V. Impact of the LSC on Classroom Practice

A. Introduction

The core evaluation focuses a great deal of attention on the impact of the LSC projects on classroom instruction. Data come from several sources: classroom observations, teacher interviews, and teacher questionnaires, as well as project evaluators' interpretations of project data in their annual evaluation reports. This section examines impact in terms of usage of the instructional materials designated for each LSC, as well as quality of classroom instruction.[8]

B. Increased Emphasis on Science Instruction

National survey data indicate that teachers in the elementary grades spend considerably more time teaching reading/language arts and mathematics than they spend teaching science. For example, in 1993, teachers in grades 1–3 reported spending an average of 84 minutes per day on reading instruction and 51 minutes on mathematics, compared to 24 minutes on science.[9]

Data from the core evaluation indicate that elementary teachers who participate in LSC professional development are spending more time teaching science. When teachers were asked, "How has the LSC affected you and your teaching?" spending increased time on science was often among the answers. As one evaluator reported:

> *All of the teachers interviewed [10] remarked about how much they had learned and how they now try to teach more science than required; whereas, before the LSC experience, they had relegated science instruction to the category of least important and often failed to provide the instruction.*

Two elementary teachers responded:

> *With curriculum it's really changed drastically. In my building, a K–3 building, science had not been thought of as part of the curriculum in the beginning. It was taught if it related to language arts and to math and however it related to language arts and math because, particularly the K–1 teachers, thought that those two subjects were the emphasis and science and social studies were really not very much a part of it. Now they really see science as a very important part of the curriculum.*

* * *

[8] While the ultimate goal of the LSC is improved student achievement, the diversity of content areas addressed by the various projects makes it infeasible to include common measures of student performance in the core evaluation. Rather, individual projects are responsible for choosing appropriate instruments to assess student achievement.

[9] Weiss, I.R., Matti, M.C., and Smith, P.S. *Report of the 1993 National Survey of Science and Mathematics Education.* Chapel Hill, NC: Horizon Research, Inc., 1994.

The grant has increased the amount of time I spend on science. I used to integrate science into language arts. Now I do it the other way around, I integrate language arts into science.

This noting of increased time spent on teaching science in some individual projects is supported by questionnaire data collected across all K–8 science projects. As Figure 33 demonstrates, the average number of days per week in which science was taught increased from 2.6 days among untreated teachers to 3.1 days among teachers with 40 or more hours of LSC professional development. It is important to note that the increase in frequency of science instruction occurred only in science projects, not in mathematics projects, supporting the hypothesis that the increased emphasis on science is attributable to LSC activities.

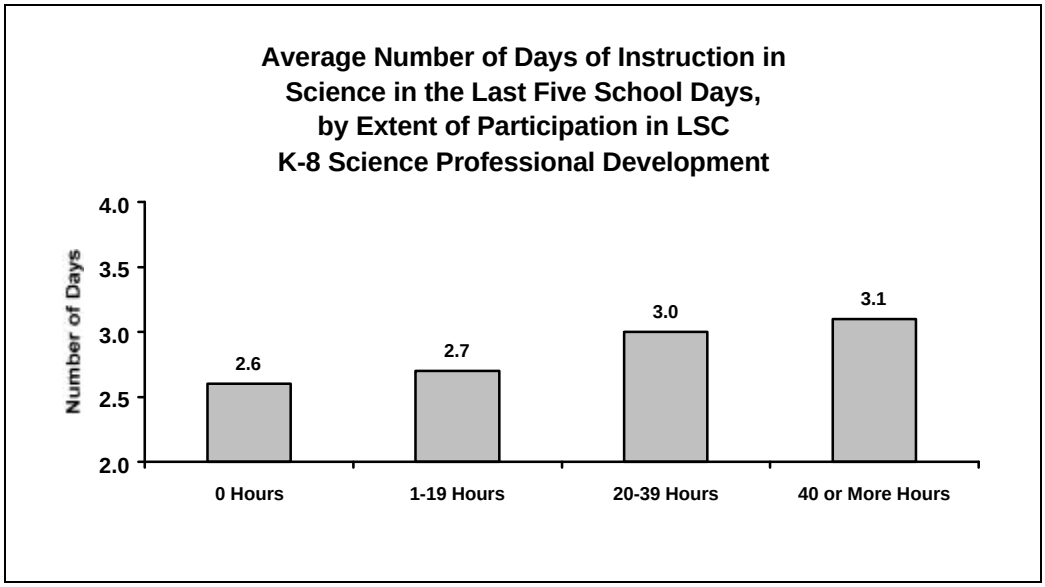

Figure 33

As would be expected, the increased frequency of science instruction resulted in a greater amount of time devoted to the subject. As can be seen in Figure 34, 27 percent of teachers who had participated in 40 or more hours of LSC science professional development spent 30 minutes or more on science each day (150 minutes per week) compared to only 15 percent of untreated teachers.

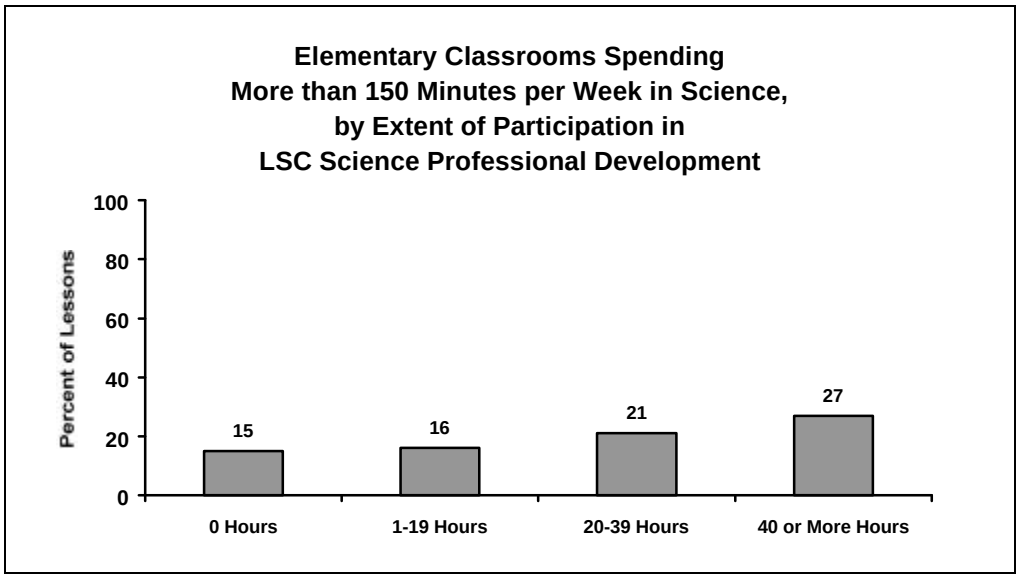

Figure 34

Interestingly, the number of science units taught per year does not appear to increase with participation in LSC professional development. (See Figure 35.) Rather, as can be seen in Figure 36, the length of units increases, with about half of the teachers who have participated most heavily in the LSC report spending more than four weeks on a typical science unit compared to only 30 percent of untreated teachers.

