SCALE Key Concepts

This series of articles illustrates key concepts of the SCALE five year National Science Foundation-funded project.

The SCALE partnership aims to improve K-12 mathematics and science teaching and learning working with four urban school districts: Los Angeles Unified School District, Denver Public Schools, Madison Metropolitan School District, and Providence Public School District. Other partners include California State University, Dominguez Hills; California State University, Northridge and University of Wisconsin-Madison. These articles reflect the major themes of the National Science Foundation's Math and Science Partnership (MSP) Program: Partnerships Across Institutions; Challenging Courses and Curricula; Evidence-based Design and Outcomes; Teacher Quality, Quantity and Diversity; and Institutional Change and Sustainability.

SCALE and the Future of Educational Improvements

When the word *sustainability* is uttered among education reformers, many think of the incredible odds against a new program still functioning past its funding date. But these people may have a false notion of sustainability, confusing it with maintenance of an entire program as designed. Century and Levy (2004) came up with a definition of sustainability that makes clear the distinction: "The ability of a program to maintain its core beliefs and values and use them to guide program adaptations to changes and pressures over time." Maintenance, they contend, is "embedding a program, as designed, into an existing school system so that all of its elements become standard practice."

Sustainability requires that a measure of pruning and modification is done periodically to maintain program viability.

Sustainability has also been likened to the process of raising a child. During the growth years (implementation), a lot of attention and nourishment are given. When the child is grown, this support stops (theoretically), and the young adult takes over the power to respond and change as circumstances require. Few expect these young adults to adhere to a rigid behavior code identical to their parents. In the same vein, after the funding for a new program ends, it should not be expected that an innovation will not be modified and used in accordance to the needs of the institution. But these changes don't just happen, according to Century and Levy. "We must articulate our vision of sustainability, plan for it, engage support for it, and evaluate progress toward it as we would any other outcome."

There is implied anticipatory change in the idea that sustainability is "something far more than merely making programs last," say Century and Levy. Sustainability requires that a measure of pruning and modification is done periodically to maintain program viability. At the same time, the program's "values, ideas and processes of the effort are widely shared and deeply felt" in order to ensure that its origins are kept intact.

In its fifth year of operation, SCALE's overarching goal has been to "transform core science, technology, engineering and math (STEM) teaching and teacher development system-wide in each of the four partner school districts, two universities and collaborating post-secondary institutions so that every student experiences deep, conceptually based instruction on core math and science concepts on a continuing basis." Out of this ambitious goal, each district has kept the basic values while adopting components as needed.

Andy Porter, a SCALE leader and Dean at the University of Pennsylvania, says: "To me, the big key idea is one of leverage, a small amount of money and a small number of people working with a small handful of districts to change (strengthen) how

they pursue excellence in mathematics and science learning and teaching."

In the Madison Metropolitan School District, there are at least two initiatives that have grown from the SCALE program: A group of ten MMSD math and science staff members who are working to implement coaching models, design and facilitate on-line professional learning and improve efforts to assess professional development impacts on student achievement. In another effort, University of Wisconsin and MMSD faculty are working to improve the quality and readiness of future science and mathematics teachers. This collaboration will re-design the core sequence of UW-Madison pre-service courses for teachers earning certification for middle school science and mathematics education. Both of these efforts have been categorized as a "transition" to post-SCALE efforts because they are in some ways initiated by groundwork laid by SCALE, according to Lisa Wachtel, MMSD Executive Director of Teaching and Learning.

A Providence Public School District administrator sees the SCALE leverage power in terms of its partnership: "Together as a partnership we are able to learn from each other. I think that is the power that SCALE brings to the district … The district would have these initiatives without SCALE; however, SCALE provides more clarity, more buy-in, and more information in terms of what we learn from the partnership." As a direct result of SCALE's influence, collaborations are being formed with STEM faculty from Rhode Island College, the East Bay Education Collaborative, Rutgers University, University of Wisconsin and Brown University to improve professional development training for science and math K-12 teachers. In addition, PPSD and its higher education partners are developing grants for preservice scholarships that are tied to teaching assignments and tenure in the PPSD, and graduate level scholarships for developing, supporting and mentoring STEM graduate students for obtaining K-12 teaching certificates.

Sustainability can be triggered at the individual level as well. As an example of a larger trend, two MMSD teachers who have attended a SCALE Science Immersion Institute plan to use at least some of what they learned from the four-day professional development in other subjects they teach. "I think [inquiry] crosses over to other subjects quite nicely. It allows the children to have much more ownership in their learning, it allows you to ask them questions like: 'What would you like to know about_____? How do you think that might affect _____?' It incorporates much more dialogue and student involvement than the teacher simply dispensing the information," said Linda Zimmerman, a third grade teacher at Chavez Elementary School. Emily Powell, an English as a Second Language Teacher at Hawthorne Elementary, says she will also use aspects of inquiry in other subjects. "I think the ideas of supporting your data and explaining your ideas are really important throughout the day. The notion that everything is up for grabs for exploration and that anything can be challenged and the process is as important as the final result will be useful when supporting a mathematical claim or a claim about an author," she explains. Both teachers plan on using the techniques they learned in the Institute five years from now.

"Indeed, teaching and learning are at the indisputable core of SCALE's efforts. With that issue well addressed, SCALE's work toward sustainability has a strong foundation," assert Century and Levy. Research on aspects of SCALE's outcomes and influence is ongoing.

For more information on completed SCALE research:

http://www.scalemsp.org/index.php?q=SCALE_research_papers

SCALE is funded by the National Science Foundation Award #0227016. Any opinions, findings, or conclusions are those of the authors and do not necessarily reflect the views of the supporting agency.

SCALE
SYSTEM-WIDE CHANGE FOR ALL LEARNERS AND EDUCATORS