APPENDIX A

BUILDING LOCAL DISTRICT CAPACITY FOR REFORM

BUILDING LOCAL DISTRICT CAPACITY FOR REFORM

A Brief Description of the Districts

The following are brief descriptions of the six ARSI districts we visited in the fall of 1999.

Knott County, Kentucky

There are 3,291 K-12 students, and 230 teachers and administrators in the Knott County school district. There are eight elementary schools (all K-8th), and there are two high schools and one alternative secondary school in the district. All of the schools in the district are school-wide Title I schools, and at the high school level, sixty percent of the students qualify for the free or reduced lunch program. In recent years, the population has been declining in the county primarily due to a lack of employment opportunities. The school district is one of the county's largest employers and, as a result, the teaching staff has been quite stable. Knott County recently acquired a GOALS 2000 grant which was built on the foundation of the work that the district has done with ARSI.

Graham County, North Carolina

There are 1,250 students in Graham County schools, with one elementary (K-6th), one middle (7th–8th) and one high school (9th–12th) in the district. A Youth Development Center serves as an alternative school for grades 6-12. There is tremendous stability in the school staff with most teachers teaching in the district for 20-30 years. This year the district hired 5 new teachers. Eighty percent of the land in Graham County is federal forest, leaving the county with a very small tax base. Graham County schools receive Title I money as well as "low wealth" and "small schools" money from the state of North Carolina. Fifteen percent of the student population is Cherokee Indian. Thirty-three percent of adults in the county do not have a high school diploma.

Oneida County, Tennessee

The Oneida Independent School District consists of one elementary (pre-K- 5th), one middle (6th–8th) and one high school (9th–12th). The district has received considerable funds from two local donors who have made their donations

contingent on improving test scores. Thus, test scores are important in this district. The district has gained and works to maintain a very good reputation statewide. In fact, it is reported that 65% of the students who attend Oneida schools live outside of the district and therefore have to be driven to school every day by their parents or other relatives. The Oneida teaching staff is fairly stable; however some teachers are lost to neighboring counties who offer higher salaries. This year the district hired 12 new teachers and has taken on five teaching interns from the University of Tennessee.

Lincoln County, Kentucky

There are approximately 3, 990 students in the Lincoln County School District and a total of 329 teachers and administrators. Sixty-five percent of the students are eligible for free or reduced lunch. The district consists of seven elementary schools, one middle school and two high schools. Almost three-quarters of the schools here are school-wide Title I. There is a high unemployment rate in the county (higher for men than for women). Many families make a living by providing foster care. The school district is the county's largest employer. Thirty percent of high school seniors go on to college. Those who don't go to college typically work for a few years and then go on to a community college or for technical training. Also, a large number of high school seniors are recruited into the military.

Wise County, Virginia

Wise County School District has 645 employees – teachers and administrators; 7,125 students attend Wise County's six elementary, three middle, six high schools, and two vocational-technical/alternative high schools. One school is school-wide Title I. On average, 42% of the students district-wide are eligible for free or reduced lunch. Pound High School has had a sharp decline in enrollment over the last 25 years (685 students in 1975 vs. 395 today). The schools in Wise County receive a coal severance tax. These monies will last another ten to fifteen years – until the coal reserves are depleted. Prisons are the newest industry in Wise County.

Cocke County, Tennessee

Cocke County School District consists of nine K - 8th elementary schools, one high school that is 9th – 12th, and one school that is K – 12th . Five thousand students attend Cocke County Schools. The district has recently invested in a lot of technology (i.e. computers) for schools but it has not yet made an investment in teacher training around the use of the technology. There is a high drop out

rate as well as a high teen pregnancy rate in this county. Fifty percent of the land here is federally owned and the largest industry in the county is the Great Lakes Canning plant. For the last six or seven years, this district has focused much of its energy on gaining southern accreditation for all of its schools.

A Description of the Protocol

In our ongoing work with school districts across the country, it has become increasingly clear that districts can make very little progress in implementing and sustaining reform without first achieving some prerequisites. Over the past few years, we have developed an instrument that we call *A Framework For Assessing The Growth Of The Capacity Of A School District For Implementing Science, Math, And Technology Education Reform*. This framework was developed out of Inverness Research Associates' work with 'discipline-based' (math, science and technology) systemic reform efforts and is used to measure individual district's capacities for implementing and sustaining such efforts.

The Framework is constructed so that it asks a set of questions that allow those interested in any discipline-based reform to review the degree to which the district is developing critical foundational capacities, setting key supportive policies, and addressing surrounding conditions that will ultimately affect their ability to improve math and science teaching within the district.

The theory that lies behind this framework may be stated very simply as follows:

1) Student success in science, math and technology depends upon classrooms that provide a steady diet of high quality science, math and technology instruction.

2) Good classroom instruction that takes place in every classroom in a district depends upon the presence of a solid district-wide science, math and technology program. Such a program includes good curriculum, readily available and well-designed materials, and supportive professional development activities.

3) To establish such a program is not easy. Few districts across the United States can boast of high quality science, math and technology programs that reach all of their students. To put such a program in place, and to sustain it, a great deal of work must be done. This work doesn't happen automatically, but rather it requires a district to develop a set of capacities – each of which is necessary but not sufficient to create standards-based, district-wide science, math and technology programs.

