

Analytic Memo, Project 70
Capital Region Science Education Partnership
Schenectady NY

Sigrin T. Newell, PhD, Walden University

To: Newly funded project PIs with a professional development component
From: Workers on a project nearing the end of its funding
Regarding: Teacher leader niche in the ecology of school systems

The ecological niche of an organism depends not only on where it lives but also on what it does. By analogy, it may be said that the habitat is the organism's "address", and the niche is its "profession", biologically speaking.
Odum, E. (1959) - Fundamentals of Ecology - W B Saunders.

The Capital Region Science Education Partnership (CRSEP) is in its fifth year of attempting to improve elementary school science education in six districts near the capital of New York State. As we reflected on what we have learned about creating teacher leaders, ecological metaphors emerged as a useful way to explore our newfound insights. It has become apparent that it is necessary to plan for sustainability from the very beginning of a project. An essential part of such preparation is to gain a very realistic view of the ecology of the local school system. In particular, teachers who are potential leaders emerge from a classroom niche. As leaders, they will move into a new niche. How this niche is defined and where it is located are essential elements of successful sustainability. A discussion of the experiences which led us to these conclusions follows.

The first lesson learned by the key players in the Capital Region Science Education Partnership is that engaging teachers as leaders in improving science education is far more difficult than we had initially envisioned. To help elementary teachers become effective as leaders, it is necessary to understand the difficulties in a very deep way and then to develop strategies to address these problems.

Just as dynamic balance is found in ecosystems, we have found that flexibility has been the key to taking advantage of lessons as they are learned. It has been necessary to change course several times as the complexity of the roles that teachers play has become apparent. The people who wrote the LSC grant had an analytical, intellectual perspective on change in schools. They were often surprised to discover the reality of the daily pressures on teachers in classrooms. The analytical skills of the CRSEP leaders were brought into play many times as problems were identified and new strategies invented. We have had to learn the impact of the school culture on how it is that teachers think and how they perceive what they are able to do.

Context and Challenges

Professional Development Specialists

The nature of school hierarchy, the place of science in the elementary curriculum, and the role of unions all are important contextual elements for understanding the potential niche that teacher leaders can fill in schools. First we will discuss the role of the Professional Development Specialists, teachers who left the classroom to work for full time for the CRSEP project. Then we will discuss the role of teachers who worked with the project while staying in the classroom.

In the CRSEP project the major providers of professional development were teachers on special assignment called Professional Development Specialists (PDS). Although the original intention was to hire each PDS to work for the entire five years of the grant, only one person did stay the five years. In all, there were seven teachers who became Specialists. The others stayed for one to three years, then either went back to the classroom or moved to a supervisory position.

In part this turnover was because of frustration with lack of authority. In schools the usual hierarchy is superintendent, principals, curriculum specialists, and then teachers. There is no place in this hierarchy for professional development specialists or teacher leaders. They have very little authority and no ongoing support for the role. It was an assumption of LSC and the CRSEP leaders that the PDS would have a role in changing the way science is taught. In our situation, since the PDS didn't have a niche in the hierarchy, they had no authority.

Another example of the role of hierarchy in the schools has been the interaction between the PDS and the project manager. In order to manage the money, scheduling, and coordination between participating school districts, a strong project manager has been essential. The CRSEP manager came with previous experience as a project manager. However, she remained under a teachers' contract. Because of this, the Specialists, also former classroom teachers, had a difficult time accepting being supervised by a supposed peer; they felt they were on level ground with her and resisted her authority.

A second contextual element in the ecology of schools is the role of the unions. The unions have expectations about who may deliver professional development. Officially, only a principal is allowed to observe or critique a teacher. This union expectation disempowered the PDS and made it difficult for them to coach teachers. It is not in the culture for teachers to be observed by peers or to have peers act as critical friends.

