NATIONAL BOARD FOR PROFESSIONAL TEACHING STANDARDS:

BUILDING A PIPELINE OF TEACHING EXCELLENCE

Proposal for the
Investing in Innovation (i3) Development Grant

CFDA Number: 84.411C: Development Full Application Grant

PR/Award Number: U411P120508

Submitted August 17, 2012
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Absolute Priority 1:
Improving the Effectiveness and Distribution of Effective Teachers or Principals

Competitive Preference Priority 9: Improving Productivity
Competitive Preference Priority 10: Technology

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Building a Pipeline of Teaching Excellence

The seminal 1986 report, *A Nation Prepared* (Carnegie Forum on Education and the Economy), made the case that a strong teaching profession is a national imperative. Almost immediately, teachers and policymakers created in 1987 the National Board for Professional Teaching Standards with goals as firm today as when it started: to establish and measure what accomplished teachers know and do, use the knowledge and skills of Board-certified teachers to drive school reform, and forge teaching into a true profession. Since that time, the National Board has established standards of accomplished teaching in 16 content areas and across four developmental levels, and has designed the assessment process to certify teachers who have met those standards. Nationwide, nearly 100,000 teachers have achieved Board certification, and more than 50 percent are working in high-need schools. The National Board process has been broadly researched with proven results, including impact on student achievement and teacher professional growth and retention.

If teaching is going to operate in ways analogous to other professions (Shulman, 2005), two big differences must be addressed: (1) in other professions, board certification is what the majority of members aspire to and most achieve, while such an expectation does not yet exist in education; and (2) in other professions the standards associated with board certification are consciously embedded into the continuum of advancement, while in education such alignment does not occur. This proposal addresses that second difference directly, and will have an indirect impact on the first.

The National Board, working with a diverse group of partners, seeks an Investing in Innovation (i3) development grant to support an effort designed to embed a coherent and tested set of principles of accomplished teaching, derived from National Board Certification, into pre-
service and induction programs. This project addresses Absolute Priority 1, Improving the Effectiveness and Distribution of Effective Teachers. Key partners in this effort include seven local education agencies (LEAs) across New York, Tennessee, and Washington; the Teacher Performance Assessment Consortium (TPAC)—a group dedicated to improving pre-service preparation and initial licensing through performance assessment—and six of its participating institutions of higher education (IHEs); the American Association of Colleges of Teacher Education; the Council of Chief State School Officers; Stanford University; TeachingWorks at the University of Michigan; evaluation partner, American Institutes for Research; as well as the American Federation of Teachers and the National Education Association.

The goal of this initiative is to advance the achievement of high-need students in grades 3-6 in mathematics and science through the development of effective teaching practices early in teachers’ careers. We will accomplish this goal through the following objectives:

− utilizing videos of teaching paired with reflective analyses (collectively called “cases”) created by accomplished teachers as part of the National Board process to improve instruction in a technology-rich, cost-effective, and sustainable way; and,

− embedding these resources into the continuum of advancement from pre-service through induction so that teachers begin their careers with a shared understanding of what accomplished teaching looks like and a clear expectation of where they are headed.

In aiming for these twin objectives in support of student achievement, we will contribute to the preparation, development, and retention of effective elementary mathematics and science teachers in high-need schools. If successful, this development effort will create an evidence base and collection of resources that can scale rapidly, reaching many more teachers and their students in a way that is cost-effective and readily sustained.
A. Significance

A (1). Development and Advancement of Theory, Knowledge, and Practices

Building Upon National Board Certification. Since 1987, the National Board has established standards and provided the framework associated with accomplished practice as determined through a peer-developed and -reviewed performance-based process, similar to what exists in other professions. National Board Certification requires candidates to demonstrate, analyze, and reflect upon their teaching performances as captured on video and in comprehensive reflective analyses, in student work samples, and through assessments of content knowledge. Research shows that Board-certified teachers advance student achievement and that the certification process supports teacher retention and professional growth (Cavalluzzo, 2004; Darling-Hammond, 2003; Ingersoll, 2001; Lustick & Sykes, 2006; NRC, 2008). Students of Board-certified teachers outperform students of non-Board-certified teachers on achievement tests (Clotfelter, Ladd & Vigdor, 2007; Goldhaber & Anthony, 2007; NRC, 2008), making learning gains equivalent to an extra month in school (Vandevoort, Beardsley & Berliner, 2004). Recently, value-added scores for Board-certified teachers were found to be one-half of a standard deviation above their non-Board certified peers, rising to nearly one full standard deviation higher when combined with performance evaluations (NBPTSa, 2012). Board-certified teachers’ impact is even greater for minority students (Cavalluzzo, 2004; Goldhaber & Anthony, 2007).

Board-certified teachers are concentrated in high-poverty schools that historically have difficulty attracting effective teachers. For example, in New York, 97 percent of Board-certified teachers are in schools where 40 percent or more students are eligible for free or reduced lunch, the same criteria used for Title I eligibility. In Tennessee, two of every three Board-certified
teachers work in high-poverty settings. In Washington, where only 22 percent of students are enrolled in Title I schools, over half of the state’s Board-certified teachers work in those schools.

