

Project Narrative

ED Abstract Narrative

Attachment 1:

Title: **ASSET Ed Abstract Narrative Pages: 1** Uploaded File: **Z:\i3 Application\ASSET ED ABSTRACT NARRATIVE.pdf**

**ASSET Regional Professional Development Centers
for Advancing STEM Education in Pennsylvania**

Through an Investing in Innovation Validation grant, ASSET Inc. (Achieving Student Success through Excellence in Teaching) will replicate, expand and sustain its proven K-6 standards-aligned STEM education program statewide through 1) the establishment of strategically-placed Regional Professional Development (PD) Centers and Satellite Sites across Pennsylvania that 2) provide Pennsylvania teachers with regional access to ASSET's comprehensive PD and 3) a fully-subsidized Advanced PD Program that builds upon and sustains Pennsylvania's foundational *Science: It's Elementary (SIE)* initiative, targeting teachers in high-needs and rural schools.

Evaluations of the Regional Centers' higher-level PD will validate the effectiveness of ASSET's 'teachers teaching teachers' continuous improvement model within varying Pennsylvania demographics. The PD Centers will be located in the eastern and central part of the state, building upon ASSET's relationships with state university partners (e.g. Penn State Great Valley). Outcomes include curriculum alignment to standards, increased teacher pedagogical and STEM content knowledge, and improved teacher effectiveness and student achievement. The Advanced PD Program will impact 48,000 students; whereas ASSET's total organizational reach is conservatively estimated at 224,000 by 2015.

ASSET's 'official' partner is a consortium of 15 *SIE* member schools. 'Other' partners include: the Pa. Department of Education; Horizon Research, Inc.; Penn State Great Valley and Elizabethtown College. Together, they support ASSET's i3 application and the organization's commitment to collaboration articulated through its core beliefs: all students have the potential to learn; increasing the capacity of school systems to strengthen STEM education is vital to the future of the nation, and most importantly, improving teacher effectiveness results in improved student achievement.

Project Narrative

Project Narrative

Attachment 1:

Title: **ASSET Project Narrative** Pages: **39** Uploaded File: **Z:\i3 Application\ASSET I3 PROPOSAL NARRATIVE.pdf**

**ASSET Regional Professional Development Centers
for Advancing STEM Education in Pennsylvania**

Table of Contents

Competitive Preference Priority 5: Innovations for Improving Early Learning Outcomes.....	2
Competitive Preference Priority 6: Innovations that Support College Access and Success.....	4
Competitive Preference Priority 8: Innovations that Serve Schools in Rural LEAs	6
Selection Criteria A: Need for the Project and Quality of the Project Design	7
Selection Criteria B: Strength of Research	15
Selection Criteria C: Experience of the Eligible Applicant	21
Selection Criteria D: Quality of Project Evaluation	26
Selection Criteria E: Strategy and Capacity to Scale Up	30
Selection Criteria F: Project Sustainability.....	34
Selection Criteria G: Quality of Management Plan & Personnel	37

Competitive Preference Priority 5: Innovations for Improving Early Learning Outcomes

A thriving nonprofit, ASSET Inc. (Achieving Student Success through Excellence in Teaching) is an independent education improvement organization that assists schools in implementing and sustaining standards-based STEM education in grades K-8.

ASSET is an organization rooted in research and best practices. It learned its model of science education reform through the National Science Resources Center, a joint project of the National Academies and the Smithsonian Institution. All ASSET programming, products and services are research-based and standards-aligned.

Research shows that children are natural explorers, active participants in their own development, and their thinking is surprisingly sophisticated. According to the National Research Council, the building blocks for learning science are in place prior to entering school. By the end of preschool, children can reason in ways that provide helpful starting points for developing scientific reasoning (*see Competitive Priorities References Appendix H-1*).

ASSET's standards-aligned program empowers teachers to translate research into classroom practice. ASSET provides teachers with hands-on, inquiry-based curriculum materials that enable young children to develop observation skills and new ideas about the world, as well as build a foundation of experiences and conceptual understanding upon which to construct later understanding. Through rigorous professional development (PD) early elementary teachers are provided with the teaching strategies to tap into **young students'** substantial knowledge of the world around them—and build upon this knowledge to develop understanding of scientific concepts.

Prior to a module ever being taught in the classroom, the teacher has received two to three days of PD to discover the investigations, concepts and materials as both learner and

teacher. Teachers also learn inquiry, assessment and science notebooking strategies for improving student achievement.

Helping students articulate what they know, the incorporation of science notebooks helps foster students' use of language, writing and mathematics as well as the process and social skills of predicting, observing, hypothesizing, experimenting and communicating.

At the heart of ASSET's services are the science modules that re-energize teachers and students. Modules for grades K-3 include the following titles:

	K	1	2	3
Life Science	<ul style="list-style-type: none"> - Animals Two x Two - Myself & Others - The Senses 	<ul style="list-style-type: none"> - Insects - Organisms 	<ul style="list-style-type: none"> - New Plants - Life Cycles of Butterflies 	<ul style="list-style-type: none"> - Structures of Life - Plant Growth & Development
Earth Science	<ul style="list-style-type: none"> - Trees 	<ul style="list-style-type: none"> - Air & Weather - Weather 	<ul style="list-style-type: none"> - Pebbles, Sand & Silt - Soils 	<ul style="list-style-type: none"> - Earth Materials - Rocks & Minerals
Physical Science	<ul style="list-style-type: none"> - Fabric - Wood & Paper - Balls & Ramps 	<ul style="list-style-type: none"> - Balance & Motion - Solids & Liquids 	<ul style="list-style-type: none"> - Solids & Liquids - Changes 	<ul style="list-style-type: none"> - Magnetism & Electricity - Chemical Tests
Technology/Engineering		<ul style="list-style-type: none"> - Comparing & Measuring 	<ul style="list-style-type: none"> - Balancing & Weighing 	<ul style="list-style-type: none"> - Ideas & Inventions - Sounds

ASSET's full curriculum framework for K-8 is located in *Appendix H-2*.

In addition to ASSET's early-learning programming, ASSET's Board of Directors has outlined in its five-year strategic business plan an intention to expand early-learning opportunities for pre-K after 2012.

Competitive Preference Priority 6: Innovations that Support College Access and Success

According to the U.S. Department of Labor, the number of jobs requiring science degrees is growing at three times the rate of other jobs. The 30 fastest-growing occupations through 2016 will require substantial math and science knowledge and skills. Yet, the number of university students majoring in engineering and physical sciences has declined by 25% (1980-2004).

Research shows interest in science begins in early childhood—by age 11. Substantial evidence indicates improved science education during the K-12 years leads to more college-bound students selecting science and engineering majors, as well as improved overall performance (*see Competitive Priorities References Appendix H-1*).

The ASSET program is based on systemic science education improvement, beginning in Kindergarten. By age 11, students in ASSET schools have received seven years of science instruction from teachers who are adept in utilizing hands-on, inquiry-based materials that not only are aligned with state and national standards, but also spark and sustain students' natural interest in science.

Independent evaluations conducted by Horizon Research, Inc. show that 4th-grade students in ASSET member schools scored significantly higher on the Pennsylvania System of School Assessment (PSSA) than students in demographically similar comparison schools in science. Additionally, a study of schools participating in *Science: It's Elementary (SIE)* indicates that science has become a higher priority and instructional time devoted to science has increased.

