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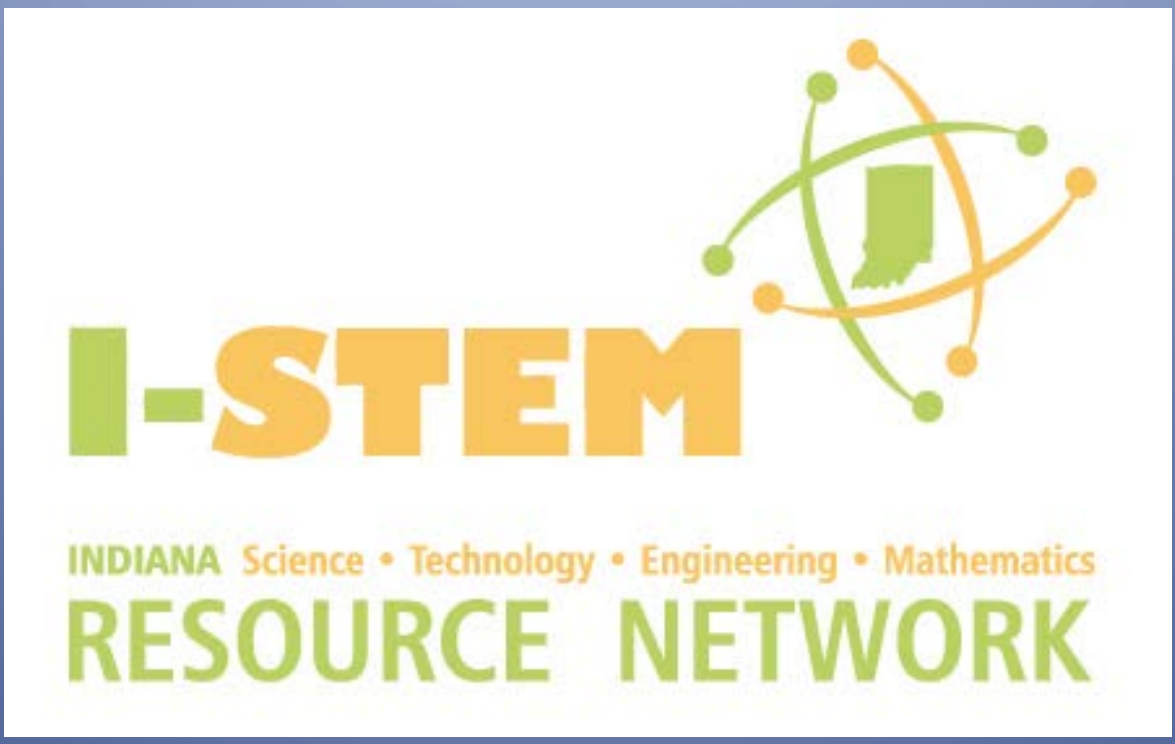

Indiana Science Initiative Update: Sustaining the Indiana Science Initiative: Evaluation Findings (TERC)

October 1, 2015

The I-STEM vision is for Indiana to be a national leader in student achievement and to demonstratively improve college and career readiness in the STEM disciplines.

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Sustaining the Indiana Science Initiative: Evaluation Findings

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I. EXECUTIVE SUMMARY

Beginning in January 2015, the STEM Education Evaluation Center (SEEC) at TERC (referred to as TERC in this report) initiated a study to understand the potential for sustaining the Indiana Science Initiative (ISI). Twenty-six interviews were conducted with ISI stakeholders at the school and district level, and 256 teachers completed an online survey. Findings from these data highlight ISI's impact and factors contributing to successful and sustainable science teaching and learning. They also point to challenges that threaten long-term sustainability.

In many school and districts, administrators and teachers identified clear and positive changes in science teaching and learning since joining the Indiana Science Initiative. Notably, they indicate that teachers' science knowledge and confidence have improved. Moreover, students are excited about and engaged in science. To reach this point, many ISI schools and districts established practices that fortified ISI's success. In particular, school and district leaders:

- focused on science, developing a vision and establishing policies.
- integrated science with mathematics and English language arts.
- built external sources of support, both human and financial.
- supported teachers with science instruction via PD offerings, coaching, and time.

The challenges for sustaining ISI were identified as well and fell into three broad categories: ISI operations and staffing (including kit use, teacher training, and online resources); classroom implementation (including limited time and space, little to no teacher support, and alignment of standards); and pressures as a result of the current educational climate (including pressure to focus solely on ELA and math, lack of funding, and teacher turnover).

In response to these challenges, and based on the data from ISI and similar evaluation studies, TERC has provided recommendations for consideration. Many focus on expanding ISI capacity, fostering collaboration within and outside of schools, and proactive planning that anticipates these challenges and has a ready response. Furthermore, increasing advocacy for science by enlisting the support of school and district leaders and their communities is critical for sustaining ISI.

II. METHODS

To study sustainability, data were collected via stakeholder interviews and a teacher survey. The ISI program manager, Dr. Jennifer Hicks, reviewed each instrument beforehand, to ensure that language and descriptions of ISI activities were consistent with the ISI intervention.

In January 2015, stakeholders were recruited for the interview using an ISI contact list. These stakeholders included district administrators, school principals, and coaches or teachers responsible for supporting ISI implementation. Invitations to participate in the interview were sent to each participant by email. District coaches and principals were offered a $50 Amazon gift card incentive, whereas higher-level district administrators participated without any incentive. The two tables identify the number of interview participants by district (Table 1) and by type of stakeholder (Table 2).

TABLE 1: Number of stakeholder interviews by district.

Districts	Interviews	Districts	Interviews
Avon Community Schools	2	Michigan City Schools	2
Crawfordsville Community Schools	1	MSD Decatur Township	2
Diocese of Fort Wayne-South Bend	1	MSD Pike Township	1
Diocese of Indianapolis	1	MSD Washington Township	2
Evansville Vanderburgh School Corporation	5	Richmond Community Schools	4
Indianapolis School District- Charter School	1	South Bend Community Schools	2
Logansport Community School Corporation	1	Tell City-Troy Township School Corporation	1

TABLE 2: Interview respondents by position

Position	#
Assistant Superintendent	3
Curriculum Director	5
Principal	11
Science Coach	4
STEM Coordinator	4

Working from a list of teachers who received ISI kits, TERC invited 12 public school districts with at least ten ISI participating teachers (1038 teacher in total) to participate in an online survey. The majority of these teachers taught grades three to eight. A total of 256 teachers completed the survey and each was provided with a $20 Amazon gift card to thank them for their time.

Table 3 shows the number of participating teachers per district. A majority of respondents were from Evansville, because the survey link was sent to those teachers by their district administrator who encouraged their feedback. It is important to note that this administrator did not have access to their responses. The following tables describe the respondents' background. Table 4 shows that 66% of teachers participated in one or two summers of the ISI training and Table 5 indicates that a majority of teachers (51%) identified themselves as being third and fourth grade teachers. Lastly, out of the 88% (226) of teachers who participated in the summer trainings, each of them participated in one or more of the following types of ISI summer trainings (see Table 6).

TABLE 3: Teacher respondents by district

District	# of Teachers	District	# of Teachers
Avon	19 (7.4%)	MSD Washington Township	13 (5.1%)
Evansville	83 (32.4%)	Pike Township	9 (3.5%)
Indianapolis	7 (2.7%)	Richmond Community Schools	21 (8.2%)
Logansport	10 (3.9%)	South Bend	39 (15.2%)
Marion Community Schools	7 (2.7%)	Tell City	3 (1.1%)
Michigan City	10 (3.9%)	District unidentified	7 (2.7%)
MSD Decatur Township	28 (10.9%)		

TABLE 4: Teacher respondent participation in ISI summer training

Years	Number of teachers	Percentage
1	115	45%
2	53	21%
3	34	13%
4	18	7%
5	6	2%

TABLE 5: Grade levels taught by respondents

Grade	# of teachers
Kindergarten	13 (5.1%)
1st Grade	16 (6.2%)
2nd Grade	17 (6.6%)
3rd Grade*	72 (28.1%)
4th Grade*	59 (23.0%)
5th Grade*	43 (16.8%)
6th Grade*	30 (11.7%)
K-6 Coach	1 (0.4%)
Unknown	10 (3.9%)

*Note: Percentages equal more than 100% due to double counting teachers that taught mixed grades in these denoted groups (e.g., 4th and 5th grade teacher)

TABLE 6: Types of ISI PD that respondents attended

ISI notebooking	ISI kit training	ISI FAS
209 (81.6%)	217 (84.8%)	71 (27.7%)

*Note: A total of 256 teachers responded to this question but percentages equal more than 100% since teachers typically participated in more than one type of PD.

III. ISI IMPACT

Data from the stakeholder interviews and teacher survey were overwhelmingly positive with numerous indications that the intervention (curriculum and professional development) was successful overall.

Among the major positive impacts of the program was an increase in teacher confidence and content knowledge, accessibility of materials for hands-on science activities, and changes in science teaching that fosters inquiry learning. Teachers and administrators also noticed increased student curiosity and thinking about science.

ISI impacted ***teachers' confidence and content knowledge***. According to the *teacher survey, most teachers felt confident about science teaching and knowledge.* Table 7 shows that the majority of teachers (62%) either agreed or strongly agreed that they feel more confident teaching science since their school began using the ISI kits. When asked about 17 different types of challenges for teaching science, more than half of the teachers did not think their own knowledge or understanding of the kit was a challenge (see Table 8). They felt that their own science knowledge was sufficient and they were well prepared to use the kits. Furthermore, teachers who felt least confident about science teaching, had, on average, participated in one year of PD or less (mean=1.25). Some teacher comments in the survey directly attributed an increase in their confidence to the professional development they received in ISI. For instance:

In 2010, I attended the pilot, I would say at that point it improved my science ability. Now I understand what I am talking about in science.

TABLE 7: Science teaching confidence

	n	Strongly disagree	Disagree	Somewhat disagree	Somewhat Agree	Agree	Strongly agree
Confidence teaching science	226	4 (1.8%)	16 (7.1%)	9 (4.0%)	56 (24.8%)	81 (35.8%)	60 (26.5%)

TABLE 8: Teachers' science and kit topic knowledge

Challenges	n	mean	Not a challenge	A little challenge	Somewhat of a challenge	A very big challenge
Own science knowledge	238	1.55	136 (57.1%)	74 (31.1%)	26 (10.9%)	2 (0.8%)
Own understanding of the kits	240	1.48	157 (65.4%)	55 (22.9%)	23 (9.6%)	5 (2.1%)

The two items above were taken from a list of 17 challenges for science instruction. These two challengers were three of the lowest rated challenges compared to the other 14. Teachers felt prepared and felt that they had good science knowledge

Teachers credited ISI training—specifically that which focused on kit use, notebooking, and making meaning discussions—with their increased confidence. Some indicated that ISI sessions helped them to develop pedagogical strategies, such as questioning techniques and fostering collaborative groups. For instance, one teacher stated:

After attending a notebooking professional development day, I feel my teaching and student engagement has increased.