The Framework is divided into six sections that reflect what might be thought of as major dimensions. Within each section are a number of descriptive indicators, each of which focuses on specific capacities, policies, or conditions. The sections are as follows:

- **Vision and Reality** – This dimension includes the development of shared, explicit, and concrete vision of what constitutes "good" science and math teaching and use of technology, a clear specification of the key components of a district-wide program, as well as a plan for how the program will be built. But, in addition to vision, a district also needs a sense of reality – specifically the realities of the classroom practice and program implementation. This includes having in place some specific mechanisms so that the quantity and quality of science, math or technology teaching, as well as the overall health of these programs, can be monitored and examined on a continuous basis.

- **Leadership** – We identify and illuminate two major forms of leadership that are needed to promote and sustain reform. The first consists of the development of those individuals who were spearheading the reform effort – the "workers." The other necessary form of leadership consists of the ability as well as the inclination of the other key leaders throughout the system – "the supporters" and the "gatekeepers" – to respond to and support the efforts of those actually working on science, math, and technology reform.

- **Reform Infrastructure** – This dimension of capacity refers to the district's ability to implement improvements in the areas of curriculum, materials, and professional development. Also included here is the district's willingness and ability to garner the financial resources needed to establish high quality district-wide science, math, and technology programs.

- **District Priorities and Policies** – This dimension of capacity refers to a district's ability to make science, math, and technology a priority and to create a supportive policy context for the science, math and technology improvement effort.

- **Climatic Conditions That Influence Science, Math, and Technology Reform** - Within this dimension lie those factors that greatly influence the progress of science, math and technology reform but also lie largely outside of the direct control of the district. State policies, educational climate, and a range of other political and economic factors can greatly inhibit or enhance the progress of science, math and technology reform.

- **Summary Judgments** - This section of the Framework asks for judgments about the overall health and robustness of the reform effort. It refers to

overall district intention and seriousness, as well as the degree to which the overall educational and political climate is favorable for reform.

The Framework is structured to measure changes in capacities, policies, and conditions over time. Although this tool was not specifically designed for ARSI, it was our hope that by using this framework, we would be able to point to those capacities for reform that ARSI has strengthened and those capacities that still need to be developed.

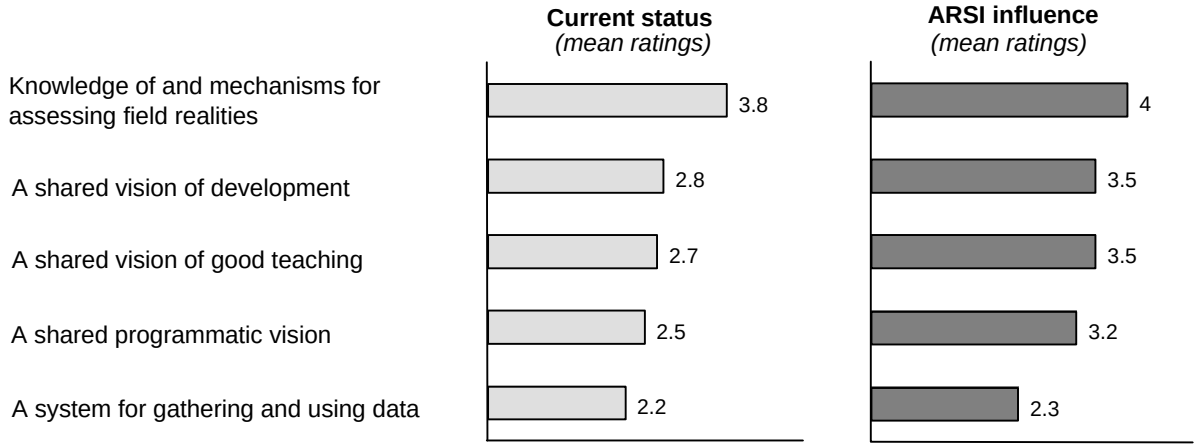
For the ARSI districts we visited, we used a rating scale of 1 through 5 (with '1' typically representing "very low capacity" and '5' representing "very high capacity"). When applicable, we rated the capacities in two ways: 1) the current status of the district's capacity (i.e., a normative measure of where the district is now); and 2) ARSI's influence on the district's capacity (i.e., the extent to which we feel ARSI has had influence on this current status).

In what follows, we present a summary of our data that gives the reader an overall picture of the six ARSI districts and their capacity for implementing and sustaining reform efforts in math and science. We have included data and observations in each of the sub-sections. Please see Appendix C for a copy of the Framework itself.

Finds About Building Local District Capacity for Reform

Vision and Reality

FIGURE 1. VISION OF "GOOD" MATH AND SCIENCE TEACHING AND SPECIFICATION OF KEY COMPONENTS OF A DISTRICT-WIDE PROGRAM



Ratings are based on five-point scales where "1" = "very low" and "5" = "very high."

Perhaps surprisingly, our research shows that ARSI has influenced districts considerably by helping them understand the realities and assess the quality of their current math and science programs. That is, as a first step, ARSI has been quite influential in helping districts and schools pay attention to their math and science programs. However, as the graph above shows, districts are still in the process of developing a vision of the elements and components of what comprises good math and science teaching. And, their vision of how a program is developed, step by step, is even less developed. In what follows we discuss these findings as well others in more detail.

- ARSI has allowed leaders in ARSI districts to know the reality of their districts better.

ARSI has had a positive influence on districts' abilities to better understand their own programs and the realities of math and science instruction within their own districts. First, ARSI has provided release time to Teacher Partners, which has allowed them to observe other teachers teaching. Furthermore, in some cases, ARSI has facilitated whole-school Program Improvement Reviews (PIRs) of the quantity, quality, and content of math and science education of each school within a particular district. Some of these districts are using the lessons learned from PIRs to align and map their math and science curriculum within individual schools and across the district.

