The LASER Model: A Systemic and Sustainable Approach for Achieving High Standards in Science Education

Summative Report Section 2:

Overview

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Acknowledgments

The success of this evaluation would not have been possible without the herculean efforts built on strong partnerships among the Center for Research in Educational Policy (CREP), the Smithsonian Science Education Center (SSEC), Abt Associates, Bernalillo Public Schools, Chama Public Schools, Cleveland County Schools, Greene County Schools, Houston Independent School District, Jemez Valley Public Schools, Johnston County Schools, Los Alamos Public Schools, McDowell County Schools, Moore County Schools, Mora Public Schools, Pecos Independent School District, Rio Rancho Public Schools, Santa Fe Public Schools, Warren County Schools, and Wilson County Schools. We extend our heartfelt thanks and appreciation to all who contributed to this amazing endeavor, and sought – and still seek – to improve the state of science education in America.

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Introduction

The Leadership and Assistance for Science Education Reform (LASER) Model is a systemic approach to science learning and teaching based on five infrastructure pillars: research-based curriculum, differentiated professional development, administrative and community support, materials support, and assessment. This model uses the Science and Technology Concepts (STC) program, an inquiry-based curriculum with connections to mathematics and language arts. This report will provide a short description of each pillar, summarized from SSEC (Smithsonian Science Education Center) documentation, information gleaned from CREP's instruments and surveys, and general interpretations of that information.

STC science kits supporting the LASER model were implemented in school districts across three regions in the United States from 2012 (Year 1) through 2014 (Year 3): Houston Independent School District (HISD), central and western North Carolina, and northern New Mexico. To reflect program implementation and effectiveness with regard to each of Smithsonian's infrastructure pillars, CREP has organized and analyzed data from LASER teacher and administrator surveys, unit logs completed by teachers after completion of STC Units, classroom observations, interviews, and focus groups. Both Phase I (immediate implementation) and Phase II (delayed implementation) teachers and administrators completed LASER surveys; when appropriate, responses from these two groups are compared. All graphs reflect available data. Results from all years of program implementation are present in the graphs, except for the final year of principal surveys in North Carolina and New Mexico, where there were too few responses to report. Except in these two instances, any blank columns in the graphs indicate zero responses with respect to that question.

This report references three CREP-created, voluntary instruments used to collect data from schools. The STC Unit log is a teacher self-report survey focusing on teacher experiences and perceptions of the STC Units. CREP administered this survey during all three years of the implementation (when instruction included the STC Units) to all Phase 1 schools. The SOM-Sci is a classroom observation tool focusing on instruction, student, and inquiry science behaviors. CREP-trained observers recorded data during baseline and all years of implementation for a subset of Phase1 and Phase 2 schools. The LASER Survey is a teacher or principal self-report survey focusing on the general science environment at the school. CREP administered the LASER survey during baseline and all years of implementation for all Phase 1 and Phase 2 schools.

At the end of each section, call-out boxes will appear with the safety symbol for "lasers" attached to the upper left corner. These call-out boxes contain the major highlights of the section.

SSEC PILLAR Structure

Summary of SSEC Pillar 1: Research-Based Curriculum

The first pillar of the SSEC's LASER model is support for research-based curriculum. The SSEC emphasizes curriculum selection that best suits the pedagogical needs of school administrators and teachers as well as state and local standards. This concept applies not only to the materials teachers use, but also to their presentation and augmentation with available resources.

Science Knowledge

Teachers knowledgeable about science are necessary to effectively present science lessons and support student understanding. As shown in Figure 1, less than six percent of teachers in any region reported concern about their science content knowledge across all four years. However, during the same time period, a growing number of principals reported that the ability to find qualified science teachers was extremely challenging (Figure 2). This trend was much more evident in Phase 1 schools, and may have been a result of knowledge gleaned from implementation of the STC Units in those schools, especially since Phase 1 principals reported assessing teachers' science knowledge more than Phase 2 principals did (Figure 3). The hands-on nature of the STC Units could have presented some principals with a better understanding of the role of teacher expertise in science instruction.

Figure 1. Largest percentage of teachers in any region reporting science knowledge as a challenge at any time point

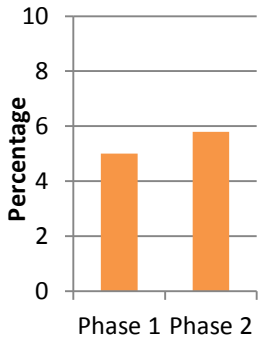
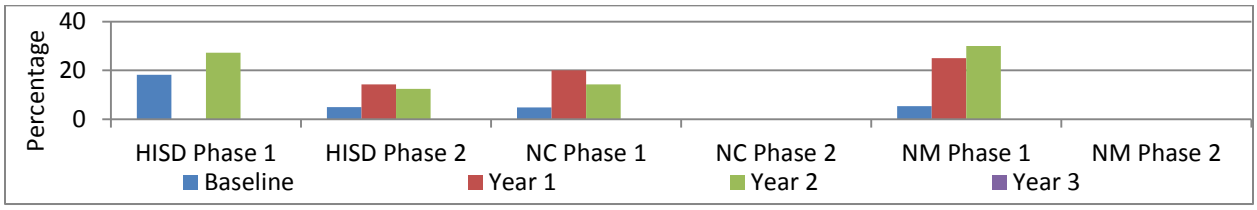
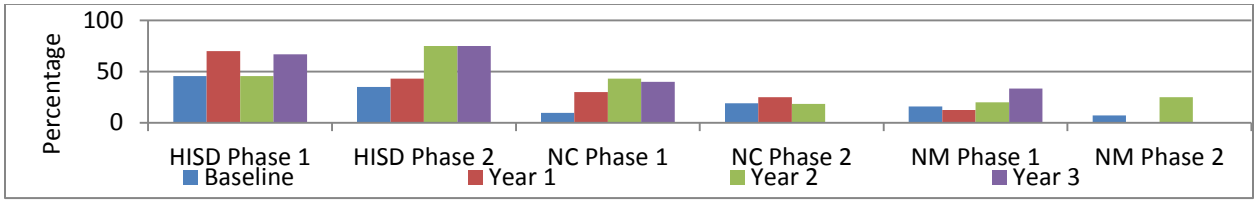


Figure 2. Percentage of principals reporting "finding qualified teachers" to be "extremely challenging."



Note: Blank columns indicate principals did not report finding qualified teachers to be extremely challenging during any survey period where data are available.

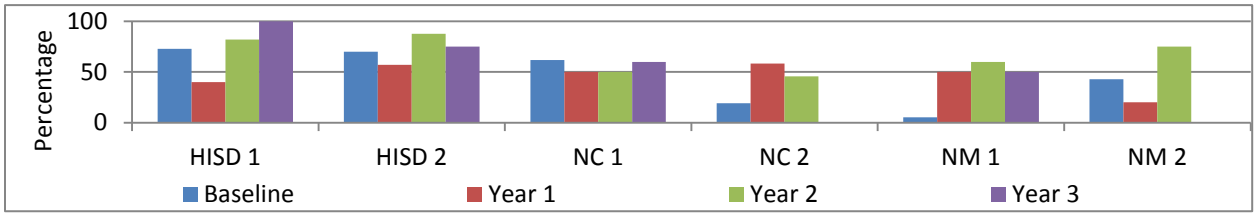
Figure 3. Percentage of principals reporting they "assessed teacher knowledge of science."



Note: Blank columns indicate principals did not assess teachers' knowledge of science during any survey period where data are available.

Perhaps, as a result of this growing concern, over half of responding principals reported that they created opportunities for teachers to further their science knowledge at some point during the implementation (Figure 4). The summer professional development (PD) workshops associated with STC Unit implementation provided Phase 1 teachers with science content knowledge for the units they were preparing to teach, and may have contributed to PD opportunities reported by Phase 1 principals.

Figure 4. Percentage of principals reporting they "create opportunities for teachers to improve their science content knowledge."



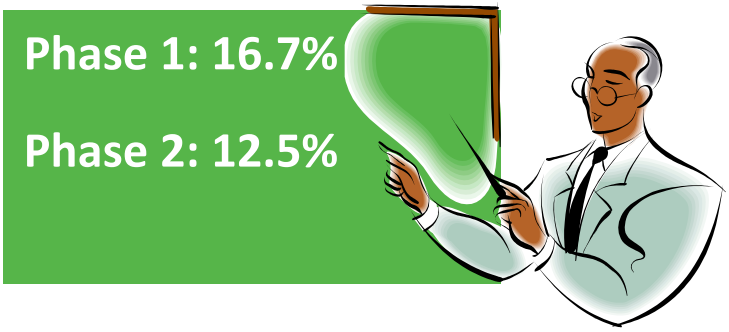
Although teachers generally felt confident in their science content knowledge, principals – especially those in schools where the STC Units were implemented – indicated concern about hiring qualified science teachers. Many principals supported creating professional development opportunities to help teachers improve their science content knowledge.

Interest in Science

Content knowledge is not the only factor that affects science instruction. Interest in teaching and learning science also contributes to effective instruction. Teachers with an interest in the subject matter are more likely to deliver it in a sincere and inviting way. Similarly, enthusiastic students are most likely to put in the time and energy needed to truly excel.

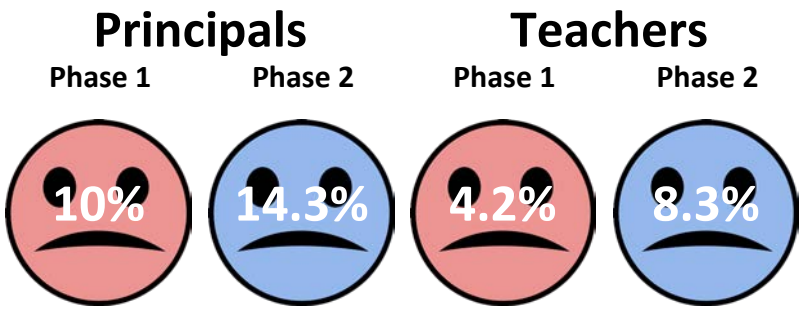
Overall, principals felt that their science teachers had an interest in the subjects they were teaching. Less than 20% of principals ever reported teacher interest in science as extremely challenging. Phase 1 principals were slightly more concerned with teacher interest in science; however, at only two time points did over 10% of principals report this concern (Figure 5). As with principal concern for teacher content knowledge, Phase 1 principals who underwent professional development and were exposed to the STC Units may have developed higher standards for what constituted an interested teacher.

Figure 5. Highest percentage of principals reporting "teacher interest in science" as extremely challenging from any year in the project.



Neither principals nor teachers perceived student interest in science as a great challenge, particularly in Phase 1 schools (Figure 6). This may indicate that the STC Units helped promote student engagement. Principals in both phases found student interest in science a greater challenge than did their teachers. Across all years of the implementation, the largest percentages of principals and teachers finding science interest a challenge was still below 15%.

Figure 6. Percentage of principals and teachers reporting "student interest in science" as "extremely challenging."



Students in Phase 1 classrooms interacted with one another more during science lessons than did their Phase 2 counterparts. Across all years, Phase 1 students were more likely to be involved in student discussions (Figure 7), ask on-topic questions (Figure 8), and report science information to other students (Figure 9). These trends were especially strong in the last year of the implementation.

Figure 7. Percentage of classrooms observed with "students discussions" occurring "frequently or extensively."

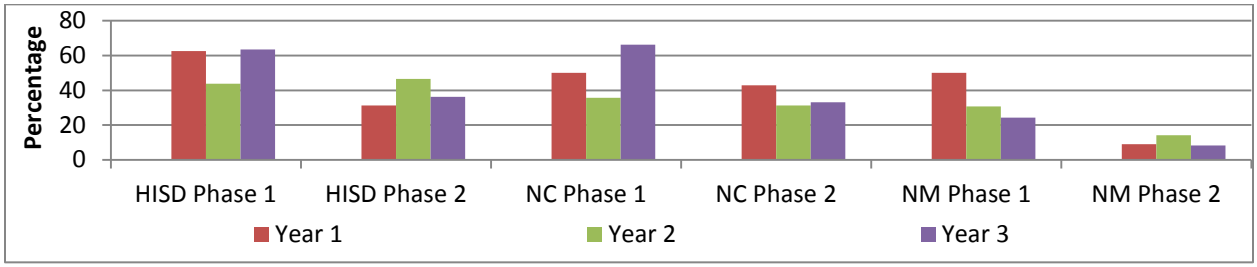


Figure 8. Percentage of classrooms observed with "students asking questions" occurring "frequently or extensively."

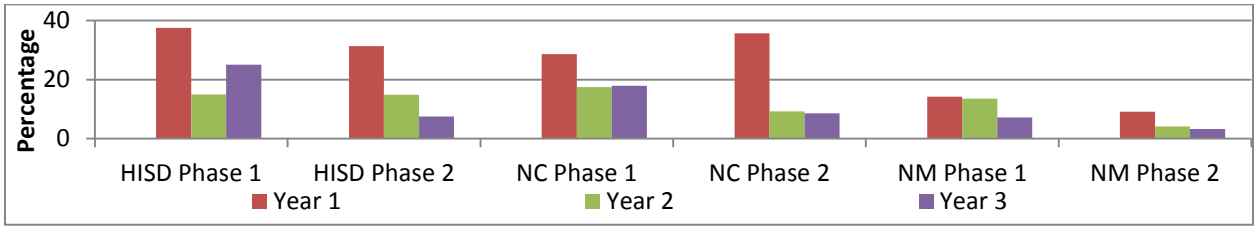
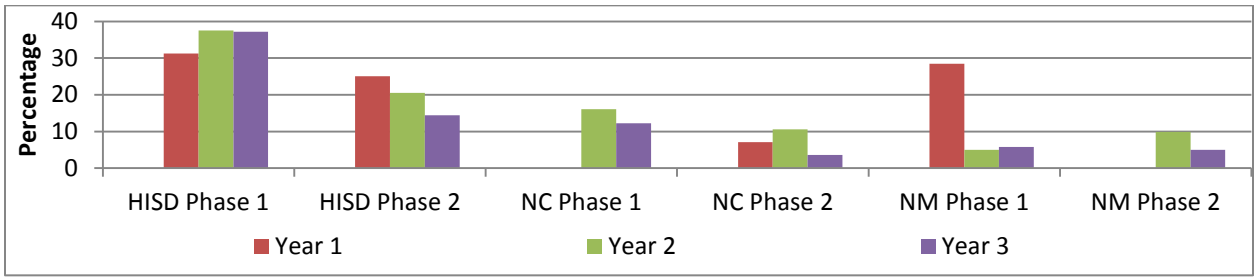


Figure 9. Percentage of classrooms observed with "students reporting out" occurring "frequently or extensively."



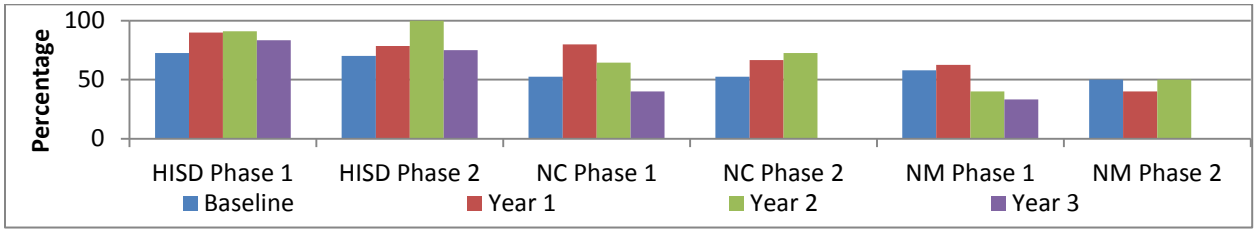
Note: Blank columns indicate classrooms where students were not observed "reporting out" during any survey period where data are available.

Use of the STC Units was associated with higher student interest in science, according to reports from both teachers and principals. Students in classrooms that used the STC Units exhibited more behaviors that suggested engagement in the learning process, including participating in discussions, asking meaningful questions, and reporting findings to other students.

Teaching to the Standards

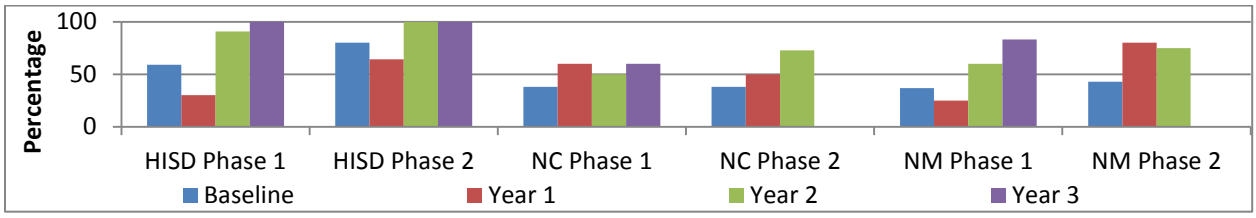
Teachers are required to provide science instruction that meets certain federal, state, and in some cases, school-based standards. This affects not only the content of individual lessons, but also the areas in which teachers must provide instruction at specific grade levels, so teachers need support and training if they are to successfully meet these many standards. Overall, Phase 1 principals reported an increase of support for teachers teaching to the state science standards during Year 1, compared to baseline, followed by a slow decline in support as the implementation progressed. These trends varied by region, with HISD being the most supportive of state standards (Figure 10). HISD and North Carolina Phase 2 principals showed a steady increase in support for state standards, while New Mexico Phase 2 principals remained relatively constant in their level of support. The consistency of principal reports within each region indicates that any work with the STC Units should be conducted with an eye for alignment to appropriate designated standards.

Figure 10. Percentage of principals reporting they "help teachers teach to the state science standards."



Principals in all regions reported increased support for alignment of science instruction to state standards across implementation, regardless of phase; however, in two of the three regions, this increase was greatest in Phase 1 schools (Figure 11). Within Phase 1 of each region, SSEC and district personnel performed walkthroughs to ensure that the STC Units aligned as closely as possible with state standards. This may have implied to principals that use of the STC Units constituted alignment to standards. Since new standards were introduced during the implementation, factors external to the implementation may have also influenced these reports.

Figure 11. Percentage of principals reporting they "promote alignment of science curriculum, instruction, and assessment with science standards."

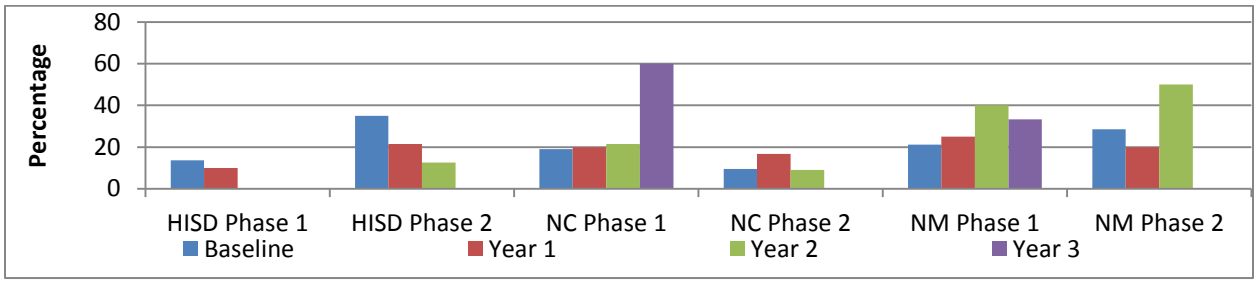


Principal support for teaching to state science standards grew constantly stronger over the implementation period, suggesting that alignment with appropriate federal state, and district standards should be a consideration when introducing the STC Units. Principals in schools that did not have access to the STC Units reported increasing teacher support for teaching to state standards, while principals in schools using the STC Units reported decreasing support. School principals may have interpreted use of the STC Units as automatic alignment with state science standards, and thus perceived a lower need for support over time as the Units were implemented.