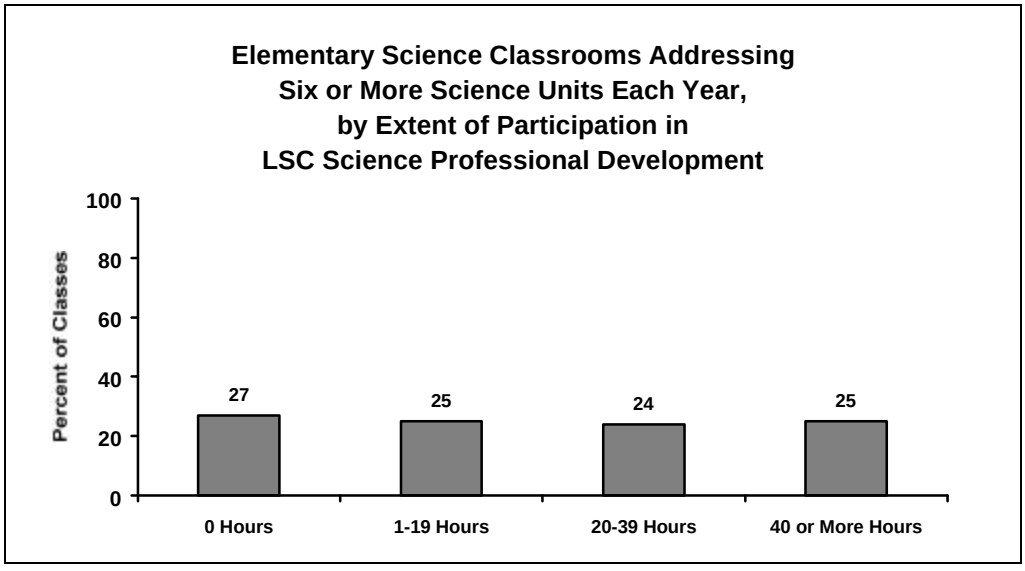

Figure 35

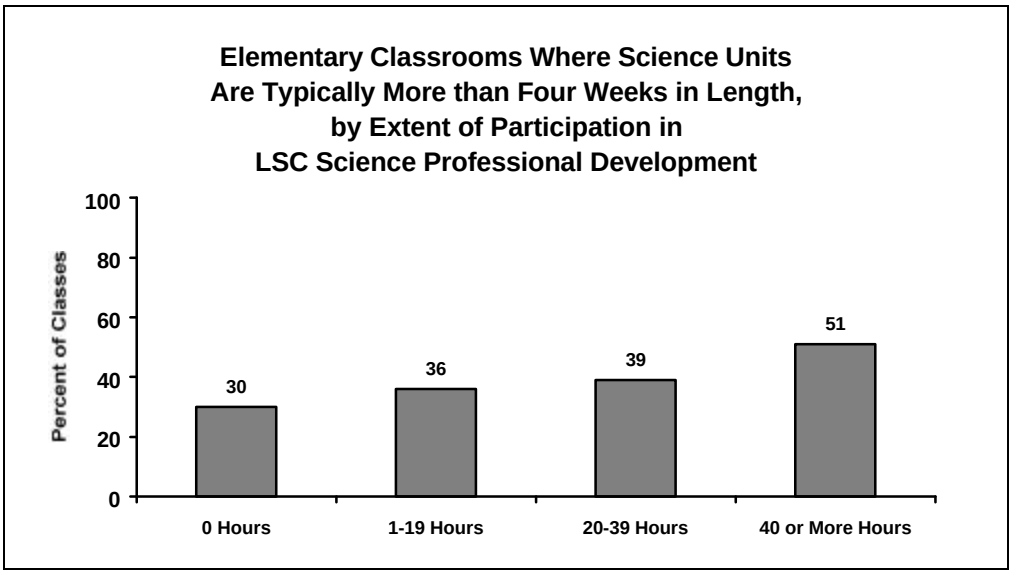

Figure 36

Teachers report that the ready availability of kits through the LSC has increased the likelihood that they will teach science and that they will do it in a "hands-on" way.

> *The project has made me focus on science more. In the past, I kind of did my own thing. We didn't have a real curriculum set up. I liked science but it was often pushed out of the way because of reading, writing, and arithmetic, and so we didn't do it as much. But now, we have these kits—and the kits come on these specified dates—and so I am pressured a little bit more to do it.*
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> * * *
>
> *I now spend more time on science because I don't have to spend time looking for things. I can actually spend the time teaching it. I used to teach isolated topics like plants or dinosaurs. It was whatever I could find. Now I use all the kits and this year they came in the right order. For example, I have the rock kit now when it's springtime and it is perfect timing.*
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> *My teaching is much more hands-on than it was before. I am also doing more science. It's just so much easier—everything is ready to go.*

C. Introduction of New Content into the Mathematics and Science Curriculum

Another apparent impact of the LSC at the classroom level is that teachers are teaching a broader range of topics. Evaluators reported that the use of kits in science supports this change by providing materials in physical and earth science in addition to the more commonly taught life sciences:

> *The co-PI has frequently referred to the idea that prior to the introduction of science standards and the inception of the [LSC] project in elementary classrooms where science was taught, the content was more likely to be life science. The distribution of [LSC] materials through the grades ensures that all science disciplines are taught in a balanced sequence.*
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> *An important indicator of [the project's] module training impact is that teachers are now using at least part of 3–4 sets of exemplary curricular materials at each grade level each year in at least three strand areas: life, earth, and physical sciences.*

In mathematics, teachers are including new areas in the curriculum, such as probability and statistics, as a result of the LSC. These evaluators' comments note the change:

> *Many teachers participating in this project reported teaching probability this past academic year as a result of the 1997 Summer Institute on Probability. Previously, some teachers had avoided this topic or given it superficial treatment because of their lack of comfort with the topic. Others did not realize its value in the mathematics curriculum.*
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> *A third impact is in the mathematical content of the classrooms. Certainly the teaching of data collection and analysis is commonly seen now where before teachers were not even aware of some of this content.*

