



Indiana Science Initiative Update: 2014 Survey of ISI Principals

October 2014

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.

Introduction The Indiana Science Initiative (ISI) is an inquiry-based science program for grades K-8 in Indiana. It was modeled after a similar program in Alabama and is aligned to Indiana’s Academic Standards for Science--2010. ISI provides a research developed science curriculum and teacher professional development (PD) with a strong emphasis on science notebooking. Professional development provides the skills needed for teachers to implement the curriculum and assess student performance.

ISI was piloted by teachers in about 160 Indiana schools in the 2010-2011 school year. After the pilot, about 130 schools chose to adopt ISI as their primary science curriculum. This adoption runs through the 2016-2017 school year. During the 2013-2014 school year, ISI materials exceeding 400 tons were shipped to member schools throughout Indiana. Additionally, PD has been offered to ISI schools each summer since 2010. The I-STEM Resource Network, which manages ISI, has sponsored 70 separate training sessions with over 2,200 hours of training offered to the approximately 2,200 teachers in ISI. A report on the PD program is available.

Funding for ISI and I-STEM has come from the generous support of the Lilly Endowment, the Lilly Corporate Foundation, Biocrossroads, and the Indiana Department of Education via a Math-Science Partnership grant. I-STEM is hosted by Purdue University. ISI schools pay a one-time adoption fee and an annual per-student fee to offset the costs of materials acquisition and management.

Assessments of the ISI program and the PD sessions are a key component of the I-STEM performance measures. For the evaluation of the ISI classroom results, ISTEP+ scores were examined in a complex model that accounted for racial, higher needs, exceptionalities, gifted and English language learners. It was found that after controlling for all of these variables an effect of ISI on science and ELA scores was marginally measurable. A separate I-STEM report is available fully reporting the results.¹

After completing the 2013-2014 school year and summer PD, I-STEM surveyed the leadership at ISI schools to assess the impact and performance of ISI from their viewpoint. Specifically, I-STEM sought feedback on the ISI curriculum, the associated PD, and several possible benefits related to ISI.

Principal Assessment Principals at the 134 ISI schools were surveyed in August 2014 on their opinions of the ISI curriculum, the impact of ISI on their school, and what changes they have made in science in their schools because of ISI implementation. We also included questions about the time spent on science each week.

The survey was implemented using the online survey tool Qualtrics (Provo, UT) hosted at Purdue University. Though the survey could be completed anonymously, participants were asked for name, email address, school and years as principal. This was done to both quantify the level of experience of respondents and allow specific feedback and follow up as needed.

Table 1 lists the 11 statements used in the survey. The survey was designed to be brief to encourage timely responses. Space was also included at the end of the survey for additional comments. Comments

¹ “Indiana Science Initiative Update: The Impact of the Indiana Science Initiative on Students’ ISTEP+ scores– TERC Evaluation Report,” I-STEM Report 2014-03r1, May 2014.

were received from 14 respondents and were helpful in resolving school-specific issues and to provide additional details to enhance participant understanding of how the ISI works in cases of new administrators.

Table 1. Statements and Questions in the 2014 IS Principals Survey.

1.	The Indiana Science Initiative is an effective science curriculum in my school.
2.	The Indiana Science Initiative has offered convenient professional development for teachers in my school.
3.	The Indiana Science Initiative has offered effective professional development for teachers in my school.
4.	Because of the Indiana Science Initiative, teachers in my school are better prepared to teach science.
5.	Because of the Indiana Science Initiative, student interest in science has increased in my school.
6.	Because of the Indiana Science Initiative, we have increased the class time dedicated to science in my school.
7.	Because of the Indiana Science Initiative, we have increased the budget spent on science in my school.
8.	Because of the Indiana Science Initiative, I see collateral improvements in English language arts in my school.
9.	On average how many hours per week are devoted to science in your school?
10.	If you were able to relax time restraints in the daily schedule, what do you think is an optimal amount of time for science instruction each week?
11.	Do you observe your teachers working to integrate instruction in mathematics and English/language arts with science?