In addition, Board-certified teachers show a higher rate of retention in the profession than their non-certified peers (Darling-Hammond, 2003; Ingersoll, 2001). U.S. Department of Education Secretary Arne Duncan reports that 90 percent of the 1,200 teachers who certified when he was CEO of Chicago Public Schools are still teaching in Chicago (Weiss, 2012).

**Pre-Service and Induction Challenges.** The nation’s preparation programs prepare about 200,000 new teachers every year (U.S. Department of Education, 2011). However, the experiences in teacher preparation often fall short of what beginning teachers need, with three of five graduates reporting that their education did not prepare them for “classroom realities,” affecting their ability to advance student learning (Levine, 2006, p. 32). Early-career teachers, especially those in their first-year, struggle with developing practice, resulting in smaller learning gains for their students compared with their more seasoned counterparts. Studies show that teachers’ effectiveness grows over the first five years on the job, though benefits of experience are less clear after that point (Clotfelter et al., 2007; Harris & Sass, 2007; Nye et al., 2004).

Today’s teacher preparation programs face a challenge: how to provide aspiring teachers with sufficient exposure to accomplished practice to ensure that they have a strong sense of what they are striving to become as they move from preparation to induction and, eventually, to accomplished status (Bransford, Brown, & Cocking, 2002; Spiro, Collins, Thota, & Feltovich, 2003; van Es & Sherin, 2006). The scale of this challenge is greater for teaching than for any other profession because nearly all future teachers have spent more than 15,000 hours as students observing teachers. This experience results in a powerful amount of imprinting and speaks to why so many novice teachers say that they teach the way they were taught (Lortie, 1975). From
the first day of their preparation programs, aspiring teachers need to know what they are striving for, what accomplished teaching looks like, and how accomplished teachers think. Given this extensive imprinting, exposure to and thoughtful engagement with multiple models of accomplished teaching is perhaps the only way to ensure that tomorrow’s teachers can become appreciably more effective than today’s and will break the persistence of mediocre teaching that leaves students in the United States less and less college and career ready.

Unlike with medicine or architecture, teacher preparation programs rarely use proven exemplars of accomplished teaching as a bridge between what aspiring teachers study theoretically in their coursework and how they apply that learning in K-12 classrooms (Darling-Hammond & Bransford, 2005). Often, pre-service teachers relate that their preparation, focused heavily on education theory, does not have an explicit link to practice. Moreover, preparation often lacks a developmental approach to support pre-service teachers building their knowledge and skills over time (Ball & Forzani, 2009; NRC, 2010; Zeichner, 2010). Early-career teachers have few opportunities to investigate accomplished practice and to reflect on how to respond to teaching challenges, which contributes to their lack of preparedness (Lampert & Ball, 1998).

**Need for a Professional Continuum.** At the root of these challenges is the lack of an articulated continuum of advancement as teachers enter the classroom. The field needs conscious alignment of a professional pathway defined by a common language and clear expectations that are created and maintained by the members of the profession, the teachers themselves.

To address this need for alignment, a growing number of states have turned to the Teacher Performance Assessment (*edTPA*) as a means of measuring the quality of pre-service teaching practice. *edTPA* is modeled on the National Board process, requiring pre-service teachers to analyze and reflect upon their teaching performances as captured on video. A
pathway that begins with pre-service preparation, assessed by edTPA, and leads to accomplished teaching, assessed by National Board Certification, creates a professional continuum for teacher development. An intermediate assessment, completed through performance-based professional licensure or the first step of National Board Certification (known as Take One!), further institutes a teacher’s journey to accomplished practice.

Recognizing that a true profession cannot be built by one organization alone, this initiative marries the National Board’s expertise in defining and certifying accomplished teaching with the expertise of critical strategic partners to systemically improve the preparation, recruitment, development, and retention of effective teachers.

A (2). Exceptional Approach: ATLAS

To prepare prospective teachers for the realities of the classroom and to build a pipeline of accomplished teaching, the National Board and its partners will collaboratively develop, implement, and evaluate an innovative approach for advancing the preparation and early-career development of teachers grounded in principles and exemplars of accomplished practice. The National Board, for the first time in its history, will provide to pre-service and early-career teachers the videos and written reflective analyses—called “cases”—submitted by Board-certified teachers during the certification process. These cases will be housed in an online resource called Accomplished Teaching, Learning, and Schools (ATLAS).

Accompanied by instructional guidelines developed collaboratively with project partners, ATLAS cases will bring accomplished teaching to life for prospective teachers. Together, the ATLAS cases and instructional guidelines will make accessible the knowledge and skills of accomplished teachers, improving the practices of teachers at all stages in their career through a coherent alignment of the expectations for teachers as they develop (i.e., edTPA through to
National Board Certification). By integrating digitally-based ATLAS cases and instructional guidelines into preparation and induction programs, teachers’ preparation will be anchored in real-world examples and provide them with opportunities to incorporate those examples into their conceptions of what they must know and be able to do to drive student learning.