Administrators also commented on how their teachers were less "scared" of teaching science. Having kits that included all of the hands-on activities helped lessen their fear because they no longer had to create their own science investigations. Administrators also pointed out that once teachers worked with the science kits and saw the engagement of their students during the investigations and activities, the teachers themselves became advocates for the ISI program. As a result teachers no longer wanted to use textbooks.

…it was our teachers who really tried to sell everybody else on it. And the teachers from my building, especially, felt so strongly. They weren't about to get a no vote. They had to have ISI. And they haven't looked back. They have not looked back. (principal)

ISI training has made a difference in teachers feeling more comfortable with using kits and as a result more teachers have embraced them. Some have actually become champions of ISI. (district administrator)

ISI has impacted ***science instruction*** in a major way. Teachers appreciated having sufficient materials (e.g., "I have enough materials for a whole class and can thoroughly teach [a subject] in interesting hands on ways"), especially since they were not readily available prior to ISI. In the past, teachers often needed to purchase materials themselves in order to do a science investigation. Table 9 shows that this is no longer a main challenge, with 70% (163) responding that out of pocket expenses are not a barrier to teaching science.

TABLE 9: Teacher out-of-pocket expenses

Challenges	n	mean	Not a challenge	A little challenge	Somewhat of a challenge	A very big challenge
Out of pocket expenses for additional kit materials	228	1.95	103 (45.2%)	60 (26.3%)	38 (16.7%)	27 (11.8%)

In response to an open-ended response question, 62% (159) of the teachers were able to list specific aspects of their science teaching that have improved as a result of participating in ISI. Students are doing science instead of reading out of textbooks, and teachers are asking students more questions, encouraging more collaborative work, and planning lessons that are more student-centered, rather than teacher led. For example, two teachers commented:

> *I am more purposeful with my students when asking questions and investigating solutions, for example notebooking [to respond to] the question "how does light travel?", [then] recording data and answers.*
>
> *Now I have my students try to make meaning themselves instead of just telling them what they need to learn.*

Other teachers noted that they ask students to do more writing in science class because of the notebooking PD. As a result, some teachers wrote that using these strategies has enhanced student comprehension and communication skills.

> *Now I have my students writing more in depth about their findings after activities, which has increased their understanding of what they have found.*

One principal described how excited her teachers are about students' notebook entries. When she observes, teachers show her student notebooks. She remarked:

> *I specifically remember a 2nd grade teacher pulling out a notebook and saying, you just gotta look at this. Cause some kids…they may not be the best writers, but boy, to illustrate what they just did and make conclusions from that, it's pretty exciting.*

In addition to advantages for students, teachers see benefits for themselves as well. While planning science lessons, some find that ISI kits facilitate collaboration with other teachers as they come together to discuss challenges and successful strategies.

> *…when we are together, when we do have that opportunity to work collaboratively, it does allow us to speak a common language and be able to talk about some of the difficulties that we're having, and share strategies that have been successful. (4th grade teacher & STEM facilitator)*

Collaboration with other science teachers, on my grade level, has given me great ideas on how to teach science. (teacher)

Through better science teaching and lessons, ISI has positively influenced ***student engagement***. And as students become excited, teachers, in turn, become more enthusiastic when they see how excited their students are. Illustrations of this are provided in teacher comments below:

My students are eager to learn more because they view the kits as 'fun."

The students love science time! The can't wait until the end of the day so they can learn/discover something new.

We got kids, who aren't excited about anything else during the school day, that come to my class and are excited to be in science, and are excited solely for science. (4th grade teacher & STEM facilitator)

As a result of this student engagement, teachers ask principals to observe their science lessons as part of their evaluation because they know that students will be immersed in learning. One principal reported finding that teachers received the highest score ever in engagement when they were being observed teaching while using ISI kits.

Teachers also commented that students show evidence of higher-level thinking and keener observational skills. These abilities are noticeable in their science notebooks and also show an increase in writing ability, language, and vocabulary development.

I never used a science notebook prior to using ISI kits. My students now know how to think about an investigation and reflect on it. Their critical thinking skills have improved. (1st grade teacher)

There is also a level of higher-level thinking in the analysis and predictions made during the ISI activities. (4th grade teacher)

Now students have a better idea of how to write actual observations instead of applying emotions and human motives to behavior observed. (4th grade teacher)

These combined facets of impact lead teachers and administrators alike to claim that ISI has been a success, as shown by one principal's overarching comment:

And we can't say enough good about it. Our teachers love it. Our students adore it. You know, if you ask them what their favorite subject is, they're going to more than likely tell you science.

III. PRACTICES AND POLICIES THAT CONTRIBUTE TO ISI SUCCESS

Stakeholder interviews revealed that approximately 9 of the 11 districts are implementing practices and policies that support ISI, across the entire district or within individual schools. This was true for public, charter, and Catholic schools. The major factor driving these successful internal practices and policies are ***leaders at the district***

or school level who advocate for science in tangible ways: 1) focusing on science; 2) participating in the ISI pilot; 3) developing a vision; 4) Establishing policies; 5) Integrating science; 6) building external support; and 7) supporting teachers.

1. Focusing on science: Administrators who advocated for science instruction demonstrated a focus on science in a variety of ways. A few had science background while others had a personal interest. These leaders readily expressed to staff their love for science and their convictions about the importance of science.

> *I think it [science] has a lot of advantages. My dad has been a science teacher for 30 some years, so I kind of grew up with a science mentality. I've always loved science. It's a wonderful, fascinating subject, very important for, obviously the whole emphasis on STEM education, not just because of career readiness, but obviously social responsibility, environmental responsibility, policy issues, maintaining a sustainable way of living. All of these things tie into it, and the sometimes lack of scientific literacy in society in general. (principal)*

2. Participating in the ISI pilot: Those who were enthusiastic supporters of science education were also *more likely* to have piloted and then adopted ISI. Moreover, their schools were more likely to do a full implementation, following teacher professional development. Some of these principals invited other schools and districts to observe PD and they shared what they were doing with other schools within their district.

> *We all support each other. We all— If one finds something that's working for us, we share it with everybody. It's not a district that is competitive. We're not at all with each other. It's all about working together, and we're very strong in that*. *(principal)*

Examples of enthusiastic communication about ISI to others, and the positive reaction that followed, were peppered throughout interview data:

- A parochial school principal invited other principals to meet with her and observe the science classes. Shortly after visiting, one principal immediately decided to implement ISI because he and his staff were so impressed by what they saw in the science classrooms.
- In a public school district, teachers from the pilot school encouraged teachers at other schools to vote for adopting ISI. Their passion resulted in an affirmative vote.
- One principal attended the ISI professional development, researched the cost of implementation, and made presentations to the superintendent and the school board.

3. Developing a vision: Many of these administrators developed and articulated a vision for science education. As a result, having a vision for science education influenced their expectations in the classroom. Teachers are expected to fully use ISI materials. In addition to mandated blocks for math and reading, time is allocated for science instruction. These districts have mapped out the science curriculum for all grades, and added resources as necessary. One district has even gone further, by setting expectations for notebooking and employing science coaches to communicate and support these expectations.

As one principal stated:

So if I'm going to be responsible for a school, I want to make sure that we have responsible science education. Using an inquiry-based method, a hands-on approach, is strongly validated in the educational, psychological literature. We have had some issues with students learning science, and [its] frustrating to me that so much of it was based on simply the memorization of concepts, learning and memorizing ideas, and not really seeing how it plays out as a logical process of inquiry. But for all those reasons, it just seemed like a good way to go.

4. Establishing policies: The policies that these administrators established increased expectations for offering quality science education for all. For example, prospective candidate's interest in science is a criterion for hiring for one administrator.

I tell them from day one, I don't hire you unless you like to teach science. And so, it's the truth. It's an expectation here that you enjoy it that kids get the opportunity, and how important it is here. (principal)

Many of these principals who advocate for science make a point of frequently observing during science class. They report that they delight in observations that show students' enthusiasm for science. One school explicitly makes science observations part of the teacher evaluation, and administrators review the criteria with staff (e.g. teacher content knowledge, student demonstration of understanding, student engagement, and teacher ability to modify instruction as needed). The principal found that this process stimulated discussion about science instruction. After the observations, she reported the findings back to the teachers.

They all got highly effective in engagement…. That's the highest rating the teachers, any of them, have ever gotten as far as student engagement. So those were the kinds of examples, clearly communicating content knowledge to students. So I think it made the teachers realize how well aligned the science kit is with our own standards and with our own teacher evaluation expectations.

5. Integrating science with other subjects: This was also a key practice that supported sustaining ISI in the long term. Both administrator interviews and data from the teacher survey indicate that teachers and administrators want to see more efforts devoted to integrating science with other subjects, particularly mathematics and English Language Arts (ELA), especially since this may ensure that they can teach science (see Table 10).

Table 10: Perceptions: benefits of integrating science in math and ELA

Makes it more likely	Doesn't make a difference	Makes it less likely
160	64	21
(65.3%)	(26.1%)	(8.6%)

Administrators and teachers both noted that it is important to have professional development specifically on integration so that it is authentic and consistent with the inquiry science approach advocated by ISI. As one teacher lamented:

With having to follow the basal exactly, it's hard to integrate science into our reading and make it an authentic learning experience.

Some cautioned that reading and writing about science is only one part of a science program and is not a substitute for engaging in scientific investigations. One district administrator further explained:

I know that they use, you will see math more and language more in their science, but I'm not sure it's the best integration of it. Does that make sense? Like they may be stronger on the math piece or stronger on the language arts piece, and the science is kind of fluffed in there.

To support these and other integration challenges, a few districts have either received grants to work on integration or offered professional development focused on making connections across subjects, (e.g. partnering with the DaVinci institute, a network that facilitates opportunities for integrating the arts and humanities with the STEM fields). A list of specific examples on how schools and districts have integrated science with other subjects is included in Appendix B.

6. Building external support: Another key practice for sustainability, implemented by some successful ISI districts, was *seeking external support*. Administrators who successfully advocated for science supported it by writing and procuring grants, developing STEM initiatives, involving parents, bringing in community resources, and in some cases, obtaining special designations for their schools.

Several districts received Math Science Partnership (MSP) grants, and more recently, one ISI district received a grant to develop lessons for integrating mathematics with science. School-based grants have included youth STEM career grants for high school students, a Project Lead the Way Community learning center grant to develop after-school programs such as NASA Ignite, and a First Lego League grant to develop a robotics program. A few schools that received these grants are applying to become STEM certified or International Baccalaureate (IB) schools, potentially allowing more paths for including science.

