

CRITICAL SUPPORTS FOR ELEMENTARY
SCIENCE REFORM:

THE TOP TEN ACTION ITEMS FOR
SUPERINTENDENTS

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INVERNESS RESEARCH ASSOCIATES

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The following is a summary statement made by Mark St. John, given at the end of a meeting of urban district Superintendents. The meeting was sponsored by CUSER, and held in Washington, D.C. on April 30, 1999.

A district Superintendent recently asked me: "What should I do to make sure we have a good elementary science program in our district? I am not sure how long I will stay in my position and want to leave a legacy of a good hands-on science program. So what should I really do?"

In response to that question, I am going to talk just briefly about some of the key supports that my experience tells me are critical, and which I think Superintendents are uniquely positioned to address. So, at the risk of being arrogant, I am going to tell you all what to do – and I am going to tell it to you in David Letterman style. Here is my "top ten" list of what Superintendents need to do if they are serious about having a good elementary science program in this district.

But, first, let me say a few things to you about elementary science education.

I know that elementary science is not at the top of your list of priorities. Not too many of the messages that came over your beepers today were about the issues and problems that were occurring in elementary science back home in your districts.

And, if we were to look at elementary science in a simple statistical fashion, then you might say that it is just one of five or six important subject matter areas. And elementary is just one of three levels. So that makes elementary science, at most, about 1/18 of your instructional worries. So why even pay any attention to it?

Here is my answer. If I were a Superintendent, I would think about my elementary science program as a small piece of my district's instructional portfolio. It is indeed a small piece. But it can be a very nice piece. You know, if you have a stock portfolio, you might wisely put most of your investment into an index fund. But you might also decide to invest a small amount of it in emerging markets. You might buy the Ireland fund or the Malaysia fund – and it might turn out to a very good investment – a gem within the overall portfolio. Lots of return for the money, even though it is not your major investment.

I would argue to you that elementary science in particular could be that gem in your instructional portfolio. Most of your investment will probably go into literacy and mathematics. But elementary science, I think, is an area very worthy of a small but sustained investment. Let me tell you why. Elementary science is one curricular area where we have a long history. There are really good curricula available. There is a lot of experience in designing professional development and in implementing district-wide hands-on programs. Elementary science is one thing we really know how to do well. There is, frankly, no mystery to it.

If we look at a district like Fall River, Massachusetts, we see an example where a good district-wide science program has come about through slow, steady work. The leaders have held a consistent

vision and simply built the curriculum, materials, and training that are needed. They have made small investments in an ongoing way, and I think that, proportionately, they now have high returns in terms of a good institutionalized program.

Now I will tell you the 10 things that I would do if I were a Superintendent and I wanted to make that kind of small steady investment in elementary science. The things I am talking about here are also the key concerns of the science leaders that we have talked with in your district, and I can tell you – they are desperate for your support in these areas.

Item #10: **Accountability.** Strangely enough, even though we have talked a lot about it today, I would put handling the issue of accountability as #10. Accountability, as you know, is a HUGE force today. Pressure for increased test scores is at an all-time high. And I am not so naïve to say that you can ignore this pressure. But I am saying that a good leader puts things in perspective and so, in multiple ways, I think you have to buffer your principals and your teachers and say: “ We are going to have a good science program in this district.” And we are going to have it because: a) we believe that ultimately such a rich program will contribute to our being accountable to the public, and b) because we believe that such a program is the right thing to do for children. I think that as Superintendent you have to create the idea that a good elementary science program is what is expected and that it also can contribute to the district’s response to the accountability demands. It is critical that you make it clear to all in the district that you are serious about wanting to see a good district-wide science program.

Item #9: **Assessment.** As Superintendent I would help my principals and teachers to think through the whole area of assessment. I would try to arrange for intelligent assessment. I am actually going to use a different word – I would ask my district instructional leaders, principals and teachers to think about the ways in which they can get “feedback” about the nature and quality of their work. I would ask them to think of common sense ways to get feedback – to find out what is actually happening at both a classroom and system level. At a classroom level you have to help teachers find out the answer to a question they almost all have: “Is this program working?” They need ways to get feedback about the nature and quality of the learning experiences their students are having in elementary science. They need to know what their kids are (and are not) understanding. They need outside critiques, as well as their own opportunities to observe and reflect on instruction.

At the system level – and this surprises me – very often even your best science specialists can't tell you very accurately what is actually happening in the classrooms around the district. We were in Tucson recently, and they were excited because they were just starting to get data about the degree to which their science kits were being used. They were beginning to get a sense of which kits were being opened and which weren't. The next question they all wanted to know was: How many of the activities were actually being taught? Which units are taught, and which are not, and why? They were excited about designing ways to find this out. They were excited about getting feedback on the realities of their district’s science program.