This type of inquiry-based learning prepares students for college and life through the development of critical-thinking, problem-solving, team working and communication skills, as well as cultivates creative innovators who can collaborate and adapt to new situations.

Competitive Preference Priority 8: Innovations that Serve Schools in Rural LEAs

Many rural schools and districts face a number of unique challenges: geographical isolation, lack of comprehensive curriculum, inability to attract and retain highly effective teachers with the necessary science content knowledge and pedagogical skills, funding shortages, caution toward —outsiders, lack of a sense of urgency to reform science education, and lack of professional development due to travel distances (*see Competitive Priorities Appendix H-1*).

ASSET can begin to break down these barriers to improving science education by establishing Regional PD Centers and Satellite Sites, reducing the need for teachers to travel long distances to receive the training necessary to improve their content knowledge and pedagogical skills. At the same time Regional PD Centers will bring together teachers from different districts allowing for divergent thinking. The subsidized PD project will give priority selection to high-needs and rural schools in Pa.

Through participation in PD, teachers become part of regional and school-based professional learning communities that foster collaboration and serve as a catalyst for empowering teachers to adopt a standards-based approach in the classroom. This network has proven to be an invaluable piece of the puzzle.

ASSET currently serves 12 rural and/or rural low-income school districts through ASSET membership and Pennsylvania's *Science: It's Elementary* program. This allocation provides schools with access to the hands-on curriculum materials and foundational professional development necessary to implement a standards-based science education program. Priority for annual selection is given to high-needs schools, including low performing, low socioeconomic and rural.

Through Validation funding, ASSET will offer rural and high-needs schools fully-subsidized PD services, including ASSET's Curriculum Alignment Planning Service (CAPS),

ASSET Inc. 6

Vision Conference, Strategic Planning Institute, higher-level Institutes for Inquiry, Assessment, Science & Literacy, and Math as well as pathways to develop Lead Teachers, Resource Teachers, PD Facilitators and Coaches.

Selection Criteria A: Need for the Project and Quality of the Project Design

The Need: Building upon a Strong Foundation

International assessments continue to show that U.S. student performance in science is declining. Publications such as the National Academies' *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* and *Taking Science to School* argue that future American competitiveness in scientific and technological areas is jeopardized without vastly improving K-12 mathematics and science education.

In 1994, ASSET was created to fulfill this need. For the last 15 years, ASSET has been working diligently to accomplish its mission to **continuously improve teaching and learning** with the support of national and regional corporate partners who have a vested interest in cultivating a pipeline of future STEM workers.

ASSET is very aware of the workforce shortfalls facing the United States and is committed to building the foundation for today's students to become tomorrow's highly skilled workers. ASSET believes this begins with highly-skilled and effective teachers. Since its inception, ASSET has provided thousands of elementary and middle school teachers with high quality, research-based PD aligned with hands-on curriculum materials - with impressive student achievement results.

Independent evaluation results show that **4th-grade students in ASSET member schools scored significantly higher on the Pennsylvania System of School Assessment (PSSA) than**

students in demographically similar comparison schools in science. Students also scored higher in math and reading.

Pennsylvania, through the leadership of Governor Edward G. Rendell and the Pennsylvania Legislature, is at the forefront of statewide science education reform to improve student achievement. Based on a proven track record and model of sustainability, success and results, ASSET was selected in 2006 to design, implement and manage the initiative known as *Science: It's Elementary* in partnership with the Pennsylvania Department of Education (PDE). To date, the Legislature has invested \$50 million in this landmark initiative to provide a foundation for improving elementary science education statewide.

While ASSET and *SIE* have made great strides in improving the teaching and learning of science in Pennsylvania, there is still a lot of work to be done. Together, ASSET and *SIE* are impacting only one-third of school districts. Every student deserves a highly effective teacher every year. And every teacher deserves access to standards-aligned curriculum materials and ongoing, rigorous PD in order to become highly effective.

To move beyond foundational towards enhancing and sustaining what the state has successfully started through *SIE*, Innovation funding will support the establishment of Regional PD Centers and Satellite Sites, so teachers across the state will have access to ASSET's full spectrum of PD. In addition to participating in the foundational and introductory courses that are an integral part of *SIE*, teachers will also have opportunities to engage in ongoing, rigorous, higher-level PD that is an integral part of the ASSET model (*see ASSET Regional PD Centers for Advancing STEM Education in Pennsylvania Appendix G-1*).

ASSET's proposed project will pick up where *SIE* leaves off—by providing teachers with regional access to the complete array of ASSET's PD offerings, including future innovations designed through a well-defined R&D process. In addition, *SIE* is designed for schools to

transition into cost-share in their fourth year of participation. Now in its fourth year, the first cohort of teachers has completed all of its foundational PD and is ready to advance to ongoing, higher-level PD—a key element of ASSET's results-backed program.

Due to the limited nature of state funding—and to not lose the momentum—Pennsylvania needs an infrastructure to support *SIE* schools as they transition out of *SIE* funding. ASSET Regional PD Centers will provide the bridge to support schools as they progress and continue to implement their standards-aligned science education programs.

Regional PD Centers and Satellite Sites will provide access to the ASSET program for districts across the state interested in joining ASSET as a fee-for-service customer as well. Currently 94% of ASSET's fee-for-service customer base comes from western Pennsylvania, where ASSET's only Professional Development Center exists.

The Solution: Scaling Up What Works (Quality of Design)

Since 1994, ASSET's comprehensive program has implemented the National Science Resources Center's model for exemplary STEM education programs: 1) standards-based curriculum materials, 2) ongoing rigorous professional development, 3) centralized materials support, 4) program and student assessment, and 5) community/administrative involvement.

The recipient of two Local Systemic Change grants from the National Science Foundation from 1995-2001, as well as a Rural Systemic Initiative grant, ASSET ambitiously implemented these five-components in 30 school districts in southwest Pennsylvania. ASSET's focus on designing and providing ongoing, rigorous teacher professional development to fulfill the grant requirement of providing 100 hours of PD for every teacher led to ASSET's teacher-focused enhancements to the national model. ASSET's exceptional approach incorporates:

1) a **—teachers teaching teachers** continuous improvement methodology; 2) a **Lead Teacher Development Pathway**; and 3) a **teacher-driven Research and Development (R&D)** cycle to

design innovative, research-based PD that advances teacher learning. The following chart illustrates ASSET's proven methods:

National Model	ASSET's Innovative Approach
1. Standards-Based Curriculum Materials	<ul style="list-style-type: none"> ● 70+ Science Modules: Life, Earth and Physical Science and Technology/Engineering ● Environment & Ecology Toolboxes * ● Math Toolkits* ● Literacy Library* ● Science Notebooks*
2. Ongoing Teacher Professional Development (PD)	<ul style="list-style-type: none"> ● Comprehensive PD Center at ASSET offices in SWPA ● Foundations, Module & Enrichment Courses * ● Institutes on Inquiry, Assessment, Literacy & Math* ● Regional and School-Based Professional Learning Communities ● Development Pathways for Lead Teachers, Resource Teachers, PD Facilitators, Coaches* ● Research & Development
3. Centralized Materials Support	<ul style="list-style-type: none"> ● 45,000 square-foot Materials Support/Refurbishment Center ● 17,000 square-foot Distribution Center ● 12,000 Modules Refurbished & Delivered Annually ● 4,000 Volunteer Hours Help Contain Costs
4. Assessment of Program and Student Achievement	<ul style="list-style-type: none"> ● Curriculum Alignment Planning Service* ● Embedded Assessments in Modules and PD ● Institute for Assessment* ● Observations of PD Sessions ● Participant Evaluations ● PD Data Collection and Reporting ● Independent Evaluations of Program/Student Achievement
5. Community/Administrative Involvement	<ul style="list-style-type: none"> ● Vision Conferences* ● Strategic Planning Institutes ● Showcases of Student Learning* ● Education Leadership Council (advocacy) ● Program Partners ● Corporate and Foundation Partners
<i>* resulted from teacher-driven ASSET R&D</i>	

While ASSET's comprehensive program assists schools in implementing high standards and high-quality assessments, at the heart of ASSET is its **focus on teachers as both the targets and agents of change in improving teaching and learning in the classroom.** Employing a —teachers teaching teachers approach to professional development creates a safe environment for teachers to continuously improve.

