

Supporting Statement for Paperwork Reduction Act Submission

Description of Statistical Methods (Part B)

1. Sampling Design

The primary sampling frame for the profiles of practice are schools and districts that have received grants through the High School Graduation Initiative (HSGI) (see www2.ed.gov/programs/dropout/awards.html). Many of these sites are engaged in activities to support student success in Algebra I, given the role of Algebra I as a gateway to more advanced coursework and the well-established relationship between poor performance in Algebra I and dropping out of high school. As described in the introduction to this request, the work products of this project will enable high schools—including HSGI grantees—to enhance their efforts to foster success in Algebra I, particularly among struggling students.

To generate the sample, the project team proposes to generate a purposive sample of 10 sites, two from each topical area. Based on the practice being examined there will be greater emphasis placed on data collection at the district or school levels (see Exhibit B.1). For example, for the topical area of curricular alignment much of the data will be collected at the district because the alignment of mathematics curricula across grade levels and schools is under the purview of the central office. For other topics, such as instructional practices, the project team will focus on the school-level. (Exhibits B.1 through B.5 specify the level at which the project team will collect data for each topic.)

Site selection criteria:

In selecting sites for the practice profiles, the primary objective will be to identify HSGI grantees that have implemented activities associated with the five topical areas that are the focus of this project. In addition, for the practice profiles to be of greatest utility to practitioners and policymakers, they should describe sites that have some track record of success in Algebra I. To enhance the probability that practitioners will identify with the school and district sites, we will seek variation with regard to urbanicity, school size, and student demographics. Thus, to the extent possible, the full set of 10 sites will reflect the following criteria:

- **Criterion 1: Sites will represent exemplars** of the particular topical area for which they are identified. That is, their practices in each topical area will reflect those that are consistent with the literature review for each topic as described below:
 - **Instructional Practices:** Selected sites will be schools with an established track record (at least three years) of teaching algebra for conceptual understanding and procedural fluency. Schools that systematically promote this type of teaching for all algebra teachers are those in which we would expect to see lessons, tasks and assessments in which concepts and procedures are mutually reinforced. Finally, the project team will seek schools that have some evidence of improved student outcomes (e.g., algebra end-of-course exam scores increased since the school implemented this type of instruction).
 - **Professional Development:** Selected sites will be districts or schools with professional development programs targeted at improving the teaching and learning of Algebra I or courses that promote algebraic thinking (e.g., programs that develop algebraic thinking in Grades 6–8). The professional development activities may include workshops or seminars that are developed and delivered by district staff and professional learning communities

that form within or across schools in the district. The focus of the professional development activities may include specific content (e.g., understanding the big ideas of algebra, linear relationships), pedagogical techniques (e.g., questioning strategies, use of multiple representations of algebraic concepts), instructional materials (e.g., how to implement adopted materials or other lessons and tasks focused on algebraic concepts), and assessments (e.g., how to implement formative assessment lessons). The district should have a systematic approach to implementing and supporting these types of professional development activities.