Districts also found a variety of ways to *involve parents*. Some teachers found that parents notice the excitement of their children and become enthused themselves. As one principal commented:

Our kids love science. When the kits come, it's like Christmas. They look forward to them. Our parents now understand the kits, and they're very much behind it. So it's just developed a community that values the kits and the instruction, where before, this didn't really exist.

Other schools have made a point to explain the science program as part of back to school night. One of the IB schools regularly invites parents to see the children's projects, including those that are part of the science investigations. A few districts have a dedicated math and science night. Other schools encourage parents to volunteer to help with the kits during science nights. Some districts with parents who are scientists have connected with the organizations that employ these parents, such as Eli Lilly.

Building community support often helps administrators stretch science dollars and gain general support. One district made a presentation to the school board about the science kit math extensions developed by teachers through a grant. A principal worked with a local newspaper on a feature article with photographs about the school's ISI program. Some districts enter into arrangements with local universities so that professors visit classrooms and/or students visit college laboratories to participate in hands-on activities. And administrators connect with local STEM companies to fund after school projects and field trips. One principal already began to brainstorm about how she would sustain ISI if funding were reduced.

> *Can we get companies in the city, which we don't have that many, but to adopt each elementary school, and support the science curriculum and sponsor the science curriculum? You know, I don't know. That seems a little out there, but I'm willing to think out of the box, because I don't want to get rid of it [ISI].*

7. Supporting teachers: Leaders who advocate for science understand that teachers need support if they are to prioritize science, especially when science is often neglected for math and English Language Arts (ELA). Both teacher surveys and interviews with coaches identified *support for teacher initiatives as essential,* and were appreciative of principals who were flexible and open to teachers' ideas about science instruction. Some examples included:

- A 3rd grade teacher team requested a larger chunk of time for science in the fall to compensate for the time lost to standardized testing in the spring. They found ways to integrate science with other subjects so they met their time requirements. The principal was very supportive and even bought grow lights for classes because teachers and students wanted to continue the unit after the kits had to be returned.
- A fourth grade team at another school was deliberating about how to divide responsibilities for planning and teaching science. This team proposed that they would all teach science while one teacher with a stronger background (the schools' science fair coordinator) would oversee the planning. This initiative came from teachers who had been responsible for all of the ELA instruction but were excited to add science to their repertoire. The principal supported the teachers' ideas and sat in on the planning meetings.
- At another school, a teacher was allowed to convert an unused room into a science classroom so that students could spread out and easily access materials while conducting their investigations.
- One teacher survey respondent commented: *The school corporation has provided additional materials, such as Power Points to help guide the investigations. These are wonderful visuals and needed by the students/teachers. Our school has allowed us to use an empty classroom as a science lab with tables. This additional space has been helpful.*

In addition to supporting teacher initiatives, the survey asked about particular supports that were sometimes available in ISI schools. These supports are listed in Table 11 below along with information about availability of each support during the past two years.

TABLE 11: Teacher supports related to science instruction

Supports	Responses	Only last year	Only this year	Last year *and* this year
Planning time for science	111	47 (42.3%)	38 (34.2%)	26 (23.4%)
PD for science	147	74 (50.3%	37 (25.2%)	36 (24.5%)
Release time or substitute to attend PD	44	25 (56.8%	14 (31.8%)	5 (11.4%)
A coach	123	53 (43.1%	39 (31.7%)	31 (25.2%)
Money for materials	35	18 (51.4%	8 (22.9%)	9 (25.7%)

Schools that have a robust implementation, make sure that their teachers have sufficient ***planning time for science instruction***. The principals are also involved enough to know that this time is well used. As one principal remarked:

> *I know that's [planning time] utilized for the science kits, because I've sat in those observations, or collaborations, before.*

Encouraging teachers to participate in ***science professional development opportunities****;* both within and outside of ISI was another source of support. One school makes their teachers aware of free STEM-related webinars offered by a technology company. So far they have always had teachers participate. The districts most committed to ISI make clear that all teachers are expected to receive kit training before using the kits. They provide flexibility for new teachers hired after the summer institute, by providing substitutes to have sessions during or after the school day or on a weekend. If travel is involved, the district pays expenses. However as shown in Table 10 above, providing substitutes and additional funding is less common.

One way that districts may support new teachers hired after the summer institute is by offering *embedded PD*. It can be provided on an ongoing basis and is responsive to teachers' needs. An appointed ISI person within the school or district proactively offers support, often providing it in the classroom setting. Some districts will ask teachers who have led prior ISI trainings or consultants to provide in-house PD. This is especially beneficial for teachers who are unable to attend the ISI Summer Institute.

Finally, one of the most crucial types of support for teachers was ***coaching***. In survey responses, teachers were very positive about the role of the coach. Many teachers (48%, 123 out of 256) either had a coach this year, last year, or both years (see Table 10). Stakeholder interviews also emphasized the value of coaches. As one superintendent explained:

> *Our principals are extremely busy, and to have someone that has [teacher needs] on their radar can say, periodically, anybody new need any training? Who*

needs support? Can I come out and help? I think that that person…is critical to the sustainability, because that's her job.

Data from stakeholder interviews and teacher surveys show that schools and districts have various models for providing coaching support. Coaches often also have responsibilities for more than one curricular area unless they have grant funding to support science exclusively. The four most common *types of coaching included district coaches, building coaches, science facilitators, and mentor teachers*. The roles and how they help to ensure ISI success are described below.

District coaches are typically the contact people for ISI. They handle the logistics for coordinating kit delivery and pickup, organize professional development, and keep track of new teachers who need professional development. In working with the district they may serve on committees for selecting math and science curriculum and focus on issues or questions emerging from schools, such as integrating math and science. They may also participate in teacher evaluations. In some districts with STEM facilitators or science support personnel they may facilitate monthly meetings. Throughout the school year they may provide PD, in addition to the ISI summer training, and in some communities are part of a year-long orientation for new teachers.

Building coaches are similar to district coaches because they might be involved in working with ISI by identifying what is missing in kits or what supplementary materials is needed or how to support teachers with kit implementation. They may also work with the central district on developing curriculum and aligning standards. However in at least one district these coaches have not had ISI training, although they may have experience teaching with kits. They may also be responsible for providing academic support in multiple subjects to other teachers in their building. They also differ from district coaches since they only work with teachers within the building. This may include having regular team meetings, doing walkthroughs with teachers and finding out how they need support. With new teachers they may help them with unpacking kits and making suggestions on kit implementation. They might also support science teaching in general.

One of the more successful models has been creating the role of *STEM facilitators*, where classroom teachers are offered a stipend and release time to take on this role. The qualifications and responsibilities for this role can be vary. However most of these facilitators are responsible for attending monthly district wide science department meetings to bring information back to teachers within their own building. Like building coaches they may support other teachers, especially new teachers, by giving them strategies for implementing the ISI kits. Some STEM facilitators reported observing teachers, modeling lessons for them, helping them inventory their kit, developing a schedule, and preparing lessons. One of these facilitators who is also a fourth grade teacher explained:

A big focus of mine this last year, is to try to give the kids in her room a better science experience. …if we didn't have this STEM facilitator position in which I was given the release time to be able to do that, I don't know if that would happen. So I think offering that STEM facilitator position has been beneficial to her, because it gives her another resource, as opposed to trying to figure out how

to fumble through it herself, or sit in meetings and say, yes, yes, yes, okay, and I'm going to do this, and then when it actually comes time to do it, she gives up easily.

Mentor teachers like STEM facilitators also work with new teachers, however in a much less formalized way. More experienced teachers are expected to pair up or form a team with less experienced teachers. They may assist new teachers by planning or helping them with kit implementation. In districts with regular time for Professional Learning Communities (PLCs) they may use that time to support new teachers with using ISI kits. This last type of coaching tends to be more typical in schools without funding for coaching support.

Other schools that do not have the budget for a dedicated science coach or cannot include science as a part of the academic coach's role have created alternative ways to support teachers using a variety of resources. Unique examples of how this has been done is by:

- Asking teachers who have led prior ISI trainings to provide in-house PD.
- Hiring a former coach as a consultant to offer PD during the school year.
- Calling on science coaches from Eli Lilly to support their science instruction.

IV. CHALLENGES INFLUENCING ISI SUSTAINABILITY

While ISI has been successful, data from stakeholder interviews combined with the teacher survey revealed key areas that could potentially challenge the long-term sustainability of ISI. Some issues can be addressed by I-STEM, while others require collaboration and/or coordination between ISI and participating districts. Other more difficult challenges are the result of the current education climate. Recommendations appear after each challenge to further support reflection and response.

1) Strengthening ISI operations internally is critical for sustainability. Although Dr. Hicks collaborates with and has some support from I-STEM staff, it is left primarily to her, to execute plans at the district, school, and teacher level. Dr. Hicks has been key in developing relationships with administrators and teachers who actively participate in ISI and organizing and running ISI PD. To help sustain ISI efforts, she enables districts to obtain grants and develops or supports additional training and curricula.

Recommendations: The current scope of ISI work cannot be done fully by one person. Moreover, if I-STEM goals expand to address critical needs and challenges surfaced by the evaluation, additional staff will be required. By having a partner or a team, each staff member can focus his/her efforts, thus increasing follow-through and sustained progress. Also, having more than one person who develops relationships with schools and other partners, and who understands all facets of ISI implementation is essential for continuity of the Initiative.

2) Teacher Training Challenges were mentioned often in administrator interviews since many new teachers are hired after the ISI summer institute takes place, and therefore, they miss out on the professional development. In addition, some teachers

are assigned to a new grade level after the summer institute, making the kit training they received irrelevant. The districts are then left to provide the training themselves. Some have trainers or coaches in district to help while others simply expect new teachers to ask questions and do their best. Typically, they do not have a formal system in place. In addition, ISI has encountered the challenge of balancing the needs of new and more experienced teachers, during the summer institute.

Recommendations: In addition to the summer institute training, equivalent PD might be offered throughout the school year to accommodate late hires and teachers who change grades. These sessions could either be in person or online. PD Facilitator manuals might be made available, so that building or district personnel (e.g. coaches, science facilitators, or teachers who have experience with the ISI professional development) could offer them in their districts. In planning these trainings it is important to take into account the different kit rotations within each school district, so that trainings focus on the kits that will be used most immediately.

I-STEM might also provide examples from districts that use experienced teachers as trainers, so that others can learn from them and build capacity within their own schools. In addition, experienced ISI teachers might take part in PD sessions designed specifically to help prepare to lead in-school training for the upcoming school year.