Perhaps the next step would be to get some sense of the actual quality of instruction. The Horizon evaluation work (for the NSF-funded) LSCs is helping districts to document the quality of the teaching. The Horizon observations and ratings are helping districts to know if teachers are simply

doing “activity for activity's sake,” or whether students are suffering from too much “passive learning.” They are helping districts see if the quality of the science teaching in their district is good.

So, as Superintendent, I would make sure that we have at least some common sense feedback mechanisms so that we have an accurate sense of what is actually happening in terms of elementary science instruction throughout the district.

Item #8: **Outside Support.** Where there are successful district-wide science programs you will often find the presence of program advocates, program defenders, and program partners. These are people outside of your district who care about elementary science. They can contribute to the development of the program, and they are likely to defend it if it is threatened. These people are political advocates for elementary science.

In our discussions today we heard a lot about the “business community.” The business community is a natural partner when it comes to math and science education, and I think elementary science presents a vision that is very attractive to business leaders. If I were Superintendent I would look for an external champion who could carry the banner for elementary science to the business community, the chamber of commerce and the scientific community. I would ask this “champion” to take the lead in organizing broader support for a core kit-based and inquiry-based program.

Item #7: **Principals.** In this era of site based management, principals are key in setting the instructional tone and the programmatic expectations at their schools. The principals really set the tone for the culture at a school; they establish instructional priorities; and they very much determine the nature and type of professional development that teachers are likely to engage in. Increasingly, principals are not only instructional leaders, but they are discipline-specific instructional leaders. That is, a principal who says “I care about the elementary science that is taught in the school” is a critical ingredient in getting elementary science taught.

Principals report either directly or indirectly to the Superintendent. Thus, it is very important what message you send to your principals. You can not only promote the importance of elementary science in a general way, but it is possible for Superintendents to be quite concrete in promoting the capacity and propensity of principals to advocate for elementary science. We heard in this meeting examples of Superintendents leading study groups for principals; we heard about Superintendents asking principals to bring in student work in elementary science for group discussion. The Superintendent can ask principals to do their teacher evaluation observations in science. All of this sends a strong message. The nourishing of principals as science instructional leaders does not have to be a major demand on their time. But a little focused effort can be a crucial ingredient in building the five percent of your instructional portfolio that is a real gem.

Item #6: **TOSAs.** “TOSA” stands for Teacher on Special Assignment. A TOSA is a teacher who is on full-time leave from the classroom and who is assigned to work at the district level with the sole job of helping to implement a district-wide high quality elementary science program. TOSAs are skilled teachers who are passionate about elementary science.

Just as you need external “program defenders”, so you also need internal “program workhorses”. Programs don’t happen by accident. It isn’t likely that tomorrow every elementary school teacher

in the district will be teaching high quality hands-on elementary science. Somebody has to do the real work of selecting and organizing good curriculum. Someone is going to have to conduct workshops for teachers. Someone is going to have to go into the classroom, and help teachers use their new science kits well. Someone is going to have to talk with principals about their school-wide progress. TOSAs are important – both for getting the work done, but also for being a kind of “squeaky-wheel” for science. A TOSA shows up at a school and walks around and says: “Can I help you open your kit?” or “How are your materials and your kit going?” Suddenly teachers pay attention to science.

TOSAs, I think, are essential. If there is the skilled presence of a TOSA, working hard day-in and day-out, then something is going to happen. If no one is there to help, promote and support, then nothing is going to happen. It is also important that TOSAs are not serving as administrators, but rather as colleagues and peers to the teachers they are assisting. So TOSAs are, I think, a critical component of any effort to develop a high quality elementary science program.

And there are also derivative benefits of having good TOSAs. One is that TOSAs very often make wonderful future instructional leaders. They often become district science specialists, or very good principals. The task of developing in a strategic way a district-wide science program is a wonderful training task. TOSAs are engaged in curriculum assessment, professional development, assessment and comprehensive school reform.

It is important to note that TOSAs can be funded by Eisenhower funds. I would argue that a good TOSA is a better use of Eisenhower funds than sending 30 people off to the NSTA conference.

Item #5: **Materials.** If a district is serious about having a district-wide kit program, then it is, I think, essential for that district to develop and maintain a high quality materials center. Pasadena School District has a wonderful warehouse that stores and replenishes and distributes science kits to every teacher in the district. El Centro School District immediately set up a new center as the starting point for the development of a program in their district. Tucson has a center, as does Fall River. All the very successful districts I know have healthy, functional, centralized materials centers.

When a district invests in a materials center, when kits come to the schools on schedule, and when teachers see that elementary science is not just a passing program, then the materials center becomes the foundation of a good program. A good materials center sends a very strong message that science is here to stay, and that science teaching is an expectation. It tells teachers – in a way that words never can – that the district cares about elementary science. The flip-side is that if districts do not handle the whole issue of materials – if the materials don't show up and you don't have a way of replenishing kits – and if the teacher has to handle materials without assistance, then it is a very strong message that science is peripheral and marginal. The district in essence is saying “We would like you to teach science so see if you can get around to it.”

