

LSC Analytic Memo
Institutionalization of Reform
STEP-uP
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Context of STEP-uP as it relates to institutionalization of reform

STEP-uP (Science Teacher Enhancement Project—unifying the Pikes Peak Region) provides a broad range of professional development for teachers and administrators in five districts in Colorado Springs in elementary science reform. STEP-uP has just completed Year 5 of the project. Prior to STEP-uP, all five districts had begun using science kits at the elementary grades, but the levels of implementation varied from 30% to 95% of the students receiving kit-based science instruction and professional development was only consistently required in one district. Three of the districts had formal refurbishment centers. A small number of kit trainings were offered regionally and the districts had begun meeting together to discuss issues of implementation.

Currently, all five districts have operating refurbishment centers. Ninety percent of all students receive hands-on, minds-on science kit instruction on three kits per year. Kits that are taught in at least two of the five districts have regional kit implementation trainings. All districts agree that an on-going staff development program is imperative to keeping science reform alive. The STEP-uP business partnership with Agilent Technologies has proven key in crafting policy decisions that have led to institutionalization of science reform. The STEP-uP university partnership with Colorado College has also been vital in furthering inquiry-based science instruction through modeling inquiry fused with content and in providing the support structures for teachers to gain graduate credit at a greatly reduced fee.

That STEP-uP focused on the five elements of elementary science reform—high quality science kits, refurbishment centers, professional development, assessment aligned to standards, and community/administrative support—and what high quality in each of these areas looked like, have been central to institutionalizing STEP-uP practices. In addition, science kits as content core for standards integration, embedded assessments, on-site professional development, embedded induction practices and multi-dimensional leadership have also been major contributors to institutionalization of STEP-uP practices.

In the fall of Year 5 (2004), STEP-uP led the superintendents, science supervisors, principal representatives, and primary and intermediate teacher representatives from the five districts through a visioning process using a Managing Complex Change model. Components of the model were Vision—Skills—Incentives—

Resources—Action Plan. Throughout the fall, district subgroups fleshed out the skills and teacher outcomes that result in improved student achievement that they wanted their teachers to have in science, identified resources and district incentives that would support the effort, and created an action plan that was to be in place by January 2005. Through that process, districts clarified which aspects of STEP-uP professional development and practices they valued and wanted to continue beyond NSF funding. The participants universally agreed that STEP-uP had been the most comprehensive, systemic initiative in which they had ever participated and that all the courses and sessions had been developed and monitored in such a way as to be replicated with fidelity. The districts envisioned continuing kit trainings, 3-hour Instructional Strategy Sessions (which included strands on Inquiry, Assessment, Integration of Literacy and Science, Integration of Math and Science, and Equity), 33- and 45-hour content courses, assessment implementation, and the Principals' Institute, plus practices embedded within the school such as mentoring, Critical Friends Groups, Assessment Implementation, beyond the NSF funding. Continuing with the science kits and refurbishment centers and working as a cross-district STEP-uP Collaborative were a given.

Science Resource Teachers (SRT) are essential to continuing the powerful professional development. The SRTs have received extensive professional development to increase their expertise in science concepts, inquiry, adult learners, and assessment. Budgeting for those positions meant a substantive commitment to elementary science reform, especially in these times of declining budgets. For the 2005-2006 school year, four of the five districts have budgeted for the SRT salaries. Though they are already seeing the limitations of realizing their vision without district SRTs, the one district without SRTs for next year will continue to receive STEP-uP support as they continue working through the process. SRTs from that district have been hired, in many cases, as building-level SRTs and they will continue working collaboratively with SRTs from other districts.

Since they were making a large budget commitment in funding the SRT positions, our districts could not afford also hiring scientist to lead content courses. From STEP-uP's perspective the scientist is vital for credibility and for the high quality of having the expertise to seamlessly intertwine content taught through inquiry. In fact, one of our earth scientists, Dr. Steve Getty, has commented that he had to wait until graduate school to learn science the way STEP-uP is teaching our teachers science. Fortunately, our business partner is stepping up to the plate to create a business coalition that will fund the scientists after NSF funding is complete. Again, leveraging partnerships has proven powerful.

Using the LSC to affect district/school policy changes: Challenges and Strategies

In affecting district and school policy changes to be pro-science, the primary challenges were the number of district and school initiatives and the high stakes testing of Literacy and Mathematics. With these initiatives and testing, STEP-uP has leveraged various aspects of our professional development so that districts have "used" STEP-uP to enhance their own initiatives. Other changes were brought about through STEP-uP interactions with our Administrative Council, which were associate superintendents and K-12 Science Supervisors.

One policy change that has proven vital to new teachers is including aspects of STEP-uP in district induction policies. Because of the LSC, we have been able to get districts to include kit trainings, STEP-uP mentoring, and Instructional Strategies Session professional development to be part of the official New Teacher Induction program in each of our districts. Each of our districts has adopted "culture-changing" initiatives during STEP-uP's five years.