Key components of ISI training (identified by Dr. Hicks) might become mandatory for teachers. This requirement will be easier if a menu of PD activities, including online options, were offered. PD that supports authentic integration of science and mathematics and ELA is likely to be of interest, maximizing the amount of time teachers can spend on science. Integration PD should not be general, but instead offer specific lessons like the development of science research projects that involve reading and writing; and recording and analyzing quantitative data from science experiments as part of a mathematics lesson.

It may also be wise to expand offerings for experienced teachers by providing more in-depth topics such as discourse in the science classroom, and strategies to support all learners (including ELL and SPED).

3) Online resources should be increased and their accessibility improved. ISI created online resources to address some ongoing PD needs. Based on the survey responses, many teachers consider these online resources to be valuable. Table 13 shows that 74% of teachers (183 of 247) at least somewhat agree that the resources available in the *Learning Connection* communities helped them to improve instruction with ISI kits. Of those, 15% (36) stated that they strongly agree with the statement.

Table 12: Contributions of Learning Connection communities to science teaching

Strongly agree	Agree	Somewhat agree	Somewhat disagree	Disagree	Strongly disagree
36 (14.6%)	70 (28.3%)	77 (31.2%)	27 (10.9%)	30 (12.1%)	7 (2.8%)

ISI makes teachers and administrators aware of online resources at the summer teacher training, when sending emails, and/or through quarterly newsletters. Nevertheless interview comments suggest that many do not remember where to find the exact resources that they need. In addition, the range of online resources may be too limited, especially for someone who cannot attend summer training. One coach gave a critique of the current online system:

> *The state of Indiana was invested in those learning connection communities for probably about five years, but they're falling in popularity, because the system now, compared to what is out there today, it looks and feels cumbersome. You have separate logins. You have to kind of plod your way through the menus. And in some grades, those communities have been very active, and in others they have not been active at all. And it's really kind of a loss. It feels like kind of wasted energy, in a way.*

Recommendations: To continue improving access and quantity of online resources, ISI might:

- invest more staff, time, and money into online resources. This includes thinking long term about how to improve and monitor a resource website;
- include communications and outreach work as part of a new staff member's job description. As part of this, the staff member would focus on maintaining and developing ISI online resources and ensuring that the database of teacher contacts is regularly updated.
- explore new and varied ways for communicating more clearly and frequently with teachers and administrators about online resources – especially with new teachers.
- given that many schools are currently focusing more on technology, ISI might suggest different technology applications or websites that would enhance instruction with ISI units (videos etc.).
- find new ways to make teachers aware of what is available online. Currently all science kit manuals are online, except for the *Science companion* and *Insights kit*—but many did not remember.

4) Kit tracking and usage data is important for ISI's long-term success since it can potentially inform ISI staff of teacher use and school/district needs. At the start of this study, TERC staff requested access to data on the extent of kit usage. Unfortunately, with no reliable streamlined process for recording this type of data, only the number of kits with green tags was available. From this, it was impossible to know when a kit was not opened or if it simply didn't require restocking of consumables. This is misleading given that there are many kits that do not contain consumables. A revised process should enable ISI to identify schools or districts that are only using a minimal amount of kit materials or returning kits unopened. ISI staff could more easily follow up with these schools to address any issues. Likewise, if these data show positive signs of usage, they can be used to justify continuing or expanding ISI initiatives in these districts.

Recommendations: To improve kit tracking and usage data, ISI staff may consider:

- collecting more reliable and informative data related to kit replenishment that ISI

staff can use to understand the extent to which kits are being used. Data generated from these forms could inform ISI staff on trends of non-usage or other problems.

- offering support to districts or schools that indicate low levels of kits use. This may require an increase in staffing and/or new mechanisms for communication.
- incentivizing teachers to provide feedback after using kits through a quick online survey.
- appointing one person per school building, such as a STEM facilitator, who could channel feedback from teachers to ISI staff regarding kit use.
- using kit data and teacher feedback to inform ISI planning for upcoming teacher trainings, kit rotation logistics, and finding additional ways to provide support to teachers and/or schools around kit use.

5) Kit use was not an issue for all schools and districts, yet for some the amount of time to set-up, clean-up, and inventory the materials at the beginning and end of the cycle can be considerable. This is especially challenging for teachers with multiple consecutive classes or when science classes are only 40 minutes long. Approximately 78% of teacher respondents indicated that the length of class time required was problematic and individual comments highlight the challenge further.

> *It is sometimes hard to prepare materials due to time of prep, etc. Some clean up/return is difficult and time consuming such as washing all bottles containing liquids for Solids and Liquids kit. (teacher)*
>
> *The biggest downer with it [using kits] is prep time. You know, when you have an elementary school teacher who is teaching three other subjects in addition to science, and they have to spend 25 minutes of their 45 minute prep time prepping for it, they're not going to be necessarily as positive (STEM facilitator and 4th grade teacher)*

Certain kits have many consumable materials, which is challenging for larger classrooms or specialist teachers who teach science to several groups during the same day. The amount of materials provided is not always enough for multiple groups, thus limiting the amount of hands-on experiences for students.

Recommendations: To address context challenges that influence kit use, ISI might:

- Identify schools in which teachers work with substantially larger science classes so that ISI can provide multiple kits or additional consumable materials in order to ensure that all students have access to kit materials.
- Provide schools and districts with a list of creative strategies, recommendations or best practices related to limitations such as lack of space or time.

Some of the challenges that emerged in the data require a school response. Based on our findings, ISI might recommend the following to school leaders during the strategic planning process:

- Teachers (especially those with multiple science classes) might use the support of paraprofessionals or parent volunteers for assisting with set-up and clean-up of science activities.
- Schools with shorter class periods of 40 minutes might consider consolidating two class time periods during the week into one longer period of 80 minutes.
- Principals might try to secure funds to purchase materials that will allow teachers to extend kit use, e.g. purchasing grow lights.
- Principals might try to find space in the building so that materials can be stored in a way that makes set-up and use easier for teachers, e.g. some schools have a dedicated room for science.

6) Kit Rotation and delivery issues surfaced during stakeholder interviews, which prompted TERC staff to ask teachers in the online survey whether they had issues with kit rotation assignments. Although it is promising that 32.5% (77) of teachers did not have a challenge, there was a wide range of responses to this question since nearly half (45.5%) of the teachers reported that it was a very big or somewhat of a challenge. These logistical issues are related to the rigidity of the rotation cycles. Often class cancellations because of snow days or testing, prevent teachers from completing kits within the allotted time for science. Teachers also expressed a need for having guidance on which lessons to prioritize in the event that they would need to complete a kit in a shortened time frame.

Receiving the first and second grade life science units in the winter has been another barrier for some southernmost school districts, since it is hard to go outside and grow plants during the cold weather. Schools were also unable to maintain the plants during the December holiday break and children did not observe plants going through the life cycle because of the short time allowed for the kit.

The rigidness of the kit schedule is also a major barrier for teaching specific content before state testing date. As explained earlier, the ability to integrate ISI science kits with grade level curricula and state testing are very important since Math and ELA instruction are a high priority. As an example, in some districts, kindergarten receives the measurement kit early in the year but they actually study measurement in math later in the year. This is also an issue for IB schools since the time they receive ISI kits is not aligned with their integrated curriculum requirements.

Finally, although delivery issues are now considered minimal since only 24% rated this as a challenge, there are still instances of materials not being delivered or not picked up on time.

Recommendations: ISI could anticipate kit rotation and delivery issues by:

- Providing guidance on which lessons to prioritize in the event that a science kit had to be completed in a shortened time frame. For instance one STEM facilitator mentioned identifying which ISI investigations were aligned with the State Standards. Then, if he needed to teach all lessons more quickly, he would make a special effort to emphasize key concepts in the lessons more closely aligned with state standards.

- Ensuring teachers are aware, that for most kits, they have yearlong access to ISI kit teacher manuals. Therefore, they can plan ahead and/or save materials to use at a later point in the year.

7) Lack of leaders who advocate for science is a major determining factor behind implementation challenges such as kit rotation and delivery schedules, the preparation and amount of materials, time, classroom space, and lack of alignment with curriculum and state standards. Buy-in to ISI requires that leaders continue to advocate for science and ISI in particular. Staffing changes can derail ISI progress in schools or districts, leaving too few to champion ISI and make it sustainable.

This study found a great deal of variation among school and districts in regard to advocacy for science education. The following statement from a district coach describes the differences among principals.

> *In some buildings, if I go to the principal and say, I really want to do this, it's a great way to build science, the principal is like, yeah, do it, and [they] make space for me to do that. In other buildings, the principals defend literacy and mathematics time, and do not encourage, and do not necessarily support science instruction. In other buildings, there's no method at all.*

Recommendations: In order to foster and sustain more leaders who will advocate for science within schools and districts, it is important for ISI to continue investing in educating principals and higher-level school and district administrators about ISI. Demonstrating to them how the ISI curriculum is aligned with state standards and how using best practices for implementing ISI (such as integrating science with Math and ELA) could potentially address some other academic goals, which might alleviate their hesitation to include more science during the school day.

8) Lack of alignment between ISI kit content and State Standards was another area of concern. As a result, teachers need to supplement the kits with lessons that they create or they need to use a different curriculum. For example, the third grade physical science kit covers light, but not sound, and some teachers have found they need supplemental materials to teach the standards that go along with the Space and Human Body kits.

> *…There are always a few standards that we tell each grade level, you know, these are the standards that you're going to have to make up, and are not covered in the kits. (district coach)*

ISI is currently addressing this issue by creating and making supplemental lessons available on the Learning Connection website, however, as the two following comments from different district administrators illustrate, there is evidence that not all teachers and administrators are aware of this.

> *For the most part, we're very pleased with ISI. In 4th grade, we feel like it aligns with our standards very well. However in 5th and 6th, we have to do a lot of supplementing.*

It's my understanding that [the kits] don't hit all standards, so providing more resources and lessons to ensure that they cover all state standards would be helpful.

Recommendations: ISI staff must deal with both lack of awareness and gaps. Therefore, we suggest that they send follow-up reminders about online resources throughout the year (maybe at the beginning of each rotation) to teachers and administrators. Furthermore, collecting, developing, and posting more lessons to fill gaps would provide sites with fuller support.

9) Pressure to focus only on Math and ELA: from a list of 16 other challenges, was considered the greatest challenge by 44% (106) of teachers on the survey. This is not surprising, since schools are sanctioned if students receive low scores on standardized tests. This situation gives rise to the second greatest challenge, identified as such by 40% of teachers—pressures related to standardized testing.