D. Implementation of Exemplary Instructional Materials

Since a specific goal of the LSC program is to increase the use of exemplary instructional materials, classroom observers were asked to note whether or not these materials were being used and to comment on the quality of their use. As can be seen in Figure 37, only 24 percent of the untreated teachers were observed using the designated instructional materials, compared to 53 percent of the treated teachers.[10]

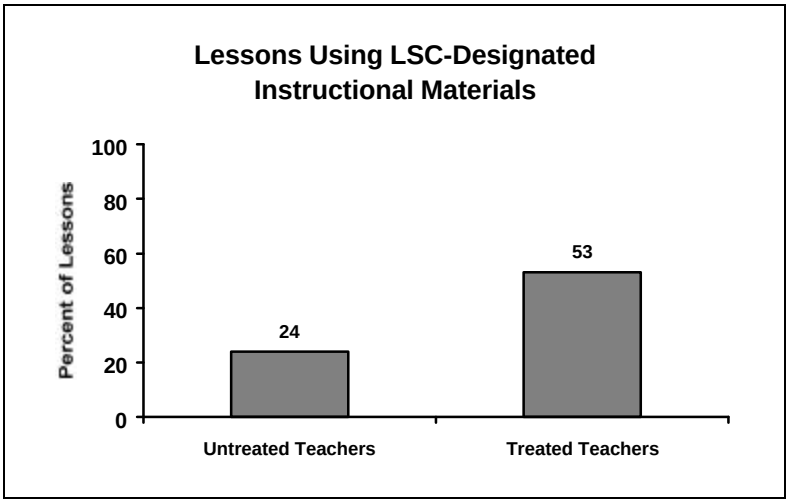

Figure 37

It appears that the combination of LSC-designated materials and LSC professional development is having a positive impact on the quality of classroom instruction. Nearly half of the observed lessons conducted by treated teachers using the LSC instructional materials were rated highly. In contrast, only about one-quarter of the lessons where the teacher was untreated, or treated but not using the LSC materials, were rated highly. (See Figure 38.)

[10] For the purposes of these analyses, "treated" was defined as participation in 20 or more hours of LSC professional development.

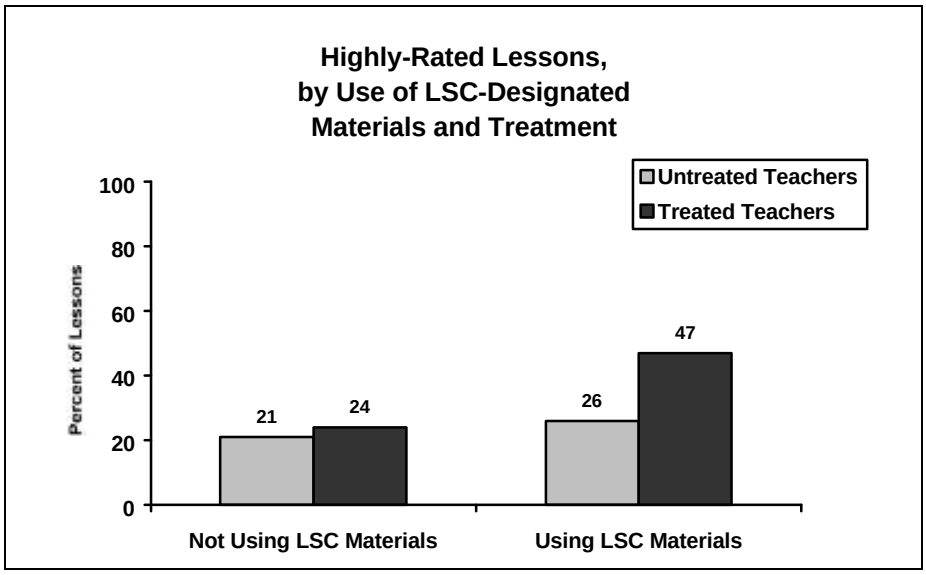

Figure 38

At the same time, evaluators noted a wide variation in how teachers used the materials. Some teachers reportedly use the designated instructional materials as the core of what they teach, implementing them essentially as designed. At the other end of the spectrum are teachers who use only selected individual lessons from the materials, in some cases with major modifications.

In general, classroom observations validated the importance of basing classroom instruction on high-quality instructional materials, as noted by this evaluator:

> *Teachers sometimes "tweaked" the lesson as designed based on their previous experience with it, their perception that their class needed additional reinforcement or reintroduction of a concept, or a similar considered reason. Nevertheless, the strong design of Investigations curriculum materials was, we thought, a major factor in the generally high-quality of the math lessons we observed; it seems to "pull up" the quality of instruction because of its careful sequencing, suggestions for imbedding performance assessment, etc.*

Interestingly, when asked about the impact of the LSC, a number of teachers cited practices that run counter to the notion of implementing carefully sequenced instructional materials as designed by the developers. Some teachers expressed concern about the scope of the instructional materials they were expected to teach, often indicating that they gave short shrift to some of the instructional activities. Others seemed to pick and choose activities, as the following comments illustrate:

> *There was too much in the kits; there was so much in there so I only got to teach about half of it.*

* * *

Well, we got together and we decided not to do a kit as a whole. We just pulled an activity from whatever kit fits with our program.

* * *

I "steal" stuff all the time and modify it to suit my needs.

* * *

I use a few of the ideas to augment my normal teaching.

A number of evaluators also reported that the materials were not being implemented as designed, and noted that the deviations lessened the potential impact on student learning.

What we have seen and heard this year is teachers omitting portions of kits or disregarding entire kits that they don't like or find inconvenient.

* * *

In some cases teachers, for various reasons, teach only selected lessons from the materials. In doing so, they, and their students, lose the developmental progression of the unit. Often times without knowing it, they are essentially dismantling much of what is to be learned from teaching of the kit as a whole.

* * *

The [project's] professional development activities need to enhance teachers' understanding of the necessity to teach the Insights modules as they are presented in the teaching guide in order to develop and build students' understanding of the science concepts effectively. In interviews and observations, teachers reported they often skipped over learning experiences in the modules, or that they taught the learning experiences out of sequence, and in other ways "adapted and modified" the Insights curriculum for "their" students without understanding that it undermined the development of students' conceptual understanding….[The project has] had to give more attention to making teachers aware of the conceptual development that underlies each learning experience in the modules.