- o **Instructional Coaching:** Selected sites will be schools that are implementing a mathematics coaching program focused on improving teachers' mathematics instruction. Although mathematics coaches within these schools may be responsible for a number of activities, the majority of their time should be spent working directly with teachers to plan, deliver, and evaluate mathematics instruction. Ideally, the school will have established a policy for hiring/training mathematics coaches to ensure that individuals in these roles are leaders with knowledge of mathematics content, mathematics teaching and learning, and teacher leadership. In addition, the school should have a support structure in place to provide coaches with the time and resources they need to work with teachers in this capacity.
- o **Curricular Alignment:** Selected sites will be districts with an established curricular framework that is vertically aligned to prepare students for Algebra I. More specifically, this curricular framework should specify a series of standards that are vertically aligned to support students in the development of skills and understandings needed for Algebra I. These include, but are not limited to, an understanding of whole number and fraction operations and the ability to reason algebraically. The standards within the curricular framework should be clearly stated and organized to support a connected progression of skills and understandings that will ultimately prepare students for Algebra I.
- o **Supplementary Learning Opportunities:** Selected sites will be schools that (1) have potentially promising outcomes for students, in the short and or longer term, and (2) provide professional development and curricular frameworks for double-dose algebra teachers. Specifically, promising outcomes can be demonstrated by improvements in Algebra I course failure rates or grades, standardized test scores in math and reading (in any grade in high school), on-time graduation, or college matriculation rates. Recent evidence demonstrates that double-dose algebra may have delayed effects on standardized test scores and that improvements may extend beyond math achievement to reading if double-dose algebra courses emphasize written and oral communication of mathematic concepts. In addition, high-quality double-dose algebra programs must go beyond extending students' learning time for algebra and provide specific guidance and curricular materials for enriching and supporting learning for struggling students in double-dose algebra courses. These materials should be accompanied with appropriate professional development opportunities for teachers.
- **Criterion 2: Each site should provide some evidence of improved outcomes.** Although the team cannot set a specific achievement threshold or percentage point gain (in none of the topics is the literature consistent enough to warrant this), each nominated site should provide documentation that shows improvement, whether in student performance on standardized tests, student pass

rates in Algebra I, student grades in Algebra I, student engagement, or other measures as appropriate for each topical area.

- **Criterion 2: Sites will reflect geographic diversity**, with regard to both regional location within the United States and urbanicity. For each topical area, the team will identify two sites representative of the primary unit (districts or schools) that are in different regions of the United States. In addition, the project team will seek to ensure that the set of ten sites includes at least one rural site.
- **Criterion 3: Sites will reflect the diversity of enrolled students**. The team will structure the profiled sites so that they reflect students of diverse ethnic, racial, and socioeconomic backgrounds—recognizing that students who struggle in Algebra I are disproportionately students of color or English learners. Thus, for each site selected, at least one-third the students will be ethnically or racially diverse or are English learners.

Identification Procedures:

To identify prospective sites, AIR will first pinpoint programs or initiatives related to each topical area among HSGI grantees. After reviewing grant applications, program descriptions, and web-based resources on the HSGI sites, AIR will conduct informal conversations with prospective sites to determine the level of implementation of each targeted practice. AIR will enter all information about each site into a Microsoft Access database that will track each program/site, its characteristics, and its progression through the selection process. With full information on each possible site, the project team will identify sites based on each criterion in succession. The project team also will identify a set of five replacement sites in the event that sites decline to participate.

2. Procedures for Data Collection

The data collection procedures of each of the main components of the project (interviews and focus groups, classroom observations, and document collection) are discussed in detail below.

Data Collection Activities by Topical Area

Because each topic for which the contractors are to collect data reflects different purposes, practices, and implementation, the data collection activities will vary for each. The common elements are that each will involve interviews or focus groups at the district and school level, and each will involve some form of document collection. All focus groups and interviews are expected to require one hour, while classroom observations could range from 60 to 90 minutes, depending on the organization of the school day. The specific numbers and roles of interviewees and focus group participants are detailed below.

Instructional Practices. The purpose of the instructional practices topic is to understand strategies, processes, and policies in schools that have made an effort to blend procedural and conceptual foci in their Algebra I instruction. Hence, the school is the unit of analysis for this topic, and the project team will visit two such schools. However, the contractors intend to collect data from the district level to better understand the context in which each school is situated. Because the contractors intend to conduct classroom observations, each site visit for this topical area will last two or three days, including one site visit lead and one site visit associate.