(Competitive Preference Priority 10: Technology)

ATLAS provides an innovative avenue for extending the reach of Board-certified teachers into thousands of teacher preparation programs and schools across the country. Recruitment and vetting of master teachers is costly, as is coordination of pre-service and early-career field experiences and exposure to classroom practice. ATLAS will include an easy-to-use search functionality, enabling users to identify relevant cases based on content, grade level, and prominent frameworks such as Common Core State Standards. ATLAS offers opportunities for educators in all settings to access exemplary cases of teaching excellence in a cost-effective, scalable, and efficient manner. (Competitive Preference Priority 9: Improving Productivity)

ATLAS will be ground-breaking because: (1) cases not only provide images of effective instruction, but also provide access to how accomplished teachers analyze their own instructional practice and student learning; (2) cases come only from the portfolios of teachers who have achieved National Board Certification, ensuring high-quality exemplars; and (3) the number of available cases is extensive, given that thousands will be added to the collection each year as a natural by-product of Board certification. All these elements result in low cost and sustainable contribution to improving the quality of learning of our nation’s teachers and students.

A (3). Magnitude of Effect: ATLAS and Advancing Student Achievement

Given that the caliber of the teacher is the single most important school-based factor in influencing student performance (Goe, 2007; Nye, Konstantopoulo & Hedges, 2004; Rivkin,
Hanushek & Kain, 2005), this development initiative is designed to advance student achievement by raising that caliber. Building on the knowledge base in teacher effectiveness, this initiative will forge processes and systems to better prepare early-career teachers to help all students learn. This initiative expects that early-career advancement of teaching practice will lead to capable and confident novice teachers who will be on a path to accomplished levels of teaching.

By embedding the core principles of accomplished teaching within pre-service and induction programs and aligning those principles to exemplars of accomplished teachers, this initiative takes a critical first step toward articulating a common and coherent professional pathway for teachers. The conscious alignment of principles and exemplars will lead to the development of a shared language across the profession that is grounded in common assessments and leads to a clear and coherent pathway for professional growth.

We hypothesize that the systematic use of ATLAS cases and instructional guidelines will have a significantly positive impact on pre-service and early-career teachers’ instructional practices. We will measure this impact in the following ways:

- Pre-service measures will include course and program assessments and edTPA scores.
- Early-career measures will include district teacher evaluation measures (both formative and summative) and National Board’s Take One!, the first step in the Board-certification process.

Furthermore, given alignment with the edTPA and the innovative support provided to teachers through this initiative, we hypothesize that students of participating teachers—especially those teachers who benefit from ATLAS in both pre-service and induction—will have significant improvements in learning and achievement as measured by informal and formal classroom assessments and achievement test scores. For teachers in this project, improvements in their
instructional practices and in their students’ achievement and growth are expected to be significant when compared to teachers in the control group. (See Project Evaluation, p. 17.)

B. Project Design

B (1). Goal and Strategy

Focus on Upper Elementary Mathematics and Science. This development initiative will focus on the goal of advancing the achievement of high-need students in grades 3-6 in mathematics and science through the development of effective teaching practices early in teachers’ careers. Students’ success in middle or high school STEM subjects (science, technology, engineering, and mathematics) is tied to the quality of instruction in their formative, elementary years (ACT, 2006; NRC, 2009), and students in this country fall behind their peers in other countries in mathematics and science achievement after the third or fourth grade (PISA, 2009). ATLAS’ focus on exemplary teaching cases from Board-certified teachers fills a void in preparing early-career teachers, particularly for high-need students, in mathematics and science.

The National Board has an especially strong record in mathematics and science. Recent revisions to elementary, mathematics, and science standards ensure that Board-certified teachers are able to meet the expectations for students established by the Common Core State Standards (NGA/CCSSO, 2010) and Next Generation Science Standards (Achieve, 2012). Board certification in elementary teaching requires teachers to demonstrate proficiency in integrating mathematics and science, and 40,000 elementary teachers have provided such evidence to achieve Board certification. Among the 2009-2011 Presidential Awards for Excellence in Mathematics and Science Teaching, 33 percent (92 of 285) are Board-certified, an impressive result given that Board-certified teachers make up only 2.5 percent of the teacher workforce.
**Target Population.** In this development initiative, we will examine multiple uses of ATLAS in pre-service preparation and district induction to develop and refine guidelines for implementing ATLAS cases. The target population for this project will be students in grades 3-6 and their teachers from seven school districts in New York, Tennessee, and Washington. The seven school districts serve at least 70,000 total students in grades 3-6; of those, over 65 percent are high-need students (see student demographics in Appendix J1).