With each new priority, STEP-uP does a thorough job of demonstrating how the reform effort and STEP-uP professional development support the district initiative. For example, several of our districts have moved toward using a Professional Learning Community model. Our districts understand the STEP-uP philosophy that you must "model-the-model" in professional develop, i.e. if you want teachers to use inquiry, then they must experience high-quality inquiry in a STEP-uP course, just hearing or reading about it will not bring about true change. With districts agreeing with that philosophy, it was compelling for them to have their principals and teachers EXPERIENCE Professional Learning Community when they participated in STEP-uP Critical Friends Groups, Lesson Study teams, Study group task forces, assessment development, and Principals' Institutes. Instead of being viewed as just one-more-thing-on-the-table, STEP-uP is viewed as a pro-active partner in achieving multiple goals in an effective way.

Through being an LSC, STEP-uP has been involved in affecting state policy regarding 5th grade science testing. We have SRTs who have participated in the Science Frameworks development. STEP-uP influenced helped clarify that K-4 standards will be assessed at the 5th grade level with 5-8 standards assessed at the 8th grade level—this was a critical step in keeping 5th grade using science kits and not moving to a textbook approach. In addition, one of our SRTs is assisting in identifying specific test items for the 5th Science CSAP.

Challenges and Strategies Associated with Testing Mandates: Being Consistent with the Reform Vision

A powerful strategy used to off-set the heavy emphasis on high stakes Literacy and Math testing was to provide professional development that integrated Science and Literacy standards and Science and Math standards. STEP-uP was able to convince our five districts that integrating standards was one way to ensure all standards were being taught and also good science teaching was an avenue to enhance math application in a meaningful context and also a way to apply literacy skills. It was important for the teachers and districts to understand that good science does not use a literacy model and that we were integrating standards using science as the content core. So the purpose of writing in science was to make meaning of the science concepts and the by-product would be increased motivation to write and more comprehensive writing because it was meaningful.

In the beginning, we cited previous research demonstrating improved reading, writing and math achievement when inquiry-based science was used. Our researchers have just completed a study that supports this previous research and correlates STEP-uP professional development in Notebooks, Graphing in Science, Reading in Science, and Assessment Implementation with significantly improved scores on the Colorado State Assessment Program in reading, writing, and math. Of course, the most compelling evidence to teachers was their own implementation of integrating Literacy/Science and Math/Science and seeing the improved reading, writing and math among their own students.

In addition, STEP-uP capitalized on Marzano's Classroom Strategies That Work by embedding those strategies that are most readily utilized in science to develop deeper science understandings into our science content courses. Again, teachers are more likely to implement at a high level what they have personally experienced. Teachers found it compelling that these strategies could be used across the curriculum, and in turn became more committed to STEP-uP professional development as a vehicle to improve student achievement in all content areas. Principals and district administrators saw the value of this strategy and encouraged teacher participation in STEP-uP science content courses (33- or 45-hours of field- or lab-based content using inquiry) as schools adopted the "Classroom Strategies" as an initiative.

A third strategy was highlighting that Colorado would be assessing science at the 5th grade level (CSAP) in the spring of 2006. Generally, when someone talks about assessing science, our teachers and administrators start asking, "Where is the science text—the content?" STEP-uP convinced decision-makers that developing conceptual storylines for their kits would help teachers focus on the content and

also that developing high quality assessments in which students could show what they know in a meaningful context was the best way to prepare for the 5th grade Science CSAP. With the heightened awareness, administrators requested that we lead the effort to ensure that their kids do well on that state assessment.

STEP-uP received supplemental funding from NSF to enhance the already-existing assessments within the kits. Using the STEP-uP model of multi-dimensional leadership, STEP-uP assembled kit-content scientists, science educators, kit trainers, SRTs, classroom teachers, and assessment experts to create conceptual storylines (6 a year for 4 years). Once those were developed, a parallel assessment storyline was developed that included constructed responses as formative assessment (similar to what we anticipated the 5th Science CSAP would have) and a final performance assessment that typically was closely related to a culminating activity already in the kit. That original final "activity" was restructured to be a performance assessment, complete with matching standards, rubrics, and student exemplars. The assessments were piloted and field-tested with revisions along the way. An important policy change as a result of the assessment project was that districts could now use the performance achievement data to satisfy state accountability requirements. Prior to implementing the STEP-uP assessments, districts were considering using paper-and-pencil tests to assessment elementary science for state accountability purposes. So everyone was a winner—the districts had their accountability measures, teachers were teaching better as a result of the conceptual storylines and the formative assessments, students were learning more as a result of knowing from the beginning what the summative assessment would be, and everyone stayed consistent with the vision for elementary science reform!

The STEP-uP research study just completed indicated a significantly significant correlation between teachers taking the STEP-uP Assessment Implementation training and higher students scores on the Reading, Writing, and Math CSAP scores, especially for girls and minorities. As our districts get closer to the high stakes science testing, both the quality of the work they have seen STEP-uP do in supporting their assessment needs and this research data seem to be keeping them on track with our reform effort.