Time for Science Instruction

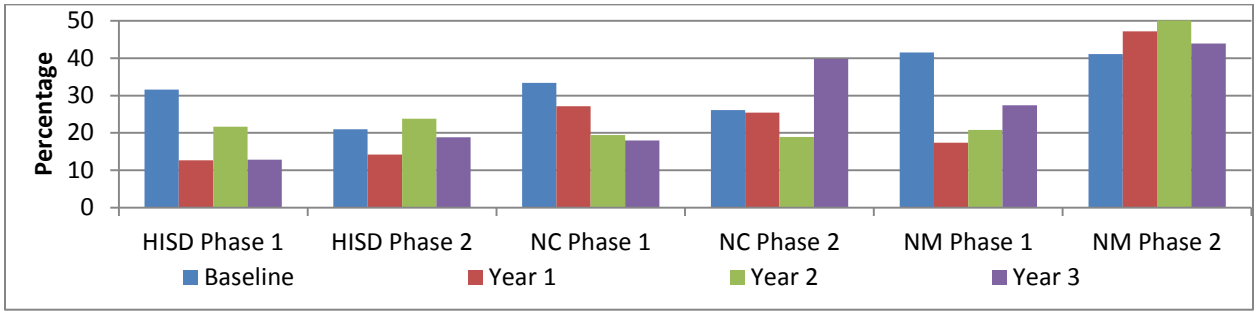
The final element in the delivery of science instruction is time allocated to this subject. Between 10% and 30% of principals (Figure 12) and teachers (Figure 13) on average reported that allocating sufficient time to science instruction was extremely challenging. However, these opinions varied among regions and years, and there did not appear to be a direct relationship between schools' LASERI3 participation and concern over time allotment for science. New Mexico Phase 2 teachers reported the greatest level of concern.

Figure 12. Percentage of principals reporting "time allocated for science instruction" as "extremely challenging."



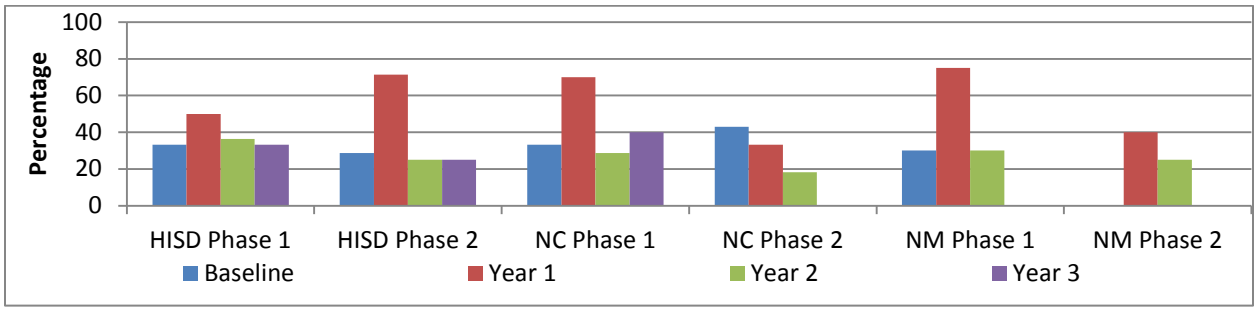
Note: Blank columns indicate principals did not report "time allocated for science instruction" as extremely challenging during any survey period where data are available.

Figure 13. Percentage of teachers reporting "time allocated for science instruction" as "extremely challenging."



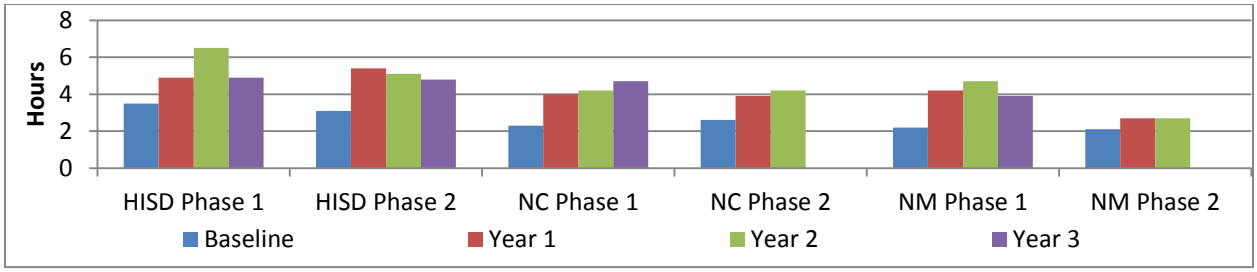
Compared with other science lessons, use of the STC Units did not impose an increased burden of teaching time on schools. Principals (Figure 14) and teachers (Figure 15) reported an increase in time spent on science instruction in Year 2 compared to baseline, but this increase occurred across all regions rather than only in Phase 1 schools. In other words, although science instructional time did increase, this increase should not be attributed to incorporation of the STC Units because it was observed in both phases. Principals in Phase 1 North Carolina schools were the only ones who did not follow this pattern, and these principals did not report an increase in science instructional time until several years after STC Unit implementation.

Figure 14. Principals reporting any increase in the "number of minutes of science instruction."



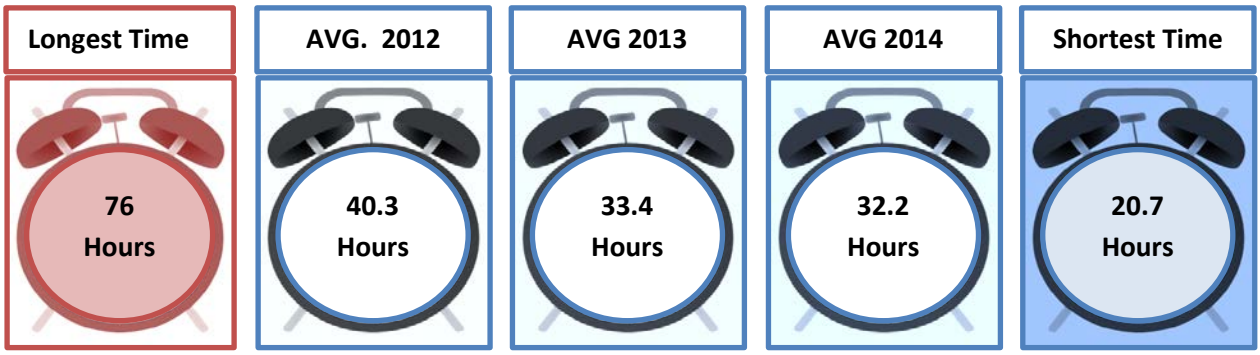
Note: Blank columns indicate principals did not report any increase in science instruction during any survey period where data are available.

Figure 15. Teacher-reported number of hours of science instruction per week.



With relatively little time allocated to science instruction, the STC Units' encapsulated 8-week window for science lessons proved a challenge to teachers of younger children, although on average, teachers taught the STC Units more quickly each year. Teachers averaged roughly 32 hours of teaching time (or about 48 minutes of instruction a day for eight weeks) per unit (Figure 16), but science was only taught two to three times a week in many of the elementary classes, rather than daily. In these cases, even if the unit were taught efficiently, it would take 16 to 20 actual school weeks for these classes to finish a single unit.

Figure 16. Average time taken to teach STC Units from all schools across all time points



Up to one-third of teachers and principals in all schools felt that allocating sufficient time for science instruction was extremely challenging. Although science instructional time increased slightly over the implementation period, it did so in all schools, whether or not they were incorporating the STC Units. The time required to teach an STC Unit decreased each year to an average of about 32 hours in Year 3. If students do not study science on a daily basis, substantially more than eight weeks would be needed to complete a single unit.

Inquiry in Classrooms

The climate of inquiry in science classrooms can also affect student learning. Here, the STC Units had a profound effect. In all years of the implementation, each region's Phase 1 schools showed more use of experiential hands-on learning (Figure 17) and cooperative/collaborative learning (Figure 18), than their Phase 2 counterparts. Both of these practices are hallmarks of inquiry-based instruction.

Figure 17. Percentage of observations with "Experiential hands-on learning (manipulatives, computer-based simulations)" coded "frequently or extensively."

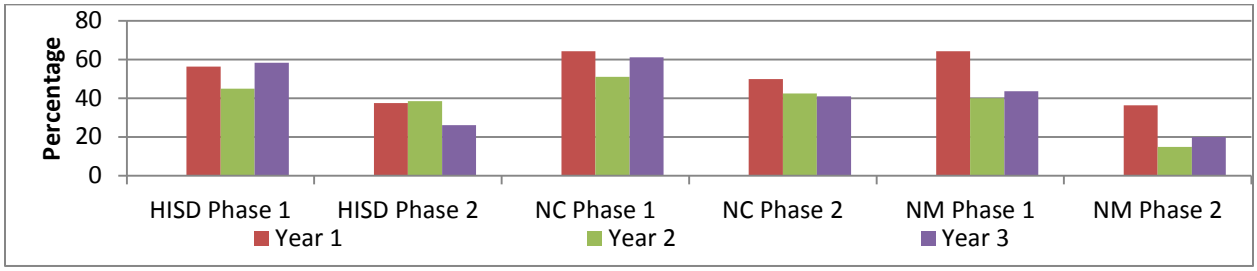
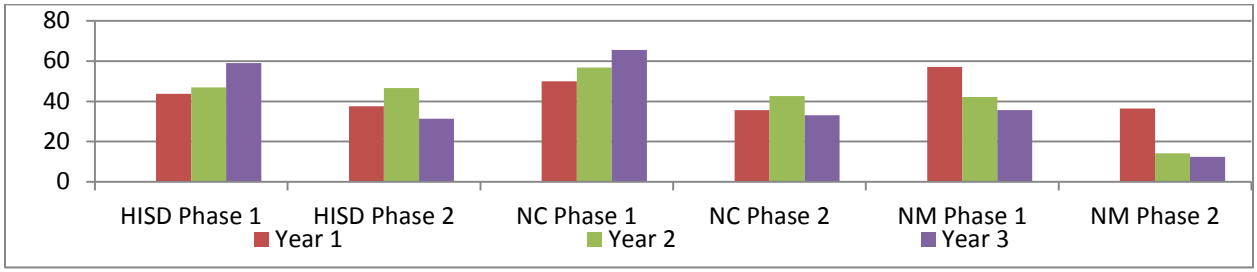
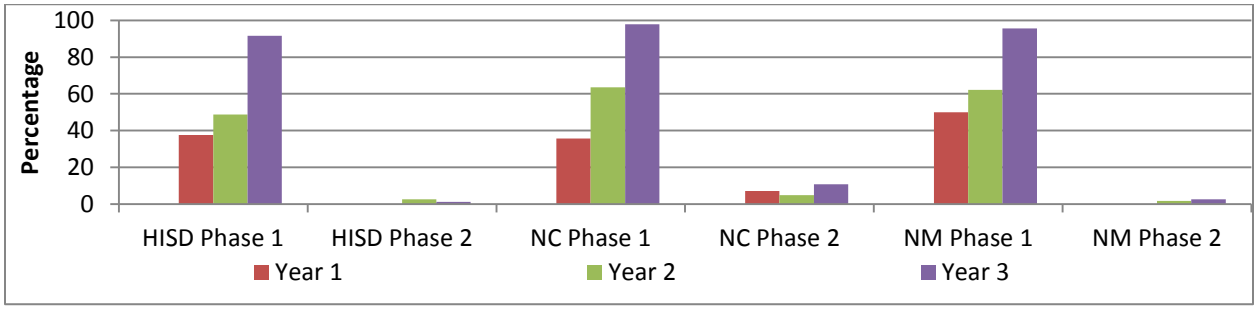


Figure 18. Percentage of observations with "Cooperative / Collaborative Learning" coded "frequently or extensively."



Unsurprisingly, the use of prepared science kits in classrooms increased each year within Phase 1 schools, but not Phase 2 schools (Figure 19). The steady increase in observations of prepared kits in use within Phase 1 schools reflects inclusion of an additional STC Unit in lessons each year. Observers were asked to view as many STC Units as possible and this may have led to a bias in reporting, but this instruction was in place from the first year of implementation, and would have remained a consistent factor across all implementation years. As shown in Figure 19, other types of prepared science kits were also seen in both Phase 1 and Phase 2 classrooms, particularly In North Carolina. This may have contributed to the Year 2 increases in experiential hands-on learning and collaborative learning seen previously in Figure 17 and Figure 18.

Figure 19. Percentage of observations with "prepared science kits in use" coded extensively or frequently.

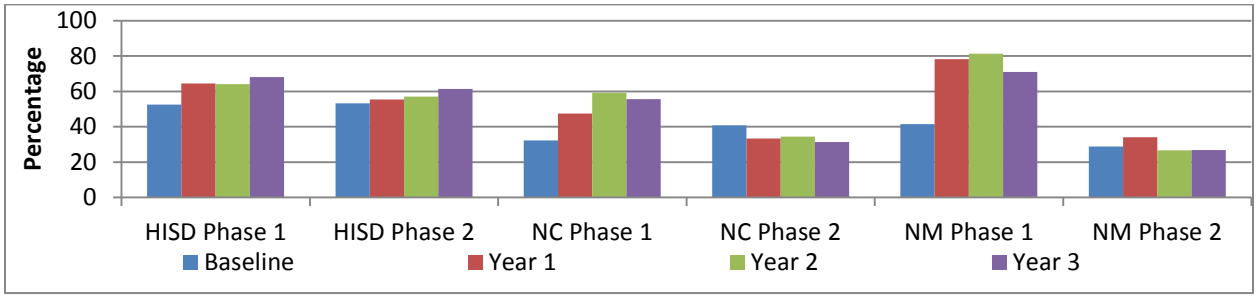


Note: Blank columns indicate classrooms where students were not observed using "prepared science kits" during any survey period where data are available.

Teachers reported they were "well prepared" or "very well prepared" to teach inquiry-based instruction consistently across all years of implementation, regardless of phase (Figure 20). However, most Phase 1 responses were stronger than Phase 2 responses.

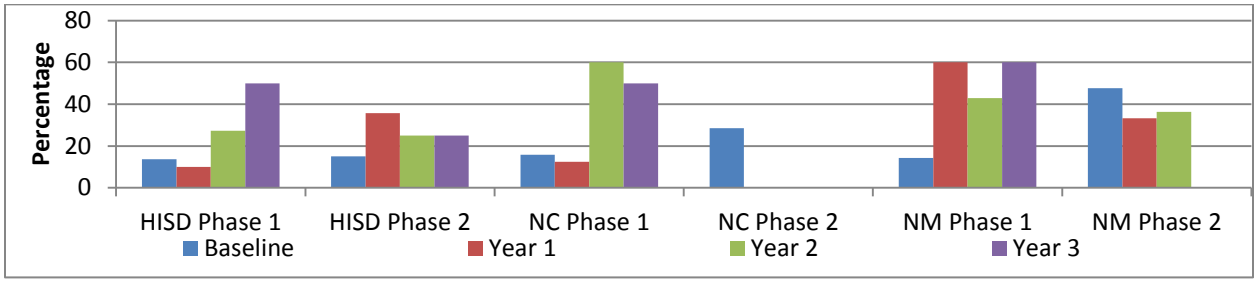
These three factors – experiential hands-on learning, collaborative learning, and prepared science kit use – indicate that although inquiry-based instruction was being taught in both Phase 1 and Phase 2 schools, Phase 1 schools used more prepared science kits. All teachers felt they were prepared to teach inquiry-based science with or without prepared kits.

Figure 20. Percentage of teachers reporting they were "very well" or "well prepared" for inquiry-based instruction.



Principal perception of teacher preparation improved over the course of the implementation. Principals in Phase 1 schools indicated that they felt their teachers were more prepared to teach science after implementation (Figure 21). In Phase 2 schools, principals' impressions of teacher preparation changed little, or decreased, over time.

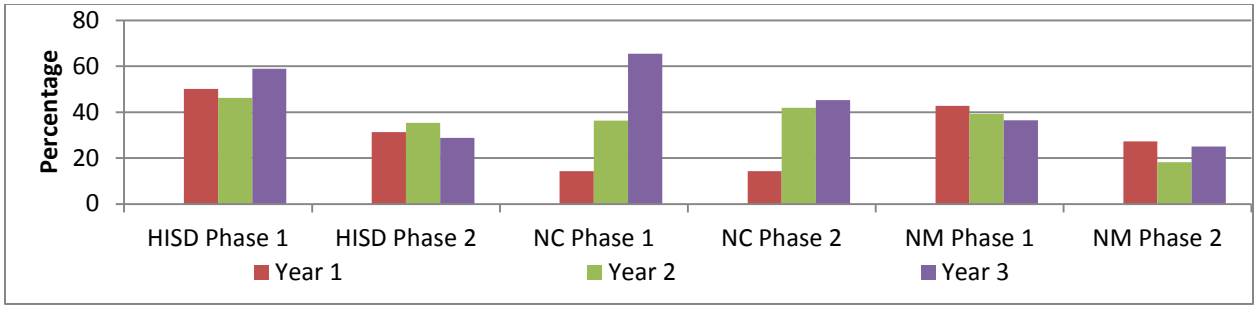
Figure 21. Percentage of principals reporting that 75%-100% of their teachers were "well prepared" to teach science.



Note: Blank columns indicate principals did not report 75% to 100% of teachers were "well prepared" to teach science during any survey period where data are available.

Observers recording what occurred during science instruction found that schools using the STC Units tended to have more student-driven classrooms. Overall, observers recorded higher instances of student-driven classrooms in Phase 1 schools than in Phase 2 schools (Figure 22). Both HISD and North Carolina schools showed relative increases in student-driven classrooms over time. In New Mexico, the frequency of student-driven classrooms observed in Phase 1 schools declined over the implementation period, but at all times it remained higher than the frequency observed in Phase 2 schools.

Figure 22. Percentage of observations with "student Driven classroom (Inquiry/cooperative)" coded "frequently or extensively."



Teachers reported that they were "well prepared" or "very well" prepared to teach students to design and conduct experiments (Figure 23), and that their students did these activities relatively frequently (Figure 24). Phase 1 teachers reported greater preparedness than Phase 2 teachers, a distinction that may be a result of the summer PD workshops provided with the STC rollout.

Figure 23. Teachers reporting they are "well" or "very well" prepared to "teach students to design and conduct an experiment."

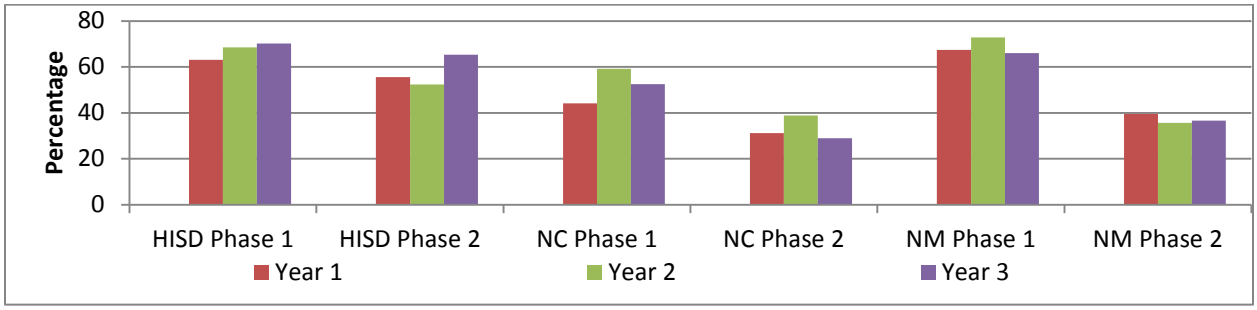
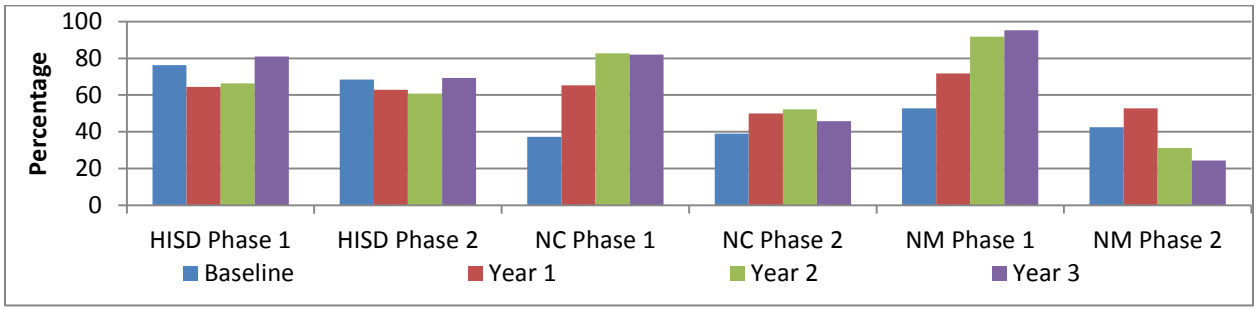


Figure 24. Teachers reporting their students "conduct science investigations in collaboration with other students" "frequently or extensively."