<table>
<thead>
<tr>
<th>LEA Partner</th>
<th>IHE Partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td></td>
</tr>
<tr>
<td>Niagara Falls City</td>
<td>Niagara University</td>
</tr>
<tr>
<td>Tennessee</td>
<td></td>
</tr>
<tr>
<td>Metro-Nashville Public Schools</td>
<td>Vanderbilt University</td>
</tr>
<tr>
<td>Jackson-Madison Schools</td>
<td>Tennessee State University</td>
</tr>
<tr>
<td>Tipton County Schools</td>
<td>University of Memphis</td>
</tr>
<tr>
<td>Washington</td>
<td></td>
</tr>
<tr>
<td>Seattle Public Schools</td>
<td>University of Washington</td>
</tr>
<tr>
<td>West Valley School District (Yakima)</td>
<td>Central Washington University</td>
</tr>
<tr>
<td>Educational Service District 105</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 1. LEA and IHE Partners*

To test the impact of ATLAS on the practices of pre-service and early-career teachers, ATLAS will be embedded into the coursework and field experiences of pre-service teacher preparation and districts’ induction programs for early-career teachers. Because a subset of teachers will have used ATLAS in their pre-service preparation and continued their use of ATLAS in district induction programs, we will also be able to test the impact of ATLAS across pre-service and induction. Measures of pre-service and early-career teachers will be available across four conditions: (1) never exposed to ATLAS, (2) exposed during teacher preparation only, (3) exposed during induction only, or (4) exposed during pre-service and induction.

<table>
<thead>
<tr>
<th>Pre-Service Teachers</th>
<th>Early-Career Teachers</th>
<th>Exposed Pre-Service through Early Career</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>Exposed to ATLAS</td>
<td>Total</td>
</tr>
<tr>
<td>2,100</td>
<td>1,175</td>
<td>760</td>
</tr>
<tr>
<td></td>
<td></td>
<td>385</td>
</tr>
<tr>
<td></td>
<td></td>
<td>148</td>
</tr>
</tbody>
</table>

*Figure 2. Teacher Participants*

Appendix J2 summarizes the demographic data of teachers in preparation programs and teachers and their students in school districts. Appendix J3 includes the project logic model.
Using ATLAS: One Teacher’s Experience. As described above, ATLAS provides a consistent framework to support teacher development from pre-service, through induction, to accomplished practice. This project can best be understood through a sample teacher, Sarah, and her experience using ATLAS. For Sarah, ATLAS represents a compass to professional practice, guiding her toward becoming an accomplished teacher able to meet the needs of her students.

In 2013, after completing two years of general education courses at her university, Sarah enters the elementary teacher preparation program and takes a mathematics methods course in the fall semester and a science methods course in the spring. In each course, a teacher educator encourages Sarah to identify the visible aspects of a Board-certified teacher’s practice on video, such as how to respond to a student’s unexpected question or idea (Grossman, 2011) or how to engage young students in the difficult skill of discussion in mathematics (Boerst et al, 2011).

Furthermore, the teacher educator challenges Sarah to engage in deeper analysis of practice by examining the accomplished teacher’s written analysis of teaching and rationale for making instructional decisions documented in the video.

Because ATLAS cases are tagged to the Common Core State Standards in mathematics (NGA/CCSSO, 2010) and Next Generation Science Standards (Achieve, 2012), Sarah learns to integrate these standards into lesson planning and has models for implementing those plans. These standards in mathematics and science require students in grade 3-6 to be literate in the
language of the disciplines, and edTPA requires that Sarah provide evidence that she supports her students’ language development and learning in the content area. By using an ATLAS case that demonstrates these skills, Sarah will be able to deconstruct the lesson of an accomplished teacher, benefiting from an understanding of the parts of teaching separately before integrating those parts into the whole of professional practice (Grossman et al., 2009).

**Student Teaching.** During spring of 2015, Sarah enters full-time student teaching, which serves as the capstone event of her preparation. As a student teacher, she will complete edTPA, which requires pre-service teachers to film their teaching, justify their instructional plans based on student needs, analyze student work, and reflect on student learning as modeled in the ATLAS cases. As Sarah designs instructional activities for her students, her use of ATLAS will continue to inform her decision-making. For example, she may refer to an ATLAS case at the same grade level and content area to compare her teaching with that of an accomplished teacher.

**Induction.** Upon completion of state licensure requirements, Sarah takes a position as an elementary mathematics and science teacher. Through her district’s two-year induction program, she is introduced to Take One!, the first step in National Board Certification. Like edTPA, Take One! requires teachers to film their teaching and provide analysis and evidence of their instructional planning and outcomes, including evidence of student learning. Once again, this activity is familiar to Sarah because of her experiences with ATLAS and completion of edTPA.

ATLAS also assists Sarah with achieving goals for her district-based performance evaluation. For example, one of her goals may be to demonstrate more precise use of formative assessments to monitor the progress of students with diverse learning needs. Sarah, with the help of the district’s instructional coach and in collaboration with other new teachers in the district, can use ATLAS cases to analyze expert practices in formative assessment as modeled by
accomplished teachers in similar classroom contexts. Sarah gains expertise by focusing on the deliberate practices of accomplished teachers (Ericsson, 2002). Finally, as Sarah completes Take One!, she takes the first formal step toward National Board Certification.