Exhibit B.1: Data Collection Activities for Instructional Practices

Instructional Practices. Sites: 2 Schools		
Level	Respondent	Total n of respondents
District (n = 2)	Interview with district official with primary responsibility for mathematics	2
School (n = 2)	Observations of up to 5 teachers	10
	Interviews with each teacher who is observed	10
	Principal interview	2
	Interview with math department chair or algebra team lead	2
	Interview with instructional coach, if applicable	2
Documents	Teacher assignments	10
	Lesson plans	12
	Schoolwide planning documents with regard to the instruction of Algebra I	Variable

Curricular Alignment. The purpose of the curricular alignment topic is to describe districts that have developed and implemented a curricular framework that promotes the skills and understanding needed to be successful in Algebra I prior to enrollment in an Algebra I course. The site level for this topic is the school district because this is the level at which the curricular framework and pacing guides are established, as well as the vision with regard to Algebra I instruction. The team will visit two districts in two different states. Each site visit for this topic will last two days, with two site visitors: one site visit lead and one site visit associate.

Exhibit B.2: Data Collection Activities for Curricular Alignment

Curricular Alignment. Sites: 2 Districts		
Level	Respondent	Total n of respondents
District (n = 2)	Interview with math leaders at the district level	2-4
School	Focus group of teachers who teach classes prior to Algebra I (elementary, across schools)	5 or 6
	Focus group of teachers who teach classes prior to Algebra I (middle, across schools)	6-8
	Focus group of teachers of Algebra I (cross-schools)	6-8
	Focus group of math coordinators (or department chairs, depending on school organizational structure) from different schools	4 or 5
Documents	Curricular framework	variable
	Pacing guides	
	Additional instructional resources that support these ideas and concepts in the early grades	

Professional Development. The purpose of the professional development topic is to explore innovative practices in terms of professional learning opportunities designed to deepen teachers' content

knowledge, conceptual understanding, and instructional capacity with regard to Algebra I. Because professional development policies are often mapped out at the district level, the school district may be the most appropriate site for this topic. However, there are often situations in which schools take on innovative professional learning practices that are not replicated elsewhere in the district. At this point, the project team proposes to identify the level of the practice profile after learning more about such practices in the HSGI sample. At present, the assumptions in Exhibit B.3 reflect a situation in which professional development was planned and enacted by the district; note, however, that such a plan includes data collection from school staff as well, as it is critical to understand how professional development opportunities are perceived.

The team will visit two districts or schools in two states. Each site visit for this topic will last two days, with two site visitors: one site visit lead and one site visit associate.

Exhibit B.3: Data Collection Activities for Professional Development

Professional Development. Districts or Schools		Sites: 2
Level	Respondent	Total n of respondents
District (n = 2)	District math coordinator	2
Schools	Focus group of teachers from secondary schools* (across up to 5 schools in the district)	10
	Focus group of principals from secondary schools (across up to 5 schools in the district)	10
	Focus group of school math coordinators (elementary across up to 5 schools in the district)	10
	Focus group of high school math department chairs (across up to 5 schools in the district)	10
Documents	Professional development documents (handouts, outline/agenda, PowerPoint presentations, district professional development plan, template for teacher/school professional development plans)	variable
Observations	Observe a professional development session (if possible)	

*This may include either middle or high schools, depending on the way in which Algebra I instruction is organized in the district.

Instructional Coaching. The purpose of this topic is to understand how districts and schools use mathematics coaches to support teachers as they continue to improve their mathematics teaching. In addition to learning more about the role of mathematics coaches as they interact with teachers, the project seeks to learn more about the policies and structures that support the training, development, and activities of those coaches. The team is interested in how the coaching program was developed, the supports that contributed to its success, and the challenges that were overcome. The team will conduct site visits to two districts and will include data collection activities in two schools in each district. The site visits will last three days and will be conducted by one site visit lead and one site visit associate.