Observers saw much more experiential hands-on learning and cooperative/collaborative learning in classrooms that had access to the STC Units, although other prepared science kits were also being used. All teachers reported feeling prepared to teach inquiry-based instruction, but only principals in schools with STC Units reported increased confidence in their teachers' ability to teach science over the course of the implementation period. Observers reported more student-driven classrooms in schools with access to the STC Units. Teachers in these classrooms also reported greater preparedness to teach students to design and conduct experiments, perhaps as a result of the summer Professional Development workshops associated with the STC Unit rollout.

Conducting and Designing Experiments

Designing and conducting an experiment is a complex process. CREP used a combination of teacher reporting and observer evidence to evaluate the degree to which students followed the steps outlined in the experimental design flowchart (Figure 25). STC Unit implementation was associated with an increase in students designing science experiments to answer a specific question. Students did this frequently or extensively more often in Phase 1 schools than Phase 2 schools, according to teacher reports. HISD teachers in Phase 2 schools were an exception to this trend (Figure 26). North Carolina and New Mexico Phase 1 teachers reported an increase in these activities as implementation continued, consistent with a positive effect of the additional STC Units provided each year. HISD teachers reported more consistent results from year to year, but teachers in this district reported the highest frequency of student design of science experiments, even during the baseline year.

Figure 25. Experimental design flowchart

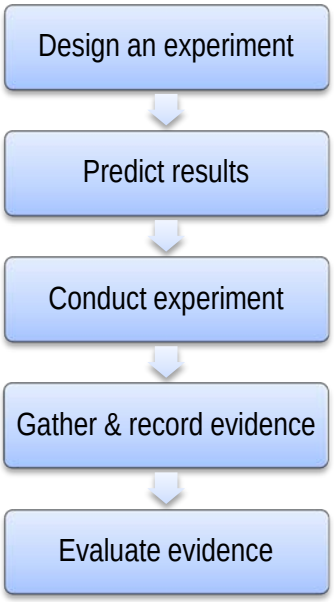
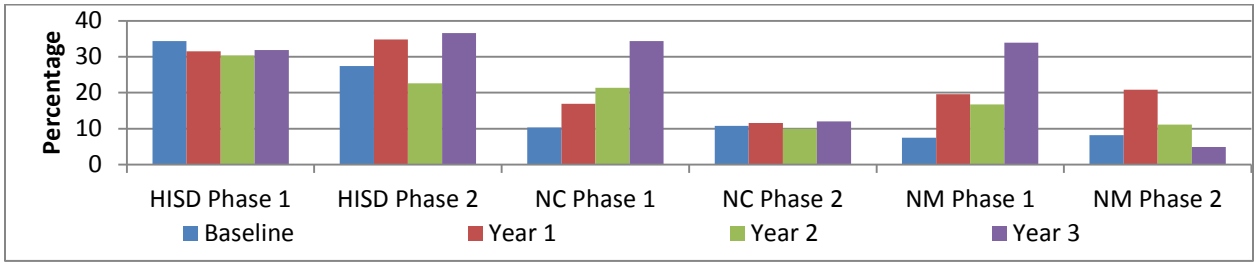
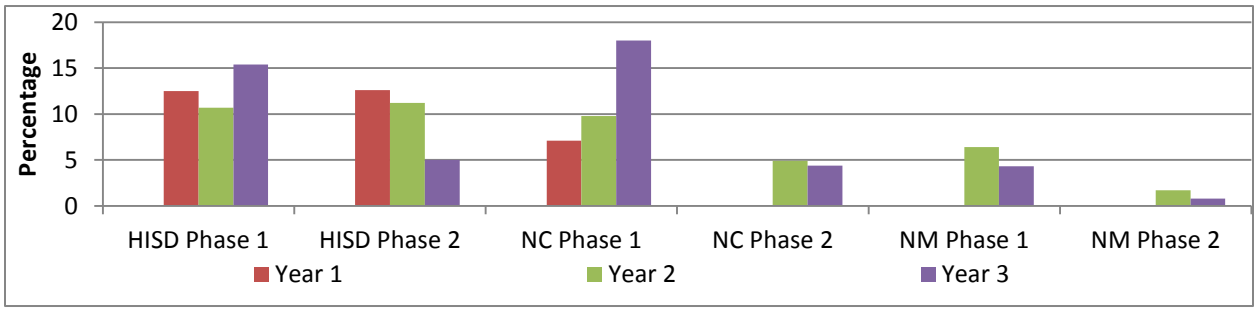


Figure 26. Teachers responding their students "design a science experiment to answer a specific question" "frequently or extensively."



While less than 40% of teachers reported this behavior in any region, this low percentage must be understood in the context of experimentation. Designing an experiment is only the first step in the process and requires time and complex thinking. Though it is an important aspect of experimentation, not all science instructional time could be devoted to this activity. Similarly, classrooms that used STC Unit logs showed a higher frequency of students designing their own procedures. Although this occurred less than 20% of the time at best, all Phase 1 classrooms showed higher levels of this activity than did their companion schools and, as corroborated by teacher reports, frequency of this activity increased over time in two of three Phase 1 districts (Figure 27). Although observers saw students designing their own procedures with similar frequency in both Phase 1 and Phase 2 HISD schools during the first year, this frequency declined in Phase 1 HISD schools, as in all other Phase 2 schools, in subsequent years.

Figure 27. Percentage of observations with "students designing their own procedures" coded "frequently or extensively."



Note: Blank columns indicate classrooms where students were not observed "designing their own procedure" during any survey period where data are available.

Students cannot design an experiment until they have a hypothesis to test. Implementation of the STC Units was associated with a higher frequency of students making predictions or hypothesizing. Students performed this activity more frequently in Phase 1 schools than in Phase 2 schools, according to observers (Figure 28). Unfortunately, except in HISD Phase 1 classrooms, the frequency of this activity declined over time; however, it remained higher in Phase 1 schools than in Phase 2 schools. Since students cannot test a hypothesis if they have not made one, it is no surprise that these trends are repeated in observations of students testing their predictions or hypotheses (Figure 29). Again, Phase 1 HISD classrooms are the exception, with frequency of this activity increasing as time goes on.

Figure 28. Percentage of observations with "students making predictions or hypothesizing" coded "frequently or extensively."

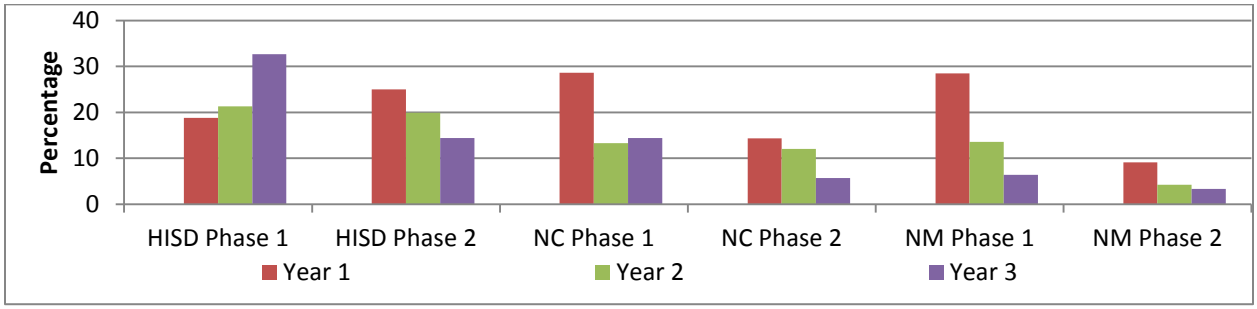
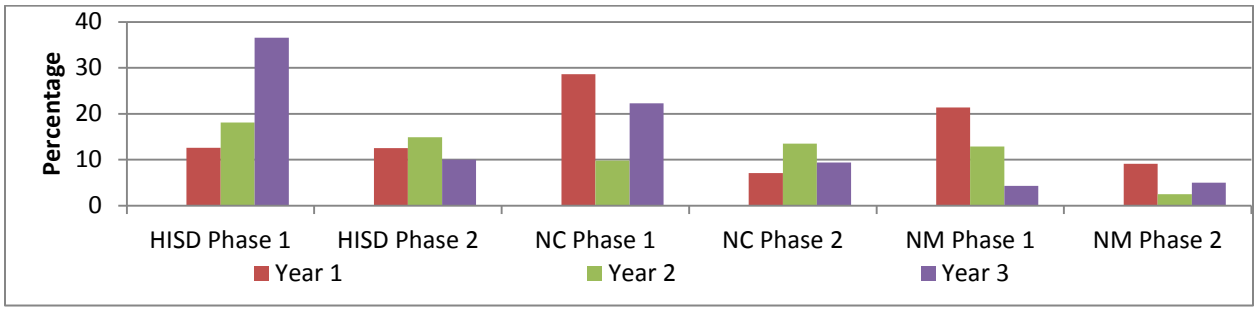
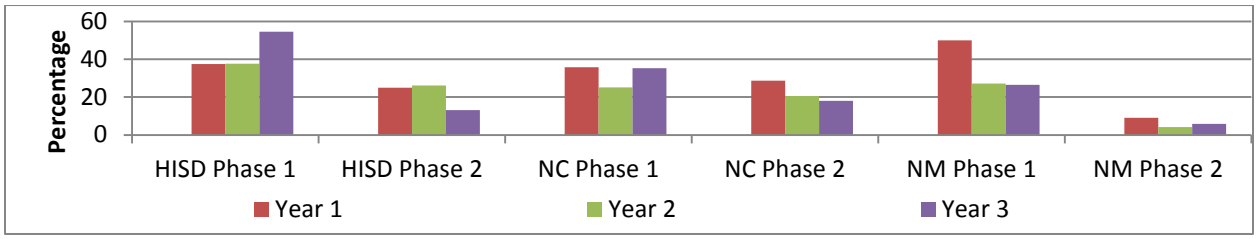


Figure 29. Percentage of observations with "students testing their predictions or hypothesis" coded "frequently or extensively."



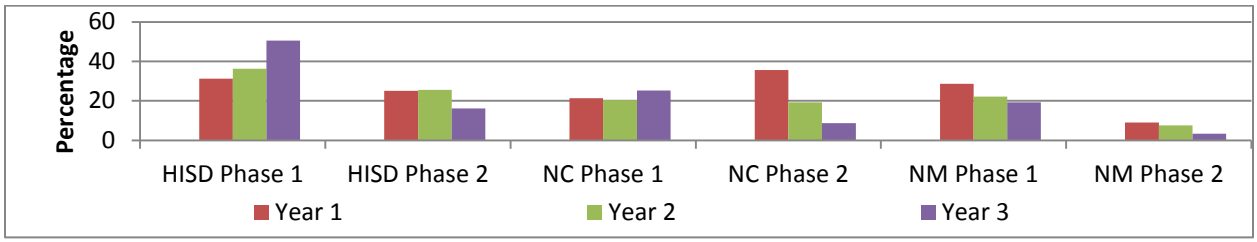
As they test their predictions by carrying out an experiment, student scientists must record the experiment's results. Again, use of the STC Unit kits was associated with a higher frequency of student evidence gathering. Phase 1 classrooms had higher rates of occurrence of gathering (Figure 30) and recording (Figure 31) evidence than Phase 2 classrooms, with HISD showing a steady upward trend. The similarity of these results is unsurprising, given the close relationship between hypothesizing, performing an experiment, and recording results. Students may have been observed recording evidence less frequently (Figure 31) because it was necessary to have only one recorder on a team of students, even when all student scientists were active in the gathering of the evidence.

Figure 30. Percentage of observations with "students gathering evidence" coded "frequently or extensively."



Note: Blank columns indicate classrooms where students were not observed "gathering evidence" during any survey period where data are available.

Figure 31. Percentage of observations with "students recording evidence" coded "frequently or extensively."



After student scientists gather their results, they must evaluate them and decide if the evidence supports their predictions. Use of the STC Units appeared to help students learn how to evaluate evidence, according to both teachers and observers. More Phase 1 teachers than Phase 2 teachers reported that they were "well prepared" or "very well prepared" to teach their students to evaluate the evidence they had gathered (Figure 32). The process of students evaluating evidence was also observed more frequently in Phase 1 schools than in Phase 2 schools, although only in HISD Phase 1 schools did CREP observers record relatively high frequency of this activity (Figure 33). HISD teachers reported the highest levels of confidence in their ability to give students the instruction necessary to evaluate evidence; this is supported by the steady increase in students observed participating in the activity.

Figure 32. Percentage of teachers reporting they were "well" or "very well" prepared to teach students to evaluate evidence.

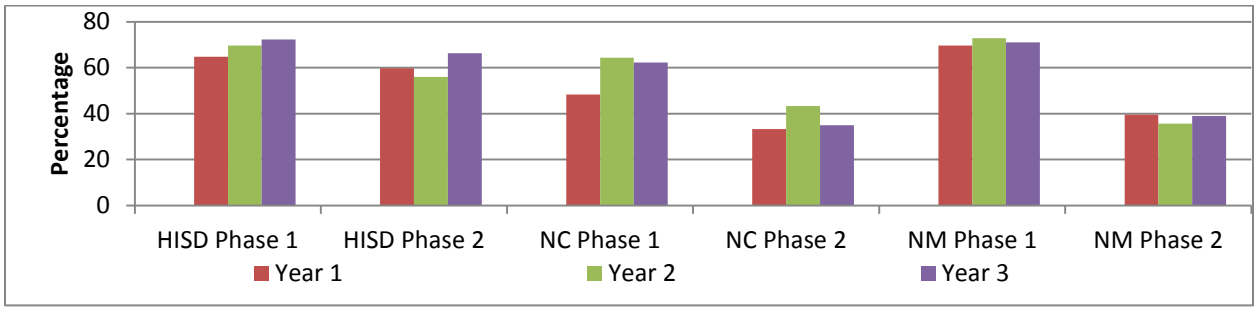
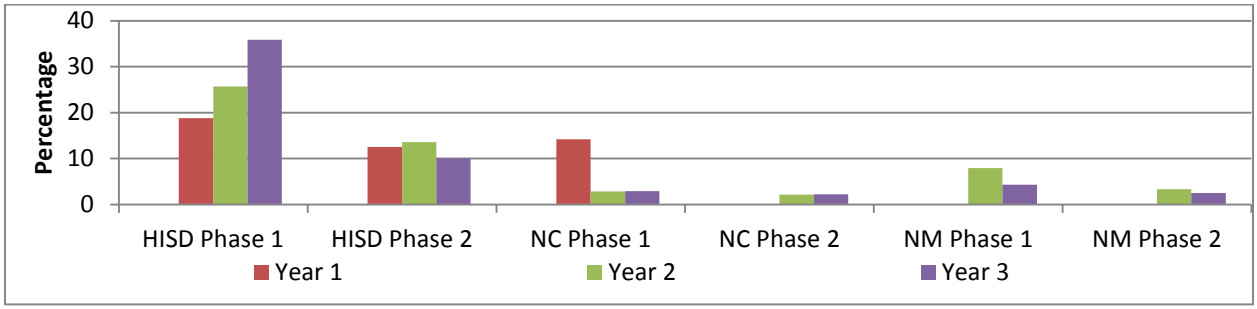


Figure 33. Percentage of observations with "students evaluating evidence" coded "frequently or extensively."



Note: Blank columns indicate classrooms where students were not observed "evaluating evidence" during any survey period where data are available.

STC Units improved students' knowledge of experimental procedures, according to both teachers' reports of student activities and observations in these classrooms. Students with access to the STC Units engaged in more of all of the activities associated with the experimental process than did other students. Observers saw an increase in these activities in two of the three districts with STC Units over the course of the implementation, but a decline in these activities in all three districts in schools that did not have access to the Units – even when teachers were reporting high levels of student activity. In short, more often than not, the use of STC Units in classrooms coincided with 1) an increase in the frequency of activities associated with scientific experimentation, and 2) more accurate alignment of teacher-reported preparedness to teach an activity with observer-reported frequency of students actually performing that activity.

Use of the STC Units in the Classroom

Phase 1 teachers reported teaching their students the experimental process and were observed using the STC Units in their classrooms. These teachers overwhelmingly reported that they taught all the lessons and activities in the STC Units (Figure 34) and taught them in the intended order (Figure 35). It is likely that the instructional techniques used by teachers in their classrooms were derived, at least in part, from the STC Units, especially since CREP observers frequently saw teachers and students engaging in activities that were promoted by use of the STC Units in the classroom (as seen in Figures 24-31, above). Less than one-third of teachers ever reported adapting the units as teacher demonstrations only (Figure 36), rather than conducting hands-on activities for students. These results, taken together, support the idea that the increased use of the STC Units in the classrooms created an environment where students were able to demonstrate the lessons learned from the STC Units in practical, applied ways.

Figure 34. Teachers reporting they taught all the lessons/activities in a unit.

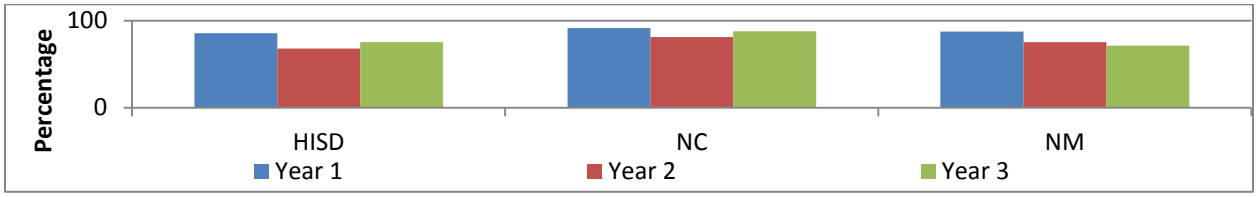


Figure 35. Teachers reporting they taught the lessons/activities in the suggested order.

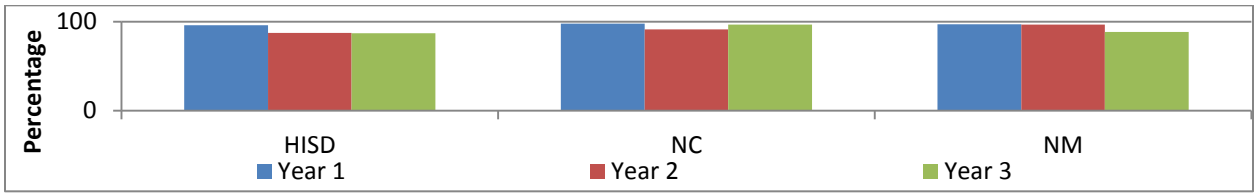
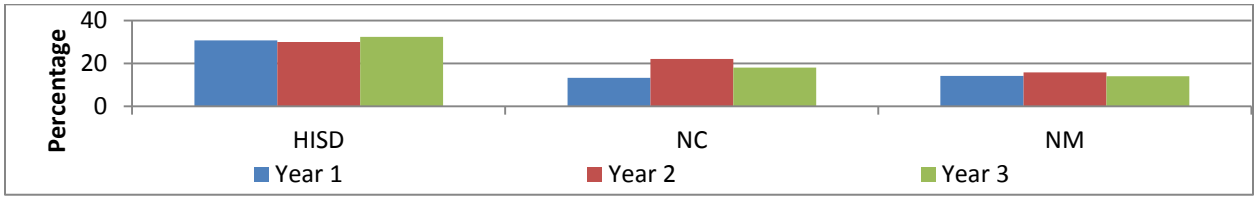


Figure 36. Teachers reporting they adapted some lessons/activities as teacher demonstration only.