Quantitative data from classroom observations across all projects support these observations. Figure 39 shows that in observed lessons, the more closely the lesson adhered to the instructions provided in the teacher's manual, the more likely it was to be rated effective. Forty-eight percent of lessons that adhered closely to the materials were given high ratings (capsule ratings of 4 or 5) compared to only 26 percent of the lessons with low adherence. These findings reinforce the LSC program's emphases on having teachers implement the designated instructional materials as designed by their developers.

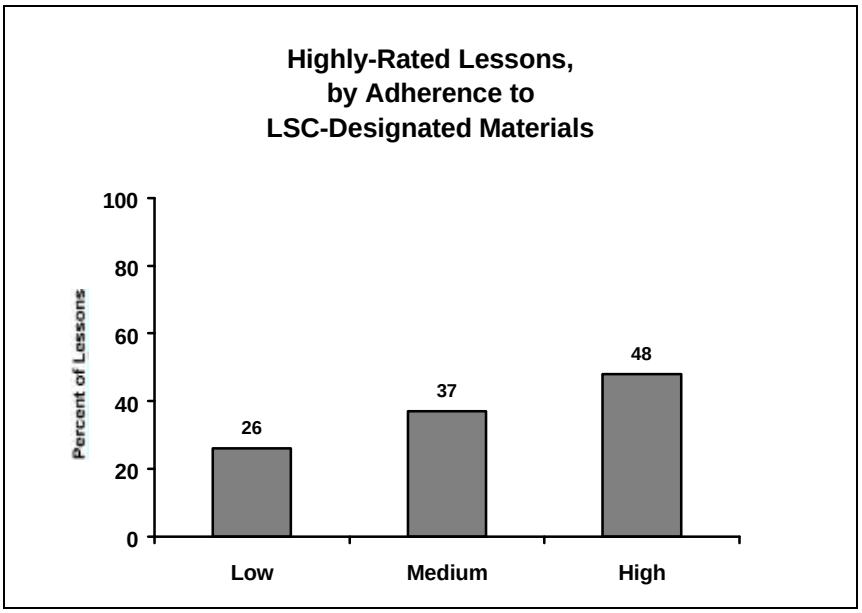

Figure 39

Sometimes it seems that professional development providers are encouraging a disregard for teaching the instructional materials as designed. For example, one evaluator noted:

> *It appears that some teachers are still unclear about the purposes and uses of the science kits. The official "ground rules" of the project are that teachers agree to teach the kits as designed. However, in individual sessions we heard facilitators and others encouraging modification and adaptation. Again, it would be good for the project to continually communicate their stance vis-à-vis their view of the place of the kits within the overall curriculum, and the vision they have for kits' usage in the classroom.*

Although lack of adherence to the materials was a problem across many projects, the evaluator of a K–8 mathematics/science project mentioned how following the materials too closely can also be problematic. For example,

> *The teacher taught this lesson directly as it was given in the teacher guide. The design worked well for the class but showed no touch of the teacher or class's individuality…the teacher still showed moments of lapsing into being too directing. His thoughts about the sequence of the instruction were too tightly based on following the lesson plan...did not show him using his personal reflection on the impact of the lesson on the child.*

The challenge for LSC projects is, of course, to find the appropriate balance. While recognizing that real-time adjustments can increase the likelihood of a lesson being effective in a particular classroom, several evaluators recommended that the projects initially place more emphasis on the importance of teaching the instructional materials as designed.

E. Quality of Instruction

The LSC vision of effective instruction includes the use of instructional strategies that are geared toward helping students develop deeper understanding of mathematics and science concepts. Evidence of impact of the LSC on teachers' use of these instructional strategies comes from a variety of sources, including interviews, classroom observations, and questionnaires.

One administrator described the way the LSC project had changed the way science is taught in the district:

> *Teachers have gone from telling kids science to teaching them science; away from, "Here are things that happen in your world," to a sense of more, "Let's watch what happens in your world." There's a relevancy to what's going on around the kits in science, and it's more apparent than in the past—the hands-on idea, student involvement, discovery, and inquiry are more promoted by different aspects of the project.*"

Evaluators noted a positive climate in many classrooms, where students were encouraged to generate questions and ideas.

> *The climate was supportive, positive, caring and students had no problems taking risks. Student to student, student to teacher, there was excellent discourse. There was an easy-going atmosphere. Students could freely give their ideas.*
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> * * *
>
> *The class began with a discussion of the preceding day's experiments. During the discussion, the teacher asked questions like: "Why did we do that?" "What did we conclude from that?"*

The importance of listening to student talk was mentioned over and over again when teachers were asked about the impact of their LSC project. One teacher commented:

> *Listen to students. Read their writing. Ask them to make connections. Talk to them. Let them talk to each other…and then eavesdrop!*

Similarly, an evaluator commented:

> *Another impact is in the focus on student strategies, thinking, and explanations. Clearly the three lessons that I would identify as being strongly influenced by the [project] workshop had students explaining their strategies and actively communicating mathematically with the teacher, and in some classes also with each other.*

Among teachers interviewed concerning impact of LSC, responses concerning changes in instruction were by far the most common. Teachers reported being less dependent on the

textbook, stepping back to "let the kids discover," doing extended projects, and looking more at how students arrived at, and justified, their answers and less on whether they got the "right" answer.

> *It helped me do better questioning with the students, getting them to think mathematically, such as: "Does this work all the time? How can you prove that? How did you come up with that? What would happen if…? Did you see a pattern? What do you predict would happen next?"*

* * *

> *I've really learned how to pull things together this year. Leading a wrap-up that would assure that the kids would focus on the main idea of the activity or the inquiry they had been involved in. This was my greatest achievement this year.*

* * *

> *I try to present new ideas in an IMPish fashion. I am able to present more real life examples instead of just solving equations.*

* * *

> *It helped me become less teacher-directed, the students have had to be more open to there being more than one answer. I am not as "stiff" as I used to be. It's not just textbooks, it is more hands-on and student exploration. Of course, the textbook is easier, but [LSC] science is better!*

Other areas of LSC impact on instruction that were mentioned by teachers and observed by evaluators include paying attention to what students already know about a subject; encouraging students to observe closely; allowing students time to reflect and identify patterns; and supporting cooperative group work by students. An evaluator of a K–8 science project summed up the impact of LSC professional development as follows:

> *The bottom line is that more teachers are teaching science as a process of inquiry rather than merely as a body of knowledge. Some of the teachers were beginning to explore this type of teaching anyway, but due to the efforts of the project have been able to go further faster.*

Several projects have made equity issues an explicit focus of their design; evaluators in those and other projects have noticed the impact the LSC has had on making mathematics/science accessible to all students. For example, some teachers are effectively using the adopted materials in their bilingual classes. Said one evaluator:

> *Three of the 5 classes receiving overall ratings of a high quality of instruction were bilingual classrooms, where teachers and students discussed and wrote about ideas in both Spanish and English. In these three classrooms, the use of*

Spanish for instruction appeared to support students' participation, learning, and expression of their ideas about mathematics.