A Pine-Richland School District third-grade teacher observed, *"Thank you so much for allowing me the opportunity to spend three days with intelligent people who are serious about what they do and dedicated to improving student learning by building up and equipping teachers to be agents of change and improvement."*

The Design: ASSET Regional PD Centers for Advancing STEM Education

Vision: To replicate, expand and sustain ASSET's comprehensive, standards-aligned K-6

STEM education program statewide to continuously improve teacher effectiveness and student achievement.

Strategies:

1. Establish two strategically-placed **Regional Professional Development Centers** (east and central—in addition to existing western Pa. Center) and corresponding satellite sites providing regional access to:

- a. **ASSET Vision Conference, Strategic Planning Institute and Curriculum**

Alignment Planning Service (CAPS) to provide schools teams with an understanding of the research-based model for exemplary science education programs. The outcomes will include a district-specific, standards-aligned science curriculum for K-6 as well as a customized five-year plan for

implementing standards-based science materials and PD. CAPS is based on Pennsylvania's current Standards for Science and Technology, and the Environment and Ecology Standards. Once the Common Core Standards for science are published, CAPS will be revised accordingly;

- b. **Comprehensive PD offerings** from foundational module courses (part of *SIE*) to higher-level five-day Institutes for Inquiry, Assessment, Science & Literacy and Foundations for Teaching Inquiry-Based Math;
 - c. **ASSET's Professional Development Facilitator Pathway** to build a statewide cadre of Lead Teachers, Resource Teachers and independent consultants to expand the human capacity to scale up and sustain standards-based STEM learning in Pennsylvania; and
 - d. **ASSET's Coaching Pathway** to provide schools with the option of developing their own coach(es) or access to coaching services from ASSET Resource Teachers who have successfully completed the Coaching Pathway.
2. Establish an **Advanced Professional Development Program, including the Professional Development Facilitator and Coaching Pathways**, at no cost to districts with selection priority given for high-needs and rural schools, in order to sustain quality teaching and learning once the Pathways have been completed.

The diagram below is a simplified logic model (*see ASSET i3 Program Logic Model Appendix G-2 for full model*) for the ASSET Regional Professional Development Centers for Advancing STEM Education.



The project outcomes (*detailed in the full model*) will benefit participating schools:

Short-Term Outcomes

- A supportive context for implementation of high standards and high-quality assessments
- Aligned science curriculum to national/state standards
- A statewide cadre of effective PD Facilitators to scale up and sustain the Regional PD Centers/Sites
- Increased teacher understanding of hands-on, inquiry-based science modules
- Increased teacher pedagogical and STEM content knowledge

Mid-Term Outcome

- Increased teacher effectiveness

Long-Term Outcome

- Improved student achievement

Application and Selection Process

ASSET will conduct a one-day Vision Conference in Fall 2010 for school administrators in Pennsylvania to learn about ASSET's approach for exemplary science education and the opportunity to apply for the ASSET Advanced PD application process, which will give priority selection to schools serving high-needs students based on:

- Low Socio-Economic Status (SES): 40% or more of its students receive free or reduced lunch; and/or
- Race to the Top —Turnaround Schools: Title I eligible with at least 50% of students at below basic (25th percentile) and have both 30% or more students below basic (10th percentile) and less and 6.6% improvement in percent of students below basic since 2005 (75th percentile); and/or
- Rural and Rural Low Income Schools: based on the population density of the school district according to Federal Guidelines.

In order to validate ASSET's program and ensure consistency, quality and evaluation fidelity, selection will include the following prerequisites:

- Participating in *Science: It's Elementary*;
- Former *SIE* participants still using science modules;
- Schools utilizing science modules (FOSS & STC) whose teachers participated in ASSET/*SIE* PD on the modules they are teaching.

ASSET will contract with an external consultant (not the third-party evaluator) who has expertise in evaluation and assessment to process applications and select schools to ensure selection bias does not occur. A rubric based on the criteria listed above will be developed to score and select applicants. The map in *Appendix G-3* pinpoints the high-needs districts as well

as those meeting the additional selection criteria previously outlined. **A total of 400 teachers in 50 schools will be selected to participate in the five-year Advanced PD Program.**

Advanced Professional Development Project Overview

School districts must commit to full participation for the fully-funded five-year program:
(see *ASSET Project Implementation Plan Appendix G-4*)

- Send a (3-5 member) team to the Strategic Planning Institute in the Spring-2011 if the school has not previously attended through ASSET or *SIE*.
- Enlist a minimum of two teachers from each grade level, Grades 1-4, to participate in the Institutes for Inquiry, Assessment, Science & Literacy and Foundations for Teaching Inquiry-Based Math.
- If the school is currently participating in *SIE*: continue to engage one (1) Lead Teacher in the Professional Development Facilitator (PDF) Pathway; if the school is not currently participating in *SIE*, designate one (1) Lead Teacher to participate in the PDF Pathway.
- Engage (1) teacher in the Coaching Pathway beginning in Year 4.
- Consider engaging a teacher as a Resource Teacher on loan.

Selection Criteria B: Strength of Research

Evidence of the impact of the ASSET program on student achievement comes from two studies. Raghavan, Cohen-Regev, and Strobel (2001) conducted a quasi-experimental study comparing 5th grade students in two cohorts of schools participating in ASSET during their National Science Foundation funded Local Systemic Change through Teacher Enhancement (LSC) grant. The first cohort had been participating in ASSET for five years, and teachers had

attended an average of 70 hours of professional development. The second cohort had been participating in the program for two years, with an average of 30 hours of professional development.

The study compared student achievement on an assessment comprised of 10 multiple-choice and 10 open-ended items that were made publically available from the Third International Mathematics and Science Study (TIMSS). Items were selected based on their alignment to the content and process skills addressed in the kit-based science curriculum materials used in participating schools. To establish the initial equivalence of the two groups, the study compared student achievement on the state mathematics and reading assessments for the two years prior to the study, as well as the proportion of students eligible for free/reduced-price lunch, and found no statistically significant differences.

Using class averages as the unit of analysis, the study found that students in the first cohort of schools scored significantly higher than students in the second cohort ($t(63) = 2.037$; $p < 0.05$), reporting an effect size of 0.5 standard deviations. The study also reported that these impacts were equivalent for female and male students.

