

NSF'S SYSTEMIC INITIATIVES:
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I am the founder and President of Inverness Research Associates. Consisting of approximately 15 researchers, Inverness Research is a small privately-held educational research company located in Inverness, California – a small town about one hour northwest of San Francisco. For over 15 years we have been studying many investments made by public and private foundations in the improvement of K-12 education. For the past five years or so, our group has been engaged in the evaluation of NSF's Systemic Initiatives, as well as many of NSF's other educational projects.

I personally know the State Systemic Initiative program quite well. For the last five years I have served as the evaluator of the New York State Systemic Initiative. I also have had the opportunity to work with the Systemic Initiatives of Nebraska, California, Connecticut, Colorado, Texas, Vermont, Florida, and South Carolina. I have served on panels that have reviewed the proposals of State Systemic Initiatives; I helped to design and conduct a Wingspread conference that studied the lessons learned from the SSIs; and I have worked with many states as they prepared for their mid-point reviews by the NSF.

I am also currently serving as the evaluator of the Appalachian Rural Systemic Initiative.

I know less about the Urban Systemic Initiatives. I have some connections with the Urban Systemic Initiatives in Fresno, Los Angeles, Cleveland, and New York City, but, in general, I have less first-hand knowledge of the workings of these grants.

I also have extensive experience in evaluating other NSF investments including five of their Local Systemic Change Projects (Buffalo, Las Vegas, El Centro (CA), Seattle and Spokane). Our group also evaluates four NSF funded “Centers” which provide technical assistance to NSF grantees and to other reform efforts across the country. We have also had the occasion to work with the National Academy of Sciences, conducting separate studies of the general status of standards-based reform across the country.

The Need for the NSF Systemic Initiatives

Over the past decade we have had the opportunity to study many different initiatives and projects, all of which are aimed at raising the quality of the educational system and, ultimately, at improving student achievement. We have spent a great deal of time “in the field:” We have visited and documented the math and science instruction taking place in hundreds of classrooms; we have visited scores of districts and schools, speaking in depth with teachers and local administrators about the issues they are facing and the factors that are most influential in shaping the quality of their schools; and we have talked with people working at the state and national levels, as they seek to improve mathematics and science education.

All of this work is giving us very consistent messages:

- 1) Most states and large districts across the country are engaged in “standards-based reform” – a process of developing new standards, assessments, and accountability systems. By setting clear goals, by measuring them consistently, and by attaching consequences to success or failure, states and districts are hoping that they can

provide both incentive and guidance for the improvement of their local educational systems.

- 2) To achieve these new and high standards, it is abundantly clear that states and districts have to significantly improve the quality of classroom instruction on a large scale. Such improvement in instruction requires several critical supports. In particular, states and districts must have the capacity to put in place high quality curriculum, to establish systems for managing instructional materials, to design and implement extensive professional development systems, and to implement sophisticated assessments.
- 3) These activities, in turn, require that states and districts have strong local leadership in math and science education. They require that districts have the will and ability to identify and focus resources on math and science education. They also require that states and districts be strategic and systemic in their thinking. We have found that these requirements are rarely met in the field. When we visit states and districts, and when we talk with those engaged in NSF-funded projects, we find many of the supports that teachers need are absent, and that many of the capacities that districts need to provide those supports are similarly missing. In short, the system does not have the capacity to improve itself to any significant degree.

The following analogy may help explain. When I was younger, I had an old British MG. This was a wonderful car as long as it worked. But when something went wrong, it was a nightmare. The systems were all interconnected and it was very difficult to diagnose the source or sources of trouble. It was also almost physically impossible to get access to the motor, gauges or wiring. And there was almost never anyone close-by who knew how to work on this kind of car.

In many ways our K-12 educational system is similar to my old MG. It is designed to run, but not to be worked on. It is robust, and well-designed to perpetuate current practice, but it is not easy to identify, get access to and/or fix problems.

The Contributions of the NSF Systemic Initiatives

I think it is important to summarize very briefly what I see as the major accomplishments of the NSF Systemic Initiatives to date:

Developing an Improvement Infrastructure: First and foremost, I believe that the NSF initiatives are addressing a critical need in this country in that they are helping to develop the capacity within the states and districts that is requisite to the continuing improvement of their math and science education programs. More specifically, the Systemic Initiatives have helped states and districts develop what might be called “an improvement infrastructure” in the following ways:

- They have helped develop strong local leadership that is capable of promoting math and science reform. The long term “residues” of the Systemic Initiatives may well consist mostly of individuals who have the expertise, commitment, and positions within the system to continue the reform effort.
- The Systemic Initiatives have provided states and local districts with knowledge, designs and tools – for selecting and implementing curriculum, for developing high quality professional development activities, and for designing appropriate assessments. (For example, South Carolina replicated the successful National Writing Project Model as they developed a statewide network of math and science teachers.)

- The Systemic Initiatives have also allowed local math and science education leaders to develop connections with national leaders and national reform projects. In many cases (such as the Appalachian Rural Systemic Initiative) the NSF Systemic Initiative has helped isolated systems gain access to state and national resources that otherwise would be unavailable to them.
- To varying degrees the Systemic Initiatives have helped to focus state and local resources on math and science education, and helped states and local districts be more organized and coherent in the use of those resources.

Addressing Issues of Equity: The Systemic Initiatives have been generally quite successful in maintaining a focus on serving under-represented students. The Systemic Initiatives have succeeded in bringing attention, expertise and resources to districts, teachers and students located in inner-cities and rural regions in a way that NSF has never done before.