**Developing the ATLAS Application and Instructional Guidelines.** In spring and summer 2013, we will develop and test the ATLAS technology platform. Cases will be available to teacher education and district faculty through a Web browser interface with streaming video. ATLAS will include search functionality that makes cases readily accessible according to content, topic, grade level, and prominent frameworks such as Common Core State Standards in mathematics, edTPA rubrics, InTASC Standards, National Board Standards and rubrics, Next Generation Science Standards, and TeachingWorks’ high-leverage practices. Partner IHE and LEA faculty will help determine relationships among prominent frameworks so that users can access videos according to their needs. Faculty will also have the administrative capability to manage system users and assign cases to specific users.

At the same time, the National Board and our partners will support faculty in developing the first version of the instructional guidelines to implement ATLAS in pre-service teacher preparation and district induction programs. The guidelines will describe how pre-service and early-career teachers in their preparation and induction programs will use ATLAS cases.

**Pilot Testing ATLAS in Teacher Preparation Courses and Induction.** Beginning fall of 2013, faculty will implement ATLAS using collaboratively-developed instructional guidelines. By May 2014, pre-service and induction teachers will be exposed to a minimum of 20 ATLAS cases in which they will describe, analyze, compare, and evaluate the instructional practices of accomplished teachers. Pre-service teachers will use ATLAS in a variety of courses
and field experiences such as content methods (i.e., methods for how to teach mathematics and science), assessment, instructional design, and child development.

With the guidance of district instructional coaches and mentors, new teachers will use ATLAS in induction programs in ways similar to the instructional approaches used in teacher preparation, i.e., new teachers will evaluate the practices of accomplished teachers to further develop their own teaching expertise. Further, during induction, each participating new teacher will complete *Take One!* to provide performance-based evidence of their teaching and students’ learning in mathematics and science. *Take One!* will be scored using National Board’s validated and reliable assessment process and result in standardized feedback to participating teachers. This feedback will contribute to teachers’ continued development of their teaching practices.

Starting in year one and continuing for the duration of the project, ATLAS partners will host in-person and virtual meetings to support IHE and LEA faculty in their implementation of ATLAS. Beginning in summer 2014, National Board and our partners will assist IHE faculty and district and school instructional leaders in making changes in their implementation of ATLAS. The iterative process of implementing ATLAS with pre-service and early career teachers concludes in May 2017. During this time, we will examine how IHE faculty, pre-service teachers, district instructional coaches, and early-career teachers interact with the ATLAS technology platform, using formative feedback to make incremental changes in the application.

**B (2). Sustainability and Scalability**

In this development project, the National Board will reach approximately 1,500 teachers with ATLAS and, through these teachers, enhance the learning of an estimated 35,000\(^1\) students, 65 percent of whom are identified as high need. Upon project completion, we will have evidence

\(^1\) Of the 70,000 total students in seven districts, half will be taught by teachers exposed to ATLAS.
for and insight into the long-term impact on students’ growth and achievement and on teachers’ practices that comes from supporting large numbers of pre-service and early-career teachers to engage with the knowledge and skills of the nation’s most highly accomplished teachers.

Funding for the ATLAS project totals $3,731,576, with $3,000,000 to be paid by a federal i3 grant and $731,576 from supporting sources. The budget narrative and Form ED 524 identify the allocable costs to be funded by the i3 grant. This proposal is cost-effective as it serves teachers and their students by repurposing existing high-quality exemplar videos and reflective analyses that demonstrate accomplished teaching. The ATLAS technology base makes it broadly scalable in a cost-effective way.

Through the use of ATLAS, IHE and LEA partners have committed to a continuum of advancement in pre-service through induction and will have built capacity during this project to carry it forward. The ATLAS resource and implementation guidelines are projected to have low ongoing operating costs once developed. The prospects for continued implementation are improved by the fact that ATLAS is integrated into core work of pre-service and induction.

Beyond the scope of this project, ATLAS is well-designed to scale on several dimensions. First, ATLAS will expand across all 25 National Board certificate areas, ultimately including thousands of cases addressing all areas of the curriculum and every developmental level of pre-K-12 education. Importantly, these cases are developed as a natural by-product of Board certification, making the costs of incorporating additional content areas and developmental levels relatively low. Second, ATLAS can easily expand to other IHEs and LEAs, initially within the three states that are part of this project and then to additional states. Given the project’s close integration with edTPA, expansion to other states participating in the TPAC is a natural next step in scaling. In only three years, edTPA has expanded to 160 IHEs and has served
as a catalyst for improving the quality of teacher preparation graduates. Third, the availability of implementation tools created as a result of this project (i.e., how ATLAS is used with pre-service and induction teachers) supports scaling based on what we will learn about uses of ATLAS in IHEs and LEAs.