TABLE 13: Top two challenges for increased science instruction

Challenges	n	mean	Not a challenge	A little challenge	Somewhat of a challenge	A very big challenge
Low priority compared to Math and ELA	241	3.1	21 8.70%	39 16.20%	75 31.10%	106 44.00%
Pressures of state testing	236	2.96	29 12.30%	48 20.30%	63 26.70%	96 40.70%

Unlike ELA and Math, science is only tested in 4th grade, and those scores are not part of the formula to determine a school's rating. Therefore there is no incentive for teachers, who are already constrained by limited time, to focus on science. In fact schools with failing students are discouraged from spending time on science given that they are mandated to spend additional time on reading and math. These issues are illustrated with the following quotes:

Our teachers are swamped with having the expectations and demands that they are again focusing on ELA and math. Until we decide to make science an accountable type of subject area like ELA and math, then it's always going to take a second seat to ELA and math; it never gets the attention. (District administrator)

We are told to sacrifice our science time frequently in order to teach more math or reading and to accommodate other testing related instruction. (teacher)

Testing schedules also reduce time for science. Tests are administered during science times, as opposed to ELA and Math blocks. One district administrator reported that 19% of kits from the prior year went back unopened, mostly because of the time constraints. Teacher and coach comments below underscore a level of frustration about limited time for science. Moreover, the mandated blocks for ELA and Math that come with the failing school designation can affect the time allocated to science in low-income schools.

I would love to spend more time using the kits but my school's focus is on literacy and math and I'm only allotted 30 min. a day for science and that's shared with social studies so it doesn't happen all the time. (teacher)

But again, where science was taught the most, first of all, were in the schools that were not in [plans] of improvement, the schools that were not, did not have a high percentage of free and reduced lunch. Now some schools where high poverty, primary, I would say maybe science was taught, is taught, at best, once a week, like a Friday kind of thing. (district coach)

This [science instruction] is somewhat out of my hands as I told my daily/yearly schedule by my school and district that I must follow. Science is truly not given priority as our math and ELA are. This is especially true of my school which has a huge population of ELL students. (teacher)

Students who are below grade level in math and reading sometimes participate in extra remediation sessions. In some schools, these students are pulled out during science. As one district coach explained:

Many of our title schools have built in extra RTI times where the kids go for additional instruction with different types of interventions that we've implemented. We have extra staff to support that. And so those schools, even though a lot of times those kids are the ones that I think would benefit the most from inquiry based instruction, and they love science and that kind of stuff, they kind of don't get as much.

A few teachers reported that science instruction is limited to enrichment times, which again excludes students who need support because that's when they attend intervention sessions.

We are allowed to use the science kits to enrich children during the intervention time for children that do not need intervention support for a weak math or ELA skill. I do manage to work in some science information when teaching ELA, but not as much as I would like.

Furthermore, the emphasis on ELA affects how resources are distributed. If the district has any money for coaching, the funds tend to go towards math or reading, Most teachers and administrators, when asked about the amount of collaborative planning time devoted to science, replied that science is not the priority. This is illustrated by the comment below.

Well, there's a very strong movement in this district for the professional learning community. In fact, they've rescheduled the day so that they have a built in, it's about 25, 30 minute time period. And I don't think— If science is ever discussed, it would be maybe three or four times a year, and they meet daily. So it's, again, it's ELA and the math (district coach)

Recommendations: Since an intense focus on math and ELA is the norm, ISI might build new curricular and instructional plans that emphasize integrating and expanding science into components of their current work (e.g., notebooking and other ELA

activities and math extension lessons). Along with this must be additional training, not only for teachers but also for coaches, RTI specialists, and other support staff who might be willing to include remedial math and ELA work within a science context.
In addition to addressing the ELA-math challenges, ISI might offer general guidance to school and district leadership, enabling them to make science a bigger priority than it may be currently. The following practices have been successful in some schools:

- Setting clear expectations for teachers to implement notebooking and other ISI practices such as Making Meaning conferences;
- Observing science classes and making science a key part of the teacher evaluation process;
- Using science coaches or appointed science representatives within schools to communicate and support integration expectations;
- Supporting teachers' initiatives related to science instruction;
  Supporting teachers to observe each other.
- Make teachers aware of PD opportunities.
- Provide planning time for science in the schedule.

Also, ISI might encourage school and district leaders to showcase interesting science projects and student work to increase exposure and gain support. Across the country, many schools and districts are finding innovative ways to do this. ISI might offer videos and community contacts to support such efforts. Some examples of support include:

- Using Back to School night or other school events to inform parents about the science program. (On Back to School flyers, including a description on of the science program with examples of projects).
- Holding math and science nights for parents—and include participatory projects.
- Encouraging parent volunteers to assist in the classroom by helping with kit inventory and setting-up investigations.
- Encouraging science-related activities such as field trips or community gardens. (In one district a community garden was created and activities in the garden were aligned with the ISI kit curriculum).
- Connecting with local STEM related organizations, and when possible, asking parents to help with connecting to these organizations (e.g., in some districts parents who are scientists have connected schools with STEM related companies.)

10) Funding was the major obstacle identified during most administrator interviews. As the comments below demonstrate, administrators know, and struggle with the fact, that implementing a hands-on science program can be expensive, since it involves equipment and consumables.

> *I'm not real confident ever when it comes to money. I'll just be honest. We don't have any money. And so it's just really difficult. You know how it is. (district administrator))*
>
> *So I am concerned about the cost [of ISI or Science]. It's expensive, it is, versus a traditional curriculum, yeah, way more expensive. But I don't care— I mean, bottom line is, this is so much better for kids, so much better. Science really,*

really [concerns]— So I don't know what we're going to do. And I don't know that I'm going to have any say in it. (principal)

One district administrator is hoping that as a statewide program, ISI might find a way to reduce costs for districts. However he understands that this would involve gaining support from decision makers such as school board members.

And that's where I think ISI has an advantage, because of it being statewide, and them having that purchasing power in bulk, then they could hopefully help to reduce that [cost], and make it to where it's affordable. …that's where talking to school board members would be helpful, or people that are decision-makers. Because unless we're able to get ISI to a level to where it is affordable for school districts, and all school districts to afford, then I think no matter what you come up with, then if they can't afford it, then it's not going to happen, no matter how much they might like it or want it. (district administrator)

An upcoming challenge for ISI is that administrators are anticipating a state-wide push for technology, such as the ***one-to-one initiative***, which is less costly, but most likely not conducive to hands-on science. Some districts are using their textbook money, which also means ISI material dollars, to fund digital curriculum. Therefore, kit affordability is key for sustainability. One principal explained:

But I'm concerned, because our district, I know, is looking at finding ways to bring down the one to one initiative. Our middle school and high school— Our high school's had it for a couple years. Our middle school has just started it this year, with laptops, and I know that our district would like to do the elementary. The only way they can do that is bringing those textbook fees down for families. So guess what's come up? Science, and the cost of science.

Districts also worry about having enough funds for continuing professional development since district administrators think it's unlikely they will have money for these expenses.

I know that that first year, as a district, we did provide I think something around a quarter of a million dollars of stipend money to get everybody trained. But that, I don't foresee that happening again. (district administrator)

Since ISI started, many grants, especially MSP grants, have funded professional development and in some districts, science coaches. As mentioned earlier these coaches provide valuable support to teachers, since they provide on site PD, especially for new teachers. Recent grants have also funded professional development focused on math extensions and video cameras that served as tools for professional development. Unfortunately, as is evident from Table 10, the number of teachers that said they had a coach this year decreased from 43% to 32%. Many coaching/staff positions bolstered ISI instruction have been eliminated either because they were funded through grants that ended or because of budget cuts. On the survey, teachers lamented the loss of coaches.

My district used to have a coach that went to the schools to advocate and work with teachers. That was helpful and encouraged more to participate.

Recommendations: Although ISI staff has no control over school funding, they can assist schools and districts by building awareness of community, corporate, and university resources. They might encourage schools to submit articles to newspapers or present evidence of science successes and needs to their school boards. ISI has helped some districts write grant proposals. If personnel are sufficient, they might train and partner with more school districts. These funds can support ISI in providing PD and other instructional supports as well as the schools and districts that need funds to purchase materials.

11) Teacher turnover was a common challenge discussed by principals and district administrators when asked about the future sustainability of ISI. Despite the fact that PD is an expensive investment, having a well-trained corps of teachers is an effective way to ensure high quality kit implementation. Unfortunately, regardless of how much training is provided, teacher turnover decreases the pool of experienced ISI trained professionals and also leads to teacher reassignment (to a new school and/or grade). This can seriously jeopardize the sustainability of ISI, as illustrated by comments below.

> *Well, the teachers who are committed to the kids are fully all in. There's no doubt, they are all in, and students are doing great things. We've had a very large problem with faculty turnover. We're on our third 8th grade science teacher in three years. ...the new teacher's first priority is usually behavior control over experimentation, yeah. So they, the kids in 8th grade have not gotten a lot of kit hands on work, some, but not a lot. And in five and six, it appears to be all or nothing. Either the teacher is fully invested in the kit, or the kit goes back to the warehouse unopened. (district coach)*

> *I think the biggest challenge is getting our teachers trained and continue to continually train them, have the manpower to do that and the, I guess, the finances. What we, what happens really in our district….is we hire the week before. And so we've got teachers coming in with no training and no time for training. So that's the biggest thing. So last year, that's when we opted to do the two hours after school. But if you know as a new teacher, you're just a little overwhelmed that first month of school, trying to get everything ready. And so it becomes a training that they attend, but I don't know how far that that takes them in the classroom. So I think that the real training comes in the teachers that have already done the kits within their grade level. And then if you don't have a strong teacher in that grade level, then it kind of gets pushed to the side. (district coach)*

Also, some administrators have mentioned that teachers are choosing early retirement due to the current educational climate of increased testing, budget issues, and implementation of the common core. This exacerbates the turnover problem.

> *…there were almost 180 retirements in our school corporation this May, which then was, and that's the largest, to my knowledge ever, that many people retiring. It's a culmination of things. It's, certainly the boomers are coming of age. But it definitely is just the school climate and culture, and the evaluation and all the*

assessments going on, but there are a lot of reasons that people are just like, okay, I'm done, which is a sad, sad thing. So that then requires, you've got to train the new people. We have the current people trained on the use of science and the science modules, and science notebook use, and now we've got a whole new group of new folks. Well, that continues. I mean, people will even retire this semester. So I'm actually doing a training for local teachers this Thursday, where the school system is paying for substitutes and paying my fee for giving them a basic training on the philosophy, the curriculum, the integration of literacy, all that. (district coach)

Districts rely on other grants and direct support from ISI to offer PD to both new instructors and veteran teachers. As mentioned earlier in this report, a few schools and districts have addressed the problem of turnover, either formally or informally, by instituting a form of the train-the-trainer model, where experienced teachers that stayed with the district help train new and inexperienced teachers. In this way they can address ongoing support for new teachers that join late in the summer and teachers that switch grades. Regardless of these solutions, the initial ISI summer training PD is still seen as a critical resource in helping teachers become more comfortable, not only with the ISI kits, but with science teaching. Many administrators are concerned about how they will continue to train new teachers once the ISI summer institute trainings are no longer offered.