A third contextual challenge is the place of science in the elementary school curriculum. Science is a weak third to English Language Arts (ELA) and Mathematics. In New York State, high stakes science tests in fourth and eighth grade have recently been introduced, which may make a difference. But for the duration of the LSC grant, elementary teachers had little incentive to focus on science. This may be true in other states as well.

At the beginning of the grant, it was our assumption that Science and Technology for Children (STC) units already in place had been implemented reasonably well and that the teachers' content knowledge was enough to meet the NY Standards. We found that this was not true. Elementary teachers frequently had little science knowledge. Thus it became necessary to refocus the professional development activities away from improving assessment toward increasing basic knowledge of science. The lack of pedagogical content knowledge on the part of the teachers is due in part to poor preparation at the university pre-service level and in part to undervaluing of science compared to reading and math.

The Culture of Teachers

The Professional Development Specialists were at the heart of the grant. It was originally envisioned that they would be instructional leaders in science and that they could train other teachers in each school to be school level science leaders. This was a daunting vision. The role of teacher leader is exceptionally important, as practitioners bring credibility to their peers for professional development. However getting people to step up to the plate is difficult. Elementary teachers are not comfortable with science. For someone to say "I'm a leader in science" takes unusual courage. An even bigger reason is the time issue. Teachers are in the classroom all day and don't have time to take on the additional task of a leader with no compensation or change in teaching assignment.

We thought that the teachers who were successful in teaching science would make good professional developers. The people who applied to be Professional Development Specialists were encouraged to do so by their own perceived success in implementing Science & Technology for Children. Administrators also recommended teachers that they thought were successful in science. However it takes a different set of skills to work with adults and to think of the curriculum from a K-8 perspective, rather than from just one's own grade level. CRSEP assumed a knowledge base and a perspective that the teachers did not have.

Elementary classroom teachers usually focus only on their own students and have a fair amount of autonomy in deciding how to teach a topic. We found that the Professional Development Specialists and other teacher leaders we worked with had an exceedingly difficult time developing a project-wide perspective. For example, attempts to improve workshops and the Curriculum Guides by creating a design template were resisted. "I'll do it my way."

Before CRSEP began, one teacher had agreed to let engineers from the General Electric Company work with her class. GE expended money for materials for the Simple Machines unit for four classrooms. When the teacher got sick and went on leave, CRSEP had a difficult time getting the materials for someone else to use. "GE was hers." She had done it her way, with paper and pencil, so no one else had a copy of the work she did. When she left, it took time to get a copy of her work. She was also reluctant to give in and do anything other than her way. This is another example of teachers' insular perspective.

If we knew then what we know now, we would try to identify the attributes and motivations of people who would be good teacher leaders and professional developers. We would explain to them the pros and cons of this job. We would look for the strengths of the potential candidates - understanding of the curriculum, awareness of teaching strategies, understanding of science content, rapport with peers, and professional development knowledge. After five years of the CRSEP project there are more teachers who have developed their capacities in these ways, so there is now a bigger pool of teachers who could be professional developers.

Preparing Teacher Leaders through University Courses

Also, we are currently developing two masters-level courses at the University at Albany, designed particularly to prepare professional development specialists. The first course, for teachers in any content area introduces teachers to the research base about professional development. The second course will be specific to science teachers.

The goal of the first course will be to get teachers to understand that as professional developers, they will shift their position with their peers. In this course the teachers will be asked to consider the following. What are you willing to give up in rapport with teacher colleagues to become a critical colleague? Are you willing to run a tight ship when you do a session? “Coffee is over-- get to work”. How will you deal with colleagues in the back of the room that would rather correct homework or do a crossword puzzle? What will you do when you observe a lesson that is a disaster? Are you willing to tell the teacher what to do differently?

To help answer such questions, the participants will study the research base about strategies and ways of thinking about professional development. Teachers will come to know that effective designs are supported in the literature, not just “I’ll do this activity.” The course will be structured as reading and discussion with a goal of creating a portfolio to present to potential employers and school districts.

