AN OVERVIEW OF ARSI:

THE GENESIS, THE CONTEXTUAL LANDSCAPE, AND THE MODEL THAT EVOLVED

The Genesis of ARSI

In the 1990s, the nation's educational focus turned to troubled schools in the nation's poorest cities. Under the leadership of Luther Williams, then Assistant Director of the National Science Foundation, the Urban Systemic Initiative was created to improve the teaching and learning of science and mathematics. The central premise of this "systemic" initiative was that NSF funding would support urban districts in taking a long-term, comprehensive approach to improving their mathematics and science programs.

Recognizing that high-needs schools were equally as pressing a problem in rural America as in urban areas, Wimberly Royster, an emeritus professor of mathematics at the University of Kentucky and a long-time advocate for math education, began a campaign to persuade NSF to expand its focus on mathematics and science education reform to include rural areas. He and others of his colleagues understood that although many of the challenges of math and science improvement were common to both urban and rural settings, rural America presented a set of unique problems. In particular they knew that poor, isolated regions of rural Appalachia where educational reform had always proved difficult needed specialized, focused attention just as urban school systems did.

In response to and recognition of the unique aspects of the rural challenge, NSF created the Rural Systemic Initiative or RSI. The initial round of RSI funding in 1995 targeted four regions in the country, one of which was Appalachia. The Appalachia region involved six states: Kentucky, Ohio, West Virginia, Virginia, Tennessee, and North Carolina. Only counties with a poverty rate of 30% or above were eligible to participate, and 66 counties in these states qualified for inclusion.

In the summer of 1995, with a grant of $10 million dollars, and a charge "to stimulate sustainable systemic improvements in science, mathematics and technology education for K-14 students in 66 eligible counties using the school and its surrounding community as the focus of its effort," the Appalachian Rural Systemic Initiative (ARSI) began.

ARSI initially had three explicit goals: 1) to develop the knowledge and skills among K-14 teachers to create effective learning environments in which all students could learn math and science and use technology; 2) to develop sustainable systems to provide access to educational resources and services in support of standards-based teaching and learning; and 3) to develop school leadership, regional partnerships, community involvement and stakeholders support to sustain long-term education improvement.

From the beginning ARSI's vision for reform was grounded in the concept of maximizing the existing capacity – deliberately striving to identify and support the growth of the indigenous leadership in the region. The project leaders understood that, were a project to come in from the outside to tell the people of the Appalachian region what to do, it would be doomed to failure.

The Contextual Landscape

The Nature of Appalachia

Appalachia is a region of contrasts and contradictions. Majestic, beautiful mountains tower over narrow, dark and often inaccessible valleys or "hollows" where most people live in isolation and poverty. Economic opportunity is limited, and yet the population is remarkably stable. Until recently, work that is available is mostly in mining and lumbering, both of which are extractive industries traditionally owned by absentee corporations. It is hard and dangerous work, but sons follow in the footsteps of their fathers and grandfathers into the mines and forests. Many mountain families have lived in the region for generations and share a strong sense of home and family. The schools are the centers of the communities, and are almost always the major employers. Ironically, however, Appalachians view schooling with ambivalence. On the one hand education is recognized as good, something worth having. On the other hand, schooling can threaten the fabric of the family and community, because achieving an education often means leaving home to seek greater economic opportunity in other places. Finally, although the region has a long history of federal education reform efforts, student achievement is chronically low and the high school graduation rate is less than 25%.

The unique nature of the Appalachian contextual landscape has implications for the progress of educational improvement. First, school districts in Appalachia (as in most rural areas) are small, with few resources and little capacity. By necessity teachers and administrators wear many hats. They teach, supervise, coach, organize bake sales, and drive the school bus. Opportunities for their professional development are very limited. Second, within the community

poverty, isolation, and a lack of personal resources lead to low expectations and fatalistic attitudes, as well as to a suspicion of "the outside" and "outsiders." Negative attitudes about change-makers are further exacerbated by entrenched class distinctions, where the "haves" control the "have-nots" and their access to limited local resources. Thus neither students nor their parents are likely to actively embrace education as a way toward self-improvement. In addition, because school districts are almost always the largest employers in rural Appalachian communities, and because of the fierce competition for jobs, many employees of school districts are forced to be more concerned with job security than with issues of educational improvement. On the positive side, however, the Appalachian's sense of place, family, community, and tradition, as well as their independence, resilience and pride, contribute to a large capacity for self-reliance and hard work.