- ARSI is a subtle reform effort that is steadily building within each district a grassroots group of teachers and district leaders – people who are knowledgeable about and, increasingly, advocates for inquiry-based, student-centered, hands-on teaching and learning.

The ARSI model is developmental and works from the inside out. That is, ARSI starts by identifying and building leadership within the district through its work with the Teacher Partners. The Teacher Partner, with the help of the District Liaison, then builds a core group of teachers and administrators who are committed to the reform effort. Eventually the reform effort may move to the level of district policy – curriculum, professional development, etc. – and then out to the community and national scene.

For example, in one district, ARSI contributed to the development of a programmatic vision by helping to position the district to write a grant with a neighboring ARSI county focusing on curriculum mapping. ARSI helped them see the need and inspired the desire to have a coherent math and science program. On the other hand, improvements in this district are also still happening on a piece by piece basis. As a result, in this case ARSI has taken on a model of enrichment with the hope that if enough good pieces are added, the system as a whole will get better.

- ARSI has provided district leaders with a way of thinking about and discussing science, mathematics and technology education that is more in line with national standards.

The "language" of ARSI and the national standards (i.e., hands-on, student-centered, inquiry-based) is beginning to be heard within schools and from leaders. However, concrete evidence of the reform – within classrooms and in district–wide policies and programs – is less evident. In ARSI districts, as elsewhere around the country, the language of the vision and the reform effort is often in place before the reform is visible in the classroom.

- ARSI is seen as a program that is aimed at improving the teaching of math and science. But there is some tension around the ways in which "improvement" is defined.

In all the districts we visited state test scores are still very much seen as "the guiding star," with many teachers trying to teach to the test. With two exceptions, the districts we visited generally lacked a larger programmatic vision. For example, it was apparent that staff in one district felt a tension between their past successes on tests and their emphasis on drill and skills, and believing in the language and ideals of the national standards. We found that ARSI is perhaps most successful in those districts where it is perceived as helping the district do well on the state tests, as well as achieve higher ideals of instructional practice. It is clear however that in most cases, in order to pass local scrutiny, ARSI work must first and foremost be seen as an efficient way to help districts help their students improve their test scores.

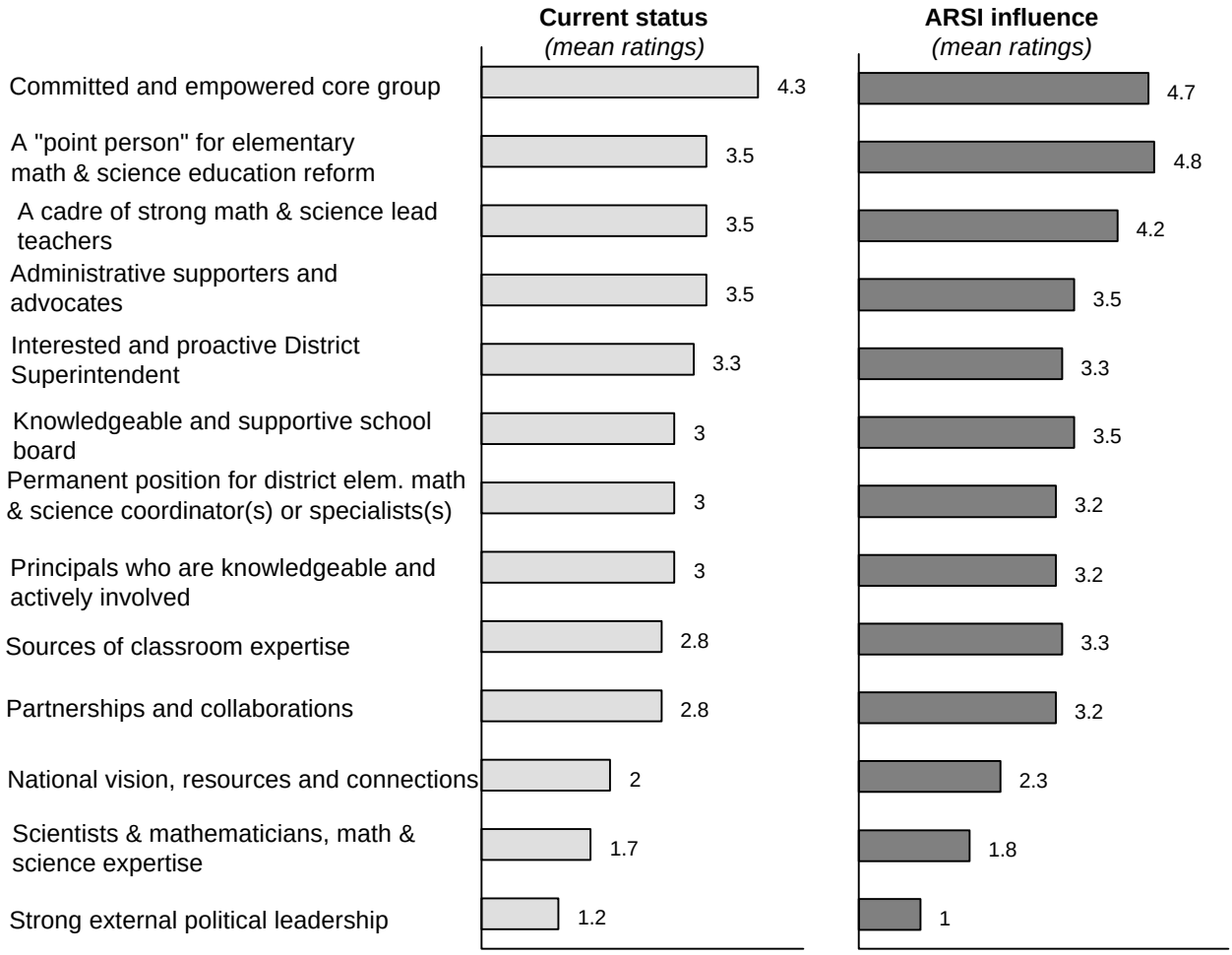
- Some districts, while lacking a vision for reform, did show a "vision of development."