The second course will emphasize professional development in science. The future developers will study unifying topics in elementary science with crosscutting themes such as systems, energy, and force. We will expect them to use concept maps, content e-mails, and the workshop format that was designed by CRSEP. Questions asked in this course include: How you deal with not knowing certain content? Are you supposed to know everything?

These courses are designed as part of a masters program and will lead to a certificate in professional development. The courses are designed for Board of Cooperative Educational Services providers, Teacher Center employees, teachers who want to work with their peers as mentors, and PhD candidates in science education. The course will begin as a face to face course, but plans are in process to make the first course on-line. As more students take these courses, there will a greatly enlarged pool of

teachers who are well prepared to be teacher leaders. These people then will be an essential element of institutionalization of reform.

CRSEP's Successful Strategies

The fundamental strategy for success has been frequent meetings between the principal investigators, the project manager and the professional development specialists. In these meetings problems are discussed and new strategies are devised. Over the five years, our understanding of the complex ecosystem of schools and how professional development specialists and teacher leaders might find their niche has grown. These insights have necessitated flexibility and willingness to change plans as we go. This has been true throughout the whole project and has been particularly effective when working with teacher leaders. The discussion below focuses first on activities with the PDS and then on strategies that worked with the larger group of teacher leaders.

The Professional Development Specialists met weekly with PI Audrey Champagne to discuss workshop plans, content knowledge, and the philosophy of professional development. The PDS read about research in professional development and discussed their readings in these meetings. In the early years, the meetings focused almost entirely on science knowledge. Until the PDS had a deep understanding of the science that they were helping other teachers to learn, they could not do their jobs well. As time went on, they were able to focus more on issues of working with adult learners, also a new challenge for them.

In the beginning, the PDS designed workshops from a logistical perspective. "First we'll do this, then this, then this." Through work with Dr. Champagne, they developed a template that insures that each workshop functions on two levels - logistical and conceptual. The template contains a section that addresses the big idea of the workshop being designed. The template also insures that content and pedagogy are given equal attention. Elementary teachers believe that that they already know pedagogy and are resistant to the idea that in science there is more pedagogy to be learned. The design template helped the PDS include effective hands-on strategies and other new pedagogies in their presentations.

An unexpected benefit of this was that it helped the PDS develop a sense of trust with the teachers. Teachers are notorious for expecting very little from professional developers. When they came away from a CRSEP workshop with a good understanding of the content so they could make sense of it for kids and when they had tried the hands-on activities for themselves, participating teachers began to trust that CRSEP workshops would be valuable. And this trust in turn, built the confidence of the PDS in their craft.

Another successful strategy for the PDS was to encourage them to be engaged in science education work beyond the CRSEP project. One of the Specialists is consulting for the New York State Education Department on the new fourth grade science test. This has a dual benefit. People in the Education Department can benefit from her CRSEP-gained knowledge, and teachers in her workshops can get a better understanding

of the expectations of the State. Another Specialist co-taught a Mathematics/Science Methods course at the University at Albany for pre-service teachers. Three Specialists made a presentation at the 2004 annual meeting of the National Science Teachers Association. They also presented at the local Science Teachers Association of New York State conference.

Teacher leaders

The CRSEP Principal Investigators, in accord with the LSC expectations also originally planned to train teacher leaders in each school. These leaders would present in-school workshops to their peers and be available for coaching. It was not possible to recruit teachers for this role, so several different strategies were developed. Some teachers were recruited to work on teams writing Curriculum Guides for each of the Science Technology for Children units. These guides aligned the STC materials with the NY State Standards. Some teachers worked on committees to improve assessment. Other teachers worked on curriculum committees in their own schools. The CRSEP Specialists worked with each of these groups, using their skills to help build a cadre of more experienced elementary science teachers.

