

LSC Analytic Memo Topic: Impact of the LSC on Classroom Practice
Subtopic: Evidence of Fidelity of Implementation of Instructional Materials
Author: Ann P. McMahon, Former Co-PI, Renaissance in Science Education (Project 87)
Riverview Gardens Schools, St. Louis, MO

History of the LSC

Renaissance in Science Education (RISE) began in 1996 as a district-funded pilot program in two K-6 elementary schools. NSF funding of RISE as a five-year, K-12 Science LSC began on July 31, 2001. Scale-up of the program began at that time. The RISE initiative includes a professional development program with three supporting components: curriculum plan, materials management system, and administrative support. There are five Facets to the professional development program, each directed to a specific audience:

- *District Leadership* – A subset of all teachers and curators (materials managers) and open to all Administrators
- *Science-for-All* – All teachers and curators (materials managers), and open to all Administrators
- *Materials Management* – All curators (materials managers)
- *School Leadership* – A subset of all teachers (may overlap with District Leadership subset)
- *Administrative Support* – All principals and selected central office Administrators

This report focuses on the elementary (K-6) program. RISE's curriculum scope covers 12 themes. These themes are investigated in a repeating 3-year cycle, with 4 themes explored per cycle year. Each theme is divided into three different levels of study according to grade level group (K-2 and 4-6). The third grade year is a curriculum review year in which students prepare for a high-stakes state test given in the spring of that year. The teachers in grades K-2 and 4-6 only address 4 themes in a given year, which allows for a more concentrated and extensive exploration of each theme as well as more efficient materials management and professional development. Because all grade levels learn a theme at the same time, the district becomes a community of focused learners.

The core of the district's implementation system is the support of a curator, or materials manager, in each elementary school. The curator prepares and delivers science materials to each teacher on a weekly schedule and stays in the classroom to assist the teacher in the most materials-intensive lesson of the week. It should be noted that curators attend professional development with teachers and have additional professional development for materials management.

The materials management system provides the conditions for every student to receive a common set of experiences each week regardless of which classroom or school the student attends. The curriculum plan and professional development program provides the conditions for all teachers, including those new to the district or who have transferred grade levels, to be trained in all science themes he or she must teach.

During the pilot phase and early NSF-funded phases of the program, the Superintendent (who was also the PI of the LSC) and principals decided that they could ensure teacher participation in professional development if they designated specific days in the district's professional development calendar for RISE *Science-for-All* training. In addition to the designated professional development days in the academic year, the project offers an annual summer Content Institute (24 hours of *Science-for-All* professional development over four days) that prepares each teacher to teach the first two of four units. Principals of all but one elementary school (8 of 9 schools) strongly encouraged teachers to attend the Content Institutes during the pilot and early NSF-funded phases. During the early years of NSF funding, 80-90% of elementary teachers participated in professional development during the summer and 90-97% participated during the school year. More than half of the elementary principals and all of the curators participated in the same professional development totaling 36-40 hours per year of *Science-for-All* training.

During the pilot phase that included two elementary schools, project staff met weekly with the two principals for *Administrative Support* professional development. The weekly meetings helped to shape and de-bug the program for the successful scale-up to implementation in eight of the nine elementary schools that occurred when NSF funding was awarded. Project staff established weekly meetings with the entire group of principals after scale-up in order to create a network among principals. Principals did not find value in group meetings; they preferred one-on-one meetings as needed with project staff in order to address their unique concerns and to customize the program to their school. Pairs of principals who had already established collegial relationships communicated about RISE informally. The group of principals communicated at RISE professional development sessions during the summer and once per quarter during the school year. Other *Administrative Support* professional development is provided occasionally to all Central Office personnel and principals by the project director (who is also the district science coordinator) during monthly district Administrators' meetings convened by the Superintendent.

Curators for the elementary schools meet two hours each week for *Materials Management* professional development. During these meetings, materials are distributed, materials preparation and delivery protocols are reviewed, and potential problems are discussed. Curators provide feedback about implementation in each school. Curators review upcoming lessons for content that students should experience. Project staffers lead these meetings. Principals release their curators from duties in the school in order to attend these meetings.

District Leadership professional development consists of the Teacher Leader Team and curators working with external partners (the St. Louis Zoo, the St. Louis Science Center, the Missouri Botanical Garden, Washington University, Tyson Research Center, University of Missouri – St. Louis) to prepare to deliver Science-for-All training to their colleagues. Self-selected individual teachers participate in *School Leadership* professional development, a series of graduate science courses at Washington University under the name Education 6000. These courses are tied to the state standards and to the inquiry-based curriculum at Riverview Gardens. They lead to a certificate in Science Education or to a Master's degree in Education with an emphasis in science.

It should be noted that the Superintendent during the pilot phase and the first year of NSF funding was also the PI of the LSC and the driving force behind the administrative support for RISE. She was involved in planning RISE and in committing district resources (professional development time, money, personnel etc.). She was instrumental in leveraging support of other Central Office administrators and principals, and in approving partnerships with other institutions. During the second year of NSF funding, a new Superintendent was hired, and in successive years, the entire Central Office staff and half of the elementary principals were replaced. The current Superintendent is not the PI of the LSC.