I really think the support comes from the teachers that are still there, and taught the, in your grade level, I think whoever's been there the longest and has had the training. But it's very interesting. When I was updating all of our training, like who's had what training on what kits and grade level, I would say 50 percent of our teachers that were trained have left. … that's just a guesstimate. But it seems as though our turnover for those teachers that did have all the training have gone, either stayed home with their kids, or are having babies, or, so we have a pretty floating group of teachers that come in and come out. (district coach)

The addition sponsorships on their part would be wonderful. Continuing the training opportunity, not just for new teachers or teachers that have changed grade levels, but continuing to have it open for everybody. Because again, I've seen teachers that have really grown using it more than once, or going to it more than once. So that would be helpful, too. (principal)

Recommendations: Although teacher turnover is beyond the control of ISI and is an ongoing challenge for all schools and districts, especially in low-income communities, it is important to *proactively* plan for turnover. Practices and policies that are already implemented by districts or schools where ISI has been successful inform some of the recommendations that follow:

- Making ISI teacher training more flexible and available on an ongoing basis to accommodate newer or re-assigned teachers. As mentioned in the previous section, ISI training must also be available during the school year and via online sessions and instructional resources.

- Build in additional sources of coaching support for teachers within schools and districts by adopting the model of STEM facilitators or mentor teachers. Thanks to additional grants, this model that has been implemented in a few districts.

VI. Conclusion

Results from this sustainability study suggest that ISI has been a successful program, positively influencing teacher knowledge and confidence as well as student interest and engagement in science. When administrative leaders have advocated for science education, ISI has taken hold and is likely to be sustained in the longer term. These leaders have communicated their vision and established policies and practices to address a range of challenges. In response to budgetary and state policy constraints, they have found creative ways to integrate science into ELA and mathematics and they have found external sources of support to keep science programming strong.

Even so, there are persistent challenges within all schools and districts. With improved capacity (e.g., additional staff and resources) ISI can diversify teacher training options, increase online resources, and collect better kit usage data in order to be responsive to implementation problems. Leaders must also work to overcome challenges that include scheduling issues, time and space requirements for science instruction, and coaching supports for teachers. As a result, ISI needs to continue to gain buy-in from administrators by educating them about the value and benefits of the Initiative. At a state level, teacher turnover, funding, and the pressure to focus on ELA and math add another layer of challenge. In individual schools and districts, many strategies have been employed to address these issues, and thus, collaboration within districts and across the state might engender more effective responses.

Throughout this report, the evaluators offered recommendations tied to each challenge. In addition, we recommend that ISI consider ways of convening regional and/or state meetings with a threefold purpose: fostering collaboration among stakeholders (including those outside of education with a science mission), sharing best practices, and increasing support at multiple levels. Meeting discussions would also provide ISI with input about the continuously changing landscape related to science curriculum, instructional supports, and career preparation.

ISI has built a strong program with solid footing in the state. Sustaining the Initiative will require growing aspects of the current program and reinventing others to respond to challenges that lay ahead and will impact science improvement in Indiana.

VI. APPENDICES

Appendix A.1. Superintendent interview protocol

Introduction:
Thank you for taking part in this interview. During this call we will ask you to describe how the ISI project was implemented in your school district and the factors that contribute to or impede sustainability. This interview should take about 30-45 minutes.

I want to remind you that we will be recording the interview. Your responses will be confidential. However, if you would like me to stop recording at any point, please let me know and I'll turn off the recorder. May I record this interview?

NOTES	SUPERINTENDANTS/ STEM COORDINATORS
BACKGROUND QUESTIONS	
(When interviewing superintendents see if their response would make the questions for principal applicable.)	1. **What is your current role/position**? a. How long have you been in this role/position?
	2. Which schools in your district are currently using ISI science kits? If so then to what extent?
	3. **How long have you been involved with ISI?** a. Did you have a previous position that involved you with ISI?
	4. **In your current role/position are there any ways that you directly interact with ISI?** (eg. authorization of teacher trainings, participating in meetings, etc.)
(If they have a lot of experience)	5. How has your role/ responsibilities in relation to ISI changed since the start of ISI or since you became involved with ISI?
(If they don't have a lot of experience)	6. If you became involved with ISI after your school/district already had began to participate, who was fulfilling the role you currently have?
INVESTMENT/SUPPORT FOR ISI	
	7. **How does the ISI project align with your district vision/goals for science education?**
	8. **What does your district do to support new teachers in preparing them to use the science kits?** (eg. formal training, informal training by other more experienced teachers in the same school).
Richmond and South Bend may have different response since they are currently partnering on a new grant with Purdue) NOTE: notice that even if they say that they will not continue using ISI, see if they will continue doing things that they learned or gained from experience of participating in ISI (eg. hands on curriculum, commitment to doing science,	**9. What is the plan for how the district schools you work with will continue ISI work?** a. Will they continue using ISI? b. Will adopt another hands on material/curriculum? c. Don't know at this time?

using science notebooks, doing investigations, add other kits they think are better)	
	10. What is happening at the school and district level that will **challenge/constrain** the work that teachers are doing in relation to ISI? (eg. new standardized testing, change in budgets, etc.)
	11. What is happening at the school and district level that will **support** the work that teachers are doing in relation to ISI? (eg. new standardized testing, change in budgets, etc.)
FINAL SUGGESITONS/ RECOMENDATIONS	
	12. Is there any other person in your school/district that you recommend we speak with about sustainability of ISI?
	13. To what extent has participation in ISI been beneficial to your district?
	14. What suggestions do you have that would make the ISI initiative more sustainable in your district?
	15. Do you have any other comments about science teaching or ISI in your district?

Appendix A.2. Coach interview protocol

Introduction:
Thank you for taking part in this interview. During this call we will ask you to describe how the ISI project was implemented in your school district and the factors that contribute to or impede sustainability. This interview should take about 30-45 minutes.

I want to remind you that we will be recording the interview. Your responses will be confidential. However, if you would like me to stop recording at any point, please let me know and I'll turn off the recorder. May I record this interview?

Once we have completed the interview we will be sending to you a $50 Amazon gift card in exchange for your time. As soon as you receive the email with the gift card we would kindly request that you immediately reply to confirm you have received it.

NOTES	COACHES
	BACKGROUND
	1. **What is your current role/position?** a. How long have you been in this role/position? b. How has your role/ responsibilities in relation to ISI changed since the start of ISI or since you became involved with ISI?
	2. **How many or which schools do you currently work with?**
	3. **Which of the schools that you currently work with are using ISI science kits?** a. If it varies what are the factors that determines which schools are using them? (e.g. schools that are underperforming, Schools that are departmentalized)
	4. **How long have you been involved with ISI?**
	INVESTMENT/SUPPORT FOR SCIENCE AND/OR ISI
	5. **How does the ISI project align with your school/district vision/goals for science education?** a. **What has been the effect of the Next Generation Standards**
	6. At all the schools you work with are teachers given specific time for collaborative curriculum planning for science? If so how many minutes per week or month? PROBES: a. who is it facilitated by? b. Is participation optional or mandated? c. What grade levels participate? d. Do you ever observe these planning sessions? If so, then can you tell us more about them, etc…)
	7. **What does your district do to support new teachers in preparing them to use the science kits?** (eg. formal training, informal training by other more experienced teachers in the same school/ train-the –trainer model).
	YOUR OWN INVOLVEMENT WITH ISI
In this question I don't ask if they observe teachers since we ask in the next questions.	8. **How do you provide support to teachers in relation to ISI?** a. ISI teacher training b. coaching on how to use ISI science kits .

	c. Planning lessons d. Debriefing or providing feedback e. Making them aware of resources such as Online learning community (if so do you know how often this resource is used)
Follow-up to previous question	9. How often do you provide this support to teachers? *(ask for probes mentioned in previous question)*
Follow-up to previous question	10. Does the amount of support that you provide vary (eg. by school, grade level, teaching experience, etc.)? *(ask for probes mentioned in previous question)*
	TEACHERS INVOLVEMENT WITH ISI
Skip next question if they reply no	11. **Do you observe teachers teaching science?** a. If so, how often? b. does it vary by school, grade, or type of teacher? c. If no, skip next question
	12. **At each school that you work with, how many minutes per week do teachers approximately spend on science instruction?** a. Does this vary by school, grade level or individual teachers? b. What helps you know how much time teachers spend on science?
	13. **How do teachers typically use ISI kits with students? For example...** a. allow all students to use/interact with materials b. they do demos with materials but rarely allow students to use them. c. Only for enrichment, specific groups of students or advanced students
only ask if they say they observe teachers regularly. If coach doesn't observe then they wont be able to respond	14. **When you observe or talk to teachers which of the following practices do you know that they implement regularly?** PROBES: a. Using science notebooks (to write focus questions, hypotheses, drawing observations, creating graphs/charts, etc.) b. Using ISI kits (FOSS, etc.) to do a science investigation/experiment (students doing observations, recording data, etc.) c. Making meaning discussions in large or small groups d. Addressing needs of a range of learners, e.g. incorporating strategies such as encouraging multiple ways of representation: drawings, graphs, charts, e. Strategies for ELL, such as Posting relevant vocabulary, using sentence frames etc.
(if they demonstrate a lot of knowledge for previous question (17) then ask follow-up)	15. Among those practices that teachers implement more regularly can you comment on or give specific examples of how they were used?
(Only ask if they have a lot of experience)	16. **If you have worked with teachers before ISI or since the ISI program began, can you describe any changes in teacher practice or planning that you have noticed?**
	17. **What challenges do teachers face in implementing ISI?**

	a. time constraints, b. understanding of how to use kits c. kit schedule delivery and management, d. adapting for range of learners e. science content knowledge
	18. In comparison to ELA and Math, how comfortable do teachers seem teaching science?
	19. **What is your perception of your teachers' attitudes towards using ISI science kits?**
	ISI AT THE DISTRICT LEVEL
Not sure if we use this as a follow-up Q	20. What is happening at the school and district level that will **challenge/constrain** the work that teachers are doing in relation to ISI? (eg. new standardized testing, change in budgets, etc.)
Not sure if we use this as a follow-up Q	21. What is happening at the school and district level that will **support** the work that teachers are doing in relation to ISI? (eg. new standardized testing, change in budgets, etc.)
	22. How likely will you be able to continue providing support for teachers and what needs to happen for it to continue?
Richmond and South Bend may have different response since they are currently partnering on a new grant with Purdue) NOTE: notice that even if they say that they will not continue using ISI, see if they will continue doing things that they learned or gained from experience of participating in ISI (eg. hands on curriculum, commitment to doing science, using science notebooks, doing investigations, add other kits they think are better)	**23. What is the plan for how your district/schools will continue ISI work?** a. Will continue using ISI? b. Will adopt another hands on material/curriculum? c. Don't know at this time?
	FINAL SUGGESTIONS/ RECOMMENDATIONS
	24. Is there any other person in your district that you recommend we speak with?
	25. To what extent has participation in ISI been beneficial to the schools you work with?
	26. What suggestions do you have that would make the ISI initiative more sustainable in your district/ school?
	27. Do you have any other comments about science teaching or ISI?