Challenges and Strategies for Keeping Attention Focused on Elementary Science

Constant attention was paid to keeping district administrators and school principals advocating for elementary science. Any time a district started heading down a path that would lead to less emphasis on science, STEP-uP principal investigators and representatives from Agilent Technologies and Colorado College would meet with district superintendents, other central office administrators and school board members. Through this constant vigilance, we were able to keep budgets from

being decreased and to yearly increase the commitment of our districts to the 5 elements of elementary science reform.

In addition, STEP-uP has built the capacity of decision-makers in each district. STEP-uP has sent these decision-makers to a variety of trainings with the most powerful being ASMC (Association for Science Materials Centers) Next Steps Institute. We brought highly respected leaders in science ed, Dr. Larry Lowery, Dr. Michael Klentschy, and Dr. Ramon Lopez, to Colorado Springs to speak with district administrators, principals, school board members, and teachers to speak about critical issues. This year our researchers, Dr. Marie Revak and Dr. M. Jean Young, shared results of their correlation research with these same groups. The participants felt honored to be trained by these fine folks and to have a terrific lunch! There are stories from each of these decision-makers about how this support has changed their thinking and made them more supportive both substantively and philosophically to science education. They know they are part of a larger movement in the country to bring high-quality science materials and instruction to their students.

During the first year of STEP-uP, all courses were offered either at Agilent Technologies or in the field or in a lab. In the second year, however, STEP-uP started offering school-based trainings. By providing on-site professional development, entire schools embarked on implementing similar strategies—much more powerful than individual teachers. The principals became empowered to direct the emphasis of the school as a whole. On-site professional development also included mentoring, lesson study, and Critical Friends Groups.

The Importance of Principal Leadership

STEP-uP suspected that the role of the principal was vital in this reform effort, so principal training was written into the original design. In the first two years, that support included principal investigators speaking at district-level principal meetings and bringing them to keynote speaker events with nationally-known presenters. During those two years, however, we were searching across country for effective principal development models that we could modify to suit our science reform purposes. The Hogue Institute in Cincinnati proved to have such a model.

Just as we had connected literacy and math standards with science implementation to meet teachers at their most obvious point of need, we linked science reform and various STEP-uP professional development practices to principal leadership practices. The principals experienced first-hand the same inquiry practices that teachers experience in their courses, so the principals developed a deeper understanding of science content/assessment/notebooks/etc. and the reform

effort which gave them more confidence in supervising the teaching of science. The course STEP-uP developed was 90-hours, which is a substantial commitment both from the principal and superintendents. The impact of the Principals' Institute has had a positive impact on how SRTs are utilized to support teachers, on the emphasis place on all kits being taught to all children, on the supervision of science teaching, and on the encouragement of teachers to participate in STEP-uP courses. To date, 40 of our 79 principals have participated in the Principals' Institute and the vision of our districts is to continue offering these Institutes beyond NSF funding. Next year we have 10 principals planning to attend the Institute bringing the total to 63% of the principals.

In addition, our assessment SRT and Project Coordinator have met individually with principals to develop strategic plans to meet school needs and ensure that the five elements of elementary science reform are kept in focus.

Most Powerful Strategies for Institutionalizing Reform

Institutionalization is a very complex and multi-level effort. Time is always a critical factor and STEP-uP was fortunate that our districts had already been using kit-based science for 5 years before NSF funding. The principal investigators had worked together for a number of years and had developed a powerful model of professional development that certainly worked to our benefit. The business partnership in Agilent Technologies and their political clout, as well as inspiration and monetary support, was vital to our success. Having outside funding for five years certainly gave us the prestige and resources to move the science reform effort deeper.

In addition to those vital basic strategies, here is a recap of a number of other strategies that have proven effective and if starting over would include from the beginning:

1. Focus on the five elements of elementary science reform—high quality materials, refurbishment centers, professional development, assessments aligned to standards, and community/administrative support.
2. Develop highly skilled Science Resource Teachers.
3. Develop an on-going partnership and meetings with an Administrative Council which consists of decision-makers at the district level.
4. Utilize multi-dimensional leadership which includes all areas of expertise from classroom teachers to assessment experts to scientists coming to a task/project on equal footing and learning from each other.
5. Work to change policy that could interfere with the reform vision, such as modifying induction policy and assessment practices.
6. Integrate standards using science as the content core.

7. Link science reform to current and emerging district priorities and initiatives.
8. Research impact on student achievement.
9. Use high stakes testing to science advantage.
10. Build capacity of decision-makers—money well-spent.
11. Educate the principal about science reform and practices.
12. Use formative and summative assessment to align to standards and high stakes tests while keeping true to the reform vision.
13. Provide site-based professional development and mentoring within the school day with a philosophy of "whatever it takes to get those kits taught well."