Participants could choose a response from 1 to 5 for statement 1-8 , with the relations shown in Table 2.

Table 1. Response Options for Survey Statement 1-8.

Selection	Meaning
1	Strongly Disagree
2	Disagree
3	Neither Agree or Disagree
4	Agree
5	Strongly Agree

Results Table 3 shows the average responses and number of responses for statements 1-8. 46 responses were received in 2013 and 43 responses were received in 2014 for each survey statement. ISI schools overall average district-wide free and reduced lunch rate of 62%, much higher than the state-wide rate of 49% for the 2013-2014 school year. The average service as a school leader was 5.2 years.

Table 3. Responses to Eight Common Statements from 2013 and 2014.

		2013 (n=46)	2014 (n=43)
1.	The Indiana Science Initiative is an effective science curriculum in my school.	4.22	3.90
2.	The Indiana Science Initiative has offered convenient professional development for teachers in my school.	3.79	3.56
3.	The Indiana Science Initiative has offered effective professional development for teachers in my school.	3.81	3.60
4.	Because of the Indiana Science Initiative, teachers in my school are better prepared to teach science.	3.96	3.77
5.	Because of the Indiana Science Initiative, student interest in science has increased in my school.	3.98	3.81
6.	Because of the Indiana Science Initiative, we have increased the class time dedicated to science in my school.	3.70	3.60
7.	Because of the Indiana Science Initiative, we have increased the budget spent on science in my school.	3.23	3.12
8.	Because of the Indiana Science Initiative, I see collateral improvements in English language arts in my school.	3.24	2.91

The results show continued satisfaction with ISI. Figure 1 compares the answers to statements 1-8 from the 2013 survey and the 2014 survey. Answers in the 2014 survey were significantly lower for statement 1 ($p=0.04$) and statement 8 ($p=0.02$). Questions 9-11 this year were added to investigate both the time spent on science and the demand for more science time. For question 9, the responses for the average time spent on science fell into the “2-4 hour” bin ($N=43$) (see figure 2). For question 10, the demand for time for science skewed towards “More than 4 hours” ($N=43$), indicating that these ISI schools would like to have more for science each week. Finally, 91% of principals responding to question 11 observed teachers working to integrate instruction in mathematics and English/language arts with science ($SD=0.29$, $N=43$). Integrating subjects is one way to create more science time by including science in mathematics and ELA lessons.