Although only four out of the six districts we visited showed a vision of program development, the ARSI influence on all of the districts in this area was seen as significant. That is, after helping districts become aware of the nature and quality of good instruction, and after helping them understand what a program consists of, ARSI is also now beginning to help districts develop long term plans for putting such programs in place. As one district superintendent noted:

> *ARSI is contagious. The enthusiasm generated in the catalyst school spreads out to other schools and they start asking for the same kinds of things. It generates a ground swell rather than mandating something from the central office.*

Leadership

FIGURE 2. LEADERSHIP CAPACITY IN ARSI DISTRICTS



Ratings are based on five-point scales where "1" = "very low" and "5" = "very high."

In all of our studies of district-level reform efforts, we have consistently found that the most important element in determining the ultimate success of a reform effort is the presence or absence of skilled and committed leadership. Such leadership, moreover, has to exist at all levels, from the Superintendent down. There is no doubt that the greatest contribution of ARSI lies in this area: ARSI is helping districts identify, train, and support local leaders who are

knowledgeable about math and science reform and empowered to work towards change in schools and classrooms. In what follows we describe this contribution in more detail.

- In most districts, a "point person" for science, mathematics and technology reform would not exist without ARSI.

The Teacher Partner is the strongest part of ARSI. And in the best cases, the Teacher Partner, along with the District Liaison, becomes the "heart and soul" of the local reform effort. In many districts we visited "ARSI" was identified as equivalent to the Teacher Partners and their work. The work of Teacher Partners takes many different forms, and they play many different roles – local resource agents, workshop leaders, district curriculum specialists, and technology consultants. Many of the districts are now providing their own funds either to support additional Teacher Partners or the other half of a Teacher Partner's salary, allowing them to focus full-time on ARSI work. Over the past several years the Teacher Partners we have seen have also been able to build additional math and science leadership throughout the district (from teachers to administrators) and some have ultimately gained the support of other key leaders in the system (i.e., the Superintendent, Assistant Superintendent and the school board). It is the work of the Teacher Partner, and this core group, that is the central contribution of ARSI to the capacity of these districts.

- ARSI has provided key supports to Teacher Partners so that they can grow in their skill and expertise, and so that their work is not done in isolation.

As we described above, ARSI's efforts have empowered the Teacher Partners by providing resources and training, and bringing external validation to their work. ARSI also has supported these leaders through a powerful network of other Appalachian Teacher Partners. It would be fair to say that ARSI is learning that the best teacher of a Teacher Partner is another Teacher Partner. Thus, the opportunity to work with, and share with, other Teacher Partners has been very successful, particularly in bringing on new ones.

In addition, Teacher Partners often have a strong connection to the Resource Collaboratives. The faculty leaders of these Collaboratives, in best case situations, are very helpful in supporting the work of the Teacher Partners through workshops, site visits, grant writing, and providing connections with other state and national programs. For example, in one previously isolated district, one teacher was able to attend a Woodrow Wilson summer institute at Princeton and another a NASA workshop – all as a result of the connections that came through ARSI.

- Most of the districts we visited now have a core group of teachers and administrators who provide visible support and motivation for improving science, mathematics and technology education.

In some cases, the "core group" was found in a loose grouping of people who are aware of and supportive of the work of ARSI. There are people that the Teacher Partner would "know to go to" for specific types of support. In other districts, there was a more formal core group. In one district math and science teachers had been identified within each school to attend district-wide meetings about science, math and technology reform. They were then responsible for bringing that information back to the other teachers within their schools. With a few key exceptions, principals in these six districts were knowledgeable about ARSI and were at the very least "passive supporters" of the Teacher Partners' work and ARSI. Superintendents, on the other hand, while also supportive, were likely to be involved in fighting other battles – school accreditation, school construction, and conflicts with school boards. While there were some notable exceptions, most Superintendents were overwhelmed with issues other than promoting math and science reform.

One district we visited had a strong District Liaison, three strong Teacher Partners, and cadres of teachers in math and science from each school who meet together four times a year. They attribute the design of the cadres to ARSI and report that teachers meet together after school willingly. They have seen great value in getting these people together from the various schools to share ideas, and they see the cadre as an ongoing thing, whether ARSI continues in the district or not. The Superintendent sees the cadres as helping "build a sense of community between schools as well as within schools – to get that team feeling."

In one catalyst school we visited, the principal has had a major commitment to improving math and science, and feels that ARSI has had a tremendous impact on his school. He has played a key role with ARSI in this district.

In another district, the Superintendent is increasingly a key leader, and is now actively planning the next steps for their reform effort. He is sponsoring a visit of his district leaders to another successful small rural district, and is in the process of applying for LSC funds so that his district can serve as a regional center.

