

**EXECUTIVE SUMMARY
OF THE
Local Systemic Change
through Teacher Enhancement
Year Two Cross-Site Report**

By

Iris R. Weiss
Kathleen A. Rapp
Diana L. Montgomery

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Horizon Research, Inc.
111 Cloister Court - Suite 220
Chapel Hill, NC 27514-2296

Background

In 1995, the National Science Foundation (NSF) began its Local Systemic Change through Teacher Enhancement Program (LSC). The goal of the program is to improve the teaching of science, mathematics, and technology by focusing on the professional development of teachers within whole schools or school districts. Each targeted teacher is to participate in a minimum of 100 hours of professional development with an emphasis on preparing them to implement exemplary science and mathematics instructional materials in their classrooms.

LSC projects are expected to align policy and practice within the targeted district(s) and to include:

- A shared comprehensive vision of science, mathematics, and technology education;
- Active partnerships and commitments among stakeholders;
- A detailed self-study that provides a realistic assessment of the current system's strengths and needs;
- Strategic planning that incorporates mechanisms for engaging each teacher in intensive professional development activities over the course of the project; and
- A set of clearly defined, measurable outcomes for teaching, and an evaluation plan that provides on-going feedback for the project.

The LSC projects are distinguished from teacher enhancement projects of the past by their systemic focus, including professional development for all teachers of science/mathematics at the targeted grade levels, the implementation of exemplary instructional materials, and the alignment of district policies and practices with the reform vision.

Core Evaluation

NSF contracted with Horizon Research, Inc. (HRI) to design and implement an evaluation for collecting data that could be aggregated across projects. The core evaluation system designed by HRI in conjunction with NSF and the project PIs and evaluators includes observations of professional development activities and science and mathematics classrooms; teacher and principal questionnaires; and teacher interviews. Project evaluators use these data, as well as any additional, project-specific data they may have collected, to address the following core evaluation questions:

1. What is the overall quality of the LSC professional development activities?
2. What is the extent of school and teacher involvement in LSC activities?

3. What is the impact of the LSC professional development on teacher preparedness, attitudes, and beliefs about science and mathematics teaching and learning?
4. What is the impact of the LSC professional development on classroom practices in science and mathematics?
5. To what extent are the district and school contexts becoming more supportive of the LSC vision for exemplary science and mathematics education?
6. What is the extent of institutionalization of high quality professional development systems in the LSC districts?

LSC Projects

Project data sheets completed by the PIs provide some basic information about the 26 projects included in Cohorts 1 and 2.

- Roughly half of the Cohort 1 and Cohort 2 projects are single-district projects; at the other end of the scale, 4 projects involve more than 10 districts, including 1 with 21 districts.
- The 8 Cohort 1 projects and 18 Cohort 2 projects plan to involve a total of 28,239 teachers in 1,312 schools in 121 districts across the United States.
- By the completion of these projects, an estimated 706,000 students will receive instruction from LSC-treated teachers each year.
- 20 projects target K–8 science; 2 projects target K–8 mathematics; and 4 projects target both K–8 science and mathematics.

This report presents highlights from the 1995–96 project year, including results from the 8 Cohort 1 projects that were in their second year of funding and the 18 Cohort 2 projects that were funded in 1996.

Findings

The LSC Initiative is proving to be an effective mechanism for providing high quality professional development to large numbers of teachers. Moreover, by operating in a systemic context, the LSC projects have the potential for greater and more sustained impact than has typically been the case in teacher enhancement projects involving individual teachers from a large number of schools and districts.

Data on the quality and impact of the LSC projects come from teacher and principal questionnaires, teacher interviews, and observation of both professional development activities and science and mathematics classrooms.

Quality of Professional Development

Project evaluators observed a number of professional development sessions in each project using a standardized protocol developed by Horizon Research, Inc. These sessions generally received high marks for the quality of their design and implementation, for the appropriateness of the disciplinary and pedagogical content, and their inclusive, collegial culture. *Overall, the LSC programs appear to be well-aligned with national science and mathematics standards, and in particular those for professional development; projects generally attend to important science and mathematics content and pedagogy in a spirit of inquiry, reflection, and continuous improvement.*

Evaluators noted a number of ways in which the LSC professional development reflects current standards for best practice in professional development. Among these are the relevancy of professional development activities to teachers' work in classrooms, the way in which professional development typically modeled effective pedagogical strategies; the opportunities for teachers to reflect individually and with their colleagues; and the attention to follow-up support as teachers worked on implementing standards-based curriculum materials in their classrooms.

At the same time, evaluators in some projects have noted a need for greater attention to the balance between content and pedagogy when helping teachers learn to implement exemplary instructional materials; "going through the activities" is valuable, but teachers also need opportunities to explore the conceptual underpinnings of these activities in more depth. Also, evaluators note that projects using inexperienced professional development providers need to pay greater attention to ensuring consistently high quality service delivery; this issue was particularly important in projects where university scientists and/or lead teachers were responsible for conducting professional development sessions.

Impact on Teachers and Teaching

Teachers who had participated in LSC professional development were generally quite positive about their experiences, indicating that they had become more confident in teaching science as a result. Moreover, teachers who have participated extensively in science and mathematics professional development report higher levels of preparedness and more frequent use of standards-based instructional strategies than do teachers with less professional development involvement.

Science lessons taught by teachers who had participated in LSC professional development were more likely than baseline science or mathematics lessons to be rated highly on the extent to which the discipline was portrayed as a process of inquiry; students were encouraged to generate ideas, conjectures, and propositions; and the degree of closure was appropriate for the purposes of the lesson. Nevertheless, when the evaluators considered the lesson as a whole, Cohort 1 science lessons were no more likely than other observed lessons to receive high ratings.

Providing a Supportive Context for Teaching

In keeping with NSF's focus on system-wide reform, the core evaluation questionnaires and interviews asked teachers about the support they receive from parents, principals, and other teachers in their schools. Teachers in the LSC districts generally feel supported by other teachers in their schools to try out innovative ideas in science and mathematics teaching, but they rarely have time during the regular school week to work with one another. In fact, lack of time to work with other teachers, inadequate funds for purchasing equipment and supplies, lack of access to computers, and the need for more planning time headed the list of problems for science and mathematics instruction reported by both teachers and principals.

Evaluators were also asked to describe the extent to which district policies and resources were aligned in support of the LSC reforms and the likelihood that the reforms would be sustained after the NSF funding period had ended. *Most projects were rated at Level 3 (out of a possible 5) in terms of district support, indicating that district policies were in transition toward a more supportive context.* Many spoke of commitments the districts had made to the LSC reforms, including purchasing kit-based instructional programs and establishing centers for maintaining and refurbishing the kits. While many LSC projects have begun the process of developing lead teachers and otherwise increasing internal capacity to provide high quality professional development, many of the LSC districts do not yet have the mechanisms or resources to sustain these systems.