The State and Local Policy Environment

As ARSI began its work in the mid-1990s, it faced challenges from the educational policy environment in the region. Four major hurdles stand out in retrospect.

Varying state contexts

The six states in which ARSI proposed to foster math and science improvement all had very strong and different state policy contexts. Some, such as Kentucky in particular, were national leaders in state educational reform, but other states lacked coherent state-wide educational policies whatsoever. Moreover, because of their tradition of independence and their geographical isolation, all the districts in the targeted counties taken together as a large whole created a great range of diverse needs. Thus ARSI was faced with the enormous challenge of creating a coordinated regional approach to eliminate duplication of efforts, and to maximize the resources already existing in each state to support systemic reform.

The false promise of technology

In the years prior to the advent of ARSI, many of the states had invested large sums of money to introduce technology into the schools. "Technology" held out the promise of bringing small, rural and isolated schools and districts into the mainstream of the informational, digital age. In most districts the focus was on acquiring and installing hardware. Less attention was paid to helping teachers learn to use technology in the support of standards-based mathematics and science. Many ARSI districts saw technology as an end in itself, or as a tool for replicating many of the instructional practices that were already prevalent in math and science classrooms, not as a strategy for instructional improvement. Thus ARSI faced the dilemma of how to best utilize the enormous investment

that had already been made in these schools and districts, but which lacked vision and expertise.

Meeting the demands of accountability

Also, as ARSI began the work of reform in the Appalachia, most states in the region had started to implement processes for making schools accountable for student achievement. Statewide testing at various grade levels had been implemented, and schools were faced with public disclosure of test results and possible censure for lack of progress. ARSI faced the additional challenge of being a strong outside voice for reform in teaching and learning in the noisy environment of state testing and accountability which dominated the discourse about educational improvement.

Readiness for reform

One of the key lessons learned in the early years was that the districts ARSI served varied widely in their readiness to embrace reform. One size did not fit all. ARSI had to adopt a "developmental approach." It had to create and implement strategies that were consistent with the degree to which the district was ready and willing to embark on a course of math and science educational improvement.

At the most basic level of readiness, districts looked to ARSI to help them gather and acquire ideas and materials that had not previously been available to them. ARSI 's role was to help create an awareness of the need for reform and the support that districts could tap into to institute reform. At the next developmental level, districts generally focused on meeting the mandates for improvement set by state frameworks and assessments. ARSI was seen as the vehicle for accessing materials, activities, and approaches for teachers to help them meet state requirements. At a third level, there was recognition of the importance of instructional leadership and support to initiate change. ARSI provided assistance in developing local leadership. Key people in each of these positions were introduced to standards-based curriculum, inquiry and assessments, as well as strategies to promote change. And finally, in the districts with greater capacity to support change, ARSI worked shoulder to shoulder with leaders to develop and implement strategies intended to lead toward long-term, sustainable systemic change.

The ARSI Model

ARSI's mission "*to accelerate improved performance in mathematics and science for all students through high-quality, standards-based teaching supported by aligned coherent local and regional systems*" was a monumental challenge to effect in a vast and diverse system across a six-state region. ARSI's overarching goal was to seek to

involve the districts in mathematics and science reform through the incremental development of indigenous leadership, the steady building of understanding and commitment of local school and community leaders.

The Components of the Model

The initial ARSI model centered around seven components, each with a particular role and function in improving math and science education in the targeted school districts:

- **Teacher Partners** – ARSI sought to create a network of lead teachers, released part-time from the classroom, who were selected, trained and supported to assist their teaching colleagues in improving science, mathematics and technology education in the local school district.

- **Catalyst Schools** – ARSI designated select schools, which were intended to become the focus of and model for improvement at the district level.

- **District Liaisons** – ARSI chose local administrators to provide advocacy, leadership and support for reform at the district level.