- Because these districts are so isolated, partnerships with other organizations and institutions are somewhat limited.

Even though partnerships are somewhat limited, ARSI has helped districts overcome some of their isolation. Through ARSI, each of these districts, especially the Teacher Partners and the District Liaisons, have become affiliated with at least one university, as well as other state resources such as national labs, museums, and other NSF projects.

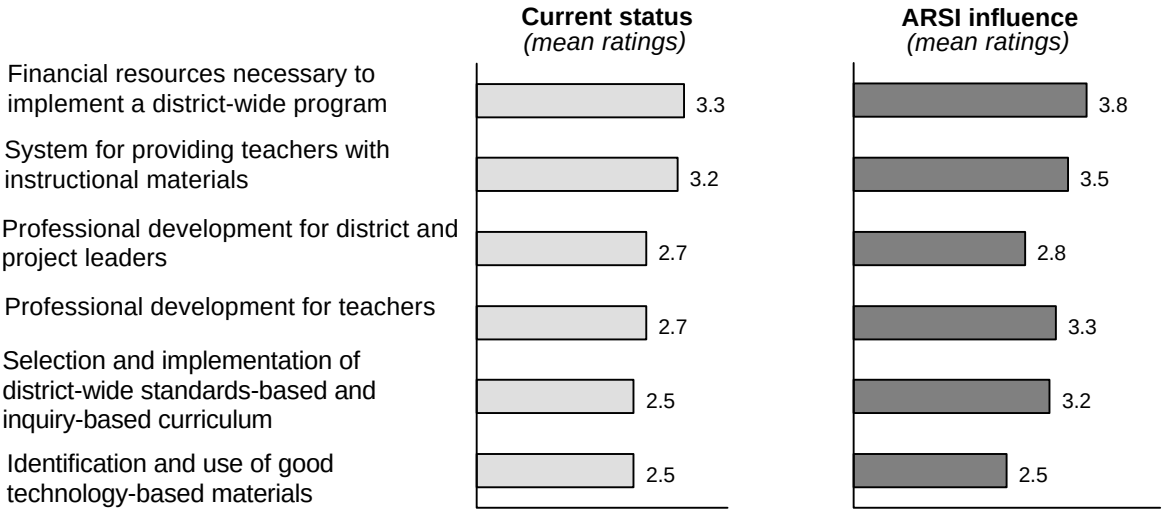
- ARSI has been weakest in building the capacity of districts in the area of math and science expertise and in the area of political leadership.

Ideally, a district-level math and science program can draw upon the knowledge and energy of local scientists or mathematics professionals. Scientists both from industry and universities can add a dimension of quality and rigor to the professional development as well as the curricular materials that are a central part of a reform effort. To date ARSI has contributed little in this area, partly because the districts are truly isolated from such expertise and partly because it is a difficult task to design appropriate roles for such professionals.

Similarly the districts have not been successful yet in building what we call political leadership for the math and science reform effort; such political leadership simply involves the strong advocacy of key community leaders (for example, school board members, local politicians, PTA members, and/or scientists).

Reform Infrastructure

FIGURE 3. DISTRICT'S ABILITY TO IMPLEMENT IMPROVEMENT IN THE AREAS OF CURRICULUM, MATERIALS, AND PROFESSIONAL DEVELOPMENT



Ratings are based on five-point scales where "1" = "very low" and "5" = "very high."

For any reform effort to succeed the district must have the capacity to address each of the key elements involved in systemic reform. (These elements are specified in the NSF "Drivers" for systemic reform.) The area of greatest ARSI influence lies simply in the degree to which ARSI has raised the priority of math and science and influenced districts to make additional investment and allocate resources to that priority.

The ARSI districts are in the early stages of developing these foundational capacities as discussed below:

- All of the districts were resourceful in grant writing and obtaining the resources that are made available in many states to economically poor, rural schools. In addition, ARSI has encouraged and supported districts in converging resources so that they use existing ones to support math, science and technology reform in an increasingly coherent fashion.

One of ARSI's contributions has been to make districts aware of additional funding and grants to encourage districts to apply for these other funds, and to use then in support of reform efforts begun as a result of ARSI. With the support of ARSI many districts have obtained new grants and continue to apply for funding, especially in the areas of professional development and technology. In this way ARSI has helped the rural districts gain a "greater share of the state pie" that is available for math, science and technology reform.

- ARSI has had some influence on districts' knowledge about and exposure to "exemplary" curricula; however, none of the districts we visited had officially adopted or implemented any of these curricula.

ARSI has had some influence on materials and curricula in some districts. They have helped bring in kits, manipulatives, and graphing calculators. However, rather than the wholesale adoption of exemplary curricula, we tended to see good teachers using innovative lessons that they had created. We also note here that it is not in the culture of many of the rural districts we visited to think programmatically. Many schools see themselves as quite autonomous and do not trust the district or the state to make choices about curriculum. Consequently, the vision of whole-district adoption and implementation may simply be unrealistic for Appalachia. Thus, it is important for ARSI to continue to work at a grassroots level, changing the beliefs and practices of teachers and principals one at a time.

- The school PIRs in Kentucky have led to changes in curriculum within schools and across districts.

One particularly strong area of ARSI influence has been the curriculum Program Improvement Reviews. These PIRs have helped schools systematically examine their math, science and technology programs, and have led some schools and even districts to begin making adjustments in their K-12 curricula to lead to a more coherent program. The PIRs were one of the most important and influential impacts that ARSI has had on these Kentucky districts.