Another evaluator provided examples of effective use of the materials in special education classrooms:

The experiences of other special education teachers supported this idea that children with special needs could benefit from their access to reform curriculum. A middle school special education teacher who taught mathematics to five eighth grade boys in a self-contained setting shared her experiences with the Mathscape materials. "We did the Math in Motion lesson; I took the boys out to the hall to do the measuring stuff on the floor. They liked these activities; they didn't have to read anything to figure out things for themselves; they learned and found it was fun. They were adding fractions, but they didn't know it."

Middle School Resource Room Teacher

In another middle school classroom, a resource room teacher and an eighth grade mathematics teacher designed a lesson they could teach as a team to a class of regular education and resource room students. There was no way to know which of the students in the classroom were learning disabled. Both teachers worked collaboratively with all the students. The teachers were highly respectful of the students, their different abilities, their prior knowledge, and their ideas. The teachers encouraged students "not to be afraid to be wrong."

The students were so engaged in the activity that the teachers decided to continue it and extend it for the duration of the period, rather than move on to another activity the teachers had planned. Students worked collaboratively with each other without having to be reminded to involve every member of the group. The groups worked truly as teams in their problem-solving investigation, respecting and listening to each others' ideas.

In the wrap-up discussion, the students protested when the teachers showed what they perceived to be favoritism in calling on the same student over and over ("Carlos again?"). The teachers explained later that this child had never before wanted to share his ideas, and here he was bursting to tell everyone what he was thinking. It was his engagement with the lesson that contributed to the teachers' decision to stay with the activity for the duration of the lesson.

When evaluators mentioned weaknesses in classroom instruction, they tended to focus on the same areas in which they saw improvement (e.g., questioning strategies, attention to closure, consideration of students prior knowledge, etc.) This would seem to indicate that although the LSC projects are making inroads in changing the ways that teachers approach teaching mathematics and science, there is still much work to be done. Several evaluators also commented on the time-lag between knowledge and behavior.

In general, we saw less evidence of reform-minded practice during classroom observations than we heard about during teacher interviews—an indication that teacher "talk" might not yet entirely match their "walk." (The fact that teachers "talk" more reform than they practice is, again, a very common pattern in the development of a hands-on science program.) Also, we note that the first part of reform often involves a focus on the nature of the activities—e.g., practice that is

hands-on, student-centered, and active. The focus on student thinking and student learning comes later in most situations.

Some evaluators also commented that lack of content knowledge on the part of teachers often impedes student learning.

When teachers lack sufficient content knowledge and the purposefulness [having in mind a purpose for the activity/exploration], it is difficult for them to make good instructional decisions about how much time to devote to explorations. We observed one math lesson where students were engaged in centers activities, meaningfully and seemingly, purposefully. But at the conclusion of the lesson, the students seemed no closer to gaining an understanding of place value than they did when they started.

Across all projects, there is a general trend for quality of observed lessons to improve with participation in LSC activities. In each classroom observation, trained observers rated the lesson on design, implementation, content, and classroom culture. Examples of indicators for each of these areas are shown in the following box.

Sample Indicators for Classroom Observations

Design

- The design of the lesson incorporated tasks, roles, and interactions consistent with investigative mathematics/science.
- The design of the session reflected careful planning and organization.
- The instructional strategies and activities used in this lesson reflected attention to students' experience, preparedness, and/or learning styles.
- The resources available in this lesson contributed to accomplishing the purposes of the instruction.
- The design of the lesson encouraged a collaborative approach to learning.
- Adequate time and structure were provided for reflection.
- Adequate time and structure were provided for wrap-up and closure.

Implementation

- The instruction was consistent with the underlying approach of the instructional materials designated for use by the LSC.
- The teacher's classroom management style/strategies enhanced the quality of the lesson.
- The pace of the lesson was appropriate for the developmental levels/needs of the students and the purposes of the lesson.
- The teacher took into account prior knowledge of students.
- The teacher's questioning strategies were likely to enhance the development of student conceptual understanding/problem solving (e.g., emphasized higher order questions, appropriately used "wait time," identified prior conceptions and misconceptions).

Mathematics/Science Content

- The mathematics/science content was significant and worthwhile.
- The mathematics/science content was appropriate for the developmental level of the students in this class.
- The students were intellectually engaged with important ideas relevant to the focus of the lesson.
- The teacher-presented information was accurate.
- Appropriate connections were made to other areas of mathematics/science, to other disciplines, and/or to real-world contexts.

Classroom Culture

- Active participation of all was encouraged and valued.
- There was a climate of respect for students' ideas, questions, and contributions.
- The interactions reflected collaborative working relationships among students (e.g., students worked together, talked with each other about the lesson).
- The climate of the lesson encouraged students to generate ideas, questions, conjectures, and/or propositions.

In addition, each lesson received on overall capsule rating. As can be seen in Figure 40, lessons of teachers who have participated in LSC activities had considerably higher ratings in each area than those of teachers who have not yet participated.