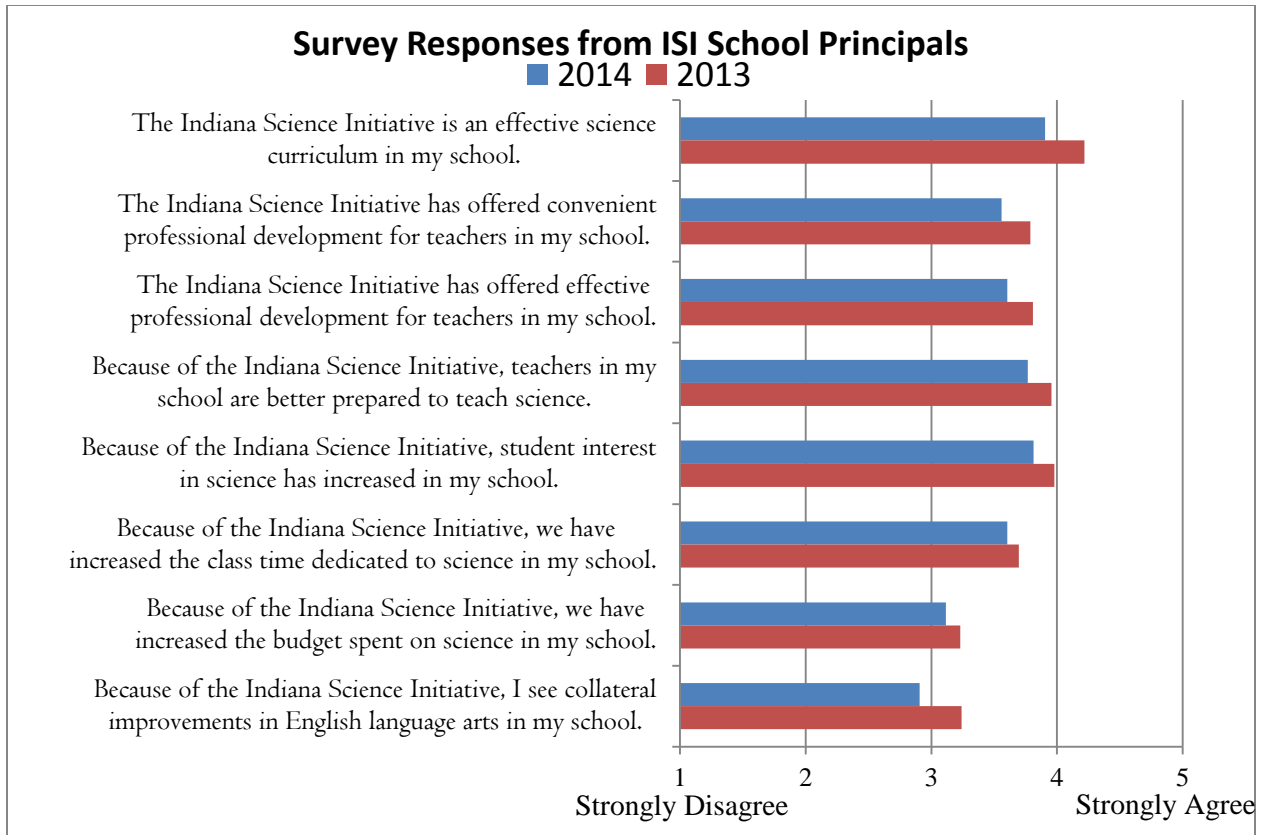


Figure 1. Comparison of responses to the 2013 (N=46) and 2014 (N=43) surveys.