- Technology – equipment and software – is evident in all districts.

All of the districts we visited were surpassingly rich in technological resources – with computer labs, graphing calculators, and geo-boards. In the six districts we visited, we saw many computers – in classrooms, and computer labs – as well as big screen televisions, scanners, and graphing calculators. One district had an

average of three computers in each of its elementary school classrooms as well as a large screen TV. On the other hand, the investment in technology was not yet well linked to the investment in math and science reform. For example, computers were mostly being used for doing "animated" worksheets that focused on building and enhancing basic skills. As a result, there is a huge need and opportunity for ARSI to help districts use their new technologies in more sophisticated and intelligent ways – so that technology ultimately supports more effective math and science instruction.

- We observed a wide range in district capacities vis-à-vis professional development.

Across all six districts we visited, ARSI was seen as having a positive influence on the type and quality of professional development that is being offered to teachers. However, while ARSI has made a strong contribution to the professional development of Teacher Partners, and while other teachers and administrators in these districts have participated in ARSI professional development offerings, there have not yet been significant district-level changes in long term policies and practices with regard to professional development.

In most districts, the professional development in mathematics and science is not a coherent series of offerings provided in the service of a vision and with the goal of improving math and science education. Rather, there is a "catch as catch can" – a philosophy of "any professional development is good professional development." Perhaps it is inevitable that districts at the beginning of a math and science improvement effort adopt a "cafeteria" approach to professional development (and also to curriculum). It is important to note, however, that those districts that are further along in their reform efforts have become, through their work with ARSI, more critical consumers of professional development offerings.

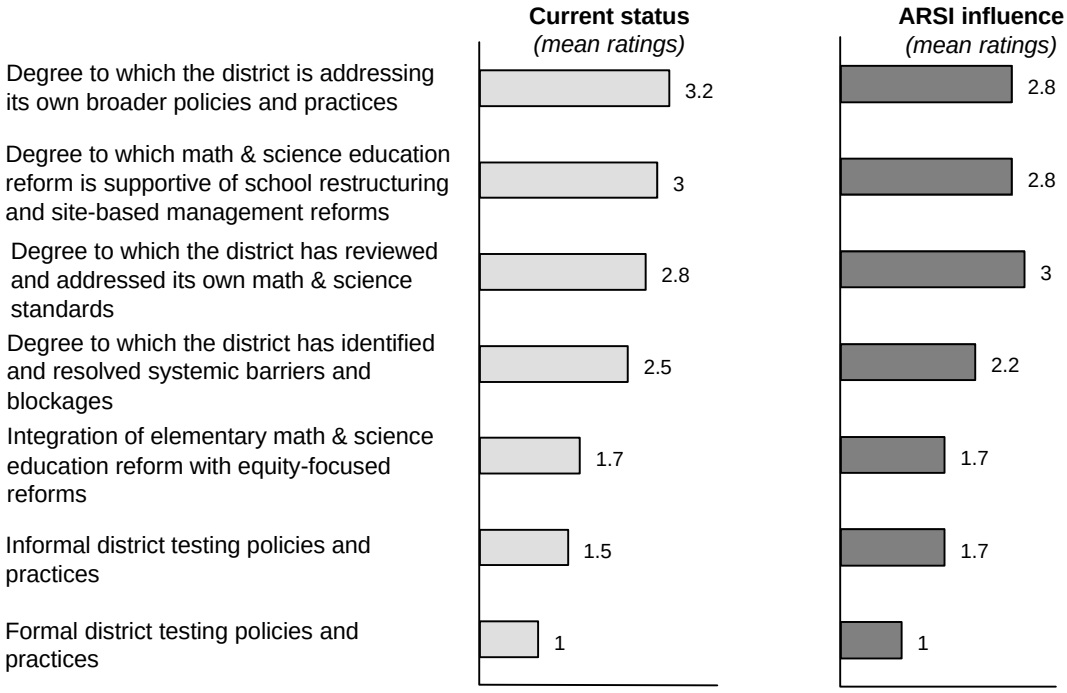
In one district, more teachers were aware of opportunities and making more requests to attend professional development. For example, eighteen teachers attended the state science teacher's association meeting where only one or two had gone in previous years.

- Overall, ARSI has been less influential in helping districts develop infrastructure, particularly in the areas of selecting and implementing curricula, than in helping them develop vision and leadership.

It is not surprising, perhaps, that ARSI has not yet had tremendous influence on district-wide practices in the area of curricula, instructional materials, and professional development. Rather, ARSI has focused first on developing leadership that has a vision and commitment to reform. Then, as that leadership grows, and as increasing numbers of teachers become more sophisticated in their thinking and practice, it becomes possible to begin the much larger task of building district infrastructure and addressing broader policies.

District Policy Landscape

FIGURE 4. DISTRICT POLICY LANDSCAPE



Ratings are based on five-point scales where "1" = "very low" and "5" = "very high."

Reform efforts are very much effected by the policy climate in which they are taking place. For example, districts may create a favorable policy climate and a favorable set of priorities so that the work of reformers may succeed. These policies and priorities may take the form of an official document such as district standards, district expectations or district frameworks.

- ARSI districts are at the early stages of developing these capacities. None of the districts we visited had instituted their own standards, assessment or policies vis-à-vis math and science education. Rather, they took the lead from the state they were located in. Consequently, the ARSI influence on broader policies that affect math and science remains quite limited in these districts.