Banilower and Weis (2009) also investigated the impact of the ASSET program on student achievement. This quasi-experimental study utilized data from the Pennsylvania System of School Assessment (PSSA), which had begun administering a science assessment in 4th grade in 2008. The study used propensity-score matching (Rosenbaum & Rubin, 1983; Rubin, 2001) to identify a set of comparison schools based on the following demographic characteristics of the students and schools:

- Percent of students in each race/ethnicity group;
- Percent of students of each gender;
- Percent of students classified as economically disadvantaged;

- Percent of students classified as English-language learners;
- Percent of students with an individualized education plan (IEP);
- Percent of students classified at Title 1;
- Whether the school is classified as a charter school;
- Number of students in the school who took the PSSA as a measure of school size; and
- Community type (city, suburb, town, rural).

After an initial list of comparison schools was identified, schools were contacted to determine the nature of their science program. Schools that used science modules like those provided by ASSET were excluded from the comparison group and another school was selected. As can be seen in Tables 1 to 3, the demographic characteristics of the schools selected for the comparison group are very similar to those participating in the ASSET program.

Table 1
Number of 4th Grade Students in the School

	N	Minimum	Maximum	Mean	Standard Deviation
ASSET Schools	104	15.00	378.00	77.30	61.09
Matched Comparison Group	104	9.00	340.00	80.89	53.37

Table 2

Demographic Characteristics for Schools Containing 4th Grade

	Percent of Schools	
	ASSET Treatment Schools (N = 104)	Matched Comparison Schools (N= 104)
Charter School	1	1
Community Type		
City	6	4
Suburb	73	74
Rural	9	9
Town	13	13

Table 3

Demographic Characteristics for 4th Grade Students

	Percent of Students	
	ASSET Treatment Schools (N = 8,039)	Matched Comparison Schools (N = 8,417)
Race/Ethnicity		
African American	15	12
Hispanic	1	1
White	81	83
Other	5	5
Gender		
Female	49	48
Male	51	52
Economically Disadvantaged	31	29
English Language Learner	1	1
Individualized Education Plan	17	16 37
Title 1	36	

The study examined science achievement as measured by the 2008 and 2009 PSSA 4th grade assessments. In addition to examining the overall science scale score, the study examined student performance on two sub-scales, one comprised of nature of science items and the other of disciplinary content items (e.g., biology, physics). The study also examined student performance on the PSSA reading and mathematics scale scores as ASSET emphasizes connecting science to both literacy and mathematics, and believes that teaching practices that are effective for science translate into improved instruction in other content areas. While results for math and literacy may not be directly connected to the ASSET program, our beliefs are supported by findings in the most recent book by Diane Ravitch (2010), who points to research that —Knowing reading strategies is not enough; to comprehend what one reads, one must have background [content] knowledge. Ravitch adds that —. . . good teaching is chiefly a matter of good training and having a coherent school setting in which to teach based on a coherent, multi-year curriculum.

Because of the nested nature of the data, the study utilized three-level hierarchical regression models with students nested within school-years, nested within schools (Bryk & Raudenbush, 1992). The analyses found that students in ASSET member schools scored significantly higher than students in the comparison schools on both the science scale score and the nature of science score. The 23-point difference on the science scale score and the 1-point difference on the nature of science score are equivalent to effect sizes (Cohen, 1988) of 0.13 standard deviations and 0.17 standard deviations, respectively.¹ On the disciplinary science content subscale score, students in ASSET member schools performed similarly to students in the comparison schools. These findings were consistent across the two years of data.

¹ The effect size is calculated as the differences between the two means divided by the pooled standard deviation.

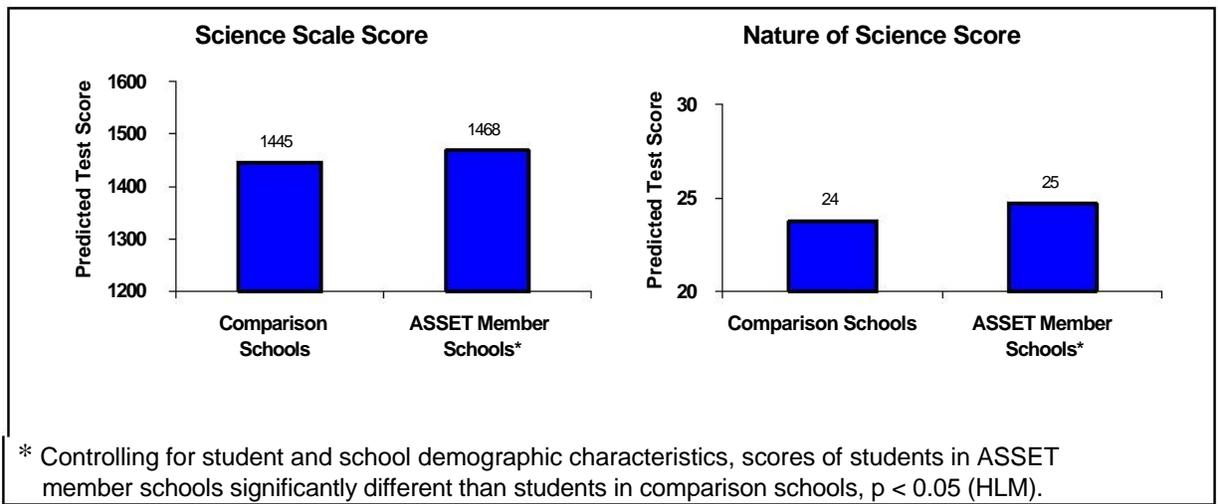


Figure 1

Results on the reading and mathematics assessments were very similar to those found for the science outcomes (see Figure 2). Students in ASSET schools f students in comparison schools, with a 39-point difference on the reading scale and a 45-point difference in mathematics (effect sizes of 0.18 and 0.19 standard deviations, respectively). Again, this aligns with Ravitch's findings.

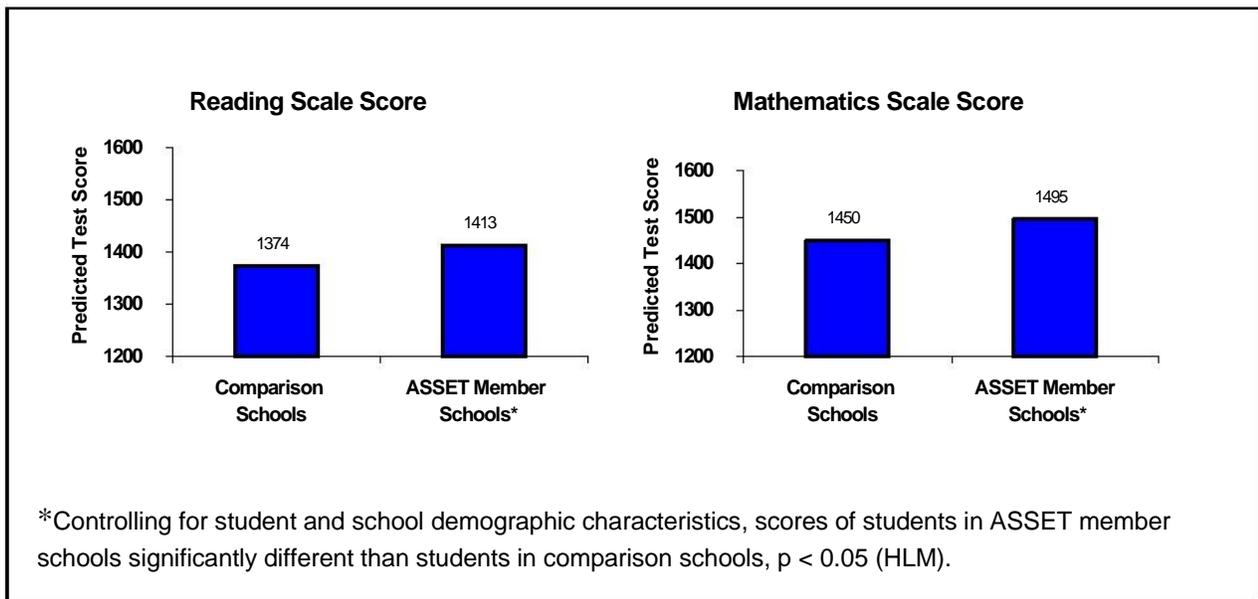


Figure 2

(See *Strength of Research References Appendix H-3*).