Most teachers presented all of the lessons and activities in the STC Units, and taught them in the intended order. The majority of students experienced these lessons as hands-on learning activities as intended.

Pillar 1 Summary

- Teachers feel confident in their science content knowledge and principals are looking for ways to help teachers further improve that knowledge.

- Principals expressed more concern about student interest in science than did teachers.

- Principals reported a strong desire to align content to standards. The STC Units will be most attractive to administrators as a teaching tool if they are as well aligned to the prevailing standards as possible.

- Allocating time for science was challenging for principals. Teachers reported a small increase in science instructional time, but this occurred in all schools regardless of STC Unit use. The STC Units are intended to be eight weeks long, but depending on the instruction schedule, these units may take up to twice as long to finish.

- Inquiry-centered techniques appeared to increase in classrooms using the STC Units, and teachers' confidence in their instruction methods was high. Observers reported higher levels of all activities associated with the experimental process in classrooms with the STC Units compared to other classrooms.

- Teachers used the STC Units as intended. Only a small portion of teachers reported altering the lessons or only teaching a part of a unit.

- Increased use of the STC Units in the classroom created an environment where students were able to engage in inquiry-based science activities in practical, applied ways.

Summary of SSEC Pillar 2: Differentiated Professional Development

Science instructional skill is not a single competency, but a conglomeration of multiple competencies, and science teachers possess differing levels of content knowledge and teaching experience. Professional development must be differentiated to address the needs of individual teachers. The second pillar promotes differentiated professional development that moves instructors of inquiry science from novice to competent and from competent to expert. Professional development can come in multiple forms: multi-day trainings, one-on-one instruction, or professional learning communities supporting teacher communication.

Formal Professional Development

Very few teachers reported the availability of PD opportunities as a challenge (Figure 37). The most notable exceptions were Phase 2 schools in North Carolina and New Mexico. This difference may have been because all Phase 1 schools received STC summer workshops and condensed trainings during the school year, while Phase 2 schools did not. All Phase 1 schools also showed a dramatic increase in principal reports of science PD in Year 2 (Figure 38) during the time that implementation of the STC Units in schools and the associated summer workshops and condensed trainings began. The two Phase 2 regions with the lowest principal reports of PD opportunities were the same two regions where teachers reported that access to PD opportunities was extremely challenging.

Figure 37. Percentage of teachers reporting "availability of science professional development opportunities" as "extremely challenging."

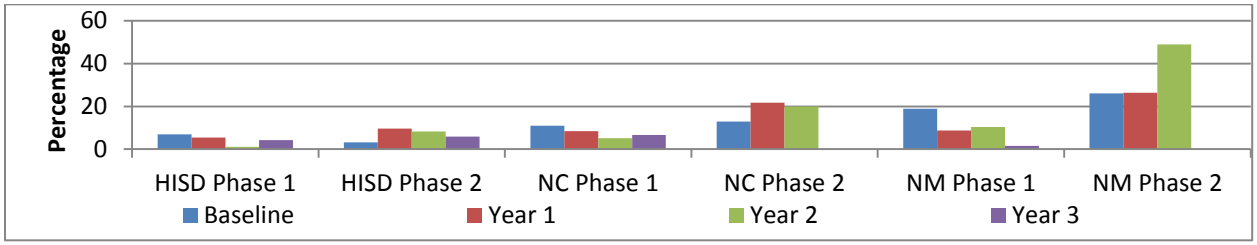
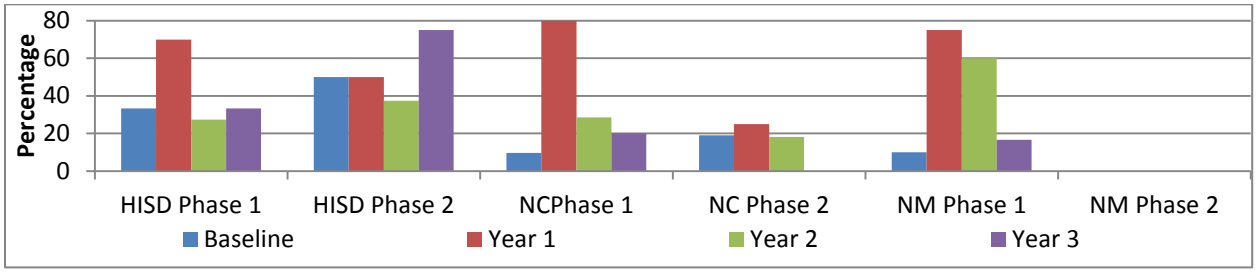


Figure 38. Percentage of principals reporting any increase in the "amount of professional development offerings in science."



Note: Blank columns indicate principals did not report an increase in professional development offerings in science during any survey period where data are available.

Teachers' responses indicate that the majority of teachers using kits attended the initial summer PD workshops (Figure 39) and felt the PD provided sufficient knowledge to use the units (Figure 40). Attendance slipped in HISD and New Mexico throughout the implementation. When asked about PD, all Phase 1 teachers responded more positively than their Phase 2 counterparts (Figure 41). Phase 1 teachers' high ratings of science PD stayed relatively constant across the three years of the STC Unit implementation.

Figure 39. Teachers responding they attended summer Professional Development training.

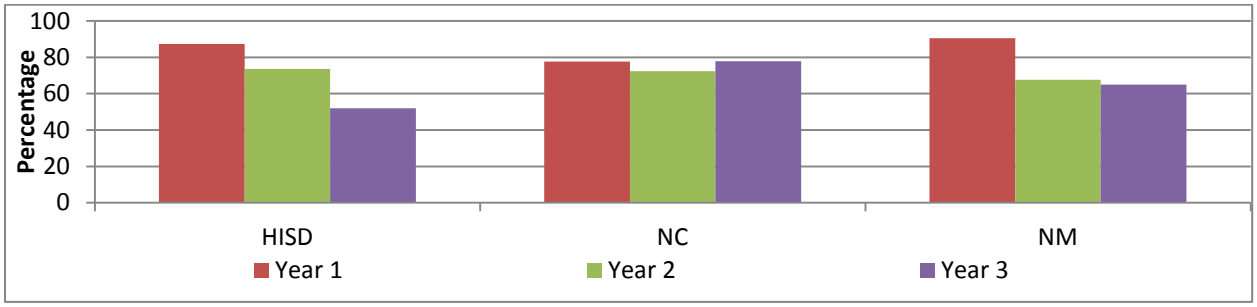


Figure 40. Percentage of teachers reporting they "felt they had sufficient training to teach this unit as it was intended to be taught" "to a "large extent" or "completely."

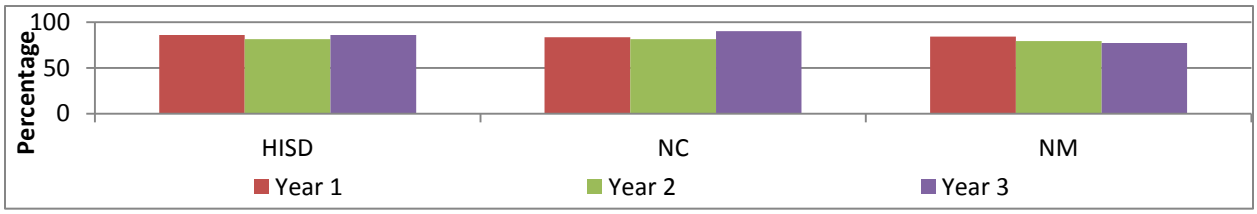
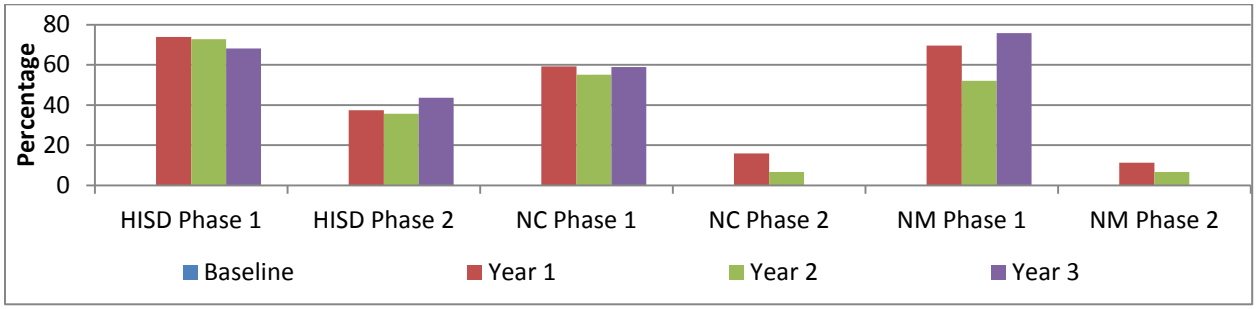


Figure 41. Percentage of teachers reporting "how useful to your science instruction was the professional development you received in the last year" as "very useful."



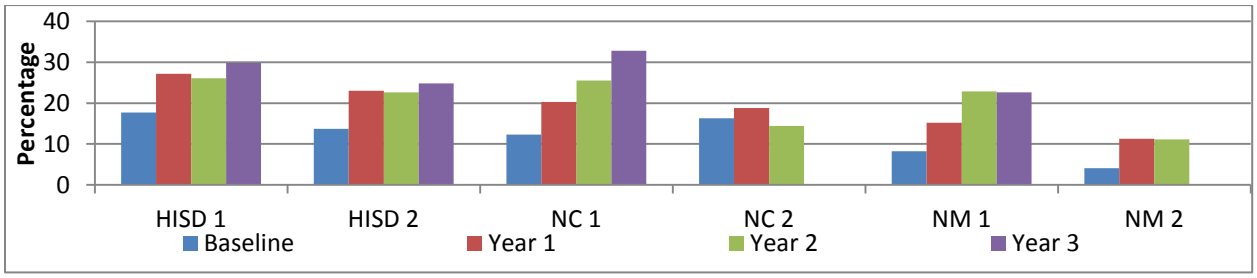
Note: Blank columns indicate teachers did not report professional development as very useful during any survey period where data are available.

The STC summer workshops and condensed kit training sessions had documented value for teachers, as concerns over PD opportunities were lowest for those teachers with access to SSEC workshops. Few teachers reported the amount of PD available as a challenge during the implementation, especially in schools with access to the STC summer workshops, and teachers rated their experience with these workshops highly. Teachers without access to the STC summer workshops reported steady but lower ratings of the PD they received. In the regions where principals reported low availability of PD, teacher satisfaction with available PD was also low.

Teacher Support of Other Teachers

Formal PD is not the only type of support for science teachers. Teachers can also help one another by acting as mentors to less experienced teachers and by sharing knowledge and techniques with one another. Compared to Phase 2 teachers, Phase 1 teachers reported higher frequencies of mentoring each year overall (Figure 42), perhaps supporting one another during the integration of the STC Units. In Phase 1 schools, teacher mentoring over time showed a positive trend, with more teachers reporting that they served as a mentor or coach each year. As implementation progressed, more teachers took time to help one another. Not all teachers took on the role of mentor, but roughly one in three of responding teachers did so.

Figure 42. Percentage of teachers reporting they "serve as a coach or mentor to less experienced teachers" "frequently" or "extensively."



Roughly half of the teachers reported discussing their science lessons with other teachers in their building after the baseline year, regardless of phase, with the exception of Phase 2 teachers in New Mexico (Figure 43). These discussions may have revolved around the integration of science with literacy (Figure 44) or mathematics (Figure 45), as demonstrated by similar trends in the three graphs.

Figure 43. Percentage of teachers reporting they "discuss science lessons with other teachers in my building" "frequently" or "extensively."

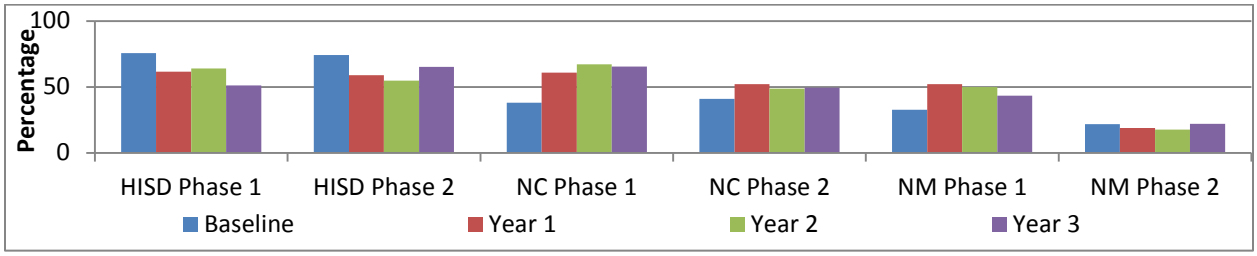


Figure 44. Percentage of teachers reporting they "talk with other teachers about ways of integrating science and literacy" "frequently" or "extensively."

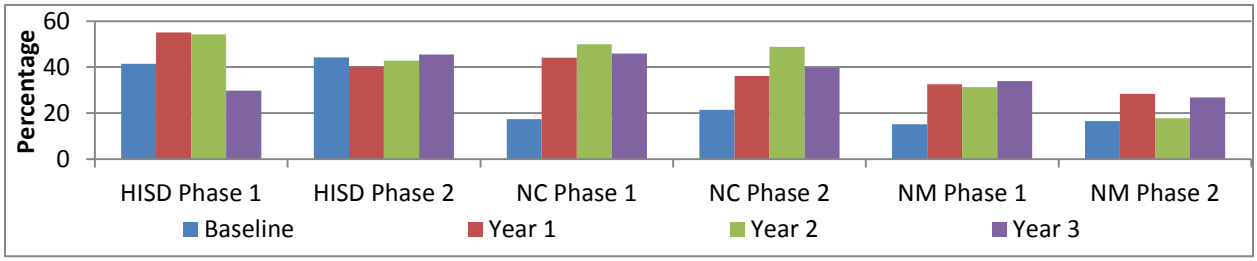
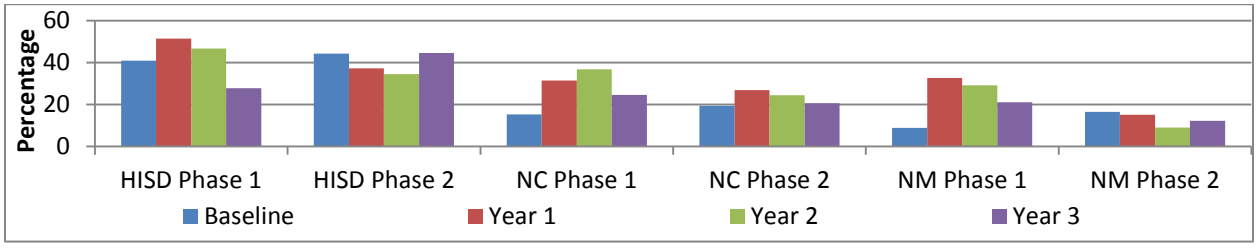
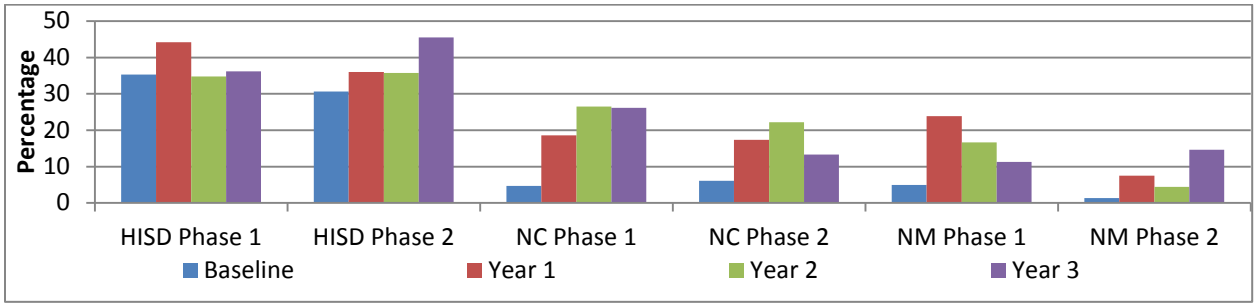


Figure 45. Percentage of teachers reporting they "talk with other teachers about ways of integrating science and mathematics" "frequently" or "extensively."



Unfortunately, these discussions were generally confined within each grade level. Less than a third of teachers reported discussing alignment across grades (Figure 46). Although alignment across grades is desirable from a broad educational standpoint, the STC Units are self-contained and do not require presentation in any specific sequence within appropriate grade bands.

Figure 46. Percentage of teachers reporting they "discuss how to align the science curriculum across grade levels" "frequently" or "extensively."



Mentoring was strong among teachers with access to the STC Units, and strengthened as implementation continued. Mentoring supports an important facet of the STC LASER program by disseminating information about science among teachers after formal professional development has ended. Like principals, teachers appeared to be discussing science integration into other subjects with other teachers at the same grade level when they discussed science, rather than talking about the flow of science curriculum from one grade to the next.

Pillar 2 Summary

- In regions where principals reported little to no increase in PD offerings, teachers considered PD opportunities to be extremely challenging and rated them poorly. The STC summer professional development workshops appeared to mitigate this effect.

- Almost all teachers who reported attending the STC summer PD workshop rated the PD they received as highly valuable.

- Roughly one in three teachers responding to surveys reported taking on a role as a mentor to other teachers. Teachers in schools where the STC Units were used reported increased mentoring as implementation continued, and mentored other teachers consistently more often than teachers in schools that did not use the STC Units.

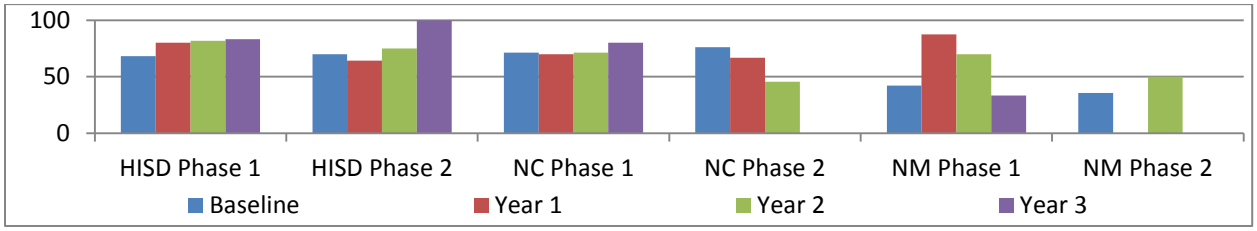
- Discussion of science lessons among teachers may have pertained primarily to the integration of science with other lessons. These results parallel those of principals, who reported promoting science integration with other lessons and supporting curriculum creation.

Summary of SSEC Pillar 3: Administrative and Community Support

The third pillar of the SSEC LASER Model is administrative and community support. Without the support of administrators, regardless of the ability or effort of teachers, a change in curriculum is impossible. Strong leadership is essential in promoting an inquiry-based approach, or any new approach, to science instruction. The first step in gaining administrator support is building their awareness of the need for support. Once they are aware, support can follow programmatically, financially, or through the provision of resources.