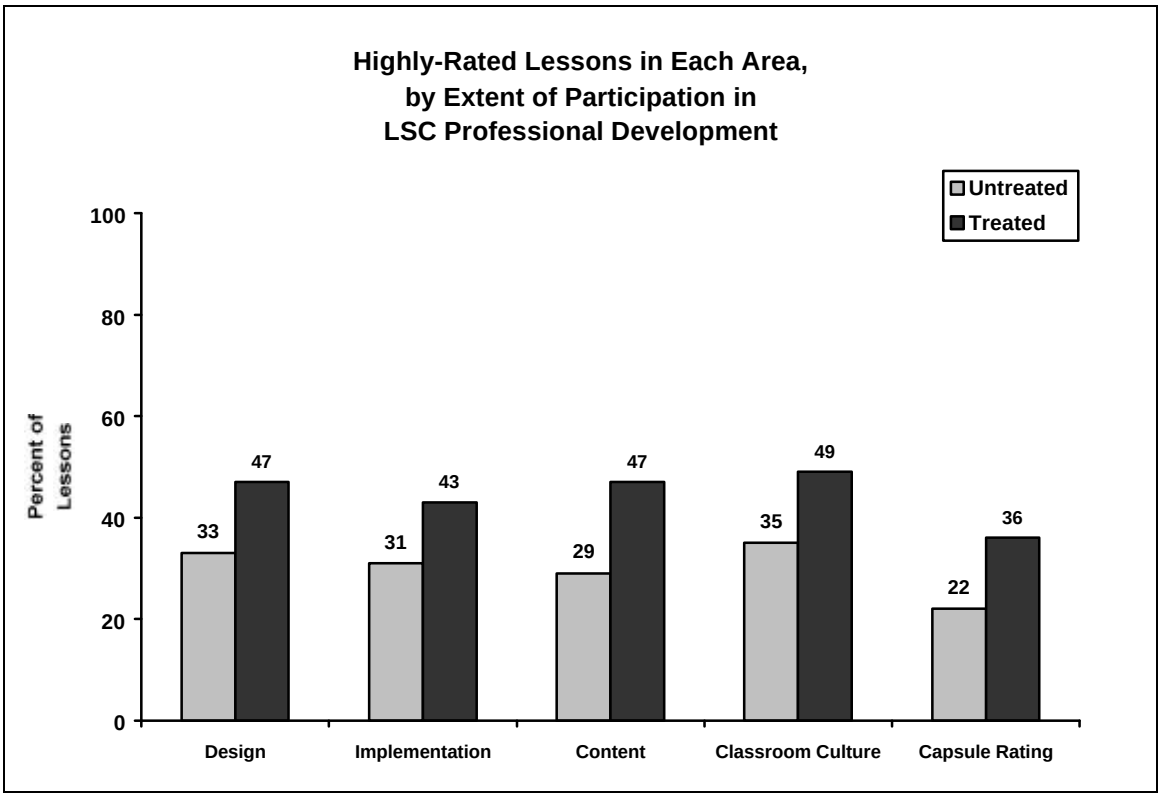

Figure 40

Another indication of the impact of LSC activities on classroom practice comes from composites created from questionnaire data. The Investigative Culture composite includes strategies used by teachers to facilitate exploration and investigation by students. It includes such practices as:

- Arranging seating to facilitate student discussion;
- Using open ended questions;
- Requiring students to supply evidence to support their claims; and
- Encouraging students to consider alternative explanations.

There is a significant increase in composite scores with increasing participation in LSC activities. (See Figure 41.) The seven-point difference in K–8 science between untreated and highly treated teachers represents a medium effect size (.55 standard deviations), whereas the three-point difference in K–8 mathematics and five-point difference in 6–12 mathematics represent small effect sizes (.17 and .36 standard deviations, respectively).

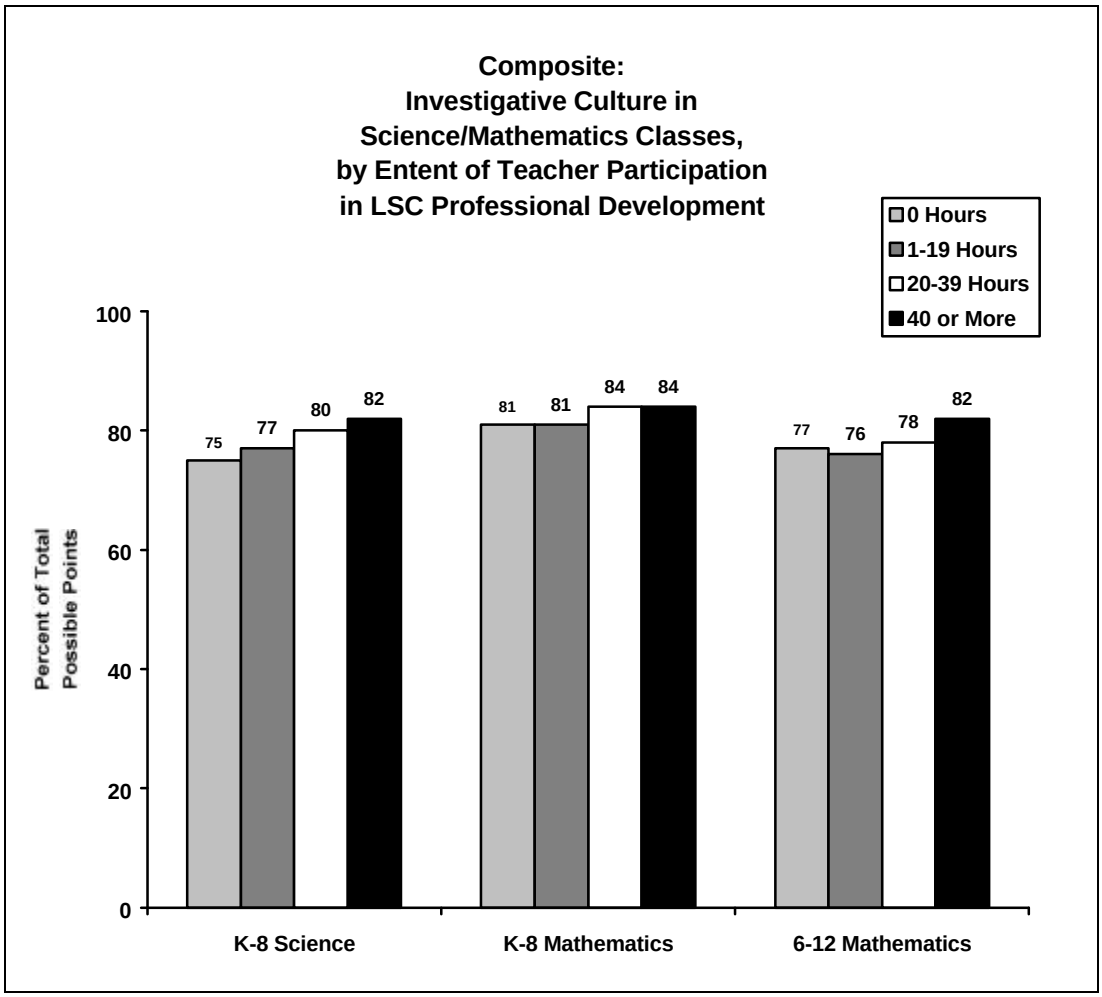

Figure 41

The Investigative Practices composite is tied to what students actually do in the classroom. It includes such instructional strategies as having students:

- Engage in hands-on mathematics/science activities;
- Work on models or simulations;
- Work on extended investigations; and
- Write reflections in a notebook or journal.

Again, as shown in Figure 42, there is an increase in composite scores across all subjects, with increasing participation in LSC activities. The eight-point difference in K–8 science between untreated and highly-treated teachers (.53 standard deviations) represents a medium effect size, while the four-point difference in K–8 mathematics and five-point difference in 6–12 mathematics represent small effect sizes (.27 and .35 standard deviations, respectively).