Selection Criteria C: Experience of the Eligible Applicant

Reflecting on Lessons Learned

ASSET was launched in 1994 through the visionary leadership of Bayer Corporation and several other business, education and community organizations. ASSET defined its mission to continuously improve teaching and learning by supporting schools in implementing all five research-based components identified by the National Science Resources Center for sustaining quality, standards-based science education programs (*see Research-Based National Model Appendix H-4*).

Initially started as a pilot program in two school districts, a National Science Foundation (NSF) grant fueled growth to 30 school districts from 1995-2001. In 2001, with the conclusion of the NSF grant, ASSET successfully transitioned to a fee-for-service nonprofit model, with all 30 districts staying on board as paying customers. In just three years, ASSET grew its member base by 30 percent, serving 45 school districts in southwestern Pennsylvania.

Based on this proven model of success, sustainability and results, ASSET was selected in 2006 to design, implement and manage Pennsylvania's statewide *Science: It's Elementary* program in partnership with PDE—converting from a \$2 million to a \$12 million organization nearly overnight. Today, ASSET and *SIE* impact 142,000 students and 5,000 teachers in 180 school districts, charter and private schools across Pennsylvania.

Being awarded this complex project injected rocket fuel into ASSET, requiring it to efficiently and effectively scale up the organizational infrastructure to support the effort—from human capacity to business systems, processes and technology. In the process of designing and managing this program, ASSET has made significant programmatic improvements and enhancements as well. For example, many courses were expanded from one day to two days to

allow more time for teachers to become confident and comfortable with content and delivery. Additionally, in order to scale up to meet teacher training needs across the state, ASSET developed the Professional Development Facilitator (PDF) Pathway to build a cadre of teachers who could facilitate ASSET PD with quality and consistency (*see ASSET Professional Development Facilitator Pathway Appendix G-5*).

The culmination of all of these experiences has led to many lessons learned that resulted in and continue to inform organizational improvement. These lessons include:

- Changing teaching culture takes time
- Patience, persistence, flexibility and adaptability are vital
- Maintain customer focus
- Importance of high-quality evaluation and constructive feedback

Validation

ASSET's successful model garnered national attention from President Barack Obama, who in his campaign platform —Lifetime Success through Education singled out *SIE* as "an example of a state taking steps to encourage inquiry-based science statewide. ASSET also has earned acclaim from the National Science Resources Center as a "model for the nation."

However, nothing speaks louder than results, and ASSET has moved the needle in student achievement (*as detailed in Selection Criteria B: Strength of Evidence*). In addition, independent evaluations of *SIE* show the program, though still in its early stages of development, is having a positive effect on student achievement and teacher development. Schools participating in the program indicate that science is now a higher priority, instructional time devoted to science has increased, and teachers incorporate a more hands-on approach to teaching science.

Data Collection and Program Assessment

As a learning organization, ASSET is dedicated to continuous improvement - not only for the teachers it serves, but also for every aspect of the organization. As such, ASSET already has systems and processes in place to collect both quantitative and qualitative data as a means to evaluate the quality and effectiveness of its program. Efforts include:

- Participant evaluations are completed at the end of every PD session. These evaluations are entered into a database with reporting capabilities to inform the PD staff and leadership team, who use this data to make decisions regarding the content and delivery of PD and conferences.
- ASSET Online Services is a Web-based registration system that tracks the number of PD sessions, participants, hours, etc.
- Veteran ASSET Resource Teachers and independent evaluators observe PD sessions to assess quality and consistency.
- Horizon Research, Inc. evaluates both the ASSET program and *SIE* and provides constructive feedback for further improvement.

Culture of a Learning Organization

From its grassroots beginning, ASSET has evolved through the power of enthusiastic, dedicated, mission-driven individuals and the synergy of partnerships. ASSET's mission is to continuously improve teaching and learning, and everything the organization does aligns with this singular focus.

ASSET patiently and persistently pushes the boundaries to motivate teachers' commitment to professional development whereby improving instructional practice in order to improve student achievement. Through these efforts, ASSET has created a learning community of innovative,

passionate people who approach learning as a lifelong, open-ended inquiry and embrace learning by doing.

ASSET delivers through the efforts of its dedicated staff. On a typical day at ASSET, you'll find classroom teachers on loan from school districts, full-time resource teachers, professionals, administrative support staff, business and manufacturing employees, part-time retirees, volunteers and individuals with special needs.

As defined by Peter Senge, a learning organization is marked by continuous transformation. That's certainly true of ASSET—an organization made up of strategic risk takers who thrive on challenges and opportunities. Even more importantly, learning organizations bring together people who continually enhance their capabilities to create what they want to create. For ASSET, that is where the fun and opportunity begins, as the visionaries leading this organization see no limits or barriers to what can be accomplished if everyone stays true to the mission and core beliefs driving it.

The Power of Partnerships

ASSET's innovation is sparked through the involvement of hundreds of community partners—individuals, corporations, foundations, social service agencies, school district personnel and parents. These partners share a voice on ASSET's Board of Directors and Education Leadership Council, a group of key opinion leaders who are committed to ASSET's mission and serve as advocates for the organization. Additionally, hundreds of volunteers donate more than 4,000 work hours annually to ASSET's Materials Support Center where they assist employees in refurbishing nearly 12,000 hands-on science modules for distribution statewide. ASSET also contracts with local agencies serving individuals with special needs, such as ACHIEVA, Life'sWork and Beaver County Rehabilitation Center.

With support from corporations and foundations, ASSET undertakes research and development projects resulting in new teaching strategies and instructional materials for teacher use across all academic disciplines. A formal ASSET Corporate Partners for Improving Science and Math Education Program was launched in 2006 and members include: Bayer Corporation, Carolina Biological Supply Company, Delta Education, Duquesne Light, Merck Institute for Science Education, PPG Industries, Universal Stainless & Alloy Products and Westinghouse. Long-time, loyal support from southwestern Pennsylvania's foundation community includes: Bayer USA Foundation, Buhl Foundation, Grable Foundation, The Heinz Endowments, Pittsburgh Foundation and Richard King Mellon Foundation.

ASSET is also part of a national network of education, research, science and technology associations in six states partnering in the systemic reform movement. ASSET's statewide partners include the Pennsylvania Department of Education and the Pennsylvania Department of Community and Economic Development. Locally, the Carnegie Science Center, Pittsburgh Technology Council, Pittsburgh Tissue Engineering Initiative, Inc., RiverQuest and the R.J. Lee Group are among the many area organizations partnering with ASSET on diverse joint projects.

Recently ASSET has initiated a partnership with Penn State Great Valley in Malvern, Pa., and The Learning Lamp in Johnstown, Pa., to hold select PD sessions for *SIE*. While most *SIE* PD is conducted in hotel space across the state, partnerships with these like-minded organizations serve as a promising model for university partnerships.