The completion of the development, implementation, and evaluation work proposed in this project will also generate capacity to scale. The National Board and our partners will participate in a cycle of inquiry, constantly improving the approach based on feedback from partners and users. These lessons will translate directly into a refined approach for engaging new IHEs and LEAs. With successful results, this project will be well-positioned to move into validation and, eventually, scale-up projects to support a coherent professional pathway that is derived from principles of accomplished teaching and that encourages all members of the profession to aspire to such standards. Beyond pre-service and early-career development opportunities, ATLAS could expand to other areas of teacher support and development by serving as a professional development tool for all teachers or for use by coaches, principals, and others to improve their ability to observe and analyze instruction.

Current estimates indicate the costs of scaling ATLAS are relatively low. The table below shows costs at the proposed scale of this project and for scales of K-12 students at 100,000, 250,000, and 500,000. The variable cost per student declines from $8 to $3, demonstrating that this approach becomes increasingly cost-effective as it reaches more teachers and students.

<table>
<thead>
<tr>
<th>Number of students reached (scale of this project)</th>
<th>70,000 K-12 students</th>
<th>100,000 K-12 students</th>
<th>250,000 K-12 students</th>
<th>500,000 K-12 students</th>
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</thead>
<tbody>
<tr>
<td>Total Cost</td>
<td>$572,000</td>
<td>$780,000</td>
<td>$1,100,000</td>
<td>$17,000,000</td>
</tr>
<tr>
<td>Cost per Student</td>
<td>$8</td>
<td>$8</td>
<td>$4</td>
<td>$3</td>
</tr>
</tbody>
</table>

*Figure 4. Cost of ATLAS at Scale*
C. Project Evaluation

The American Institutes for Research will conduct a rigorous external evaluation of ATLAS, moving from highly formative to primarily summative across five years. A timeline of all activities is located in Appendix J4. The primary goal of the study during the first half of the project is formative: to provide feedback on the strengths and weaknesses of the ATLAS development and implementation processes that will contribute to the efforts of the National Board to refine and strengthen the program. The primary goal of the study during the project’s second half is summative: to assess the extent the program as a whole and component-by-component is implemented with fidelity, to identify the factors positively and negatively influencing implementation fidelity, and to evaluate the impact of ATLAS on teacher effectiveness and student achievement in mathematics and science. The evaluation consists of:

− An implementation study to assess the progress of the National Board and its partners in developing and implementing ATLAS.

− An impact study to determine changes in teacher effectiveness and student academic outcomes in mathematics and science resulting from ATLAS.

The implementation study will track development and implementation of key program components and gather detailed descriptions and assessments of program relevance, quality, and utility from participating IHEs and LEAs. This will enable the evaluation team to:

− Monitor and assess the process by which the program is developed, and provide highly useful feedback to the development team for refinement of the implementation approach.

− Evaluate the extent to which partners implement ATLAS in their teacher preparation and induction programs with fidelity, including facilitators of and barriers to implementation.
− Compare and contrast the multiple ATLAS development and implementation processes among and between partners to identify best practices.

The impact study will evaluate the impact of ATLAS on teacher effectiveness and student achievement in mathematics and science. The goals are to assess ATLAS’ potential for improving teacher and student outcomes and to understand the contributing factors involved.

C (1). Key Research Questions

The evaluation addresses seven questions, 1-4 by the implementation study, 5-6 by the impact study, and 7 by both studies. The questions are: (1) How is ATLAS developed by the National Board and partners? (2) How is ATLAS being implemented at the IHE and LEA levels? (3) What are facilitators of and inhibitors to development and implementation of ATLAS? (4) What are developers’ and users’ assessments of the relevance, quality, and effectiveness of ATLAS? (5) What are the associations between ATLAS use in IHE and LEA programs and effective teaching of grades 3-6 mathematics and science? (6) Do students of mathematics and science teachers in grades 3-6 who have used ATLAS perform better than students of mathematics and science teachers who have not used ATLAS? (7) What are the similarities and differences among answers to questions 1-6 among IHEs? Among LEAs? Between IHEs and LEAs?

C (2). Data Sources

The evaluation will use six sources of data. A crosswalk of research questions to data collection and analysis activities is located in Appendix J5. The Non-Exempt Research Narrative is located in Appendix J6.

Document Review. This will involve annual collection and review of documents related to key components of ATLAS development and implementation. For example, it may involve
comparing ATLAS documents with class descriptions to determine how many video case analyses are required by pre-service and early-career teachers. (Implementation study)

**Interviews.** Semi-structured interviews will be conducted with faculty directly involved in the development and implementation of ATLAS from each IHE and LEA, focusing on the successes and challenges of each process and on the relevance, quality, and usefulness of ATLAS. Interviews will be with four staff from each institution, evenly split between those involved with development and implementation, in the fall of 2013 and again, to the extent possible, in the spring of 2014 and 2015. One-third of the interviews will be in person, with the remainder via telephone. (Implementation study)