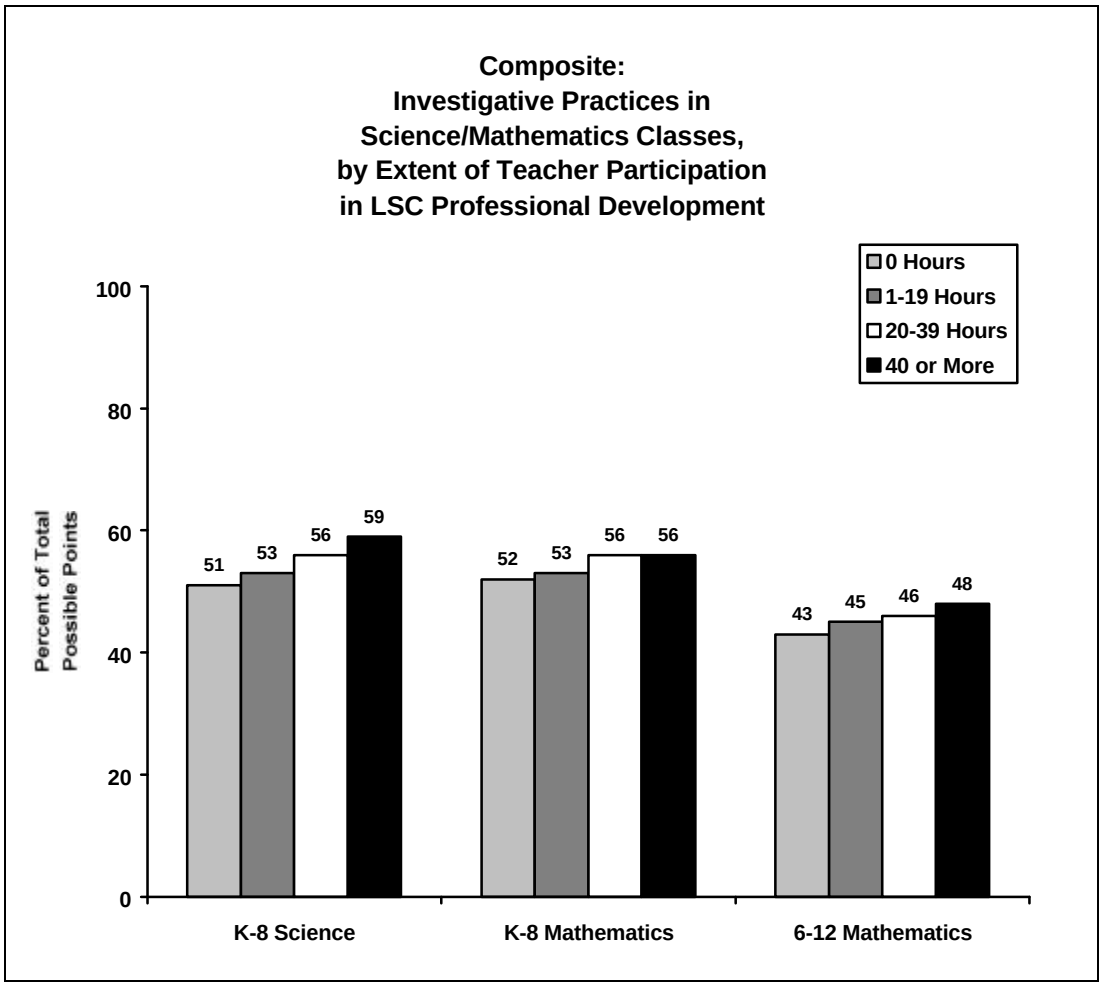

Figure 42

F. Changes in Assessment Practices

Many of the LSC-designated instructional materials include embedded assessment activities. In general, teachers reported that they were having students write more, using scoring rubrics to assess work, using open-ended test questions, and asking for performance products. At the same time, teachers raised concerns about assessment issues. For example, evaluators reported:

> *Assessment is the one aspect of the new curriculum that teachers uniformly indicate is "'hard" or "frustrating." One reason for this frustration is that much of the assessing of students and their work must happen during class time, and record-keeping in the classroom is a challenge.*
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> *Some teachers indicated that they continue to have difficulty assessing limited English proficient students, and that alternative assessments were too time-consuming and did not fit with standardized testing.*

In interviews, teachers reported a greater use of both "pre-assessment" and embedded assessment in their teaching. They also talked about using a broader range of assessment strategies.

> *In seventh grade assessment, I realize I have to go further than multiple choice tests. Students need to explain what they did and not just do it.*
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> * * *
>
> *I'm walking away from [a] standard of grades and now look at performance. I've set up rubrics. It has worked great and there is less failure in my classes.*
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> *For those children that are not necessarily as verbal, they still can show me, maybe not on paper and pencil, but they might be able to show me using the manipulatives or drawing the picture or, you know, in another way so I can tell.*

Classroom observations were not a good source of information on formal assessment, since teachers were unlikely to schedule observations for "testing" days. However, observers noted many informal assessment strategies used by teachers in the course of instruction. These included observations of students during group work, asking probing questions of individuals, and class discussions in which students were asked to explain their thinking.

Observers described how teachers listened carefully to students as they were working, embedding informal assessment in the work of the day.

> *After a teacher taught her class how to play "100–201 Bingo" from Mathematical Thinking, students broke into pairs. The game format provided the teacher an*

opportunity to observe and listen to the level of individual student thinking (e.g., Did students quickly mentally calculate where to move, or did they use their fingers to count out their moves?). As she watched and listened, she recorded her observations on a notepad.

Other evaluators described instances where teachers clearly modified the planned structure of the lesson in response to observation and questioning. The following is an example from a fifth/sixth grade class.

At one point, the teacher asked a series of questions to determine whether or not students could distinguish constants from variables. It was clear that she was informally assessing student understanding of key concepts and making adjustments to the lesson to clarify misconceptions.

During the post conference I asked the teacher what the next lessons were likely to be about. She quickly answered that she wasn't finished with the constant and variable discussion. She said that it was clear from the responses to the questions that students did not understand these concepts and she wanted to teach them again. This was an example of a mid-course curriculum correction resulting from informal assessment strategies.

While the core evaluation data collection does not include documenting impact on students, sometimes teachers commented on what their assessments had shown them. For example, a second grade teacher commented on a mathematics lesson concerning new ways of adding two-digit numbers:

By the end of the lesson, they had learned faster than any other group I had ever taught.