Mind Share

Just as ASSET has learned from experts in the field, the organization shares its expertise with others in order to support efforts in improving education. ASSET has served in a consultant capacity for projects in other states, including the development of the Kansas City Science Initiative in Kansas City, Mo., as well as initiatives in Louisiana, New York, Ohio and West

Virginia. ASSET's Directors and Resource Teachers regularly present at statewide and national conferences (i.e., National Science Teachers Association, Pennsylvania Science Teachers Association, Association of Materials Support Centers Next Steps Institute) as well. ASSET's incoming Executive Director has both national and international experience in presenting and publishing.

Selection Criteria D: Quality of Project Evaluation

The external evaluation of the project will be conducted by a 10-member team at Horizon Research, Inc. (HRI) led by [REDACTED] HRI has more than 20 years experience specializing in evaluation and research in mathematics and science education. HRI staff's experience on these projects ensures that the evaluation team has the knowledge and expertise to conduct a strong evaluation that both provides implementation data and gathers evidence of effectiveness. In addition, the budget for this project designates sufficient resources [REDACTED] for HRI to conduct the evaluation activities.

Appropriate to a validation project, the evaluation will focus on five key questions:

1. What is the nature and quality of the training provided to PD Center staff, and to what extent does it provide staff with the requisite knowledge and skills?
2. To what extent are PD Center activities implemented with quality and fidelity to the program design?
3. To what extent do teachers attending PD Center activities learn what is intended, in terms of: (a) targeted science content for teachers; (b) understanding of the content storyline of the instructional materials; (c) intended pedagogical practices for teachers to learn and enact; and (d) targeted pedagogical content knowledge required for high-quality implementation of the instructional materials?

4. To what extent are teachers implementing the instructional materials and pedagogical practices as intended? What contextual factors affect their willingness and/or ability to implement these materials and practices?
5. To what extent does student achievement increase as a result of teacher participation in the center's PD?

To address Evaluation Question 1, HRI will observe the PDF Pathway trainings, as well as administer surveys to and interview participants. The surveys and interviews will focus on a number of important intermediate outcomes, including participants' impressions of the quality of the training; changes in perceptions of preparedness as PD providers; and understanding of the critical components of the professional development sessions they are intended to offer (in terms of both the mechanics and purposes of each component).

Evaluation Question 2 will be addressed through observation and documentation of a representative sample of PD Center activities. In addition, interviews with PD Center staff will provide data on factors that affect the ability of the PD Center to implement the program. Data collected for Evaluation Questions 1 and 2 will be used to provide ongoing feedback to the project leadership that can inform modifications to the initial work of preparing staff at new PD Centers.

The impact of the PD Centers on teacher participants (Evaluation Question 3) will be addressed through data collected from pre- and post-PD questionnaires and teacher interviews. The questionnaires and interviews will assess teachers' perceptions of impact of the PD on their pedagogical and science content preparedness, understanding of the role of inquiry and assessment in science teaching, and their disposition to implement what they have learned in the classroom.

Evaluation Question 4 will also be addressed through multiple data sources.

Implementation surveys will be used to get a large-scale measure of teachers' implementation of the materials and practices promoted by the program. These data will be triangulated and augmented with classroom observations. In addition, the evaluation will examine the coherence and alignment of school and district practices and policies that are likely to affect changes in classroom practices. Consequently, the implementation surveys and teacher interviews will probe teachers about the impacts of these practices and policies on their instruction.

Questionnaires and interviews with key members of the school and district administration will also shed light on how the local contexts affect implementation.

Evaluation Question 5 will be addressed through two means. In the initial years of the PD centers, HRI will administer content assessments at the beginning and end of the school year to students in grades 3-6 in participating schools. These assessments were developed to assess grade-level appropriate content as part of the evaluation of Pennsylvania's *Science: It's Elementary* program.² Data from these assessments will be analyzed using a three-level hierarchical linear model (HLM), with students nested within teachers nested within schools. The key independent variables for these analyses will be extent of teacher implementation of the program materials and practices, and extent of teacher participation in the PD Centers' offerings.

² The development process for these measures included several steps to help ensure validity and reliability. Potential items were reviewed by content experts with a Ph.D. in the relevant topic for content accuracy. In addition, cognitive interviews were conducted to determine if the items were functioning as expected and that students were getting them correct or incorrect for the appropriate reason (i.e., their knowledge of the content domain) and not for other reasons (e.g., test-wiseness). The items were administered to several thousand students and dimensionality and item-response theory analyses were conducted. Finally, the Pennsylvania Department of Education's Science Advisor assisted in the selection of items for the final scales.

HRI will also examine the program's impact on student achievement using data from the Pennsylvania System of School Assessment (PSSA), which includes a science assessment in grade 4 that was first administered during the 2007-08 school year. This aspect of the evaluation will utilize a quasi-experimental design, with a well-matched comparison group of schools. A 1-to-1 propensity-score matching algorithm will be used to identify a set of comparison schools that have similar demographic characteristics and prior achievement patterns to the treatment schools. Scores from the 4th grade state science assessment will be tracked across time to determine if the trajectory of achievement scores for treatment and comparison schools diverge. These data will be analyzed using a three-level hierarchical model, with individual student scores nested within years nested within schools. The main independent variable will be treatment status of the school. The analyses will control for student demographic characteristics (e.g., race/ethnicity, gender, eligibility for free/reduced-price lunch), as well as school characteristics (e.g., school size, community type). The anticipated reduced form of the regression equation will be:

$$\begin{aligned}
 Y = & \gamma_{000} + \gamma_{001} Treatment + \gamma_{002} SchType + \gamma_{003} SchSize + \gamma_{004} SchCommunity + \gamma_{005} Sch\%female + \\
 & \gamma_{006} Sch\%Race + \gamma_{007} Sch\%ED + \gamma_{008} Sch\%IEP + \gamma_{009} Sch\%ELL + \gamma_{010} Sch\%Title1 + \gamma_{011} Time + \\
 & \gamma_{012} Time * Treatment + \gamma_{013} Time * SchType + \gamma_{014} Time * SchSize + \gamma_{015} Time * SchCommunity + \\
 & \gamma_{016} Time * Sch\%Female + \gamma_{017} Time * Sch\%Race + \gamma_{018} Time * Sch\%ED + \gamma_{019} Time * Sch\%IEP + \\
 & \gamma_{020} Time * Sch\%ELL + \gamma_{030} Time * Sch\%Title1 + \gamma_{040} IEP + \gamma_{050} Title1 + \gamma_{060} ELL + \gamma_{070} ED + \\
 & \gamma_{500} Gender + \gamma_{600} Race + r_0 + u_{00} + u_{01} * Time + e
 \end{aligned}$$

HRI will also investigate whether there are differential impacts on various sub-groups of students, such as those from groups historically underrepresented in science and those from rural areas. A power analysis using the Optimal Design software (Liu, Spybrook, Congdon, Martinez, & Raudenbush, 2009) indicates that, with the proposed number of schools, this study would have

an 80 percent probability of detecting an effect size of 0.10 standard deviations, and a power of at least 0.94 to detect effects of similar magnitude to those found in previous research.³

Liu, X., Spybrook, J., Congdon, R., Martinez, A. & Raudenbush, S. (2009). *Optimal Design for Multi-level and Longitudinal Research (Version 2.0)* [Computer software]. East Lansing, MI: University of Michigan.