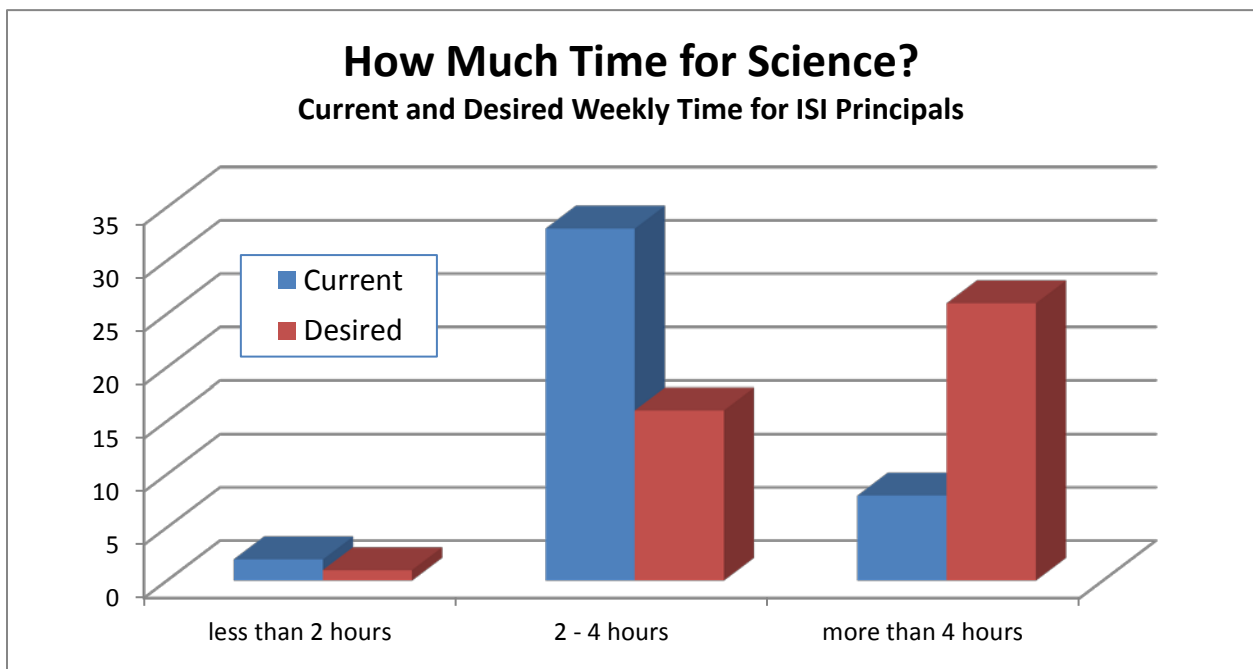


Figure 2. Distribution of Current and Desired Science Times from the Survey of ISI Principals. (N=43)

Additional analysis looked at the associations between certain responses using a Chi-Squared Test for Independence. A Chi-Squared Test for Independence is used to determine if there is a significant association between responses to two questions. The association between responses to statements 3 and 4 is shown in Figure 3, evaluating the effectiveness of PD and the preparedness of ISI teachers. The Chi-Square test is shown in Figure 4.

		3.The Indiana Science Initiative has offered effective professional development for teachers in my school.					Total
		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	
4. Because of the Indiana Science Initiative, teachers in my school are better prepared to teach science.	Strongly Disagree	0	0	0	0	0	0
	Disagree	1	3	2	0	0	6
	Neither Agree nor Disagree	0	0	6	2	0	8
	Agree	0	0	5	12	2	19
	Strongly Agree	0	0	0	7	3	10
Total		1	3	13	21	5	43

Figure 3. Association Matrix for Statements 3 and 4.

		Please answer the following questions as a reflection of your experience with the Indiana Science... - 3.The Indiana Science Initiative has offered effective professional development for teachers in my school.
Please answer the following questions as a reflection of your experience with the Indiana Science... - 4. Because of the Indiana Science Initiative, teachers in my school are better prepared to teach science.	Chi Square	43.24*
	Degrees of Freedom	16
	p-value	0.00

**Note: The Chi-Square approximation may be inaccurate - expected frequency less than 5.*

Figure 4. Chi-Square Analysis for Statements 3 and 4.

Higher Chi Square values correspond to stronger associations between factors. The corresponding p-value indicates the probability of a random association. The closer the p-value is to 1, the more likely the association between the two statements is random; the closer the p-value is to zero, the greater the probability that the association between the two statements is not random.

The association between responses to statements 4 and 5 is shown in Figure 5, evaluating the association of ISI teacher preparedness and student interest. The Chi-Square test is shown in Figure 6.

		4. Because of the Indiana Science Initiative, teachers in my school are better prepared to teach science.					Total
		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	
5. Because of the Indiana Science Initiative, student interest in science has increased in my school.	Strongly Disagree	0	2	0	0	0	2
	Disagree	0	3	0	0	0	3
	Neither Agree nor Disagree	0	0	6	3	0	9
	Agree	0	1	1	12	2	16
	Strongly Agree	0	0	1	4	8	13
Total		0	6	8	19	10	43

Figure 5. Association Matrix for Statements 4 and 5.

		Please answer the following questions as a reflection of your experience with the Indiana Science... - 4. Because of the Indiana Science Initiative, teachers in my school are better prepared to teach science.
Please answer the following questions as a reflection of your experience with the Indiana Science... - 5. Because of the Indiana Science Initiative, student interest in science has increased in my school.	Chi Square	63.19*
	Degrees of Freedom	16
	p-value	0.00

*Note: The Chi-Square approximation may be inaccurate - expected frequency less than 5.