A majority of principals reported supporting inquiry-based learning, such as that exhibited in the STC Units, in their schools. HISD and North Carolina Phase 1 principals reported stronger support of inquiry-based instruction in the last year of implementation compared to baseline (Figure 47). New Mexico Phase 1 principals showed high levels of support initially, but a steady decline followed each year. This trend also occurred in North Carolina Phase 2 principals' reporting. That HISD showed increasing support, regardless of phase, suggests overall support for inquiry-based instruction at a district level. The North Carolina trends suggest that implementation may have sustained principal support, since schools without the STC Units steadily decreased from a comparable level of support.

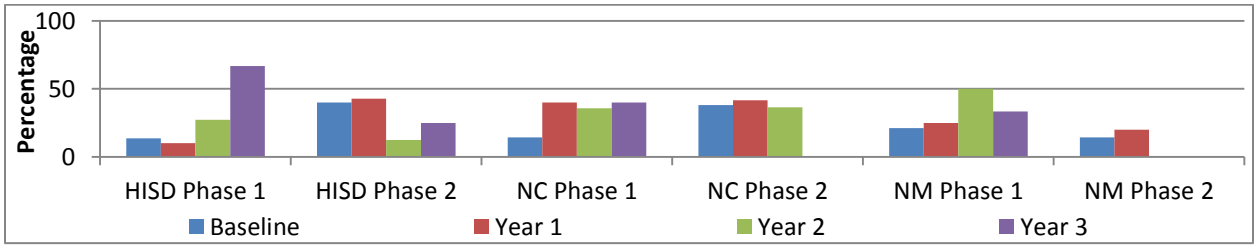
Figure 47. Percentage of principals reporting that they "support inquiry-based science instruction."



Note: Blank columns indicate principals did not report support inquiry-based science instruction during any survey period where data are available.

Implementation of the STC Units was associated with improved principal perceptions of student learning. In the final year of implementation, Phase 1 principals reported higher levels of belief that their students were "well prepared" for the next level of science instruction compared to Phase 2 principals (Figure 48). The trends in Phase 1 reporting are all positive, with New Mexico showing a possible downward slip in the final year of implementation. Student learning gains can be studied more in depth in Section 3:PASS Assessments and Student Attitudes.

Figure 48. Percentage of principals reporting 75%-100% of their students were "well-prepared" for the next level of science instruction.



Note: Blank columns indicate principals did not report 75% to 100% of their students "well prepared" during any survey period where data are available.

Principals were more likely to have a hand in their own schools' science instruction than they were to influence another school's corresponding curriculum use. With a few exceptions, principals reported promoting more alignment of curriculum within their schools (Figure 49) than with the schools from which children arrived or to which they were sent (Figure 50).

Figure 49. Percentage of principals reporting they "work with others to align science curriculum across all grade levels within [their] school."

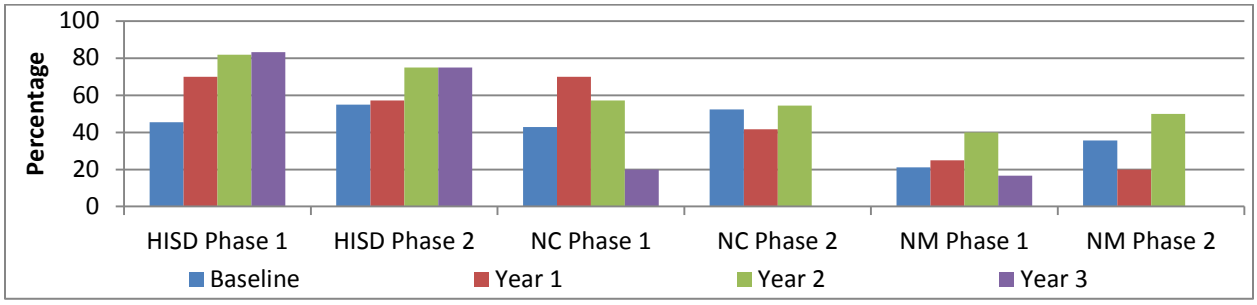
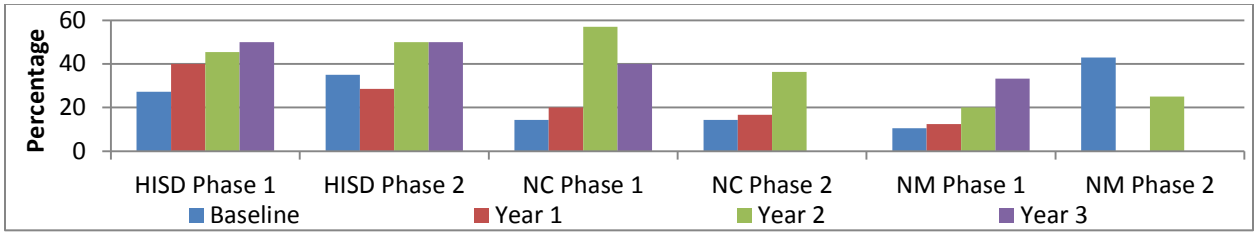
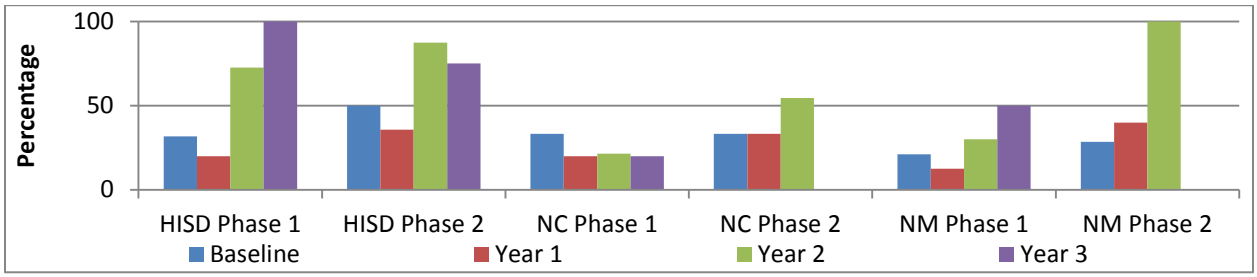


Figure 50. Percentage of principals reporting they "work with others to align science curriculum across all grade levels between schools (elementary to middle, middle to high)."



Where the STC Units were implemented, principals reported increased teacher assistance for integrating science with other subjects, at least initially. Principals reported an initial increase in the assistance they provided toward integrating science with other subjects in Phase 1 schools in all districts through Year 2, though the level of reported assistance then declined in North Carolina and New Mexico Phase 1 schools (Figure 51). This decline in Year 3 may be because teachers had become more familiar with a curriculum constructed for them, and required less principal support. In contrast, support toward integrating science instruction increased in HISD over all implementation years, regardless of phase. Taken with the similar trend in principal support for inquiry science (Figure 47), this may indicate that a districtwide mandate in HISD also influenced principals' behavior.

Figure 51. Percentage of principals reporting they "help teachers integrate science with mathematics and other subjects."



The initial increase in principal support may be because introduction of the STC Units required them to work with teachers to allocate time for the new materials, possibly by integrating them into other subjects. By the end of implementation, most teachers reported roughly four hours of instruction time per week devoted to science (Figure 15). In order to complete a unit within the eight-week window, principal assistance in integrating science and the STC Units in as many ways as possible, including integration with other subjects, seems likely. Across all regions and time points, a minority of principals reported any substantial increase in the number of science courses (Figure 52). The smallest wedge in Figure 52 represents the largest number of principals reporting any increase in science course offerings, reported at fewer than 10% of time points. Most principals did not feel that more emphasis on subjects other than science was a challenge to science instruction, with the exception of both phases of New Mexico schools (Figure 53). This may explain, in part, why New Mexico schools consistently had the lowest scores for many of the inquiry-based science activities discussed in Pillar 1. For the most part, Phase 2 principals reported slightly more concern than their counterparts, except for a spike in Phase 1 North Carolina schools during the final implementation year. Changes seen in the last year of implementation should be interpreted with caution, however, due to low response rates.

Figure 52. Percentages of principals reporting any increase in science courses

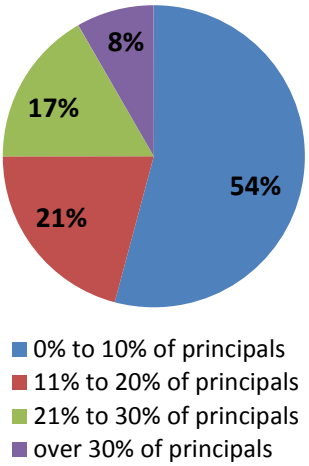
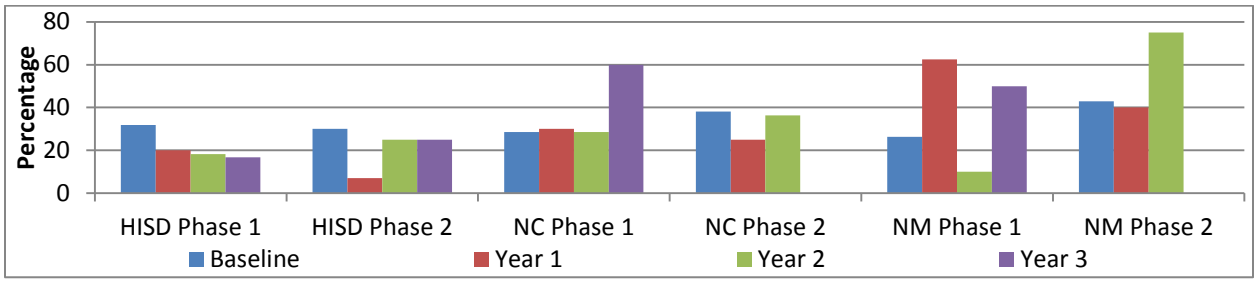


Figure 53. Percentage of principals reporting "More emphasis on English/language arts and mathematics than science instruction" extremely challenging.



Principals in schools with access to the STC Units supported the use of inquiry science in their science classrooms. Though they seldom increased the number of science courses, they did attempt to integrate science with other subjects, stressing the importance they put on science. These actions, along with the use of STC Units in the classroom, appear to have increased principals' confidence in the ability of their students to tackle future science instruction.

Pillar 3 Summary

- Principals in schools using the STC Units reported higher levels of support for inquiry-based instruction than did principals in schools that did not (except in HISD, where all principals reported support). This suggests principal buy-in to the idea of using STC Units in their schools.

- Principals were more likely to be involved in their own school's science curriculum than help with curricula for schools from which their students attended previously or will attend in the future.

- There were very few science courses added in schools during the implementation period. Integration of science with other courses may have been a result of principals trying to increase science instructional time without increasing the number of science classes.

- Principals in schools using the STC Units were more likely to believe their students were "well prepared" for the next level of science instruction than principals in schools that did not.

Summary of SSEC Pillar 4: Materials Support

A sustainable, inquiry-based curriculum relies upon a support system for the environment, equipment, and supplies needed to teach hands-on science lessons. Without these things, it is difficult to create a classroom where inquiry instruction can occur. The fourth pillar of the SSEC LASER model is a commitment to supporting science instruction by making certain the necessary environment and materials are available to students and teachers. Materials support can come from a number of sources, but all share a single objective: To ensure students have all the physical materials necessary for hands-on learning.

The Classroom

In the broadest sense, the classroom itself is a "material." Teachers who use conventional methods of science instruction require a dedicated laboratory workspace or, at the least, a science table for demonstration. These can be costly and consume valuable space for a singular use in classrooms where multiple subjects are taught. One of the benefits of building a curriculum around the LASER model's STC Units is the ability to teach research-based, inquiry-driven science without a dedicated laboratory or laboratory space. The STC Units are designed to turn regular classrooms into laboratories without the need for an actual laboratory space.

STC Units may benefit a large proportion of classrooms because many do not have the necessary laboratory space. CREP found that, at best, barely one-half of observed science classrooms had a dedicated laboratory space, and in New Mexico, less than a quarter of classrooms had an area specifically for hands-on science (Figure 54). Luckily, almost every classroom is set up for cooperative learning and teaming (Figure 55). Using the STC Units allowed science teachers to turn any ordinary classroom into a laboratory, especially those already organized for cooperation.

Figure 54. Maximum dedicated science laboratory/Laboratory space observed in three school districts across all years.

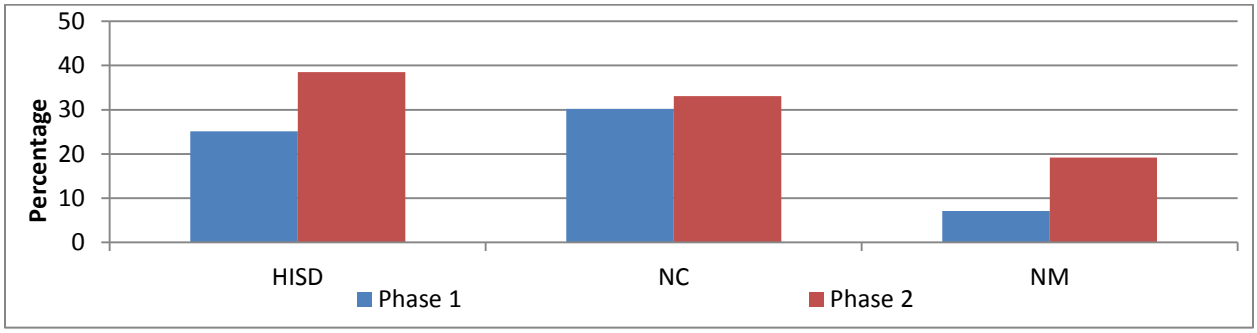
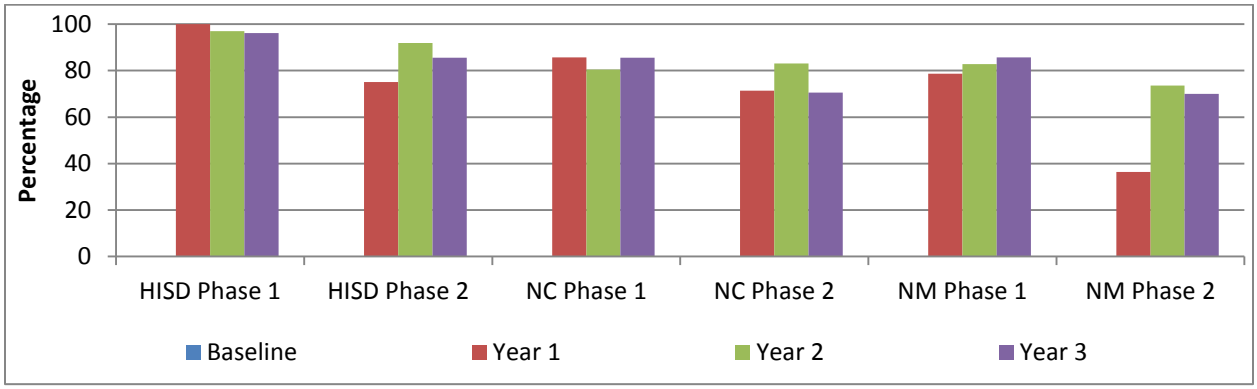


Figure 55. Organization for teaming observed during classroom visits.



Lab space is not the only part of a classroom that enhances science. The contents of a classroom also play a part in instruction. Only about one in three rooms visited by observers had visible science artifacts present (Figure 56). Just over half of the rooms contained visible scientific equipment, such as beakers or scales (Figure 57). A majority of the classrooms had some sort of visible science literacy materials, such as books on science subjects or posters on the walls (Figure 58). Within a region, Phase 1 and Phase 2 classes showed similar trends in their classroom environments across time.

Figure 56. Visible scientific artifacts observed during classroom visits.

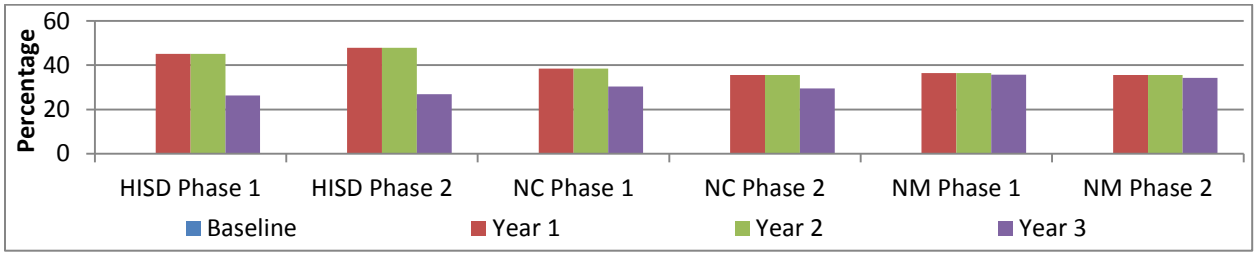


Figure 57. Visible science equipment observed during classroom visits.

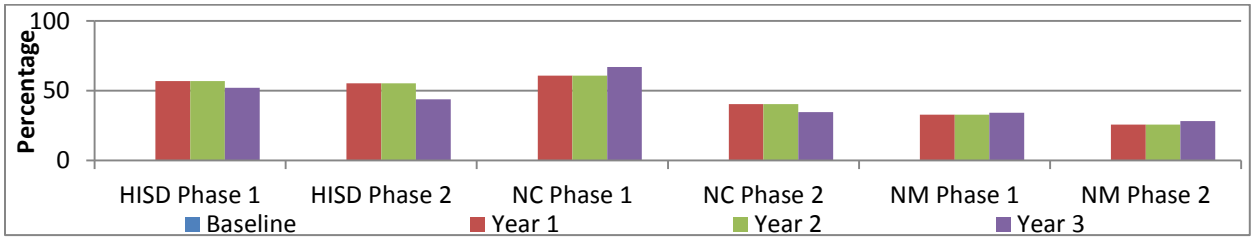
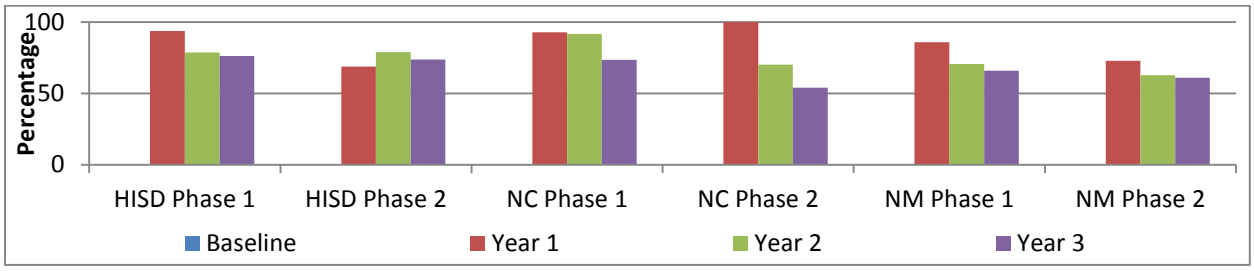


Figure 58. Visible support for science literacy observed during classroom visits.

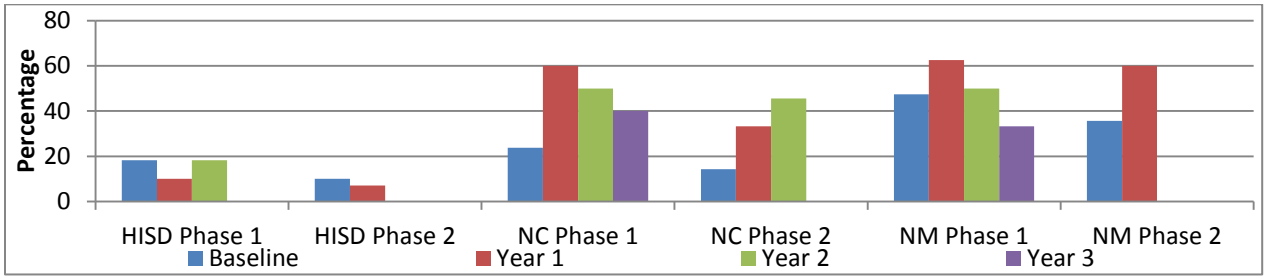


The self-contained nature of the STC Units could be of great benefit to science teachers and students. Only half of observed classrooms had a designated laboratory space, but nearly all were set up for cooperative learning. Most classrooms contained visible science literacy materials, but only half contained scientific equipment, and only one-third contained visible artifacts.