³ Assumptions for the power analysis were: an average of 73 students per school; level 2 ICC = 0.03; level 3 ICC = 0.20; and that level 3 covariates would reduce variance at that level by 88.5 percent. All of these assumptions are based on findings from analyses of previous years' statewide PSSA science assessment data.

Selection Criteria E: Strategy and Capacity to Scale Up

Through the five-year Advanced PD project, ASSET expects to reach a projected total of 48,000 students across Pennsylvania. Additionally, a growing number of students will be impacted through the comprehensive three-pronged approach involving the establishment of Regional PD Centers, having accessible PD for all teachers statewide and subsidized Advanced PD targeting high-needs and rural schools. ASSET's anticipated total reach in Pennsylvania is conservatively estimated at 224,000 students by 2015.

The project will involve several partners, including a consortium of SIE schools, the Pennsylvania Department of Education, Horizon Research, Penn State Great Valley and other university partners to be determined. The program will have long-term effects well beyond the five -year timeline as the content and pedagogy teachers learn will ultimately impact tens of thousands of students throughout the duration of their careers.

ASSET currently partners with Penn State Great Valley to hold select PD sessions for *SIE*. Through an extension of this partnership, ASSET's first full-fledged Regional PD Center will be located on the Penn State Great Valley campus in Malvern, Pa., near Philadelphia, which will serve a large number of urban and charter schools. The establishment of this Center will

serve as a model for an additional PD Center, which will serve rural schools in central Pennsylvania at a site to be determined. Additionally, ASSET will partner with other higher education institutions, such as Elizabethtown College (near Harrisburg), to establish Satellite Sites surrounding each respective PD Center.

As described in *Selection Criteria C*, ASSET has demonstrated its expertise in scaling to meet exponential growth. ASSET already has in place the management capacity, organizational infrastructure and business systems (*see ASSET Inc. Organization Chart Appendix G-6 and ASSET Business Systems G-7*) to manage this project. To meet human capacity needs and to implement this project with expertise and fidelity, ASSET will staff each PD Center with a Site Coordinator, Resource Teachers, Professional Development Facilitators (PDFs) and Lead Teachers (*see ASSET Professional Development Center Scale-up Plan Appendix G-8*). The staff for each PD Center will support surrounding Satellite Sites as well.

- **PD Center Coordinators** - ASSET will employ one coordinator at each PD Center. ASSET currently has a site coordinator in place at Penn State Great Valley who has oversight of PD conducted at that location. Once a full-fledged PD Center, the coordinator will be responsible for all activities occurring at that Center and surrounding Satellite Sites.
- **ASSET Resource Teachers** - ASSET's —teachers teaching teachers model enables teachers to learn from their peers. Since its inception, ASSET has hired full-time Resource Teachers as well as Resource Teachers on-loan from area school districts to conduct PD. At each Center, ASSET will employ four Resource Teachers (two full-time and two on loan). Veteran Resource Teachers in Pittsburgh will mentor the new Resource Teachers who will engage in ongoing professional development to ensure content and delivery expertise.
- **PDFs** - ASSET has developed a learning pathway to cultivate a cadre of PD facilitator consultants. This Pathway engages candidates (primarily recently retired teachers) in courses

and institutes to learn the foundations of inquiry, writing to learn, facilitation skills, content and assessment. Upon completion of the Pathway, candidates may facilitate ASSET PD on an as-needed consultant basis. ASSET currently has access to 21 PDFs (with seven more currently in the pathway) and plans to develop at least 18 more to scale up to meet the needs of the Regional PD Centers and Satellite Sites.

- **Development of Lead Teachers** - Lead Teachers follow a similar pathway and serve in a similar capacity as PDFs; however, rather than serve as consultants, they remain active classroom teachers in their district. Lead Teachers serve as mentors and coaches for their peers as they learn to conduct ASSET module training for new participating teachers within their schools. At the district's discretion, Lead Teachers may also conduct PD on ASSET's behalf. This model serves as a capacity-builder for both districts and ASSET. ASSET plans to develop at least four Lead Teachers in districts who will be actively co-facilitating PD sessions at each Regional Center.

Garnering Support

ASSET believes that innovation cannot happen in isolation. Fueling ASSET's tremendous growth is the engagement of community foundations and corporations who will be the ultimate benefactors of a workforce that can think critically, discover and innovate. To date, ASSET has not secured the total 20% private sector funding match; however, ASSET's leadership team is confident in the ability to do so. ASSET's annual contributions average:

Foundation Grants	████████	In-kind Donations	████████
Corporate Partners/EITC	████████	Individual Giving	████████

A key component of successful and sustainable STEM education programs is administrative and community support. ASSET already engages in widespread stakeholder

communications activities to garner ongoing support. Communications with all partners (including national), funders, school district personnel, parents, legislators and community members include: direct mail and email, electronic newsletters and announcements, Web site content, Results Reports, Annual Reports, Vision Conferences and other informational and membership recruitment events.

Additionally, ASSET works with schools to conduct *Showcases of Student Learning*. Showcases are an opportunity for school administration, parents, community members and legislators to experience firsthand how students in the school have been learning science by doing science. During the *Showcase*, students facilitate investigations from their hands-on science modules and highlight important science concepts they've learned through hands-on, inquiry-based learning.

As part of the Investing in Innovation validation effort, ASSET leadership will pursue opportunities to publish articles and share results with the national education community through online services and national scientific and professional conferences. ASSET will continue its outreach efforts in order to garner ongoing support for its expanded role in advancing STEM education in Pennsylvania and serving as a model for other states.

Scaling to Impact More Teachers and Students

The fully-subsidized Advanced PD Program will directly affect 19,200 students over the five-year course of the program and reach an additional estimated 48,000 students. The cost per student directly affected will total approximately \$1,162 over the full five-year period. Operating and indirect costs per student per year: Year One \$462.26; Year Two \$488.24; Year Three \$477.96; Year Four \$472.00 and Year Five \$423.34. Operating and indirect costs for additional estimated students reached include: Year One \$184.90; Year Two \$195.30; Year Three \$191.18; Year Four \$188.80 and Year Five \$169.33.

The cost for reaching proportionally larger student populations over five years includes:

- 100,000 students - \$11,620,000
- 250,000 students - \$29,050,000
- 500,000 students - \$58,100,000

Selection Criteria F: Project Sustainability

Sustainability has been the foundation of ASSET's successful business model since its inception in 1994. From 1995-2001, ASSET was the recipient of a NSF funded Local Systemic Change through Teacher Enhancement grant enabling it to serve 30 school districts in Allegheny County for six years. During the grant, districts paid for the science materials while their PD (up to 100 hours for every teacher) was provided through the grant. When the grant ended in 2001, ASSET collaborated with its school district partners to design a fee structure that would meet their diverse needs while enabling the organization to become self-sustaining. The result: ASSET successfully transitioned to a fee-for-service organization—retaining all of its member districts. ASSET's fee-for-service model allows new school districts to participate and as a result the organization continues to experience organic growth annually.

Indicative of the value of ASSET's program is that its fee-for-service membership thrives and continues to grow while delivering the free statewide program, *Science: It's Elementary*. While the Pennsylvania Department of Education pays the full share of program delivery to schools during the initial three years, a cost-share model is implemented in the fourth and fifth year of participation, with schools transitioning out of the grant and into ASSET fee-for-service membership thereafter. Already several school districts that have one elementary school participating in *SIE* have joined ASSET in order to provide hands-on, standards-aligned science education in their other schools.