Exhibit B.4: Data Collection Activities for Instructional Coaching

Instructional Coaching. Sites: 2 schools		
Level	Respondent	Total n of respondents
District (n = 2)	Interview with district mathematics coordinator	2
	Interview with district official responsible for math coaching	2
School (n = 2)	Interviews with math coaches (in each school)	2-4
	Interviews with principals (in each school)	2
	Interviews with math department chair or teacher leader (in each school)	2
	Focus groups with math teachers in each school (up to 5 teachers)	10
Documents	Coach training manuals	variable
	Coach job description/guidelines	
	Coaching materials (e.g., rubrics, forms used to provide feedback, forms to monitor teacher progress, schedules)	

Supplementary Algebra. The purpose of this topic is to explore the structures and implementation processes associated with instructional programs in which students receive additional Algebra I instruction. For example, students may participate in a traditional Algebra I class but then attend a second Algebra I class that reinforces what they have learned. The team will conduct site visits and collect data from two schools in two districts. Each site visit for this topic will last two days, with two site visitors: one site visit lead and one site visit associate.

Exhibit B.5: Data Collection Activities for Supplementary Algebra

Double-Dose Algebra. Sites: 2 School		
Level	Respondent	Total n of respondents
District (n = 2)	District math coordinator	2
School (n = 2)	Principal interview (high school)	2
	Math department chair/teacher leader interview	2
	Supplementary algebra teacher focus groups (up to 5 teachers in each school)	10
	Observations of supplementary algebra classrooms and their associated standard Algebra I classroom/session (1 observation of supplementary algebra and associated algebra class session for each of four schools)	2
Documents	Example lesson plans from each supplementary algebra teacher in each school (2 lesson plans and a “syllabus” for up to 5 teachers in each school)	variable
	District and school guidance on course placement policies for supplementary algebra	
	District and school curricular guides for supplementary algebra class sessions	

Site Visits

Protocol Development

Interview and Focus Group Protocols. Two contractors, AIR and Windwalker, have developed protocols to guide the interviews and focus groups. These protocols include both open-ended questions and closed-ended questions. The open-ended questions will encourage in-depth responses and incorporate flexibility so that the project team can follow threads of conversation to their logical conclusion. The closed-ended questions will ensure that similar types of data are collected across the sites participating in the fieldwork. The team recognizes the utility of including broad questions to initiate discussion, followed by focused probes to ascertain insights in important areas. In developing protocol questions, the team has sought to avoid language that may be loaded, leading, or likely to yield socially desirable responses. Interview and focus group protocols have been designed to explore the guiding questions without placing undue burden on the respondents.

The contractors anticipate that site visitors will adapt the protocols for the context in the site visit schools. To facilitate this process, the protocols include suggested probes, topics that the interview should “listen for,” and notes to indicate where the interviewer should adapt the protocol to the particular respondent’s circumstances. Although each question contains many possible probes, the interviewer is not required (or expected) to ask each of these. Rather, the probes are intended to ensure that the interviewer is attuned to the full range of possible topics and variables to be addressed in the responses and—in rare cases—to prompt a less communicative interviewee.

Following publication of this OMB submission for public comment, the project team conducted piloting interviews with fewer than 10 district officials, principals, and teachers in three locations. Team members asked these educators and administrators to react to (1) the overall organization, flow, and length of the interview; (2) the clarity of the interview wording and language; (3) specific questions that were unclear or difficult to answer; and (4) any recommended changes. The project team then used the responses from these pilots to modify the protocols to make them as suitable as possible for the actual site visits.

Classroom Observation Protocol. As part of the data collection on instructional practices, the team will conduct a small set of classroom observations using instruments that AIR has developed and successfully implemented in other projects focused on math teaching and learning. For example, AIR has a low-inference instrument that captures the frequency with which teachers focus on concepts, procedures, or both.

Request for Documents. The plans for each topical area include some collection of documents, as relevant for the specific topic. Because each topic requires a different set of documents, the team has prepared a separate request for documents for each of the five areas. In general terms, there are two types of requests:

- (1) **A general request.** The project team requests a straightforward set of documents that are generally readily accessible, such as a district’s curriculum framework, pacing guides, or a training manual.
- (2) **A request with detailed guidelines.** For example, the request for teacher assignments includes specific guidelines on how many assignments are to be submitted by each teacher, the focus of the assignment, and the intended level of cognitive demand for the student.