It is against this background that the following account of the impact of the LSC on classroom practice is made.

Materials Management that Facilitates Change in Classroom Practice

LSC-designated instructional materials were purchased by the district and delivered to all schools in the district. Each elementary school received twenty-four different kit-based curriculum units over a three-year period (four each year for K-2, and four each year for 4-6). Elementary school curators receive any additional materials they might need at the weekly curator meetings. Curriculum review units were delivered to third grade teachers at each elementary school in preparation for the high-stakes state tests administered in the spring. The curator in each school prepares and maintains the materials in each school. Each curator/school is supported and supplied by a central district warehouse.

The professional development makes it clear what support teachers will receive from the curator in their building. The framework for each unit and professional development session is a document we call a handbook. The handbook is a week-by-week implementation plan written by Teacher Leaders and based on the unit's teacher's guide. Each week in the handbook contains a pre-lab lesson, a lab lesson (when the curator stays to help the teacher) and a post-lab lesson as well as vocabulary words and a list of pages teachers can read for background information. For each lesson, the handbook contains the following sections 1) designation of the lesson as a pre-lab, lab, or post-lab; 2) advance preparation of materials with teacher-provided materials and curator-provided materials listed; 3) lesson objectives; 4) procedure notes that include any modifications to the lesson as written in the teacher's guide; 5) a list of assessments appropriate for that lesson; and 6) connections to the district's math and literacy programs. The handbook is meant to be used with the teacher's guide for the unit. A packet of activity sheets, assessments and writing prompts that support the district's literacy program accompanies the handbook and teacher's guide.

Elementary curators participate in a facet of professional development called *Materials Management*. The curators meet as a group with project staff for two hours each week. At that time, materials that supplement the kits already in their buildings are distributed. We review the handbook and materials to be prepared and delivered for upcoming lessons and review the student observations to be made in the lab lesson. We discuss the successes and challenges in implementing the lessons of the previous week, and the fidelity of implementation of the prescribed lessons in each school. It is the curators' weekly feedback, coupled with formal

classroom observations that provide a realistic picture of what really goes on in the classroom and how professional development affects classroom instruction.

The curator's role in the school is vital to high quality implementation of the science program. In addition to preparing all materials for the teachers, the weekly appearance of the curator in the classroom provides both support to the teacher and a feedback loop to the principals and the project staff. Because the curator sees a particular lesson implemented several times in a week, s/he can advise teachers in the implementation of a lesson based on experiences from those who conducted the lab before. Often, if a teacher forgets to call attention to something that happens in lab, the curator can provide a gentle reminder. The curator operates on a schedule in order to get to all classrooms in a week, so if a teacher is not prepared or cancels the curator's visit, the principal and project staff hear about it. The curator's presence adds accountability.

We have noticed two requirements for successful implementation of the curator model of materials management: 1) hiring a curator with proper organizational skills and 2) gaining the commitment of the principal to protect the curator's time. Anyone who can budget time and organize materials makes a good curator. Project staff can help those who have not previously been responsible for organizing time and materials with some protocols that have evolved over the years of the project. Only the principal can protect the curator's time. In several of our elementary schools, principals have chosen to use the curator as a substitute teacher on short notice, as a supervisor of in-school suspensions, or otherwise interrupt the schedule of science deliveries and support. Occasionally, teachers can and do successfully perform lessons using materials on a cart prepared by the curator and left in the teacher's room. The chances of high quality implementation decrease dramatically when the curator's schedule is frequently interrupted. In the schools where the curator is well-organized and supported by the principal, the quality of implementation is high. Classroom observations by trained evaluators and anecdotal reports from curators reinforce this claim.

While the presence of a curator tells the project staff the fidelity of implementation of the curriculum, the quality of the instruction is evaluated by those trained in the HRI evaluation instruments. These evaluators include our external evaluators and project staff.

Conclusion

The curator role changes classroom practice in 5 ways: 1) Curators remove the "barrier of the box" of materials by preparing and delivering materials for each lab lesson to teachers on time, in working order, and in amounts that allow students to work in pairs. 2) Because the curator visits teachers on a schedule each week, s/he can motivate teachers to do the post-lab for the prior week's lab lesson and the pre-lab for the current week's lab lesson before the curator arrives to help with the current week's lab lesson. 3) The principal has the opportunity to monitor the implementation of the science curriculum by monitoring the curator's visits to the classrooms. If a teacher cancels or reschedules lab lessons routinely, it can prompt a principal to check on curriculum implementation in that classroom. 4) At their weekly professional development meetings, curators report to project staff the fidelity of implementation of lessons in their schools. Project staff can then target classrooms for informal observations during pre-labs,

labs and post-labs. 5) Teachers so appreciate the materials and classroom management service the curator provides that they are more willing to teach science.