Science Materials

In addition to physical space, teachers require many specialized supplies (e.g., safety equipment, containers, test samples, etc.) to effectively deliver science content to students. The modular nature of the STC Units addresses teacher and student needs for lesson-specific equipment and supplies in a science classroom. Many principals in North Carolina and New Mexico considered obtaining the funds necessary to purchase equipment and supplies extremely challenging (Figure 59). However, most principals whose schools were using the STC Units found purchasing equipment and supplies easier over time: This concern lessened over the implementation period for most Phase 1 principals. The STC Units ameliorated this challenge because they come with most of the materials and equipment necessary for each lesson, as long as the school district can buy the STC curriculum as a whole. STC Units can be taught multiple times with minimal additional funding; only consumables used during experiments and occasional damaged pieces of equipment will need replacement.

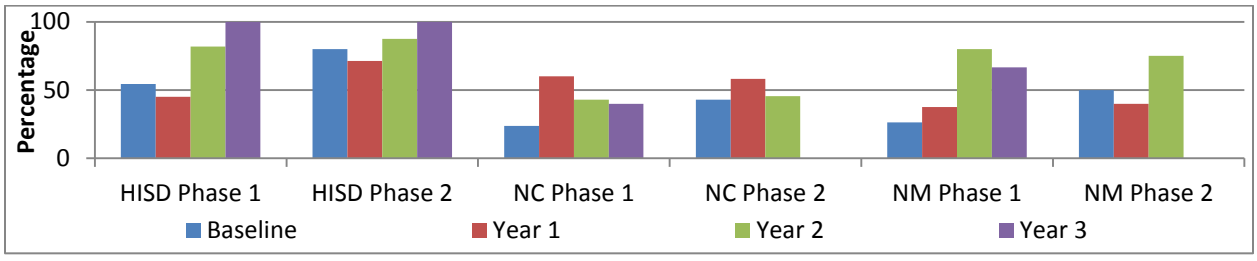
Figure 59. Principals reporting "funds for purchasing equipment and supplies" to be "extremely challenging."



Note: Blank columns indicate principals did not report funds extremely challenging during any survey period where data are available.

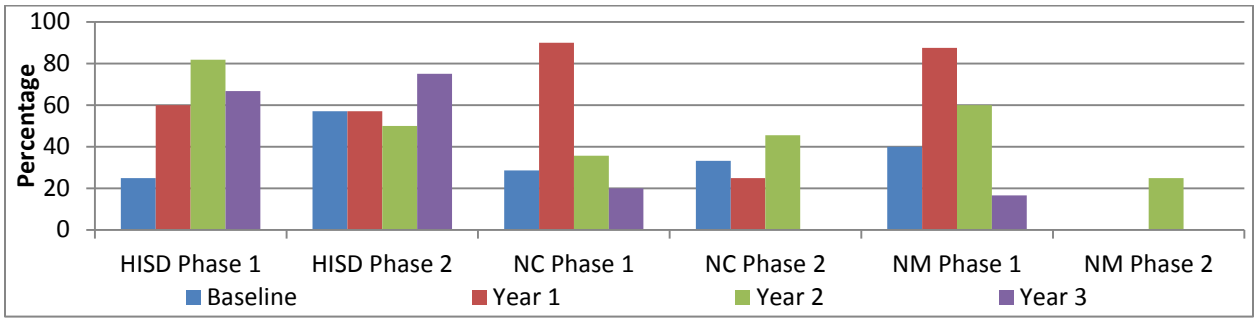
Even though some regions reported difficulty in obtaining funds for science materials, many principals reported working toward improving access to high-quality instructional materials. This effort increased within several regions after baseline in both Phase 1 and Phase 2 schools (Figure 60). Such trends in all schools suggest an external focus on materials outside of the implementation of the LASER Model.

Figure 60. Percentage of principals reporting they "work to improve access to high-quality instructional materials in science."



Most Phase 1 principals reported an increase in available science materials during the first year of implementation, followed by a decrease in the second or third years (Figure 61). This increase during the first year of implementation probably reflects awareness of the availability of the STC materials. Phase 2 principals also reported some increases in materials availability, but not until Years 2 or 3, and not to the same extent as Phase 1 principals.

Figure 61. Percentage of principals reporting an increase in "availability of science materials."



Note: Blank columns indicate principals did not report an increase in science materials during any survey period where data are available.

Principals and teachers actively sought access to science materials. However, the space available for dedicated science instruction and the funds available to purchase equipment and supplies were limited. The STC Units have the potential to help alleviate both of these concerns. They create laboratories out of classrooms and provide science lessons with easily replenishable supplies from year to year. These units also give principals an avenue to provide their teachers with high-quality science materials, a concern most have stated they want to remedy.

STC Units

Teachers who used the STC Units had favorable impressions of the kits. Almost all teachers felt that the units contained the necessary materials for teaching all of the lessons (Figure 62). Across all regions, teachers reported that the materials in the units were easy to organize (Figure 63) and easy to use (Figure 64). Given the many demands on teachers' time, these characteristics greatly increase the likelihood that units will be implemented in classrooms.

Figure 62. Percentage of teachers reporting they "did have all of the materials you needed to teach the lessons as described in the Teacher's Guide."

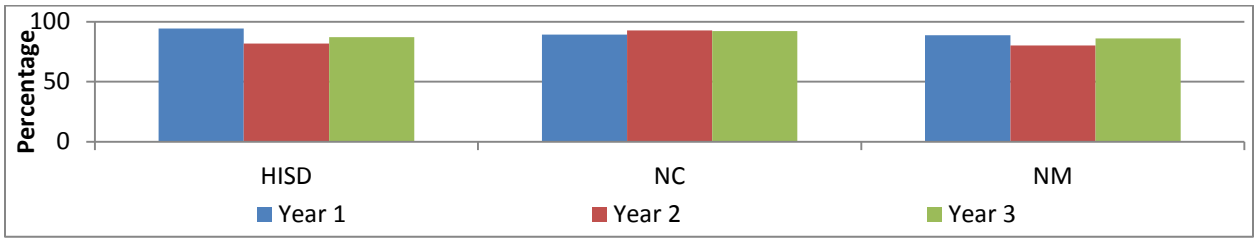


Figure 63. Percentage of teachers reporting they "did find it easy to organize the materials in the kit you taught."

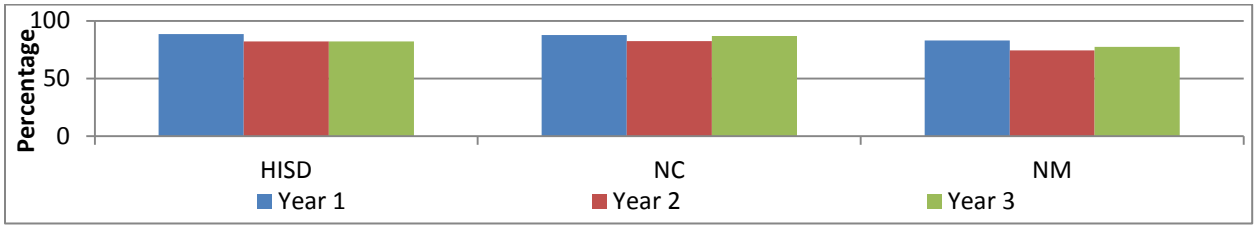
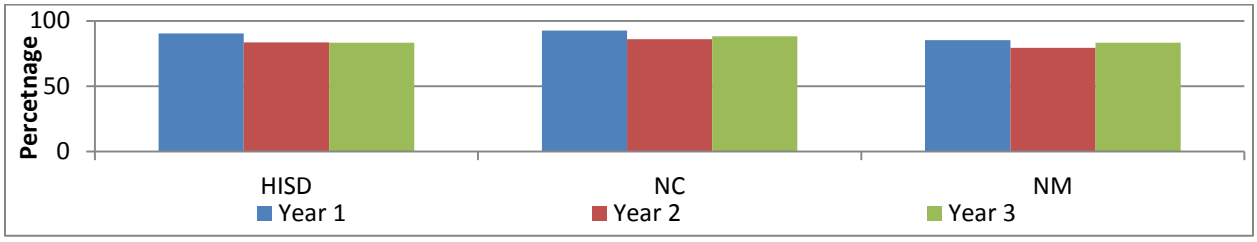


Figure 64. Percentage of teachers reporting they "did find the materials in the kit you taught easy to use."



Teachers reported a slight increase in the inclusion of materials from sources other than the STC Units as implementation progressed (Figure 65). This may have been due to routine breakage of equipment over time, use of consumable materials such as chemical reagents, or simply adaptation to accommodate teacher preference. Few principals reported extreme challenges obtaining replacement materials for the STC Units (Figure 67), so it is unlikely that external materials were used because replacement STC Unit materials were unavailable. Teachers reported feeling very comfortable adjusting the units during the first year of implementation, but less so later (Figure 66). Materials replacement for STC Unit kits also appeared to be much easier than for other science lessons, as over 75% of Phase 2 principals reported this process as extremely challenging, compared to just 10% of Phase 1 principals.

Figure 65. Percentage of teachers reporting they "did supplement the lessons with materials from other sources (e.g., your own materials, other curricula)."

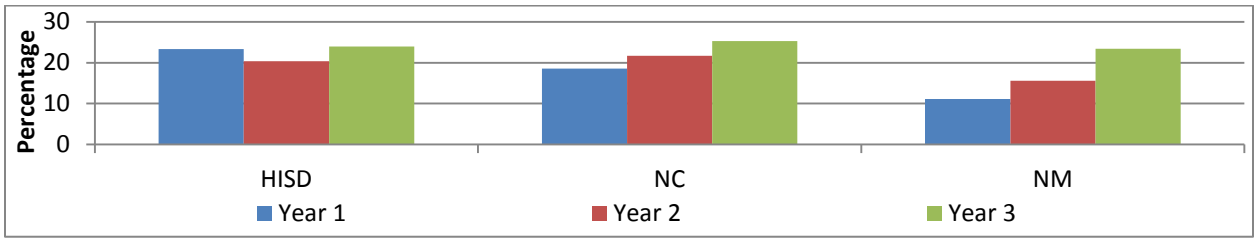
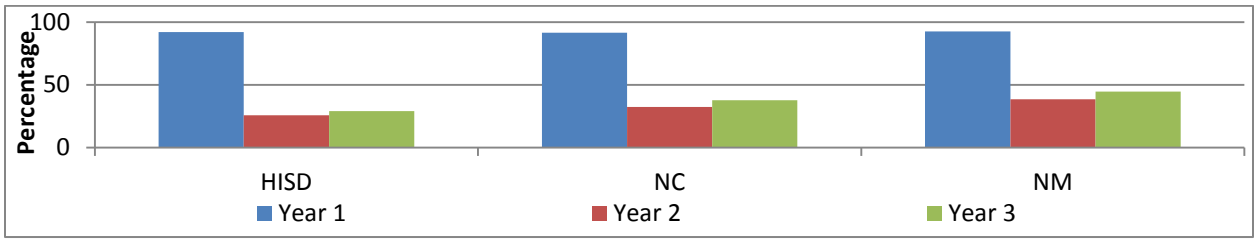
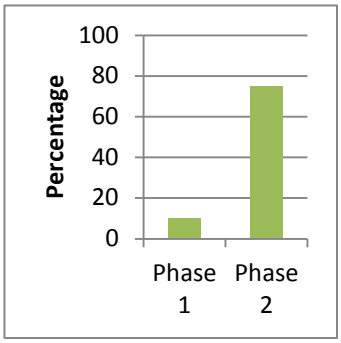


Figure 66. Percentage of teachers reporting they were "very comfortable or able" "to adjust [their] teaching of the unit to meet particular student needs and interests."



From a materials perspective, science instruction faces a number of challenges. Classrooms are ill-equipped to serve as laboratories in the traditional sense. Funding for materials is scarce, and those materials must be replaced periodically. The STC Units addressed many of these difficulties, and administrative support appeared sufficient to consistently resupply units in schools. According to teacher reports, the STC Units were deployed as intended, easy to use, and well received.

Figure 67. Highest percentage of principals in year 2 reporting "materials replacement for science kits." extremely challenging



Pillar 4 Summary

- Many science classrooms lack laboratory space, but are organized for teaming. In light of this, the ability of the STC Units to convert any space into a laboratory represents valuable curriculum support of hands-on, inquiry-based science. Many principals reported that obtaining funding for science materials was difficult. In schools using the STC Units, this concern appeared to dissipate over time, but did not wholly disappear.

- Many principals were committed to finding ways to gain access to high-quality science materials for their schools.

- Very few principals of schools using the STC Units reported difficulty obtaining replacement materials for the STC Units.

- Overall, teachers reported positive views of the STC Units they taught. Most teachers taught the units as intended by the SSEC, with little adaptation necessary.

Summary of SSEC Pillar 5: Assessment

The key to the fifth pillar of the STC LASER model, as defined by the SSEC, is constant assessment. It is important to know where students begin their journey, how they are learning, if they are retaining information, and what they have learned after instruction. Assessment is important for gauging student progress and adapting instruction to fit student needs.

Traditional Assessment

Implementation of the STC Units was associated with an increase in teachers' confidence in their ability to assess student learning in science. Phase 1 teachers' confidence increased by between 18% and 34% from baseline when the STC Units were implemented (Figure 68), then changed little thereafter. In the same year, Phase 2 teachers' confidence also increased, but only by between 3% and 14%. Overall, by the end of implementation the majority of Phase 1 teachers felt more confident in their ability to assess science learning than did Phase 2 teachers.

Phase 1 teachers reported assessing student learning in multiple ways. Over half of teachers in all regions indicated that they created their own strategic questions (Figure 69) and used the assessments provided with the STC units (Figure 70) to gauge student science learning.

Figure 68. Teachers reporting they were "well" or "very well" prepared to assess student learning about science.

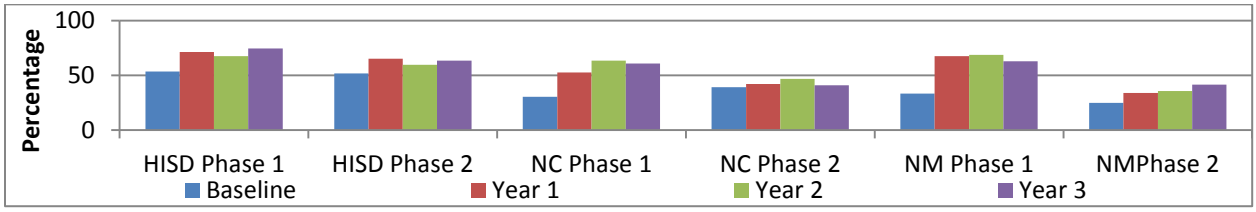


Figure 69. Percentage of teachers reporting they "assessed student answers to their own strategic questions."

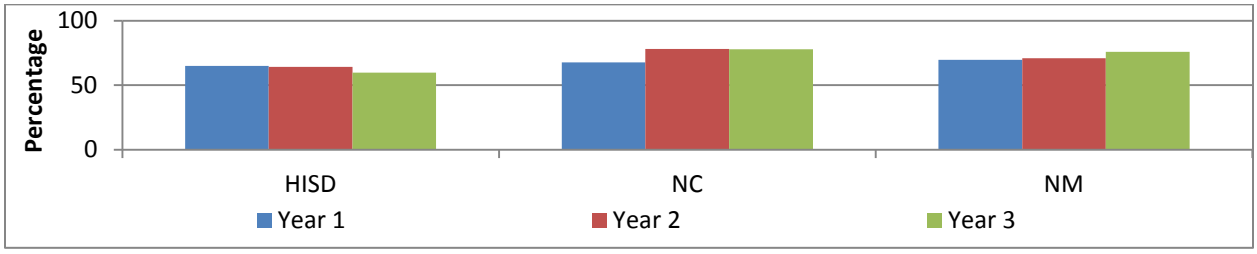
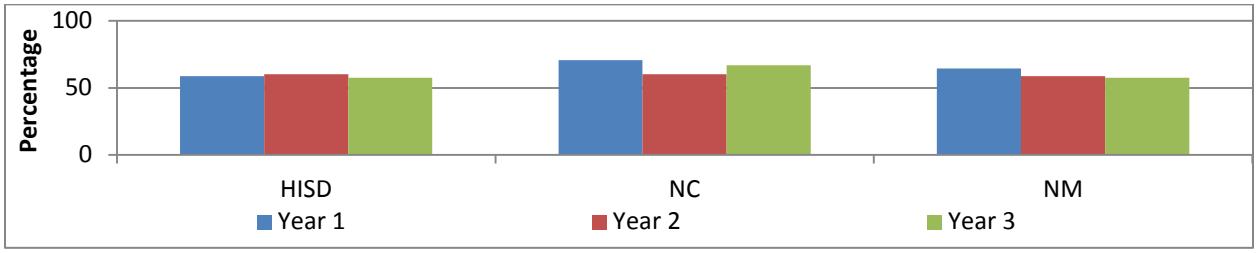


Figure 70. Percentage of teachers reporting they "used the assessments provided with the unit."



Teachers gave glowing reports of using the STC Units with their students. Over 80% of teachers reported that their students were successful in learning the underlying scientific concepts of the STC Unit taught (Figure 71). Even more teachers (85%) reported that their students were able to grasp the basic scientific facts of the STC Unit taught (Figure 72Figure 72). These learning gains may have occurred, in part, because 80% of teachers reported that they felt comfortable with the scientific content of the unit to help their students understand it (Figure 73Figure 73). This final point highlights the importance of the summer professional development workshops, which familiarize teachers with each STC Unit to be taught the following school year.

CREP observers seldom saw summative assessment being conducted during classroom visits, but this does not necessarily indicate that assessments were not occurring. During observations, CREP observers reported summative assessments in only 18% of classrooms (Figure 74). While this was in a Phase 1 classroom, it occurred in the first school year of implementation. The next highest Phase 1 percentage was 1.9%. Two major factors may have contributed to this. First, summative assessments are most frequent at the end of a project, and are therefore the least likely classroom activity to be observed during a project such as this. Secondly, observers were asked to not visit classrooms when paper and pencil tests were occurring for the entire class period. As a result, observers may have avoided being in the classroom when testing was occurring for any of the class period.

Figure 71. Teachers answering "yes" to "did your students successfully learn the underlying scientific concepts of the unit?"

Figure 72. Teachers answering "yes" to "did your students successfully learn the basic scientific facts of the unit?"

Figure 73. Teachers answering "yes" to "did you feel sufficiently comfortable with the science content of this unit to help your students understand it?"

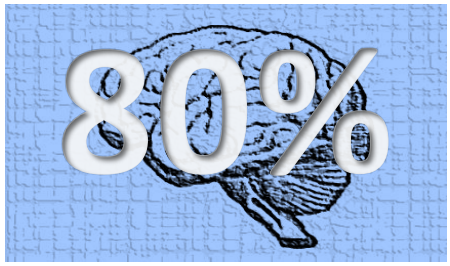
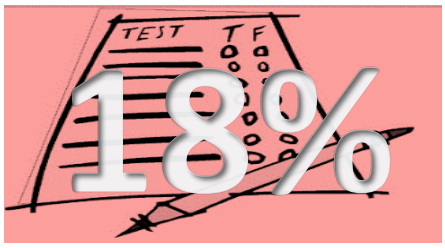
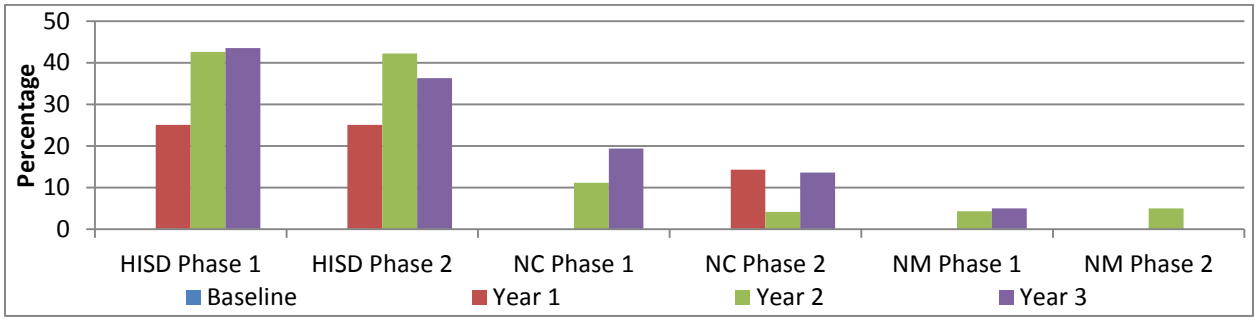


Figure 74. Classrooms where observers witnessed summative/performance assessments (percentage).