Overall, these districts are very focused on and concerned by state standards and state-level standardized testing. Lacking both capacity and incentive, they do little to set their own policies and institute their own assessment procedures. As a result, it has proven very difficult for ARSI to influence the policy environment that strongly shapes the thinking and practices of teachers. Rather, the approach has been to offer teachers and principals an alternative, complementary vision of math and science reform, and to allow them to use that vision to "go beyond" the state minimums.

- Many of the districts we visited have policies in place that can be broadly supportive of reform.

Several districts had policies such as block scheduling, common planning time for teachers, and release time for professional development, which can be helpful to reform efforts. In most cases, these policies were not put into place as a result of ARSI, or in order to support reform; however, they have and can be useful in supporting the efforts of the ARSI project.

- Those districts who are further along in their reform effort were more likely to be proactive and thoughtful with regard to the impact (positive or negative) of the district policies on reform efforts.

When ARSI initiates its efforts in a district, the program is likely to be perceived as an effort that is confined to a catalyst school and/or the work of the Teacher Partner. As the work of ARSI within the district builds momentum over several years, issues are likely to emerge about district policies, priorities and use of resources. That is, the work of the Teacher Partner may ultimately raise broader questions about the use of resources for professional development and instructional materials, as well as assessment practices. We found, overall, that ARSI districts who had a strong District Liaison (working at the Assistant Superintendent level) were more likely to focus on and be proactive about removing policy barriers to science and math reform.

One district we visited, who has participated in the ARSI school PIRs, has a policy on a math portfolio which is supportive of standards-based practice. They also require four math credits (the state requires three), and have teacher release time for common planning. The District Liaison has been working diligently with principals to help them understand how to gear their evaluations of teachers towards a kind of summative process where they are looking at teachers' growth and their ability to implement inquiry in their own classrooms. The District Liaison has also done a couple of workshops with teachers on alternative assessments of students and plans to continue these. A Teacher

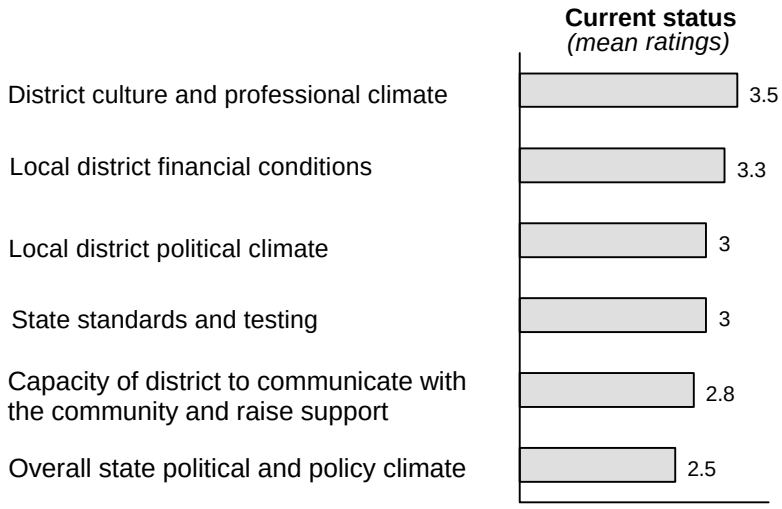
Partner working in this district stated that "we have always used a one-size-fits-all evaluation instrument." The District Liaison added "that is one of the things we are changing with this process." One school in this district has downloaded curricula resources on every teacher's desktop computer.

- Perhaps most importantly, ARSI brings credibility – in the form of the NSF imprimatur – to local math and science education improvement efforts.

ARSI provides funding, support and attention to the need for improvements in math, science and technology education. Those working inside districts who were interested in reform efforts find validation for their efforts through ARSI, and assistance in making their efforts more high profile and widespread.

State Context and Other Influencing Factors

FIGURE 5. STATE CONTEXT AND OTHER INFLUENCING FACTORS



Ratings are based on a five-point scale where "1" = "very low" and "5" = "very high."

- The "district culture" and professional climate in these districts was fairly positive.