Prior to conducting site visits, AIR will ensure that all data collection procedures (including informed consent forms, in Appendices A - E of this document) are approved by its Institutional Review Board.

Training and Preparation

Training for Site Visitors. The team will train the site visit team so that each member brings to his or her on-site work a consistent understanding of the relevant policies, the project, and the data collection needs. Prior to the first wave of data collection, all site visit staff from AIR and Windwalker will convene in Washington, DC, for a one-day training session. The site visit team leads from AIR and Windwalker will jointly develop and conduct the training so that consistent messages and training content are delivered across organizations. The one-day training will cover many topics, including the major concepts and big ideas of algebra, site visit approach and activities, data collection on-site (including brief review of interview protocols), and coordination of site visit work.

For the training, the site visit task leaders will develop a site visit checklist that will outline all tasks the site visitors need to perform before, during, and after each visit. All site visit team members will adhere to this checklist to ensure that visits are conducted efficiently, professionally, and consistently. There will be regular meetings of the site visit task leaders from AIR and Windwalker as well as weekly email updates and periodic larger meetings of the site visit staff.

Preparation for Site Visits. Prior to each site visit, the project team will compile and review all extant background information on the school. Although some document data must be collected on-site, Web-based resources (primarily state, district, and school websites) include important contextual information on the history, priorities, performance, community support, and staffing of each school. Staff will review these closely before each visit and will enter preliminary information in a data capture template.

Administration of the Site Visits

Each site visit team will consist of two project team members from either AIR or Windwalker. Having the members work as a team during the site visits will enhance the consistency and reliability of data gathered. The same team will be responsible for scheduling and conducting the visits, and both site visitors will attend all interviews if possible. However, site visitors may conduct interviews separately if this is necessary to collect information from all respondents. Because of this, each interview and focus group will be audio recorded. In preparation for each visit, site visitors will review notes from interviews with state officials, review extant data on each site, consider the reasons each jurisdiction was selected for inclusion in the sample, review other relevant documentation, and annotate each section of the individual interview protocols accordingly. Further, these notes will be used to guide the wording of each question. The use of experienced interviewers, coupled with careful preparation, will ensure that interviews are not “canned” or overly formal. The lead site visitor for each site will have ultimate responsibility for completing and submitting the specified set of standard deliverables on the checklist for each site visit or follow-up.

Two-person site visit teams will be instructed to be flexible in determining how to organize each school visit, being mindful of district and school context and the need to collect data that answer specific evaluation questions. However, the site visits will have a standard set of features, including interviews and focus groups with district-, and school-level respondents; all topics will include the collection of document data as well.

Three of the topical areas include cross-school focus groups that will include five or six respondents across schools of a given level (elementary or secondary). To convene these focus groups, AIR and Windwalker will work with a district administrator to facilitate communications with school-level respondents and to identify a central location with convenient access for required respondents. In addition, the contractors will be as flexible as possible with regard to the timing of interviews and focus groups, so as not to disrupt school schedules.

Throughout the process of data collection and reporting, the contractors will make all efforts to protect the privacy of respondents participating in the site visits. The team will not identify by name any of the interviewees and will not attribute quotations. Although the team will identify the names of states in the final reporting of profiles of practice, districts and schools will be identified by pseudonyms.

Collection of Documents and Files

All the topics include the collection of some document data, including schoolwide planning documents, professional development training guides, curricular framework, and pacing guides, among others. Two documents in particular—lesson plans and teacher assignments—will require more specific guidelines for the data collection team.

First, the team plans to collect two sets of lesson plans from each teacher whose class is observed: (1) plans for the classes in which teachers are introducing a new topic and (2) plans for the days during which students are preparing for a test. In addition to the plans themselves, the project team will collect associated slide presentations, handouts, and other supporting materials.