Formative assessments, on the other hand, should occur periodically throughout lessons to gauge student progress toward goals. Phase 1 classroom instruction included more instances of formative assessment than were observed in Phase 2 classrooms (Figure 75), but everywhere except HISD, the frequency of these formative assessments was very low. The relatively high frequency of formal assessments in HISD suggest a district-wide instructional objective for teachers. These results should also be interpreted with caution, given a lack of baseline data and low response rates in both North Carolina and New Mexico.

Figure 75. Percentage of frequently or extensively observed formative assessments.



The STC Units were well-received by both teachers and students. Most teachers reported that students using the STC Units learned both the basic facts and underlying concepts of the lessons. In addition, most teachers who used the STC Units said that they felt comfortable with the scientific content of the units, and reported improved confidence in their ability to assess student learning in science. Although observers seldom saw summative assessments being conducted, formative assessments were more often observed in classrooms with access to the STC Units than in classrooms without.

Notebooking

The STC Units emphasize the use of notebooking as a learning tool. Review of notebooks is a traditional formative assessment technique that may occur when students are not present. Implementation of the STC Units appeared to increase the use of notebooking in North Carolina and New Mexico, where notebooking was not a common practice prior to implementation. Although teachers in Phase 1 HISD schools reported a slight decline in notebooking over the implementation period, notebooking was already high in this district. Overall, Phase 1 teachers reported more frequent use of notebooking than did Phase 2 teachers (Figure 76). The percentage of students observed writing for sustained periods of time was also higher in Phase 1 schools than in Phase 2 schools (Figure 77). Sustained writing, for these purposes, was not copying notes or data, but was a process where the students, specifically, generated the information they were writing down. Sustained writing may or may not have been done in an STC notebook, since there were deployment issues in some districts, but the activities were comparable with regard to the STC curriculum.

Figure 76. Teachers reporting their students "frequently" or "extensively" "wrote reflections (in a journal or notebook).

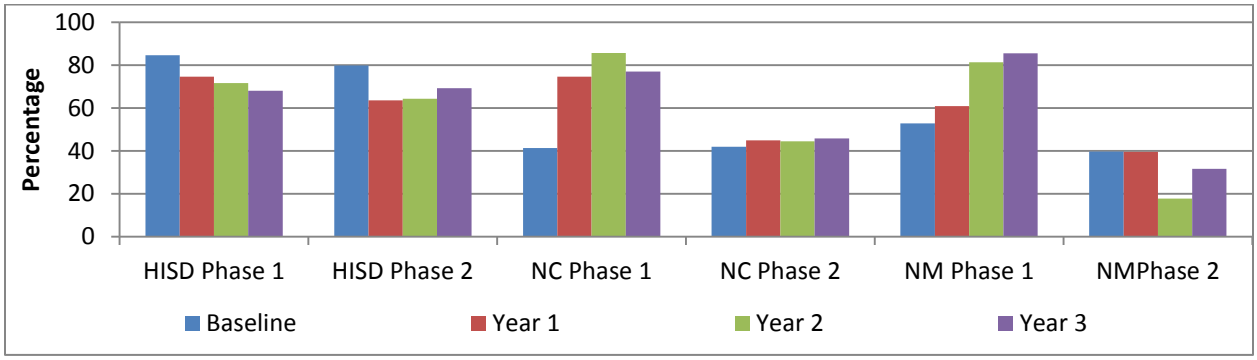
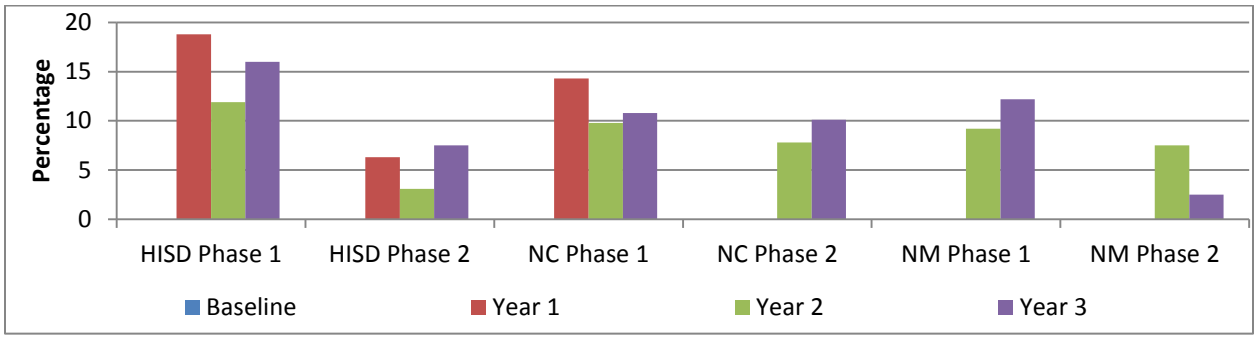


Figure 77. Percentage of frequently or extensively observed sustained writing.



Almost every teacher reporting about their experiences with the STC Units indicated that they assessed their students' notebook entries (Figure 78). Of those teachers that assessed notebooks, the majority placed at least moderate emphasis on the quality of those entries when assessing their students' learning (Figure 79). This suggests that more formative assessment was occurring in classroom instruction than was evident in CREP's observations.

Figure 78. Teachers reporting they assessed student notebook entries.

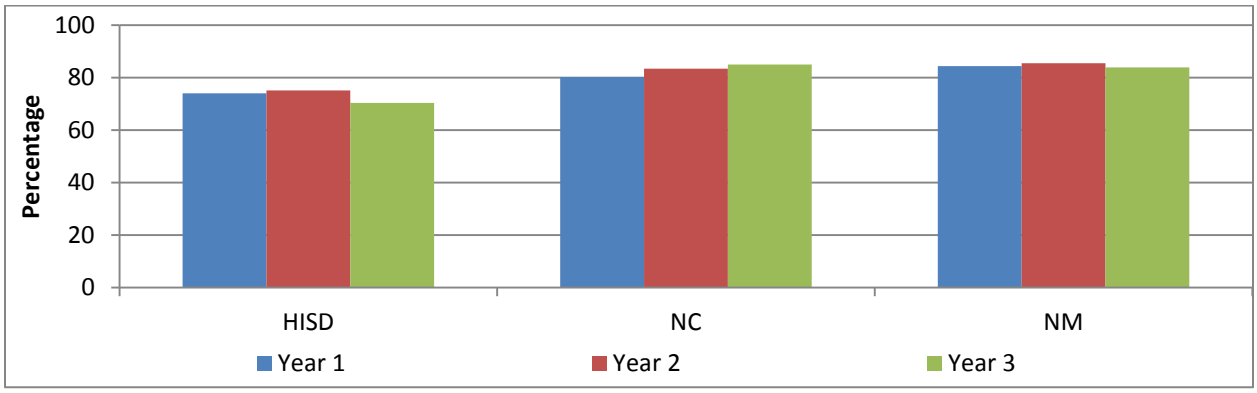
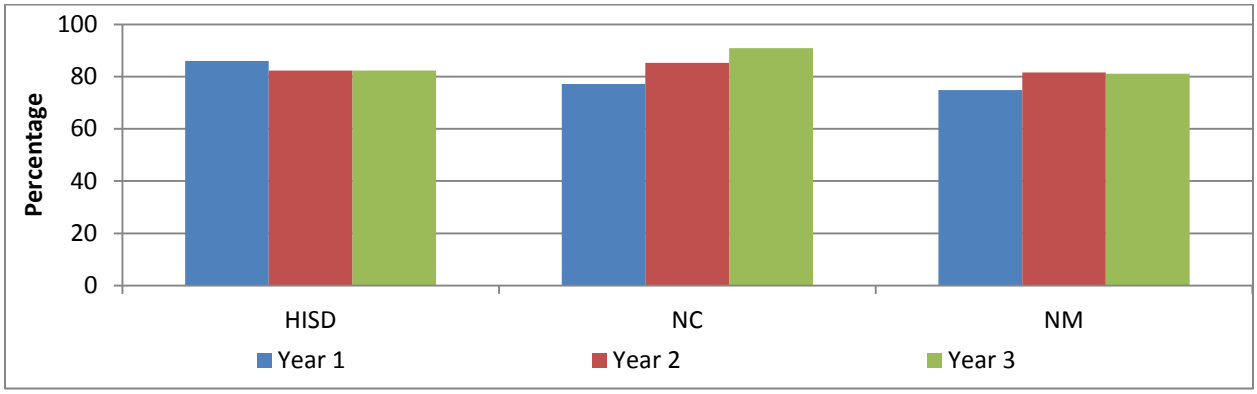


Figure 79. Teachers reporting placing moderate or strong emphasis on the quality of student notebook entries.



Notebooking and sustained writing were both observed more frequently in classrooms with access to the STC Units than in classrooms without. Almost all teachers using the STC Units reported that they assessed their students' notebook entries, and most placed at least moderate emphasis on their quality.

Pillar 5 Summary

- Teachers using the STC Units felt more confident in their ability to assess student learning in science.

- The majority of teachers using the STC Units reported that students were able to understand the content of the units.

- According to both teacher reports and observations, students using the STC Units were more likely to write self-generated content long periods of time, an activity comparable to notebooking.

- Teachers used student notebooks as an assessment tool in their classrooms, and placed at least moderate importance on their quality.

Appendix A: Data tables for Research-based Instruction

Question	Response	Region	Baseline	Year 1	Year 2	Year 3
Assess teacher knowledge of science content (Figure 3)	% "YES"	HISD Phase 1	45.5	70	45.5	66.7
		HISD Phase 2	35	42.9	75	75
		NC Phase 1	9.5	30	42.9	40
		NC Phase 2	19	25	18.2	
		NM Phase 1	15.8	12.5	20	33.3
		NM Phase 2	7.1	0	25	
Conduct science investigations in collaboration with other students (Figure 24)	% “Frequently” or “Extensively”	HISD Phase 1	76.2	64.5	66.3	80.9
		HISD Phase 2	68.5	62.9	60.7	69.3
		NC Phase 1	37.2	65.3	82.7	82
		NC Phase 2	39	50	52.2	45.8
		NM Phase 1	52.8	71.7	91.7	95.2
		NM Phase 2	42.5	52.8	31.1	24.4
Cooperative/Collaborative learning (Figure 18)	% “Frequently” or “Extensively”	HISD Phase 1		43.8	46.9	59
		HISD Phase 2		37.5	46.6	31.3
		NC Phase 1		50	56.7	65.5
		NC Phase 2		35.7	42.6	33.1
		NM Phase 1		57.1	42.2	35.7
		NM Phase 2		36.4	14.1	12.5
Create opportunities for teachers to improve their science content knowledge (Figure 4)	% "YES"	HISD Phase 1	72.7	40	81.8	100
		HISD Phase 2	70	57.1	87.5	75
		NC Phase 1	61.9	50	50	60
		NC Phase 2	19	58.3	45.5	
		NM Phase 1	5.3	50	60	50
		NM Phase 2	42.9	20	75	

Question	Response	Region	Baseline	Year 1	Year 2	Year 3
Design a science experiment to answer a specific question (Figure 26)	% "Frequently" or "Extensively"	HISD Phase 1	34.4	31.5	30.4	31.9
		HISD Phase 2	27.4	34.8	22.6	36.6
		NC Phase 1	10.3	16.9	21.4	34.4
		NC Phase 2	10.8	11.6	10	12
		NM Phase 1	7.5	19.6	16.7	33.9
		NM Phase 2	8.2	20.8	11.1	4.9
Did you adapt some of the lessons for use as teacher demonstration only? (Figure 36)	"Yes/Completely" or "To a Large Extent"	HISD		30.7	30	32.4
		NC		13.3	22	18
		NM		14.1	15.7	14
Did you teach all of the lessons/activities in the unit? (Figure 34)	"Yes/Completely" or "To a Large Extent"	HISD		85.5	68.1	75.4
		NC		91.5	81.1	87.7
		NM		87.4	75.5	71.5
Did you teach the lessons in the suggested sequence? (Figure 35)	"Yes/Completely" or "To a Large Extent"	HISD		96	87.4	87.2
		NC		97.9	91.5	96.8
		NM		97	96.7	88.3
Experiential hands-on learning (manipulatives, computer-based simulations) (Figure 17)	% "Frequently" or "Extensively"	HISD Phase 1		56.3	45	58.3
		HISD Phase 2		37.5	38.5	26.2
		NC Phase 1		64.3	51.1	61.2
		NC Phase 2		50	42.5	41
		NM Phase 1		64.3	40	43.6
		NM Phase 2		36.4	14.9	20
Finding qualified teachers (Figure 2)	"Extremely Challenging"	HISD Phase 1	18.2	0	27.3	
		HISD Phase 2	5	14.3	12.5	
		NC Phase 1	4.8	20	14.3	
		NC Phase 2	0	0		
		NM Phase 1	5.3	25	30	
		NM Phase 2	0	0		

Question	Response	Region	Baseline	Year 1	Year 2	Year 3
Help teachers teach to the state science standards (Figure 10)	% "YES"	HISD Phase 1	72.7	90	90.9	83.3
		HISD Phase 2	70	78.6	100	75
		NC Phase 1	52.4	80	64.3	40
		NC Phase 2	52.4	66.7	72.7	
		NM Phase 1	57.9	62.5	40	33.3
		NM Phase 2	50	40	50	
Hours of science instruction (Figure 15)	Average hours per week	HISD Phase 1	3.5	4.9	6.5	4.9
		HISD Phase 2	3.1	5.4	5.1	4.8
		NC Phase 1	2.3	4	4.2	4.7
		NC Phase 2	2.6	3.9	4.2	
		NM Phase 1	2.2	4.2	4.7	3.9
		NM Phase 2	2.1	2.7	2.7	
My own knowledge of/background in science (Figure 1)	"Challenging"	HISD Phase 1	4.2	0.7	0	4.3
		HISD Phase 2	4.8	2.7	2.4	3
		NC Phase 1	4.4	1.7	1	1.6
		NC Phase 2	3.7	5.8	1.1	1.2
		NM Phase 1	5	0	2.1	0
		NM Phase 2	4.1	3.8	2.2	2.4
Number of minutes of science instruction (Figure 14)	% "Any Increase"	HISD Phase 1	33.3	50	36.4	33.3
		HISD Phase 2	28.6	71.4	25	25
		NC Phase 1	33.3	70	28.6	40
		NC Phase 2	42.9	33.3	18.2	
		NM Phase 1	30	75	30	0
		NM Phase 2	0	40	25	

Question	Response	Region	Baseline	Year 1	Year 2	Year 3
Prepared science kits in use (Figure 19)	% “Frequently” or “Extensively”	HISD Phase 1		37.6	48.7	91.6
		HISD Phase 2		0	2.5	1.2
		NC Phase 1		35.7	63.6	97.8
		NC Phase 2		7.1	4.9	10.8
		NM Phase 1		50	62.1	95.7
		NM Phase 2		0	1.7	2.5
Promote alignment of science curriculum, instruction, and assessment with science standards (Figure 11)	% "YES"	HISD Phase 1	59.1	30	90.9	100
		HISD Phase 2	80	64.3	100	100
		NC Phase 1	38.1	60	50	60
		NC Phase 2	38.1	50	72.7	
		NM Phase 1	36.8	25	60	83.3
		NM Phase 2	42.9	80	75	
Student discussion (Figure 7)	% “Frequently” or “Extensively”	HISD Phase 1		62.5	43.8	63.5
		HISD Phase 2		31.3	46.6	36.3
		NC Phase 1		50	35.7	66.1
		NC Phase 2		42.9	31.2	33.1
		NM Phase 1		50	30.7	24.3
		NM Phase 2		9.1	14.1	8.3
Student disinterest in science (Principals) (Figure 6)	% “Extremely Challenging”	HISD Phase 1	0	0	9.1	0
		HISD Phase 2	0	14.3	0	0
		NC Phase 1	4.8	0	7.1	0
		NC Phase 2	0	0	0	
		NM Phase 1	0	0	10	0
		NM Phase 2	0	0	0	

Question	Response	Region	Baseline	Year 1	Year 2	Year 3
Student disinterest in science (Teachers) (Figure 6)	% "Extremely Challenging"	HISD Phase 1	3.3	3.3	1.1	2.1
		HISD Phase 2	2.4	3.8	8.3	4
		NC Phase 1	1.8	1.7	1	3.3
		NC Phase 2	2	5.1	3.3	2.4
		NM Phase 1	1.3	2.2	4.2	0
		NM Phase 2	2.7	3.8	6.7	2.4
Student driven (inquiry based learning, cooperative learning) (Figure 22)	% "Frequently" or "Extensively"	HISD Phase 1		50.1	46.3	59
		HISD Phase 2		31.3	35.4	28.8
		NC Phase 1		14.3	36.4	65.5
		NC Phase 2		14.3	41.9	45.3
		NM Phase 1		42.8	39.3	36.5
		NM Phase 2		27.3	18.2	25
Students asking questions (Figure 8)	% "Frequently" or "Extensively"	HISD Phase 1		37.5	15	25
		HISD Phase 2		31.3	14.9	7.5
		NC Phase 1		28.6	17.5	17.9
		NC Phase 2		35.7	9.2	8.6
		NM Phase 1		14.2	13.6	7.2
		NM Phase 2		9.1	4.1	3.3
Students designing their own procedures (Figure 27)	% "Frequently" or "Extensively"	HISD Phase 1		12.5	10.7	15.4
		HISD Phase 2		12.6	11.2	5
		NC Phase 1		7.1	9.8	18
		NC Phase 2		0	4.9	4.4
		NM Phase 1		0	6.4	4.3
		NM Phase 2		0	1.7	0.8

Question	Response	Region	Baseline	Year 1	Year 2	Year 3
Students evaluating evidence (Figure 33)	% "Frequently" or "Extensively"	HISD Phase 1		18.8	25.7	35.9
		HISD Phase 2		12.5	13.6	10
		NC Phase 1		14.2	2.8	2.9
		NC Phase 2		0	2.1	2.2
		NM Phase 1		0	7.9	4.3
		NM Phase 2		0	3.3	2.5
Students gathering evidence (Figure 30)	% "Frequently" or "Extensively"	HISD Phase 1		37.5	37.6	54.5
		HISD Phase 2		25	26.1	13.2
		NC Phase 1		35.7	25.2	35.3
		NC Phase 2		28.6	20.6	18
		NM Phase 1		50	27.2	26.4
		NM Phase 2		9.1	4.2	5.8
Students making predictions or hypothesizing (Figure 28)	% "Frequently" or "Extensively"	HISD Phase 1		18.8	21.3	32.7
		HISD Phase 2		25	19.9	14.4
		NC Phase 1		28.6	13.3	14.4
		NC Phase 2		14.3	12	5.7
		NM Phase 1		28.5	13.6	6.4
		NM Phase 2		9.1	4.2	3.3
Students recording evidence (Figure 31)	% "Frequently" or "Extensively"	HISD Phase 1		31.3	36.3	50.6
		HISD Phase 2		25.1	25.5	16.2
		NC Phase 1		21.4	20.3	25.2
		NC Phase 2		35.7	19.2	8.7
		NM Phase 1		28.6	22.1	19.3
		NM Phase 2		9.1	7.5	3.3