A cornerstone of ASSET's sustainable model is its ongoing research and development (R&D) cycle. Under the NSF grant, the organization's leadership learned that in order for teachers to continuously improve, they must provide an ongoing mechanism for designing innovative, research-based professional development and involve classroom teachers in the process. More than a decade later, dozens of ASSET products and services, such as Science Notebooks, Environment and Ecology Toolboxes and five-day Institutes for Inquiry, Assessment, Science & Literacy, and inquiry-based Math, are literally changing the way teachers teach and students learn in hundreds of classrooms. Corporate and foundation support continues to fund new R&D enabling ASSET professional development content to provide the most-up-to-date research, thinking and applications in the field.

ASSET will look to incorporate new resources and expertise throughout Pennsylvania into its R& D process as well as roll-out new products and services to the Regional Centers so that all teachers and students in Pennsylvania may reap the benefits of continuous improvement.

Another underpinning of sustainability is that ASSET believes that innovation cannot happen in isolation. ASSET thrives through community partnerships of all shapes and sizes:

- **School District partners** are at the core of ASSET's successful —teachers teaching teachers model. Building a cadre of Lead Teachers, Resource Teachers and Science Coaches who can facilitate professional development sessions at the Regional PD Centers and Satellite Sites is paramount to sustaining effective science education across Pennsylvania.
- **Program partners** are vital to innovation. From the Pennsylvania Department of Education to Penn State Great Valley, the Carnegie Science Center and to the classroom teachers who ask questions and share their successes with their peers, ASSET's partners exemplify how the whole is stronger than the sum of its parts.

- **Volunteers** from all walks of the community, including social service agencies, parent groups, university students, veterans, employee groups and individuals, collectively donate 4,000 hours annually in ASSET's Materials Support Center.
- **Community business and education leaders** serve on the Board of Directors and Education Leadership Council, where they share their expertise and advocate on ASSET's behalf.
- **ASSET Corporate Partners for Improving STEM Education** have a vested interest in providing a STEM-literate workforce and support ASSET's mission through expertise as well as monetary and in-kind contributions. Current partners include Bayer Corporation, Carolina Biological Supply Company, Delta Education, Duquesne Light, PPG, Universal Stainless & Alloy Products and Westinghouse.
- **Foundation partners** provide guidance and advice as well as grants for ASSET's ongoing R&D, resulting in the launch of new products, and strengthening its infrastructure to ensure the whole organization is viable and sustainable. Long-time foundation supporters include Bayer USA Foundation, Buhl Foundation, Grable Foundation, The Heinz Endowments, Pittsburgh Foundation, PPG Industries Foundation and Richard King Mellon Foundation.

As ASSET embarks on establishing Regional Professional Development Centers and Satellite Sites, it will proactively seek partnerships with like-minded organizations across the state. Through an ever-expanding network of partners and supporters, ASSET is committed to sustain and build upon the progress made through the Investing in Innovation Fund.

Selection Criteria G: Quality of Management Plan & Personnel

ASSET's leadership team is comprised of dedicated professionals and educators who share a common passion for continuous improvement of both the organization and the teachers it serves. The management team for this project already has successfully navigated the organization through the scale up effort for *Science: It's Elementary*. Each member of the team has been with the organization for a minimum of four years up to 15 years. The founding executive director and associate director have grown the organization from its infancy and share their expertise at conferences and educational forums around the country.

Project Leadership	Name/Title	Responsibilities
Organization Leadership	██████████ Executive Director ██████████ ██████████	Oversee project leadership team and fiscal operations relating to the implementation of the proposed project and its future and sustainability
Organization Leadership	██████████ Associate Director	Support the Executive Director in overseeing and supervising project leadership team in implementing the project
Project Director	██████████ Director of Programs	Direct day-to-day operations and PD Center staff relating to the project and its future and sustainability
Professional Development	██████████ Director of PD	Lead and manage the overall PD staff and activities related to implementing the project
Grant Reports/ Communication	██████████ Director of Communications/ Resource Development	Direct programs and staff to facilitate relevant communications, recruitment efforts, partnership and resource development outreach in order to scale and sustain the project
Financials	██████████ Director of Finance	Direct financial resources, accounting process and staff related to carrying out the project

Operations	██████████ Director of Operations	Oversee materials support, business systems and personnel
Technology	██████████ Director of Information Technology	Manage IT staff and comprehensive information systems and process
Center Coordinator I	██████████ Center Coordinator	Coordinate day-to-day activities and operation of Regional PD Center at Penn State Great Valley
Center Coordinator II	TBD	Coordinate day-to-day activities and operation of Regional PD Center at site TBD

(Resumes of the leadership team can be found in Appendix C. ASSET's Organizational Chart is located in Appendix G-6.)

As referenced in *Selection Criteria D: Quality of Project Evaluation*, the external evaluation will be conducted by a team at Horizon Research, Inc. (HRI) ██████████. HRI has more than 20 years experience specializing in evaluation and research in mathematics and science education. ██████████ background in science education and research methodology and experience conducting science education research support his leadership of the 10-member evaluation team. He currently leads research and evaluation teams at HRI for several science and mathematics education programs. HRI staff's experience on these projects ensures that the evaluation team has the knowledge and expertise to conduct a strong evaluation that both provides implementation data and gathers evidence of effectiveness.

ASSET's leadership team in partnership with HRI will conduct the following activities and accomplish the milestones listed in the chart below:

Timeline Program Development		Timeline Center Development		Milestones
Year 1 2010 - 11	Vision Conference	Site 1 ██████████		October 2010 Vision Conference
	Application			November 2010 Application Process
	Curriculum Alignment			

	Strategic Planning Institute			Spring 2011 Program Launch
	Institute/ Inquiry Session A			Spring 2011 Site 1
	Lead Teacher Pathway I			
Year 2 2011 - 12	Institute/ Inquiry Session B & C	Site 1 [REDACTED]	Site 2 [REDACTED]	2011-12 Teacher Participation
	Lead Teacher Pathway II	[REDACTED]	[REDACTED]	Fall 2011 Site 2
	Institute/Assessment Session A	[REDACTED]		June 2012 Program Evaluation
Year 3 2012 - 13	Institute/Assessment Session B & C	Site 1 [REDACTED]	Site 2 [REDACTED]	2012-13 Teacher Participation
	Lead Teacher Pathway III	[REDACTED]	[REDACTED]	June 2013 Program Evaluation
	Institute/Science & Literacy Session A	[REDACTED]	[REDACTED]	
Year 4 2013 - 14	Institute/Science & Literacy Session B & C		Site 2 [REDACTED]	2013-14 Teacher Participation
	Coaching Pathway I		[REDACTED]	June 2014 Program Evaluation
Year 5 2014 - 15	Institute/Math			2014-15 Teacher Participation
	Coaching Pathway II			Fall 2014 School Coaches June 2015 Program Evaluation

Furthermore, ASSET's Project Director and appropriate members of the leadership team look forward to participating in the Investing in Innovation Communities of Practice to discuss potential issues, share research-based and proven practices and collaborate with other grantees regarding similar projects.

Through an Investing in Innovation Validation grant, ASSET welcomes the opportunity to engage in this project to build upon the *SIE* program, solidify and sustain a state model for STEM education, and improve teacher effectiveness and student achievement.