- **Community Engagement Teams** – ARSI designated and supported a group of community members to build support for MST improvement beyond the schools and districts, throughout the community.

- **Regional Collaborative** – ARSI organized a collaborative situated at a university or college in each of the six ARSI states, intended to provide school districts access to federal, state and local resources and services.

- **Resource Coordinator** – ARSI intended that coordinators and staff housed within the Regional Collaborative provide a range of professional services, supports and curricular assistance to the Teacher Partners and the local school districts. Also sometimes referred to as Resource Collaborative Coordinator.

- **Regional and National Resources** – ARSI drew upon a larger support system, including all the Rural Systemic Initiative

leadership to help the local leadership learn about and gain access to national and regional resources to support MST reform.

The overall concept was that each core group at each of the local districts—i.e., the Teacher Partner, District Liaison, Catalyst School, and Community Engagement Team—would be supported by multiple, interactive layers of the larger improvement community outside the core group, such as the Regional Collaborative, the Resource Coordinator, and the still larger set of regional and national resources.

An Evolving Strategy

The original ARSI model envisioned three organizational levels connected by an emphasis on technology. The first level was local reform, which encompassed the local schools and district, the community and the community engagement team. The second level was ARSI services and support provided to the districts by the Regional Collaboratives. The third level included the central ARSI administration, planning and operations, the evaluators and the advisory groups.

Technology was the key focus in the first two years of the ARSI project. Like the districts who had invested heavily in technology, ARSI hoped technology could be the "answer" to reform, and could serve as a viable way to help schools and districts overcome geographic isolation and to access a wide range of resources to improve local mathematics and science programs. But in year three of ARSI, the vision of technology as the center of reform shifted. It became evident that schools did not have the capacity to utilize technology and its processes to develop leadership capacity as the project had originally intended. Moreover the National Science Foundation applied pressure to re-direct the focus of the project more on improving instruction in mathematics and science.

Community engagement was another key strategy in the early ARSI plans which found little traction. ARSI originally envisioned a comprehensive strategy to build community readiness and leadership to support and sustain quality mathematics and science education in the schools through community planning conducted by a local Community Facilitator and the Community Leadership Team. Although this strategy was initiated in some districts, and while some local ARSI leaders found ways to increase support of mathematics and science through programs and parent support organizations that were already in place, community engagement as a core strategy faded from the forefront of the ARSI plan.

The development of teacher leadership

As some aspects of the original ARSI model were recognized as less viable, others became obvious winning strategies. Building local leadership and expertise through intense and focused training, tailored to the needs of the local school and district setting, quickly became the primary ARSI strategy. The Teacher Partners were the central core of the strategy to increase leadership capacity. For them, ARSI was knowledge-building—a great wealth of high-quality, carefully selected professional and leadership development activities and experiences which empowered them to become leaders of the reform effort in their schools and in their region. The Resource Coordinators assumed primary responsibility for providing the Teacher Partners with professional development, access to resources, opportunities to network, and support and strategies for working with other teachers and district personnel. Locally, the District Liaisons also provided support for the Teacher Partners and advocacy for reform at the district level.

The "Program Improvement Review" process

Another key strategy that emerged from ARSI's growing understanding of the need at district level for coherent mathematics and science programs was working with school systems to help them analyze and determine their strengths and weaknesses, and thereby defining their needs more clearly. The Program Improvement Review (PIR) became an important tool for creating awareness and catalyzing change in individual schools. Using an established protocol, a team of teachers and administrators from outside the district "audited" the math and science programs in a school and reported their findings to the administration and school leaders. The PIR process was useful to the school in developing a comprehensive improvement plan, and it was a very effective professional development experience for the teachers and administrators on the team. As the audits became more widely used, the understanding among teachers and administrators of what constituted good science and mathematics curriculum and instruction became more widespread throughout ARSI counties.

Over the decade-long lifespan of the project, ARSI refined their model for working with their target districts, developing and redesigning structures and processes along the way that increasingly supported local leaders in building the capacity to further their own reform work. As a result of their steady, responsive, developmental approach, ARSI became increasingly successful in giving school districts concrete, individualized assistance in formulating both a vision of mathematics and science education for the future and a plan for achieving it.