Appendix A.3. Principal interview protocol

Introduction:
Thank you for taking part in this interview. During this call we will ask you to describe how the ISI project was implemented in your school district and the factors that contribute to or impede sustainability. This interview should take about 30-45 minutes.

I want to remind you that we will be recording the interview. Your responses will be confidential. However, if you would like me to stop recording at any point, please let me know and I'll turn off the recorder. May I record this interview?

Once we have completed the interview we will be sending to you for your school a $50 Amazon gift card in exchange for your time. As soon as you receive the email with the gift card we would kindly request that you immediately reply to confirm you have received it.

NOTES	PRINCIPALS
	BACKGROUND QUESTIONS
	1. **What is your current role/position?** *(If interviewing principal see if their response would make questions for science coach applicable.)*
	2. How long have you been in this role/position?
	3. Is your school currently using ISI science kits? If so then to what extent?
	4. **How long have you been involved with ISI?**
	5. In your current role/position which responsibilities are related to ISI … a. The ISI teacher trainings b. Teacher use of science kits/notebooks c. Other?
	6. *(If they have a lot of experience)* How has your role/ responsibilities in relation to ISI changed since the start of ISI or since you became involved with ISI?
	7. *(If they don't have a lot of experience)* If you became involved with ISI after your school/district already had began to participate, who was fulfilling the role you currently have?
	INVESTMENT/SUPPORT FOR ISI
	8. How does the ISI project align with your school/district vision/goals for science education?
	9. What type of support does your school give to teachers in relation to science instruction/ ISI? a. Currently in addition to ISI, is there any other PD related to science that occurs? b. (If we know district doesn't have coaches don't ask question) Are there coaches available to support teachers with their science instruction? c. Is money made available or release time provided for teachers to participate in science related opportunities?
	10. Is this support given equally to all teachers or does it vary by grade level, years experience, etc.?

	11. Are science teachers given specific time for collaborative curriculum planning? If so how many minutes per week or month? a. PROBES: who is it facilitated by? b. Is participation optional or mandated? c. What grade levels participate? d. Do you ever observe these planning sessions? If so, then…)
	12. **What does your school do to support new teachers in preparing them to use the science kits?** (eg. formal training, informal training by other more experienced teachers in the same school/ train-the –trainer model).
Richmond and South Bend may have different response since they are currently partnering on a new grant with Purdue) NOTE: notice that even if they say that they will not continue using ISI, see if they will continue doing things that they learned or gained from experience of participating in ISI (eg. hands on curriculum, commitment to doing science, using science notebooks, doing investigations, add other kits they think are better)	**13. What is the plan for how your school will continue doing ISI work?** a. Will continue using ISI? b. Will adopt another hands on material/curriculum? c. Don't know at this time?
	14. What is happening at the school and district level that will **challenge/constrain** the work that teachers are doing in relation to ISI? (eg. new standardized testing, change in budgets, etc.)
	15. What is happening at the school and district level that will **support** the work that teachers are doing in relation to ISI? (eg. new standardized testing, change in budgets, etc.)
	SCIENCE INSTRUCTION AND USE OF ISI
	16. **Do you ever have any opportunities to observe or monitor teachers' science instruction at your school?** (E.g. observations, review lesson plans, scores on science tests, monitor use of materials)
	17. How many minutes per week do teachers in your school spend on science instruction? **a.** Does this vary by school building, grade level or individual teachers?
	18. *(only ask if they say they observe teachers*) **If you do observe teachers teaching science, how often do you observe teachers doing the following?** PROBES: a. Using science notebooks (to write focus questions, hypotheses, drawing observations, creating graphs/charts, etc.) b. Using ISI kits (FOSS, etc.) to do a science

	investigation/experiment (students doing observations, recording data, etc.) c. Making meaning discussions in large or small groups d. Addressing needs of a range of learners, e.g. incorporating strategies such as encouraging multiple ways of representation: drawings, graphs, charts, Strategies for ELL, such as Posting relevant vocabulary, using sentence frames etc.
	19. *(Only ask if principal is very involved with teachers)* **How do teachers typically use kits with students?** a. allow all students to use/interact with materials b. they do demos with materials but rarely allow students to use them. c. Only for enrichment, specific groups of students or advanced students
	20. *(only ask if they have more experience)* ***If you have observed teachers teaching science before the ISI program began, or early in the ISI project can you describe any changes in teacher practice or planning that you have noticed or heard of?***
	21. Do you know or have you heard of any challenges teachers face in implementing ISI? a. time constraints, b. understanding of how to use kits c. kit schedule delivery and management, d. adapting for range of learners (only ask if very involved) e. science content knowledge (only ask if very involved)
	22. In comparison to ELA and Math, how comfortable do teachers seem teaching science?
	23. What is your perception of your teachers' attitudes towards using ISI science kits?
	FINAL SUGGESITONS/ RECOMENDATIONS
	24. Is there any other person in your district or school that you would recommend that we do this same interview with?
	25. To what extent has participation in ISI been beneficial to your school?
	26. What suggestions do you have that would make the ISI initiative more sustainable in your district/ school?
	27. Do you have any other comments about science teaching or ISI in your school?

Appendix A.4. ISI Teacher Survey 2015

The evaluation of the Indiana Science Initiative (ISI) is being conducted by TERC, a nonprofit educational research and development organization located in Cambridge, MA. Your participation will help us to evaluate how the ISI project was implemented and the factors that contribute to or impede sustainability. After completing this survey we will send you a $20 Amazon e-gift card.

The information you provide in this survey will be confidential – only TERC evaluators will have direct access to your responses. Although we gather identifying information such as your name and email address, we will remove this information before analyzing the data and we will not identify individual teachers or schools in any of our data summaries.

Your participation in this survey is entirely voluntary and has no impact on your participation in the Indiana Science Initiative.

Thank you for sharing your insights. If you have any questions about this study or your participation in it, please call Audrey Martinez-Gudapakkam at TERC, 617-873-9775 or email her at audrey_martinez-gudapakkam@terc.edu. If you would like to speak to someone outside of the project, you may contact Rena Stroud of TERC's IRB. She can be reached at (617) 873-9868 or at rena_stroud@terc.edu.

By selecting "YES" below, you indicate that:

- I understand that my participation is entirely voluntary and confidential; and
- I agree to contribute my insights about the ISI project through a survey.

1. Are you willing to participate in the Indiana Science Initiative (ISI) survey described above?

- ○ Yes
- ○ No

ISI Teacher Survey 2015

1. During this academic year did you use an ISI science kit?

- ☐ Yes
- ☐ No

2. During this academic year did you use any non-ISI kits?

- ☐ No
- ☐ Yes (please specify the kit names)

3. Are you hoping or planning to use the ISI kits next year?

- ☐ Yes
- ☐ No

ISI Teacher Survey 2015

ISI participation

1. **Including this academic school year, how many years have YOU participated in the Indiana Science Initative (ISI)?**

2. **Including this academic school year, how many years has YOUR CURRENT SCHOOL participated in ISI?**

   If you do not know please type in 0.

3. **What years did you attend ISI summer training?**

   Check all that apply

   - ☐ **Summer 2014**
   - ☐ **Summer 2013**
   - ☐ **Summer 2012**
   - ☐ **Summer 2011**
   - ☐ **Summer 2010 (pilot year)**

4. **What components of the ISI summer training can you recall participating in during one or more ISI summer training sessions?**

   Check all that apply

   - ☐ **Kit training**
   - ☐ **Formative Assessment training**
   - ☐ **Notebooking**
   - ☐ **Other**

ISI Teacher Survey 2015

Supports for science

1. At your current school which of the following supports for science instruction were available this academic year and previous years since ISI? (Please check all that apply)

	This academic school year	Previous academic ISI years	N/A
A science coach or specialist	☐	☐	☐
Collaborative planning time related/specific to science	☐	☐	☐
Money for science related materials for ISI, in addition to ISI kits	☐	☐	☐
PD that had some focus on science (offered by school or money to attend outside PD)	☐	☐	☐
Release time and/or substitute teacher to attend PD	☐	☐	☐
None/ no support for science available	☐	☐	☐
N/A or first year teacher	☐	☐	☐
Other	☐	☐	☐

Please explain If you chose the 'other' option above :

ISI Teacher Survey 2015

Please rate your level of agreement with the following statements while keeping in mind the supports for science instruction that your school currently offers.

1. **My school will continue to provide the same type(s) and/or amount of support for science instruction in future school years.**

- ○ Strongly agree
- ○ Agree
- ○ Somewhat agree
- ○ Somewhat disagree
- ○ Disagree
- ○ Strongly disagree
- ○ Other (please explain)

2. **The support(s) for science instruction that my school currently offers help me improve the quality of my science instruction.**

- ○ Strongly agree
- ○ Agree
- ○ Somewhat agree
- ○ Somewhat disagree
- ○ Disagree
- ○ Strongly disagree
- ○ Other (please explain)

3. **The support(s) for science instruction that my school currently offers helped me increase the amount of time I spend on science instruction.**

- ○ Strongly agree
- ○ Agree
- ○ Somewhat agree
- ○ Somewhat Disagree
- ○ Disagree
- ○ Strongly Disagree
- ○ Other (please explain)

4. **The resources available in the *Learning Connection* kit communities have helped me improve my science instruction with the ISI kits.**

- ○ Strongly agree
- ○ Agree
- ○ Somewhat agree
- ○ Somewhat Disagree
- ○ Disagree
- ○ Strongly Disagree
- ○ Other (please explain)

ISI Teacher Survey 2015

Science teaching at your school

1. For this academic year, on average, how many MINUTES per week do you teach science?

2. Which of the following statements best describes the amount of science teaching you did this academic school year compared to previous years?