Second, the team will collect two sets of teacher assignments from each teacher whose class is observed. One assignment will be what the teacher considers to be a “typical” assignment, whereas the second should be a more challenging assignment. The teacher should also submit the answer key and details regarding how he or she would grade the assignments—that is, the number of points possible for each part as well as the way in which points would be allocated or reduced on the basis of student work. The purpose of these data will be to provide examples of practice in the technical assistance tools that the contractors will develop.

3. Methods to Maximize Response Rate

Data collection is a complicated process that requires careful planning. The team has developed interview and focus group protocols that are appropriately tailored to the respondent group and are designed to place as little burden on respondents as possible. The team has also piloted core data collection instruments to ensure that they are user-friendly and easily understandable, all of which increases participants’ willingness to participate in the data collection activities and thus increases response rates.

In addition to careful instrument design, a high response rate among the sites may be ensured through careful recruitment materials. These recruitment materials will emphasize the social incentive to respondents by stressing the importance of the data collections to provide much-needed technical assistance and practical information to districts and schools. AIR’s experience in past data collection efforts has demonstrated the importance and value of building a consensus of support with participating districts. Investing in site development at the front end reduces problems in the back end, helping to ensure smooth implementation of the evaluation. Based on prior experience collecting data through site visits, the project team anticipates a nearly 100 percent response rate – not less than 90 percent.

4. Expert Review and Piloting Procedures

Following publication of this OMB submission for public comment, the project team conducted piloting interviews with district officials, principals, and teachers in three states (not more than three respondents per topic). Project team members asked these educators and administrators to react to (1) the overall organization, flow, and length of the interview; (2) the clarity of the interview wording and language; (3) specific questions that were unclear or difficult to answer; and (4) any recommended changes. The project team then used the responses from these pilots to modify the protocols to make them as suitable as possible for the actual site visits. For example, earlier drafts of the protocols included more questions about the interviewee’s background, but these yielded unfocused and lengthy responses at the expense of topics more central to Algebra I. In addition, the project team identified questions that were difficult for teachers to address (specifically questions that would require some involvement in instructional decision making), so these questions were moved to the principal protocols. Importantly, the piloting procedures enabled the project team to determine the likely duration of the interviews and focus groups and to shorten the protocols accordingly.

5. Individuals and Organizations Involved in Project

AIR is the contractor for Promoting Student Success in Algebra I. The project director is Dr. Kirk Walters, who is supported by an experienced team of educators leading the major tasks of the project (see Exhibit B.9 for a list of key staff and responsibilities).

During data collection and particularly during the initial phase of analysis, the contractors will draw on the cross-staffing of some key members of the project, including the project director, deputy project director, and team leaders. Contact information for the individuals and organizations involved in the project is presented in Exhibit B.9.

Exhibit B.9. Organizations, Individuals Involved in Project

Responsibility	Organization	Contact Name	Telephone Number
Project Director	AIR	Dr. Kirk Walters	(202) 403-5838
Deputy Director	AIR	Dr. Nicholas Sorensen	(312) 283-2318
Task Lead: TWG Meeting and Senior Math Consultant	AIR	Dr. Toni Smith	(202) 403-5926
Senior Math Content Advisor	AIR	Steven Leinwand	(202) 403-6926
Task Lead: Profiles of Practice	AIR	Dr. Kerstin Carlson Le Floch	(202) 403-5649
Task Lead: Qualitative Analysis	AIR	Andrea Boyle	(650) 843-8294
	Windwalker	Jennifer Grossman	(703) 970-3518
	Windwalker	Meschelle Linjean	(703) 970-3554
	Windwalker	Lauren Malone	(703) 970-

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	Windwalker	Alison McNeil	(703) 970-3528
	Windwalker	Samantha Schwartz	(703) 970-3519

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