A Systemic Perspective: The Systemic Initiatives represent a significant increase in the sophistication of the educational funding strategies of the NSF. The Systemic Initiatives have helped to change the way people at national, state and local levels think about educational change. They are helping local leaders to learn how to apply a systemic perspective to their own efforts to improve the teaching of mathematics, science and technology.

Issues Facing the Systemic Initiatives

Prior to the Systemic Initiatives, NSF funded “projects” which typically worked within a single dimension of reform (e.g. curriculum development, professional development, assessment). Also prior to the Systemic Initiatives, NSF would typically fund scientists and/or professional science educators (who work outside of the school system) to carry

out curriculum development and/or professional development projects. This approach has the advantage of funding very high quality people who typically produce very good products and/or services. This “project” approach, however, has a disadvantage in that often the projects would remain quite marginal to the system – curriculum would not be widely used; professional development remained unconnected to the rest of the state and district agenda. And the “residuals” of the project remained with those university faculty leading the project, not with those who worked within the schools and districts.

Under the Systematic Initiatives most of the funding goes to the states and districts themselves. The goal is to assist states and districts in engaging in their own multi-dimensional systemic change effort. This is a real bootstrap approach where the one who is initiating change is also the “change.” Not only is this approach systemic in nature but the residual benefits of the projects (e.g. the development of new leadership) remain within the local school setting.

But there are limitations and disadvantages to this approach. One is that very often the state and district grantees lack the experience, skill and expertise to conduct high quality projects. There is a Catch 22 here: NSF wishes to fund local people to do the work, because they are already inside the system and because they will benefit from the experience. But the very reason they need the grant is the very reason they lack the capacity to carry it out. Hence, the challenge for NSF is to find ways to provide local reformers with outside support and expertise so that their work can be guided by the knowledge of those who are most highly experienced in the disciplines, in education, and in the process of change itself. That is, NSF needs to find multiple and creative ways to provide technical assistance to the state and district-based leaders of its Systemic Initiatives. To date, I think, the NSF has had a mixed record in providing such support.

To its credit NSF has evolved its own understanding of systemic change as the program has proceeded. They have derived from their experience a set of “drivers” which the Foundation sees as the fundamental building blocks of a systemic reform effort. This is a reasonable start at providing an overarching theory to its investments, and a framework for helping districts and states track their progress.

Accountability: Accountability is a major issue in education today, and there are real issues around the ways in which NSF seeks to hold its grantees accountable. There is no doubt that NSF and all other funders need to insist that grantees be accountable and responsible for the intelligent use of public funds. But accountability should not be a burden so great that it interferes with the working of the project. The rules of the game, so to speak, should be clear, consistent and appropriate. And I would argue that it is inappropriate and even counterproductive to assess the effectiveness of a Systemic Initiative by examining student achievement scores. Rather, the Systemic Initiatives would be better served by carefully documenting the ways in which and the extent to which they are, in fact, developing local capacity within states and districts.

An analogy here is to consider the effort by the Americans to go to the moon. When Kennedy announced the goal of putting a man on the moon in ten years, the project spent nine plus years developing the systems and capacities necessary to make the trip. Even though the goal was to go to the moon, it would have been highly inappropriate to measure each year the distance gained towards the ultimate destination. The project would probably have been cancelled after year 3 because no measurable progress would have been made. Similarly, the progress toward the improvement of the educational system should not be measured initially in terms of the movement toward the ultimate destination of increased student achievement. Rather, it should be measured in terms of the progress made toward developing the system capacities necessary to make the trip.

We would urge Congress and the NSF to think more carefully about the whole issue of accountability. We think that accountability itself should be held accountable. We think that it is important that funded initiatives be held accountable for producing results that are realistic and compatible with their purpose. Accordingly, we would argue that the Systemic Initiatives should be evaluated only on the basis of their ability to provide data that answers the following question:

To what extent and in what ways has this Systemic Initiative enabled this state and/or district to initiate and sustain a process of continual improvement of the quality of the mathematics and science instruction offered within its classrooms?

The Scale of the Investment: There are also real issues that arise out of the fact that often the scale of the investment NSF is making is very small relative to the size of the system NSF is trying to influence. In New York State, for example, the SSI investment is on the order of 60 cents per child per year for five years. In California the SSI amounts to approximately 20 cents per year per child. (This is the equivalent of approximately two pencils per year per child.) Many of the Urban Systemic Initiatives are similarly small investments. The expectations for city-wide and statewide impact must be scaled accordingly. The small scale of the investments, when spread out across a whole state or city, also emphasize the need to focus the work of the Initiatives on the building of state or district *capacity*, and not on trying to achieve immediate and direct impacts.

Summary

In summary, I think the Systemic Initiatives of the NSF represent a bold and promising attempt to apply a systemic perspective to the design of investments aimed at improving K-12 math and science education. The results, to date, of this strategy are mixed – but that is very understandable, even expected, and should not deter NSF or others from continuing to evolve a systemic change strategy. For decades we have made marginal improvements using a project-based approach. The truth is that it is

very, very difficult to improve our educational system from the outside with small amounts of money. Thus, we believe that the NSF Systemic Initiatives represent a smart and appropriate use of Federal funds, for they are aimed directly at meeting the critical need to build local capacity as well as at fostering more equitable opportunities to learn.

The Systemic Initiatives of the National Science Foundation represent a recognition of the complexity of the educational system and the complexity of designing initiatives to improve it. It is important that Congress and, ultimately, the public also come to understand this complexity. When the public has an incomplete understanding of the investments that are made in education, and when accountability expectations become over-simplified and inappropriate, they become a strong limiting factor on the potential success of the Initiatives. Thus, the ultimate success of the program may well depend upon the extent to which the public, and the Congress, can understand and appreciate the difficulty and the nature of the work that systemic change involves.