The Professional Development Specialists participated in meetings of the Science Curriculum Committees in each district. These committees are charged with 1) curriculum alignment K-12, 2) curriculum development, 3) assessment development, 4) curriculum evaluation, 5) communicating information from the teachers in their building to the science coordinator, as well as from the coordinator to the teachers, and 6) integration of the science, language arts and math curriculums. The members of these committees take information back to their co-workers, and thus are a major source of leadership in individual districts. The Curriculum Committees frequently looked to the CRSEP Specialists for advice and logistical support.

As it became apparent that the Science and Technology for Children units were not well aligned with the NY State Standards, it was decided to recruit teachers to work on creating curriculum guides for each unit. In these guides, there are new hands-on activities that address content from the standards that is not in the original STS units. There are also end-of-unit assessments for each unit with multiple choice questions and constructed response questions that mirror the NY assessment. Writing the curriculum guides and creating the assessments served as a major development process for the fifty four teachers who together logged more than 2400 hours on this project. The teachers came up with drafts of aligned activities and assessments and then met with Dr. Champagne to discuss revisions. This process improved the pedagogical content knowledge of the participating teachers and put them in a good position to be informal leaders back in their own schools.

Living with Lessons Learned about the Ecology of Schooling

One of the problems that has been most challenging has been that of specialist and teacher leader turnover. It turns out to be very difficult for experienced elementary

teachers to leave their classrooms and move into the larger realm of professional development. Moving out of the traditional culture of friendly equal peers and into the role of critical friend is uncomfortable, particularly in a context where the new professional developer has little authority to influence how science is taught.

It is difficult to keep lead teachers involved once they have been recruited. Some change their teaching assignments and leave the CRSEP project. Others are too busy. The ones that stay involved continue because they like our project. But they have a limited amount of time. Only a certain percentage of teachers have the leadership personality to step forward. They get spread thin and then get pulled off in different directions. Once they have met their personal goals for learning science, they go off to other curriculum areas. Another lesson learned however, is that not every teacher should be a leader. Sometimes teachers say they would like to be leaders, but they are unwilling to learn the science content with the necessary depth.

One of the biggest problems in preparing future teacher leaders is that it takes more than a year for a classroom teacher (teacher on special assignment) to learn how to be an effective professional developer. It takes a combination of preparation and experience to develop the needed skills, but it is difficult to get teachers to agree to leave the classroom for such an extended time.

Getting the right person who is a good representative from each district is very helpful. The Specialists report that the teachers in their home district are doing better than teachers who are not in their district. The teachers in their home districts already have a rapport with the Specialists and work there has proceeded much more effectively. The teachers in the other districts don't have the same buy-in. This insight puts a high priority on training future teacher leaders in a local manner, so that they go back to their own districts.

The courses being designed at the University at Albany for a professional development certificate are intended to address some of these problems by making the teachers more confident in their new role as developers. It is hoped that those who start with realistic expectations and a stronger knowledge base, both in content and in professional development strategies will stay on in the role of science leaders in their schools.

The biggest lesson of all, however, is that just working to develop teachers' leadership skills and content knowledge is not enough. It is essential to rebuild the hierarchy of the schools so that there is a real niche for the teacher leaders once they have been prepared. As organisms in a natural ecosystem need a home, food and a supporting habitat, so teacher leaders need space to do their work, budgetary allotments, and a school culture that values their work. The phrase 'systemic reform' takes on real meaning when one considers what must happen before the dream of effective teacher leadership becomes a reality.

*The Principal Investigators on this project are
Dr. Audrey Champagne and Dr. John Falco.*

ORGANISM	ADDRESS/NICHE	PROFESSION (RESPONSIBILITY or FUNCTION)
Superintendent/Principal	Administrative Offices	Oversee everything
Science Curriculum Specialist	Departmental Offices	Oversee K-8 curriculum
Teacher	Classroom	Have students meet the standards
Professional Development Specialist	??????	Strengthen classroom practice