**Focus groups.** Graduating pre-service teachers from each IHE and early-career teachers from each LEA will gather in focus groups to provide more in-depth information on the relevance, quality, and usefulness of ATLAS. In 2013-14, the focus group participants will be pre-service teachers, followed by the early-career teachers in 2014-2015. (Implementation study)

**Online surveys.** ATLAS users will respond to surveys to assess the relevance, quality, and utility of ATLAS; identify its strengths and weaknesses; and suggest improvements. Surveys will be completed each semester in 2013-2014 and at the end of the academic year in 2015-2016. (Implementation and impact studies)

**IHE pre-service data.** All participating IHEs will use edTPA as a common measure to evaluate the impact ATLAS has on pre-service teacher effectiveness. (Impact study)

**LEA teacher performance data.** A range of data sources across LEAs will be used to assess ATLAS’ impact on early-career teachers’ performance in teaching mathematics and science. In addition to edTPA, these include:

− student performance on state and local mathematics and science assessments.
− Teachers’ value-added scores in mathematics.
− *Take One!,* the first step in National Board’s certification process.

During 2013-2014, the evaluation team will work with each LEA to identify teacher performance data sources appropriate for collection and analysis for assessing impact. (Impact study)

**Administrative data.** The researchers will help LEAs identify data on student, teacher, and school demographics; student and school performance; and ATLAS usage. Similarly, IHEs will identify data on pre-service student, faculty, and school demographics; performance; and pre-service student and faculty ATLAS usage. These data will be collected annually.

(Implementation and impact studies)

C (3). **Proposed Methods for Addressing Specified Key Research Questions**

For the implementation study, extant documents will be systematically reviewed to measure the extent to which the program is implemented with fidelity. Data collected from interviews and focus groups will be analyzed with NVivo software. Coding will focus on the extent to which development and implementation of ATLAS are progressing, to identify facilitators and barriers to implementation and strategies used. For the survey analysis, scale scores will use the Rasch model for ordered categories to provide a quantitative measure of frequency and intensity of an individual’s responses with respect to relevance, quality, and utility of ATLAS from multiple user perspectives. Administrative data will be analyzed descriptively and used to create variables for subgroup analyses (e.g., higher-performing versus lower-performing pre-service teachers) and matching procedures as necessary for the impact study.

For the *impact study*, a quasi-experimental design is used to assess the impact ATLAS has on teacher effectiveness and students’ mathematics and science performance. In assessing the relationship between ATLAS and teacher effectiveness, we use a multiple
treatment/comparison contrasts design to examine average teacher effectiveness scores between teachers exposed to ATLAS and not exposed, both within and across IHEs and LEAs.

C (4). Statistical Modeling of Teacher and Student Outcomes

To examine the relationship between ATLAS and teacher and student outcomes, the outcomes for participating teachers (and their students) will be compared to the outcomes for non-participating teachers and their students. As these groups may have pre-existing differences in achievement, demographics, and context, all available controlling variables will be included in the analyses. Furthermore, matching techniques (e.g., propensity score matching) to reduce selection bias will be used when possible. The main outcome analyses will focus on three specific contrasts between participating subjects and non-participating subjects comparing (1) pre-service and early-career teachers exposed to ATLAS to pre-service and early-career teachers not exposed to ATLAS, (2) the effectiveness of teachers from participating IHEs or LEAs to teachers from non-participating IHEs or LEAs, and (3) standardized achievement scores for students of ATLAS-exposed teachers to teachers not exposed to ATLAS, controlling for student pre-achievement. To examine the robustness of these results beyond this initial comparison, class average standardized reading scores will be used as another non-equivalent control time series. A full description of the proposed statistical models, the contrasts, and the available outcomes used for each analysis are provided in Appendix J7.

Note that we have specified a quasi-experimental design that uses a simple treatment and control group comparison based on the most likely scenario of data available. In our analytic model, we will include prior outcome data if available, and we plan to further strengthen our design by conducting an interrupted time series analysis with multiple comparison groups if at least three years of data are available prior to intervention for any of the above-mentioned outcomes. For example, this may be possible with the TPA data if the pilot and field test year data are available to us and the data are found to be stable and similar to scores of the official first year.
C (5). Implementation Data and Periodic Progress Assessment

Findings from the implementation analysis will be discussed regularly and reported to the National Board annually. After each report, the evaluation and implementation team will discuss findings, identify successful program components and areas that warrant further probes, and determine next steps in the data collection process. The aim is to fuel an iterative cycle of continuous improvement.

C (6). Information for Further Development, Replication, and Testing

The use of interviews, surveys, and focus groups should provide extensive data on the implementation of the program components. This information, when combined with impact estimates, will suggest the benefits ATLAS has on pre-service and early-career teachers’ practice and thus the need for further development, replication, and testing. It also will provide much of the foundation needed for further implementation and future studies in other contexts.