Question	Response	Region	Baseline	Year 1	Year 2	Year 3
Students reporting out (Figure 9)	% "Frequently" or "Extensively"	HISD Phase 1		31.3	37.5	37.2
		HISD Phase 2		25.1	20.5	14.4
		NC Phase 1		0	16.1	12.2
		NC Phase 2		7.1	10.6	3.6
		NM Phase 1		28.5	5	5.8
		NM Phase 2		0	9.9	5
Students testing their predictions or hypothesis (Figure 29)	% "Frequently" or "Extensively"	HISD Phase 1		12.6	18.1	36.6
		HISD Phase 2		12.5	14.9	10
		NC Phase 1		28.6	9.8	22.3
		NC Phase 2		7.1	13.5	9.4
		NM Phase 1		21.4	12.9	4.3
		NM Phase 2		9.1	2.5	5
Teach students to design and conduct an experiment (Figure 23)	% "Very Well or Well Prepared"	HISD Phase 1		63.1	68.5	70.2
		HISD Phase 2		55.6	52.4	65.3
		NC Phase 1		44.1	59.2	52.5
		NC Phase 2		31.2	38.9	28.9
		NM Phase 1		67.4	72.9	66.1
		NM Phase 2		39.6	35.6	36.6
Teach students to evaluate evidence (Figure 32)	% "Very Well or Well Prepared"	HISD Phase 1		64.8	69.6	72.3
		HISD Phase 2		59.8	56	66.3
		NC Phase 1		48.3	64.3	62.3
		NC Phase 2		33.3	43.3	34.9
		NM Phase 1		69.6	72.9	71
		NM Phase 2		39.6	35.6	39

Question	Response	Region	Baseline	Year 1	Year 2	Year 3
Teacher interest in science (Figure 5)	% "Extremely Challenging"	HISD Phase 1	4.5	0	9.1	16.7
		HISD Phase 2	10	7.1	12.5	0
		NC Phase 1	4.8	0	0	0
		NC Phase 2	0	0	9.1	
		NM Phase 1	5.3	0	0	0
		NM Phase 2	0	0	0	
Teacher preparedness for inquiry-based instruction (Figure 20)	% "Very Well or Well Prepared"	HISD Phase 1	52.5	64.5	64.1	68.1
		HISD Phase 2	53.3	55.5	57.1	61.4
		NC Phase 1	32.3	47.4	59.2	55.7
		NC Phase 2	40.7	33.3	34.4	31.3
		NM Phase 1	41.5	78.3	81.3	71
		NM Phase 2	28.8	34	26.7	26.8
Time allocated for science instruction (Principal) (Figure 12)	% "Extremely Challenging"	HISD Phase 1	13.6	10	0	0
		HISD Phase 2	35	21.4	12.5	0
		NC Phase 1	19	20	21.4	60
		NC Phase 2	9.5	16.7	9.1	
		NM Phase 1	21.1	25	40	33.3
		NM Phase 2	28.6	20	50	
Time allocated for science instruction (Teacher) (Figure 13)	% "Extremely Challenging"	HISD Phase 1	31.6	12.7	21.7	12.8
		HISD Phase 2	21	14.2	23.8	18.8
		NC Phase 1	33.4	27.1	19.4	18
		NC Phase 2	26.1	25.4	18.9	39.8
		NM Phase 1	41.5	17.4	20.8	27.4
		NM Phase 2	41.1	47.2	55.6	43.9

Question	Response	Region	Baseline	Year 1	Year 2	Year 3
What percentage of teachers who teach science in your school do you feel are well-prepared to teach science (Figure 21)	% Reporting "75-100% of Teachers Well-Prepared	HISD Phase 1	13.6	10	27.3	50
		HISD Phase 2	15	35.7	25	25
		NC Phase 1	15.8	12.5	60	50
		NC Phase 2	28.6	0	0	
		NM Phase 1	14.3	60	42.9	60
		NM Phase 2	47.6	33.3	36.4	

Appendix B: Data tables for Differentiated Professional Development

Question	Answer	Region	Baseline	Year 1	Year 2	Year 3
Amount of professional development offerings in science (Figure 38)	% "Any Increase"	HISD Phase 1	33.3	70	27.3	33.3
		HISD Phase 2	50	50	37.5	75
		NC Phase 1	9.6	80	28.6	20
		NC Phase 2	19	25	18.2	
		NM Phase 1	10	75	60	16.7
		NM Phase 2	0	0	0	
Availability of science professional development opportunities (Figure 37)	% "Extremely Challenging"	HISD Phase 1	7	5.4	1.1	4.3
		HISD Phase 2	3.2	9.6	8.3	5.9
		NC Phase 1	10.9	8.5	5.1	6.6
		NC Phase 2	12.9	21.7	20	
		NM Phase 1	18.9	8.7	10.4	1.6
		NM Phase 2	26	26.4	48.9	
Did you feel you had sufficient training to teach this unit as it was intended to be taught? (Figure 40)	% "Yes/ Completely" or "To a Large Extent"	HISD		86	81.5	86
		NC		83.5	81.4	90.2
		NM		84.4	79.4	77.3
Discuss how to align the science curriculum across grade levels (Figure 46)	% "Frequently" or "Extensively"	HISD Phase 1	35.3	44.2	34.8	36.2
		HISD Phase 2	30.6	36	35.7	45.5
		NC Phase 1	4.7	18.6	26.5	26.2
		NC Phase 2	6.1	17.4	22.2	13.3
		NM Phase 1	5	23.9	16.7	11.3
		NM Phase 2	1.4	7.5	4.4	14.6

Question	Answer	Region	Baseline	Year 1	Year 2	Year 3
Discuss science lessons with other teachers in my building (Figure 43)	% "Frequently" or "Extensively"	HISD Phase 1	75.8	61.6	64.1	51.1
		HISD Phase 2	74.2	59	54.8	65.3
		NC Phase 1	38.1	61	67.3	65.6
		NC Phase 2	41	52.2	48.9	49.4
		NM Phase 1	32.7	52.2	50	43.5
		NM Phase 2	21.9	18.9	17.8	22
How useful to your science instruction was the professional development you received in the last year (Figure 41)	% "Very Useful"	HISD Phase 1		73.9	72.8	68.1
		HISD Phase 2		37.5	35.7	43.6
		NC Phase 1		59.3	55.1	59
		NC Phase 2		15.9	6.7	
		NM Phase 1		69.6	52.1	75.8
		NM Phase 2		11.3	6.7	
Serve as a coach or mentor to less experienced teachers (Figure 42)	% "Frequently" or "Extensively"	HISD Phase 1	17.7	27.2	26.1	29.8
		HISD Phase 2	13.7	23	22.6	24.8
		NC Phase 1	12.3	20.3	25.5	32.8
		NC Phase 2	16.3	18.8	14.4	
		NM Phase 1	8.2	15.2	22.9	22.6
		NM Phase 2	4.1	11.3	11.1	
Talk with other teachers about ways of integrating science and literacy (Figure 44)	% "Frequently" or "Extensively"	HISD Phase 1	41.4	55.1	54.3	29.8
		HISD Phase 2	44.3	40.2	42.9	45.5
		NC Phase 1	17.3	44.1	50	45.9
		NC Phase 2	21.4	36.2	48.9	39.8
		NM Phase 1	15.1	32.6	31.3	33.9
		NM Phase 2	16.5	28.3	17.8	26.8

Question	Answer	Region	Baseline	Year 1	Year 2	Year 3
Talk with other teachers about ways of integrating science and mathematics (Figure 45)	% "Frequently" or "Extensively"	HISD Phase 1	40.9	51.4	46.7	27.7
		HISD Phase 2	44.3	37.2	34.5	44.6
		NC Phase 1	15.2	31.4	36.7	24.6
		NC Phase 2	19.3	26.8	24.4	20.5
		NM Phase 1	8.8	32.6	29.2	21
		NM Phase 2	16.5	15.1	8.9	12.2
What type of training did you have for teaching this unit, and who provided the training to you? (Figure 39)	Summer	HISD		87.3	73.6	52
		NC		77.7	72.3	77.9
		NM		90.4	67.6	65

Appendix C: Data tables for Administrative and Community Support

Question	Answer	Region	Baseline	Year 1	Year 2	Year 3
Help teachers integrate science with mathematics and other subjects (Figure 51)	% "YES"	HISD Phase 1	31.8	20	72.7	100
		HISD Phase 2	50	35.7	87.5	75
		NC Phase 1	33.3	20	21.4	20
		NC Phase 2	33.3	33.3	54.5	0
		NM Phase 1	21.1	12.5	30	50
		NM Phase 2	28.6	40	100	0
More emphasis on English/language arts and mathematics than science instruction (Figure 53)	% “Extremely Challenging”	HISD Phase 1	31.8	20	18.2	16.7
		HISD Phase 2	30	7.1	25	25
		NC Phase 1	28.6	30	28.6	60
		NC Phase 2	38.1	25	36.4	NA
		NM Phase 1	26.3	62.5	10	50
		NM Phase 2	42.9	40	75	NA
Number of science course offerings (Figure 52)	% “Any Increase”	HISD Phase 1	16.7	20	27.3	33.3
		HISD Phase 2	21.4	35.7	12.5	0
		NC Phase 1	14.3	20	7.1	0
		NC Phase 2	0	8.3	0	0
		NM Phase 1	0	25	30	0
		NM Phase 2	0	0	0	0

Question	Answer	Region	Baseline	Year 1	Year 2	Year 3
Support inquiry-based science instruction (Figure 47)	% "YES"	HISD Phase 1	68.2	80	81.8	83.3
		HISD Phase 2	70	64.3	75	100
		NC Phase 1	71.4	70	71.4	80
		NC Phase 2	76.2	66.7	45.5	0
		NM Phase 1	42.1	87.5	70	33.3
		NM Phase 2	35.7	0	50	0
What percentage of your students do you feel are well-prepared for the next level of science education (e.g., middle or high school) when they leave your school (Figure 48)	% Reporting "75-100% of Students Well-Prepared"	HISD Phase 1	13.6	10	27.3	66.7
		HISD Phase 2	40	42.9	12.5	25
		NC Phase 1	14.3	40	35.7	40
		NC Phase 2	38.1	41.7	36.4	
		NM Phase 1	21.1	25	50	33.3
		NM Phase 2	14.3	20	0	
Work with others to align science curriculum across all grade levels between schools (elementary to middle, middle to high) (Figure 50)	% "YES"	HISD Phase 1	27.3	40	45.5	50
		HISD Phase 2	35	28.6	50	50
		NC Phase 1	14.3	20	57.1	40
		NC Phase 2	14.3	16.7	36.4	
		NM Phase 1	10.5	12.5	20	33.3
		NM Phase 2	42.9	0	25	
Work with others to align science curriculum across all grade levels within your school (Figure 49)	% "YES"	HISD Phase 1	45.5	70	81.8	83.3
		HISD Phase 2	55	57.1	75	75
		NC Phase 1	42.9	70	57.1	20
		NC Phase 2	52.4	41.7	54.5	
		NM Phase 1	21.1	25	40	16.7
		NM Phase 2	35.7	20	50	

Appendix D: Data tables for Materials

Question	Answer	Region	Baseline	Year 1	Year 2	Year 3
Availability of science materials (Figure 61)	% "Any Increase"	HISD Phase 1	25	60	81.8	66.7
		HISD Phase 2	57.1	57.1	50	75
		NC Phase 1	28.6	90	35.7	20
		NC Phase 2	33.3	25	45.5	
		NM Phase 1	40	87.5	60	16.7
		NM Phase 2	0	0	25	
Dedicated science laboratory/Laboratory space (Figure 54)	% "Frequently" or "Extensively"	HISD Phase 1		25.1	23.7	21.8
		HISD Phase 2		12.6	38.5	29.4
		NC Phase 1		21.4	29.4	30.2
		NC Phase 2		14.3	27	33.1
		NM Phase 1		7.1	3.6	5.7
		NM Phase 2		18.2	16.5	19.2
Did you find it easy to organize the materials in the kit you taught? (Figure 63)	"Yes/Completely" or "To a Large Extent"	HISD		88.6	82.3	82.1
		NC		87.7	82.4	87
		NM		83	74.3	77.4
Did you find the materials in the kit you taught easy to use? (Figure 64)	"Yes/Completely" or "To a Large Extent"	HISD		90.4	83.5	83.2
		NC		92.5	86	88.3
		NM		85.2	79.3	83.2
Did you have all of the materials you needed to teach the lessons as described in the Teacher's Guide? (Figure 62)	"Yes/Completely" or "To a Large Extent"	HISD		94.3	81.8	87.1
		NC		89.4	92.7	92.2
		NM		88.8	80.3	86.1
Did you supplement the lessons with materials from other sources (e.g., your own materials, other curricula)? (Fig. 65)	"Yes/Completely" or "To a Large Extent"	HISD		23.3	20.4	24
		NC		18.6	21.7	25.3
		NM		11.1	15.6	23.4

Question	Answer	Region	Baseline	Year 1	Year 2	Year 3
Funds for purchasing equipment and supplies (Figure 59)	% "Extremely Challenging"	HISD Phase 1	18.2	10	18.2	0
		HISD Phase 2	10	7.1	0	0
		NC Phase 1	23.8	60	50	40
		NC Phase 2	14.3	33.3	45.5	
		NM Phase 1	47.4	62.5	50	33.3
		NM Phase 2	35.7	60	0	
Material replacement for science kits (Figure 67)	% "Extremely Challenging"	HISD Phase 1		10	0	0
		HISD Phase 2		7.1	12.5	0
		NC Phase 1		10	7.1	0
		NC Phase 2		16.7	18.2	NA
		NM Phase 1		37.5	10	0
		NM Phase 2		60	75	NA
Organization for teaming (tables, grouped desks) (Figure 55)	% "Frequently" or "Extensively"	HISD Phase 1		100	96.9	96.2
		HISD Phase 2		75.1	91.9	85.6
		NC Phase 1		85.7	80.4	85.6
		NC Phase 2		71.4	83	70.5
		NM Phase 1		78.6	82.8	85.7
		NM Phase 2		36.4	73.6	70
To what extent were you able to adjust your teaching of the unit to meet particular student needs and interests? (Figure 66)	% "Very comfortable adjusting" or "Able to make some adjustments"	HISD		92.1	25.6	29.1
		NC		91.5	32.3	37.7
		NM		92.6	38.5	44.5
Visible scientific artifacts (Figure 56)	% "Frequently" or "Extensively"	HISD Phase 1		45.1	45.1	26.3
		HISD Phase 2		47.9	47.9	26.9
		NC Phase 1		38.5	38.5	30.3
		NC Phase 2		35.5	35.5	29.5
		NM Phase 1		36.4	36.4	35.7

Question	Answer	Region	Baseline	Year 1	Year 2	Year 3
		NM Phase 2		35.6	35.6	34.2
Visible scientific equipment (Figure 57)	% “Frequently” or “Extensively”	HISD Phase 1		56.9	56.9	52
		HISD Phase 2		55.3	55.3	43.8
		NC Phase 1		60.8	60.8	67
		NC Phase 2		40.4	40.4	34.6
		NM Phase 1		32.9	32.9	34.3
		NM Phase 2		25.6	25.6	28.3
Visible support for science literacy (books, posters, word wall, notebooks or journals) (Figure 58)	% “Frequently” or “Extensively”	HISD Phase 1		93.8	78.7	76.3
		HISD Phase 2		68.8	78.9	73.8
		NC Phase 1		92.8	91.6	73.4
		NC Phase 2		100	70.2	54
		NM Phase 1		85.8	70.7	65.8
		NM Phase 2		72.8	62.8	60.9
Work to improve access to high-quality instructional materials in science (Figure 60)	% "YES"	HISD Phase 1	54.5	45	81.8	100
		HISD Phase 2	80	71.4	87.5	100
		NC Phase 1	23.8	60	42.9	40
		NC Phase 2	42.9	58.3	45.5	
		NM Phase 1	26.3	37.5	80	66.7
		NM Phase 2	50	40	75	

Appendix E: Data tables for Assessment

Question	Answer	Region	Baseline	Year 1	Year 2	Year 3
Assess student learning in science (Figure 68)	% "Very Well" or "Well Prepared"	HISD Phase 1	53.5	71.4	67.4	74.5
		HISD Phase 2	51.6	65.2	59.5	63.4
		NC Phase 1	30.5	52.5	63.3	60.7
		NC Phase 2	39.3	42	46.7	41
		NM Phase 1	33.3	67.4	68.8	62.9
		NM Phase 2	24.7	33.9	35.6	41.5
Did you feel sufficiently comfortable with the science content of this unit to help your students understand it? (Figure 73)	% "Yes/ Completely" or "To a Large Extent"	HISD		89.5	84.7	90.5
		NC		94.2	88.4	93.5
		NM		93.3	86	89.1
Did your students successfully learn the basic scientific facts of the unit? (Figure 72)	%"Yes/ Completely" or "To a Large Extent"	HISD		88.2	86.6	88.3
		NC		93.1	93	93.5
		NM		85.9	87.7	86.9
Did your students successfully learn the underlying scientific concepts of the unit? (Figure 71)	"Yes/Completely" or "To a Large Extent"	HISD		86.8	82.7	86
		NC		85.6	91.2	90.3
		NM		84.4	81.5	84.7
Write reflections (e.g., in a journal or notebook) (Figure 76)	% "Frequently" or "Extensively"	HISD Phase 1	84.7	74.6	71.7	68.1
		HISD Phase 2	79.8	63.6	64.3	69.3
		NC Phase 1	41.3	74.6	85.7	77
		NC Phase 2	42	44.9	44.4	45.8
		NM Phase 1	52.9	60.9	81.3	85.5
		NM Phase 2	39.7	39.6	17.8	31.7
How much emphasis did you place on the quality of student notebook entries? (Figure 79)	Strong & moderate Emphasis	HISD		86	82.3	82.3
		NC		77.2	85.3	90.9
		NM		74.8	81.6	81.1

Question	Answer	Region	Baseline	Year 1	Year 2	Year 3
I assessed student notebook entries (Figure 78)	% "YES"	HISD		74.1	75.2	70.4
		NC		80.3	83.5	85.1
		NM		84.4	85.5	83.9
Summative/Performance assessment (Figure 74)	% Frequently + Extensively	HISD Phase 1		18.8	1.9	0
		NC Phase 1		0	0	0
		NM Phase 1		0	1.4	0
		HISD Phase 2		6.3	5.6	1.9
		NC Phase 2		0	0	0
		NM Phase 2		0	2.5	1.7
Sustained writing/composition (Figure 77)	% “Frequently” or “Extensively”	HISD Phase 1		18.8	11.9	16
		HISD Phase 2		6.3	3.1	7.5
		NC Phase 1		14.3	9.8	10.8
		NC Phase 2		0	7.8	10.1
		NM Phase 1		0	9.2	12.2
		NM Phase 2		0	7.5	2.5
Formative assessment (Figure 75)	% Frequently + Extensively	HISD Phase 1		25.1	42.6	43.5
		HISD Phase 2		25.1	42.2	36.3
		NC Phase 1		0	11.2	19.4
		NC Phase 2		14.3	4.2	13.6
		NM Phase 1		0	4.3	5
		NM Phase 2		0	5	0
I used the assessments provided with the unit (Figure 70)	% "YES"	HISD		58.8	60.2	57.5
		NC		70.7	60.1	66.9
		NM		64.4	58.7	57.5
I assessed student answers to my own strategic questions. (Figure 69)	% "YES"	HISD		64.9	64.2	59.8
		NC		67.6	78	77.9
		NM		69.6	70.9	75.9