Other teachers commented on how students enjoyed the new approaches. For example, a science teacher reported:

They love it, LOVE it! They're smiling and talking to each other. They're talking to their parents. They have to work in groups and they don't fight!

Classroom observers also considered the potential for student impact as they observed lessons being taught. Areas of likely student impact are compared for treated and untreated teachers in Figure 43.[11] While there appears to be a trend of lessons taught by teachers having 20 or more hours of LSC professional development showing a greater likelihood of having positive student impact, only the 12 point difference in the likely effect on students' understanding of mathematics/science as a dynamic body of knowledge generated and enriched by investigation is statistically significant.

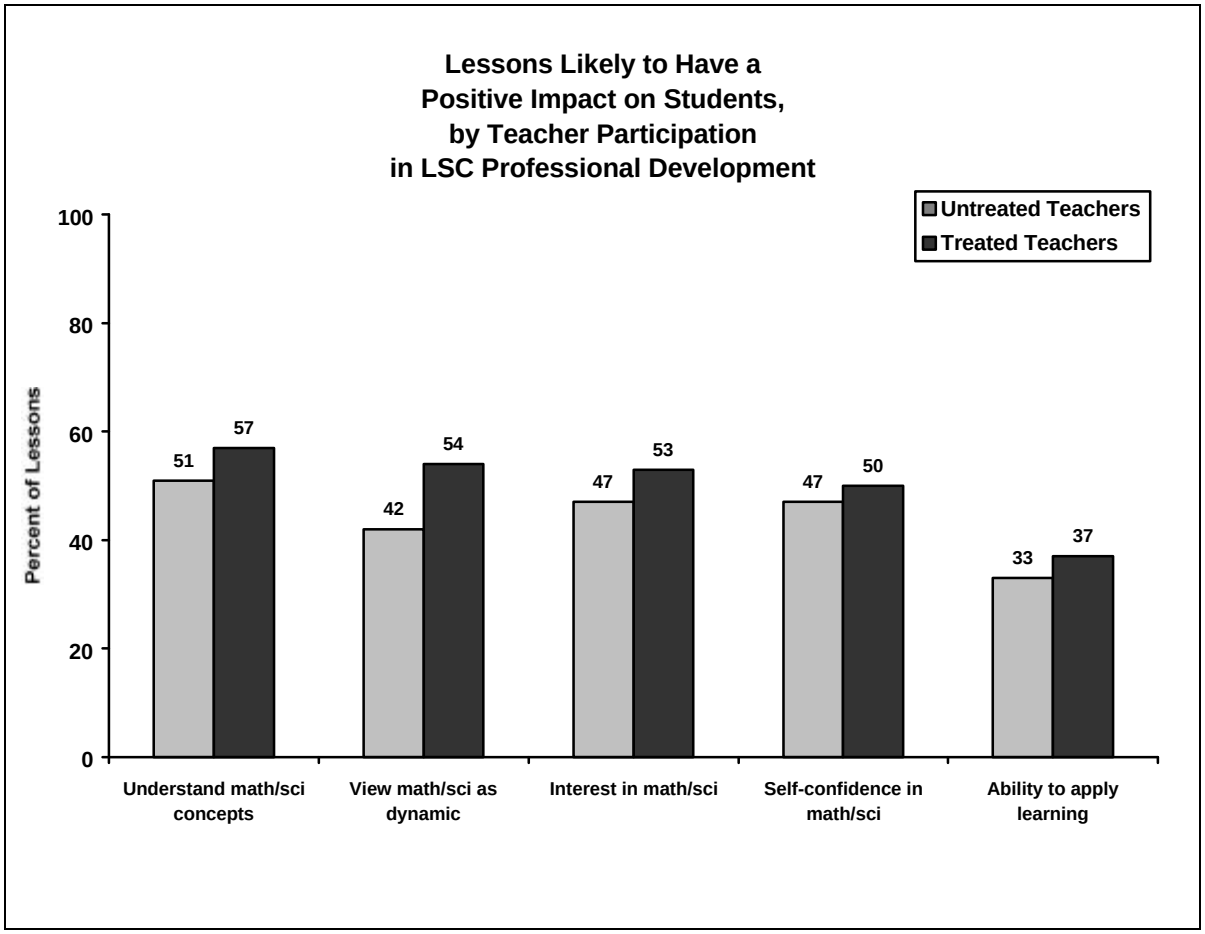

Figure 43

[11] While questionnaire results were presented for four levels of participation in LSC professional development (0, 1–19, 20–39, and 40 or more hours), the considerably smaller number of classroom observation participation prevented that extent of disaggregation.

G. Broader Impact

While the focus of the core evaluation is on mathematics and science instruction, teachers and evaluators also noted other ways that LSC professional development is having a more general impact on school programs, as these comments from interviewed elementary teachers illustrate:

> *I make a lot more use of inquiry techniques, not just in science, but in other areas, too.*
>
> * * *
>
> *I learned how to ask open-ended questions and how to get children to respond to questions. Definitely changed my teaching—not just in science, but in everything.*

There is less evidence that the LSC is having a general impact at the secondary level. While some evaluators reported that teachers were "edging the philosophy and methodology of the [project] curriculum to the [other mathematics] classes they teach," other evaluators noted that teachers seem to be reluctant to implement reforms with their accelerated students. An evaluator of a secondary mathematics project reported:

> *It is a concern that for some teachers, the accelerated classes do not get the benefit of reform curriculum, nor of reformed pedagogy. An informal observation revealed a teacher who apparently understands reform and is able to teach reform curricula effectively, using very traditional instruction with his accelerated students. His comment was that "these kids can handle a fast paced lesson." Although it is unclear how many of the teachers teach their accelerated class in a more traditional format, believing that the students can easily learn in this format, it seems important to get a better handle on the extent of this practice. This should concern the project staff and some focus, through professional development experiences, on the learning of students in accelerated tracks seems to be needed. This seems particularly relevant in the context of this LSC in which accelerated students are heavily tracked in their mathematics instruction.*

Similarly, another evaluator commented:

> *To ensure that all students have equal access to mathematics, the district needs to reconsider tracking students for mathematics instruction. The introduction of reform curricula materials for all levels of instruction in elementary and middle schools is a step forward in reversing this policy. As currently structured, however, the implementation model excludes the honors students in grades 8–12 from using the exemplary mathematics materials.*

While the LSC projects have had success in improving mathematics and science education in the participating schools and districts, the reform process will clearly require additional time, effort, and resources.