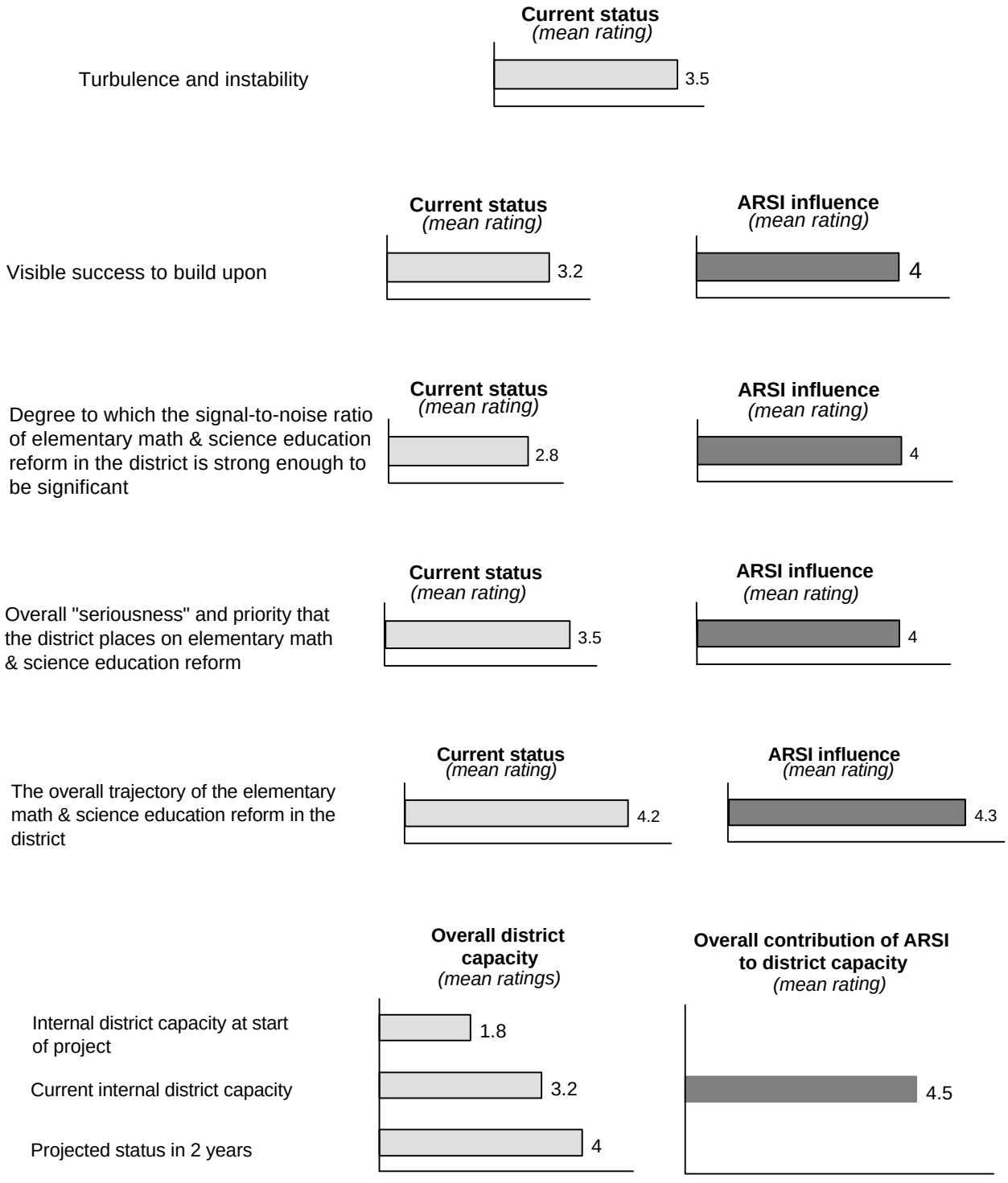
Within the communities we visited, the public schools were longstanding community institutions and often one of the most desirable employers. Many of the teachers had graduated from the schools in which they are now teaching. In all but one of the districts, teachers were described as being dedicated, and open to new ideas – an attitude which has been beneficial for the reform effort.

- However, all of the districts we visited are trying to implement reform in the midst of less than ideal surroundings and conditions.

The districts we visited share a variety of factors that create constraining conditions on reform efforts. For example, some states have assessment and accountability climates that provide mixed or slightly negative climates for reform. Some have state assessments (standardized tests) that teachers feel pressure them into teaching to the test vs. teaching the discipline (or as one

student described – the difference between memorizing and learning). And most districts find little support or interest on the part of the community for discipline-based reforms. We were often told that in general, the community and parents were more interested in football and basketball than they were in science, mathematics and technology reform.

Summary Judgments About The ARSI Districts



The summary judgments for the ARSI districts encapsulate the previous rankings as well as provide a gestalt, or holistic sense, of the contributions of ARSI. The following findings summarize what we learned:

- The ARSI districts are just beginning now to show visible results from the ARSI work.

As we have already described, most of the ARSI work lies in the area of vision and leadership; capacity building in these areas is not always visible. After several years with ARSI, some of the districts are now beginning to show visible manifestations of progress – such as new materials, new instructional practices, and community science events and committees.

- The stability of the isolated and rural districts is actually a net benefit.

Unlike many large districts and urban districts that we have studied, these districts – and their communities – are very stable. There is no large turnover of teachers or administrators, and there are not radical swings in financial and political conditions. Hence, there is an opportunity for steady reform efforts to have a cumulative effect. The downside to the stability we found in the Appalachian communities is that there is also a tendency toward complacency and even resignation about the inevitability of the status quo.

- The ARSI project has clearly had a strong impact on the internal capacity of these six districts. The districts we visited continue on an upward trajectory as they work to improve their math and science programs.

All of the districts have greatly increased their overall capacity for sustaining science, math and technology reform and this increased capacity is attributed largely to the presence of ARSI. It is important to note that this indicator is a measure of what we see as the "value added" to the districts, and this value-added benefit is independent of the existing capacity of the district. That is, we found ARSI moving each district toward improved math and science programs, no matter their initial starting point.

In addition, we found the districts to be well-positioned to maintain and even continue to build their internal capacities in the coming years. Some are clearly farther along than others simply because they were more ready for reform when the ARSI project began its work.

- The ARSI districts have become more serious about math and science reform.

The work of ARSI has led to greater awareness within these districts for the need to improve math and science teaching. Through the dedicated work of the Teacher Partner, and increasing participation in ARSI by district administrators, most of the ARSI districts we visited had developed a more serious intention to improve their math and science programs.

In many districts we have studied the biggest threat to reform is not the lack of a high quality reform effort but rather, the presence of many other competing priorities and issues. The ARSI program has provided a kind of steady reform "signal" in an otherwise "noisy" environment that helps to maintain the progress in improving math and science teaching.