- ○ This year I am teaching more science
- ○ This year I am teaching the same amount of science as before
- ○ This year I am teaching less science
- ○ Not applicable (first year teacher)
- ○ Not sure (please explain)

3. Which of the following statements best describes the amount of science teaching you expect to teach next year?

- ○ Next year I will teach more science
- ○ Next year I will teach the same amount of science as before
- ○ Next year I will teach less science
- ○ Not sure (please explain)

4. Select all of the following statements that best describe how science was taught this academic school year. (check all that apply)

Please select all that apply

- ☐ Science was taught separately from other subjects
- ☐ Science was taught integrated with Math
- ☐ Science was taught integrated with English Language Arts
- ☐ Science was taught integrated with other subjects (please list)

5. Select all of the following statements that best describe how science was taught in prior years.

Please select all that apply

- ☐ Science was taught separately from other subjects
- ☐ Science was taught integrated with Math
- ☐ Science was taught integrated with English Language Arts
- ☐ Science was taught integrated with other subjects (please list)

6. Does integrating science with other subjects make you MORE OR LESS likely to teach science?

- ☐ Makes it more likely/easier
- ☐ Does not make a difference
- ☐ Makes it less likely/more challenging
- ☐ Not sure (please explain)

7. At your school is science taught only at specific times during the school year (e.g., one semester)?

- ☐ No, science is taught all year long.
- ☐ Yes (please explain)

ISI Teacher Survey 2015

Use of ISI science kits

1. By the end of this current school year, how many ISI kits do you plan to use?

   ○ 0 ○ 1 ○ 2 ○ 3 ○ 4

2. If you do not plan to use ALL of the ISI kits this school year, please explain why:

3. On average how many WEEKS do you spend on each of the ISI science kits?

4. Please choose one of the following statements that best describes the EXTENT to which you typically use the ISI kits?

   ○ I always complete the ISI kits
   ○ I usually complete the ISI kits
   ○ I somewhat complete the ISI kits
   ○ I rarely complete the ISI kits
   ○ I never complete the ISI kits

5. Please choose one of the following statements that best describe the amount of ISI kits you have used this academic school year compared to previous years since ISI began.

   ☐ This year I am using more ISI kits
   ☐ This year I am using nearly the same number of ISI kits
   ☐ This year I am using less ISI kits
   ☐ N/A or first year teaching
   ☐ Other (please explain)

6. Please choose one of the statements that best describes how you most often used the ISI science kits this academic school year.

   ☐ All students use ISI kits/ interact with materials
   ☐ Only the teacher interacts with materials while doing a demo
   ☐ Only specific groups of students (e.g., advanced/enrichment) interact with ISI kits
   ☐ N/A or first year teaching
   ☐ Other (please explain)

7. Please choose one of the statements that best describes HOW the ISI science kits were most often used in prior years since ISI began.

   ☐ All students use ISI kits/ interact with materials
   ☐ Only teacher interacts with materials while doing a demo
   ☐ Only specific groups of students (e.g., advanced/enrichment) interact with ISI kits
   ☐ N/A or first year teaching
   ☐ Other (please explain)

8. How easy/hard is it for you to use the ISI kits?

   ☐ Very easy
   ☐ Somewhat easy
   ☐ Somewhat hard

ISI Teacher Survey 2015

Use of other ISI practices

1. Please select all of the following ISI science practices that you are using this academic school year AND previous school years since ISI began. (check all that apply)

	This academic school year	Previous academic ISI years
Using notebooks (which may include some or all of the following: writing focus questions, recording data or observations, writing conclusions or responding to focus questions)	☐	☐
Making meaning discussion (in pairs, small groups, large groups, or whole class)	☐	☐
Formatively assessing student understanding (e.g., using color coding, marking notebooks with colored stickers or post-its)	☐	☐
Providing non-verbal feedback to students (e.g., writing specific comments or questions with post-its or in notebook, using colored stickers)	☐	☐
Having students reflect on, revise, or expand on learning (e.g., using Line of Learning, Next steps, etc.)	☐	☐
Math extensions	☐	☐
None	☐	☐
N/A or first year teaching	☐	☐
Other	☐	☐

Please describe a concrete example of how you used these ISI practices:

ISI Teacher Survey 2015

1. Since your school began to use ISI kits, do you feel more confident teaching science?

- Strongly agree
- Agree
- Somewhat agree
- Somewhat disagree
- Disagree
- Strongly disagree
- N/A or first year teaching
- Other (please explain)

2. If your teaching has improved as a result of participating in ISI, then please list two examples or ways it has improved:

(eg. Now I have my students do ___ instead of just doing ___.)

1

2

3. To what extent are the following factors/issues CHALLENGES for your science instruction and use of the ISI kits?

	Not a challenge	A little challenge	Somewhat of a challenge	A very big challenge	N/A
Lower priority subject when compared to ELA and Math					
Duration of periods/length of class time					
Other time constraints (e.g., scheduling due to inclement weather)					
Lack of appropriate or sufficient classroom space					
Your own science content knowledge					
Your own understanding of how to use kits					
Adapting the kit for a range of learners					
Kit missing materials					
Kit rotation assignment not appropriate for the time of year when they are assigned					
Other kit schedule delivery and management issues (late delivery, etc.)					
ISI kits not aligned with school curriculum					
ISI kits not aligned with state standards					
Pressures related to standarized testing					
Limited budgets					
Classroom management					
No school support (e.g., coaches, specialists, etc.)					
Out of pocket expenses to purchase additional kit materials					

Any other challenges not listed above?

4. How likely do you think you will continue using ISI science kits in your instruction?

- Very likely
- Likely
- Somewhat likely
- Somewhat unlikely
- Unlikely
- Very unlikely
- I don't know (please explain)

5. Please list what factors make it MORE LIKELY for you to use ISI science kits and/or spend more time teaching science:

6. Please list anything your school/district is doing that SUPPORTS and/or CHALLENGES the work teachers are doing with ISI:

ISI Teacher Survey 2015

Background information

1. How would your describe your current teaching position/role?

2. What grade(s) are you currently teaching or working with?

☐ K ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

3. How many years have you been teaching?

4. Which of the following types of schools do you currently work at?

○ Public ○ Charter ○ Parochial ○ Private ○ Other

5. What is the name of your schools' district or city?

6. What is the name of your school (optional)?

ISI Teacher Survey 2015

Gift card information

1. **To receive your gift card please provide the best email to send you the Amazon electronic gift card in June or early July (when we officially close the survey):**

   This information will not be shared with any third party and your responses will be reported anonymously.

First name

Last name

Email

Other comments?

APPENDIX B. Examples of science integration with other subjects.

The following are examples of how science is being integrated with other subjects in some ISI schools.

The most common way schools are *integrating science with reading*, seems to be reading non-fiction texts by using...

- The reader that's in the science kit for their interactive read-aloud, during the reading block.
- A book series such as NSTA's *Picture Perfect* to go along with particular science kits.
- Nonfiction books in their library that are relevant to a particular kit.
- History books, for example, to learn about the history of particular inventions, theories, and technological advances.

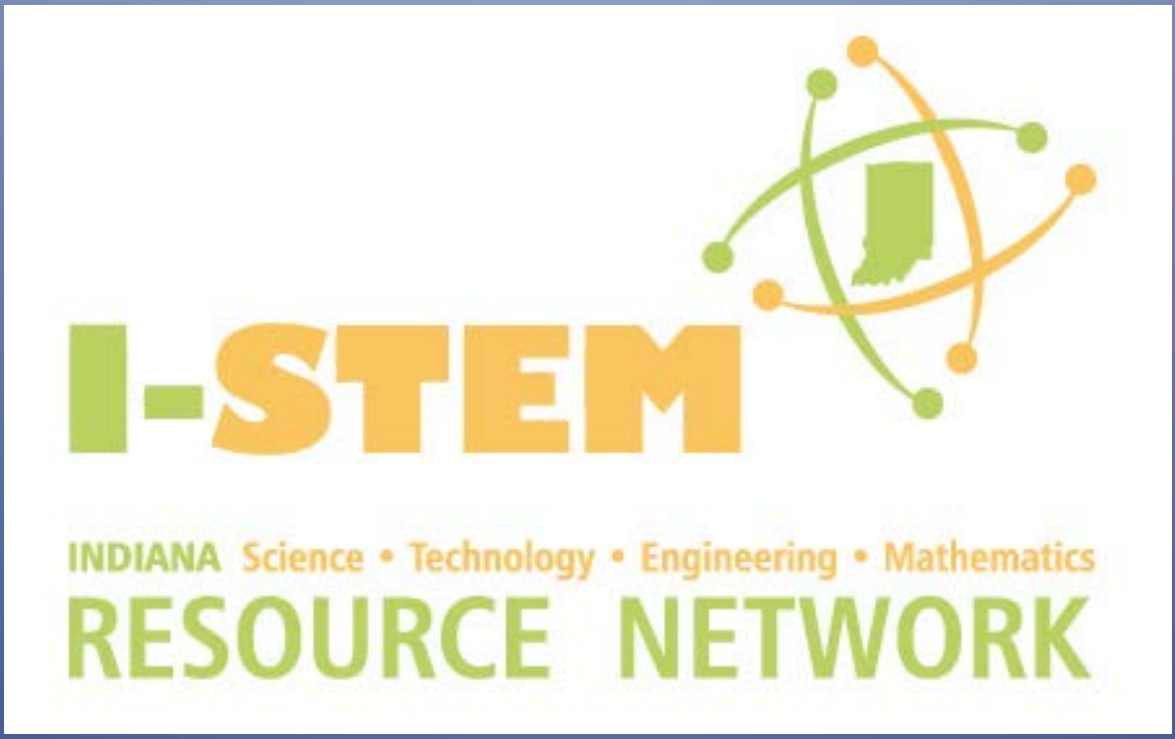
For *integrating science and writing* a typical way of doing this is using the science notebook. Some districts and schools encourage using them in the following ways:

- Students recording data in their notebooks, writing predictions and making claims.
- Students reading notebooks as part of their literacy blocks
- Developing research projects connected with the kits so that students are taking notes and writing about a topic.

Teachers and administrators are aware that *integrating science and mathematics* is an emphasis of both the new math and science standards. Integration helps students be analytical in their thinking and in explaining strategies for solving problems. Given the natural connection between science and math, which involves data collection and analysis, students are analyzing the data that is generated from an investigation and using terms such as claims and evidence that they learn in science. Some of the ways that teachers and/or districts have integrated science into math is by…

- Teachers reinforcing math standards such as measurement and graphing with the kit activities.
- Having students use a math journal to define terms and demonstrate strategies for solving problems.
- Developing math extensions for the kits. (Eg. One district received a grant to develop math extensions to the kits. Administrators presented the examples of these projects to the school committee.)

I-STEM Resource Network is supported by the Lilly Endowment, the Lilly Foundation, Biocrossroads, the Indiana Department of Education, the Indiana Commission for Higher Education, and Purdue University.



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