Figure 6. Chi-Square Analysis for Statements 4 and 5.

The association between responses to statements 6 and 7 is shown in Figure 7, evaluating changes in budget or time spent on science in ISI schools. The Chi-Square test is shown in Figure 8. Note the relatively low Chi Square value and the corresponding low p value indicates insignificant association.

		6. Because of the Indiana Science Initiative, we have increased the class time dedicated to science in my school.					Total
		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	
7. Because of the Indiana Science Initiative, we have increased the budget spent on science in my school.	Strongly Disagree	0	2	0	0	0	2
	Disagree	0	2	2	3	0	7
	Neither Agree nor Disagree	1	1	7	7	3	19
	Agree	0	1	1	6	6	14
	Strongly Agree	0	0	1	0	0	1
Total		1	6	11	16	9	43

Figure 7. Association Matrix for Statements 6 and 7.

		Please answer the following questions as a reflection of your experience with the Indiana Science... - 6. Because of the Indiana Science Initiative, we have increased the class time dedicated to science in my school.
Please answer the following questions as a reflection of your experience with the Indiana Science... - 7. Because of the Indiana Science Initiative, we have increased the budget spent on science in my school.	Chi Square	26.93*
	Degrees of Freedom	16
	p-value	0.04

**Note: The Chi-Square approximation may be inaccurate - expected frequency less than 5.*

Figure 8. Chi-Square Analysis for Statements 6 and 7.

Discussion The results of this survey show an overall satisfaction with ISI (86% Agree or Strongly Agree) and I-STEM’s teacher professional development (62% Agree or Strongly Agree). Also, 47% of these schools have increased the emphasis on science, as shown in their budgets and time spent on science. These numbers are all lower than the 2013 survey results, however. Finally, although an analysis showed improved ISTEP+ E/LA scores in 10 ISI schools correlated with improved science scores², 79% of principals responding to this survey do not see a causal relationship, a higher percentage than last year. Evaluation of the Chi-Square Tests for Independence does not reveal any surprises. There is a significant association between the effectiveness of the PD and the preparedness of ISI teachers for science (statements 3 and 4). PD is a resource-intensive and time-consuming process as currently offered, requiring many hours of preparation and planning for a few days of training. Many teachers cannot attend all of the training sessions due to other constraints. Additionally, as many as 30% of the teachers will change grade level or school each year, resulting in a need for additional training. There is a real need for just-in-time training on the science curriculum that teachers could access from anywhere at any time. I-STEM has begun to post video training on the web to address this need. There is a statistically significant association between effective PD (statement 4) and student interest (statement 5). This result supports ISI’s continued emphasis on teacher preparation: a well-prepared teacher will instill an interest in science (and other disciplines) much better than an ill-prepared teacher. Finally, there was a significant association between increased time and budget for science (statements 6 and 7). The data in Fig. 7 shows a trend a greater increase in time being allocated for science than an increase in funding. Schools tend to have more discretion with time than with their budget. Additional survey comments indicated that an increase in time and/or budget for science could be part of a larger initiative that included ISI but was not driven by it.

² “Student Performance on State Accountability Testing from Ten Schools Participating School-Wide for Four Years,” I-STEM Report 2014-05, August 2014.

The survey results for questions 9 and 10 on the actual and desired time for science show a demand for more science time in ISI schools. This isn't surprising but does indicate the need to making science count in the daily school planning.

Conclusions and Next Steps From the results above we can draw the following conclusions:

1. The survey indicates positive results for ISI effectiveness and PD preparation for teachers.
2. Several schools have increased the time devoted to science and some have also increased their budgets.
3. Well-prepared teachers help instill an interest in science in their students.

These results have helped identify some next steps:

1. ISI and I-STEM will follow-up on specific comments.
2. I-STEM will investigate why scores dropped in general since the survey taken in 2013.
3. Another survey will be planned for summer 2015 to continue this evaluation.

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