

Training data will be collected for each region by having all Summer Institute trainers of fifth grade math, fifth grade science, seventh grade math and seventh grade science complete logs indicating what they covered each day and how they were covering it. Their session participants will each complete a pre-post retrospective survey to assess knowledge, skill, and confidence gains relative to receipt of the training. Portions of sessions for each of these four training groups will also be observed. In the case of one region, Montevallo, the high numbers of session participants required two additional trainers, and while the additional sessions will not be observed, the logs and participant surveys will be completed. Because data will be collected for each of the three regions, results can be aggregated to the region level.

Another sub-sample will be used to conduct teacher observations and interviews. Each region will be broken into seven strata: fourth grade math, fifth grade math, sixth grade math, seventh grade math, eighth grade math, fifth grade science and seventh grade science. Separating teachers into the different strata is important because the impact analyses will be conducted

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separately for each grade and subject, and there are test scores available only for these seven grades/subjects. Stratifying into seven groups will thus make it possible to match implementation information to test score data. Stratifying by region was selected to ensure that each region was covered, thus taking into account the possibility that implementation may vary by region. Because teachers within a given stratum will be chosen at random, it can be assumed that, on average, the 21 observed teachers are representative of instructional practice in the three regions. The data collection will be as follows: In the AMSTI schools, 21 teacher/classroom observations and follow-up interviews with those teachers observed will be conducted in the 20 schools (1 in 19 schools; and 2 in 1 school). This will allow for three observation/follow-up interview data points for each of the seven strata. In addition, another 21 "stand alone" interviews will be conducted with other teachers (not observed) to provide for an additional three interview data points for each of the seven strata. The same sampling procedure will be used to select 21 teachers for observations and interviews, and another 21 teachers to complete the "stand alone" interviews in the 20 control schools.

(3) Methods to Maximize Response
Efforts to maximize response are extensive. Training participants first meet researchers at their summer training where they are introduced to the study and given the opportunity to ask questions. Principals then receive an e-mail followed by a telephone call, further providing them the opportunity to learn more about the study and ask questions or voice concerns. Once principals have signed consent forms, their teachers receive an informational e-mail containing contact information so that they may learn more about the study and ask questions of researchers. Then teachers meet within their schools to again discuss the study and to sign consent forms. Invitations to the web-based surveys are e-mailed to each teacher and principal. Non-respondents receive first an e-mail and then phone calls in order to assure acceptable response rates.

Prior to the observations and interviews, staff will contact principals and selected teachers by phone or e-mail. The principals and teachers will be provided with information about the purpose and procedures for the observations and interviews. Also at this time, researchers will work out a schedule for classroom visits, ensuring these visits take place during a time that is convenient to the teacher and principal, and during a time when AMSTI teachers will be conducting lessons using the AMSTI materials and kits.

(4) Tests of Procedures or Methods
The principal survey and teacher survey items have been previously piloted. Items were taken from the following sources: SRI: Integrated Studies of Educational Technology Teacher Survey, Spring 2001; U.S. Department of Education, *National Educational Technology Trends Study: Teacher Survey*, OMB No. 1875-0233; and the Empirical Education Item Bank. Some items may be slightly modified to reflect context and/or name of curriculum, or to reflect appropriate time span and/or frequency.

The trainer checklist was developed based on various materials available from the trainers and AMSTI officials. These materials include: teachers' guides in the relevant subjects, books and other materials on the training reading list, and PD training agendas. The trainer checklist and pre-post participant survey were piloted with all grade 5 and grade 7 math and science trainers in the 2006 training institutes.

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The classroom observation form was adapted from a synthesis of the Authentic Instructional Practices Classroom Observation form (Borman, Rachuba, Datnow, Alberg, Stringfield, & Ross, 2000), and the Reformed Teaching Observation Protocol (MacIsaac, Sawad, Daiyo, & Falconer, 2001). The observation and interview protocols will be piloted with at least four teachers: two science, two math, and with two raters for each pilot observation to assess inter-rater reliability.

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