D. Management Plan

D (1). Project Timeline and Milestones

ATLAS will be developed, implemented, and evaluated according to project objectives and measured against appropriate milestones (see Figure 5). In the design phase, the ATLAS technology and instructional guidelines will be completed in late summer 2013, and pilot testing in IHEs and LEAs will begin in fall 2014 and continue over the life of the project. On-going data collection among project participants will inform program revisions (including technology) during summer 2014. This program improvement process will take place in each remaining year of the project, resulting in delivery of the final ATLAS library and accompanying instructional guidelines in fall 2017. As described earlier in project evaluation (see p. 17), AIR will conduct formative data collection and analysis in all project years, delivering updates quarterly and at the
end of each project year. AIR will deliver a final project report in December 2017. The project advisory board will meet virtually each quarter and in person annually. Key personnel, as described below, will ensure the project is completed on time and within budget.

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Key: 1 = Winter, 2 = Spring, 3 = Summer, 4 = Fall

Figure 5. Management Plan

D (2). Key Personnel

National Board for Professional Teaching Standards. Lisa Stooksberry, Ed.D. (PI), is Chief Standards and Assessment Officer at National Board. She oversees the Board’s processes for standards and assessments in 25 areas, as well as programs designed to support improved teaching through certification, such as the federally-funded Teacher Incentive Fund (TIF) project. In former roles, she worked on projects such as the Standards-based Teacher Education Project and TPAC. She holds a doctoral degree from Vanderbilt University.

Paula Saranac is Director of Program Management. She develops the processes and policies to effectively implement grant-funded initiatives, and provides direct management of National Board’s Teacher Incentive Fund (TIF) grant funded by the U.S. Department of Education. Before joining National Board, Saranac worked in information technology, serving as director of quality control for a local non-profit and later as a director of engineering.

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3 See Appendices F and G for resumes of key project personnel and letters of support.
Patrick Ledesma, National Board Certified Teacher, Director of Educator Engagement, is responsible for developing initiatives to advance the expertise of Board-certified teachers. A 2010-11 Teaching Ambassador Fellow with the U.S. Department of Education, Ledesma served as a technology specialist and special education department chair with Fairfax County Public Schools (VA). Ledesma is a doctoral candidate at George Mason University.

Janet Haber is a Project Analyst at the National Board, where she provides research support to National Board’s Teacher Incentive Fund project. Haber has strong project management and financial experience acquired through federal and foundation-funded projects, such as the National Reading Technical Assistance Center.

Accelerant Studios. David Glick is the President of Accelerant Studios, where he runs all projects and initiatives. Glick served as CEO of iDiploma.com, an education company that provided curriculum for use with at-risk students. He served as president of Fast Cuts, Inc., a television post-production facility specializing in communication through technology.

Stanford University. Linda Darling-Hammond, Ed.D. (PI), is Charles E. Ducommun Professor of Education at Stanford University where she has launched the Stanford Center for Opportunity Policy in Education and the School Redesign Network and serves as faculty sponsor for the Stanford Teacher Education Program. Darling-Hammond is a prominent leader in teaching and teacher education and leads the work of the TPAC and edTPA.

Andrea Whittaker, Ph.D. (Co-PI), is the Director of TPAC, managing design and development of edTPA and providing technical and policy support to IHEs and state departments engaged in the national field test. President-Elect of the California Council for Teacher Education, she was Professor of Education at San José State University for 15 years. She holds a Ph.D. from Stanford University.
**Vanderbilt University.** Marcy Singer Gabella (Program Co-chair) holds a Ph.D. from Stanford University. She is a Professor and Associate Chair for Teacher Education at Vanderbilt University. She is Principal Investigator of an NSF-funded study designed to trace the development of teachers’ understandings of mathematics and science content and pedagogy. Singer-Gabella is the TPAC state liaison and coordinates Tennessee’s efforts in the field test.

**Metro-Nashville Public Schools.** Lisa Wiltshire (Program Co-chair) is Assistant to the Director for Strategic Planning & Management for Metropolitan Nashville Public Schools. She leads strategic action planning for systems-level reform initiatives, oversees the programmatic allocation of the district’s Race to the Top grant, and develops strategic partnerships to extend and sustain district reforms. Wiltshire holds an M.A. from Bank Street College.

**American Institutes for Research.** Lawrence Friedman, Ph.D. (Evaluation Study Monitor) is a managing director at AIR with more than 25 years of experience in education reform and innovation, serving as PI for an i3 Development project, SciGames, with the New York Hall of Science. He serves as senior advisor of READ 180 in the Milwaukee Public Schools, funded under the Striving Readers program of the U.S. Department of Education.

**Advisory Board.** Advising the project over its five years, attending one meeting per year and joining quarterly meetings conducted virtually will be: Tim Boerst, Ph.D., NBCT, University of Michigan, specializes in elementary mathematics; Dat Le, Ph.D., NBCT, Arlington Public Schools, specializes in early adolescence science; Mary Diez, Ph.D., Alverno College, brings expertise in standards- and performance-based teacher preparation and assessment.
References


developed under a grant from the Spencer Foundation and the U.S. Department of Education.


Programme for International Assessment (PISA) Database, 2009,