A materials center is a very concrete thing, and it has great symbolic value. It is a wonderful thing for business and industry to help you with. You could also broaden the concept and think of a mathematics and science materials center where there is teacher training, materials, etc. You can have a big vision or little vision, but the handling of science materials is a very, very critical thing. And again, it is something that the Superintendent must support.

Item #4: **Curriculum.** Curriculum is a Latin term that stands for “the course to be run”. An elementary science curriculum outlines what is to be taught and how it is to be taught. My own experience is that in the domain of elementary science districts do better by starting with high quality curriculum materials such as those that have been developed through NSF projects. What does not work is to give teachers a framework, or a set of standards, or a list of essential skills, and then say to them: “Accomplish these outcomes any way you want.” It is simply too much to expect that local teachers, working during summer vacation, can create materials and units that are of the same quality as NSF-funded materials. So my message to Superintendents is to insist that the district select high quality, well designed curriculum programs that are essentially kit-based.

Item #3: **A Science Point Person.** The next one on our top 10 list, is what I call a science “point person”. If I were a Superintendent and I were trying to put in place a district-wide science program, I would put first on my list the science point person. I would want to find, hire and empower a strong individual who knows and loves elementary science, who is capable of organizing professional development events, who can work with district administrators and school principals, and who has the political skills needed “to work the system.”

When we did a study of districts that had succeeded in implementing good hands-on science programs, there was really only one common element. And that was the presence of an individual – a science point person – who had extraordinary energy, commitment and skill. If you look at all of the districts who have had success in the past – like Jefferson County, Mesa, and Fairfax – there are individuals who come right to mind. They are the individual leaders who made their district science programs happen.

I would argue a good science coordinator – a point person – is not just adding to district level bureaucracy. Rather I would argue that unless you have such an individual at the helm, you are unlikely to get a district-wide, high quality hands-on science program.

Item # 2: **Program vision.** The key role of the Superintendent in elementary science is to provide and promote a steady vision of what elementary science should be. The Superintendent needs to say, “In this district I have a vision for elementary science and it looks like this.” It may be a vision that is expressed in terms of curriculum and kits and hands-on learning and so forth. But underneath that there must be a deep commitment to the children of the district. In some ways elementary science reform is all about equity. A Superintendent says: “It is not okay with me, as leader of this district, for some children – but not all children – to have rich learning experiences in science at the elementary level. It is not okay with me for children to learn science only if they happen to have a teacher that likes it.”

You are saying as Superintendent to your parents and your community: “One of my priorities is to make sure that we are going to work hard to create a district where all elementary children get a steady daily diet of rich science instruction.” Certainly you say those things about math, reading and writing. It is not alright for a child not to receive math instruction because this year the teacher does not like it.

Your vision has to have three levels to it. The first level is what good instruction looks like and consists of. The second level is what the district program looks like. And finally, you must be clear

about the district capacities (like point people, TOSAs, curriculum, and a materials center) that must be in place to support all of this. Thus, the Superintendent must be the one to hold the big picture – and to communicate that picture to others who can make it happen.

So the vision for elementary science must include not only the final product but how you are going to get there. We didn't talk too much today about the developmental plan of getting there. It is almost like a business plan. You say: "Here is the bridge I want to build and I have this vision (and the detailed drawings). I know how many cars it is going to carry and why we need it and so forth."

But you also need to plan how we are going to build it, how are we going to get there. The Superintendent can lay out how over the next three years, we are going to put in place the capacities that are needed, and how the program will be developed and implemented district-wide. (Note that I emphasize this capacity piece because all too often we undertake an endeavor without first making sure we have the capacity to do it.) So as Superintendent, at least in broad terms, you need to be the one to lay out how the district is going to identify good curricula, to hire and empower a strong point person, and to create and sustain a materials center. Your vision has to not only specify "outcomes" but it also must be specific about the capacities that are to be created.

I can't emphasize enough the importance of a Superintendent who is persistent and steady in their assertion that the district is going to have a high quality elementary science program. And then backing that up with a concrete vision of how it is going to happen.

And this leads me to the number one item of what a Superintendent should do if they are serious about putting in place a high quality elementary science program.

Item # 1: **Have courage.** I came to this conclusion today by listening to all of you talk. I am deeply impressed by the magnitude, complexity and difficulty of being the Superintendent of an urban district. (In fact, I am curious about the personality flaw that you all must share in wanting to do this job!) In the environment we are living in, with incredible and not always realistic accountability pressures, and where the average urban Superintendent holds their job something like 1.9 years, then I think it is going to take tremendous courage to help principals and administrators do the right thing for children. And I am convinced, as I think are many of you, that a rich hands-on inquiry based elementary science program is a very good thing for children.

But, even though we may know that, I think it is going to take tremendous courage to create an elementary science program in today's world. Because, ultimately, there is probably not enough external political incentive to justify doing it. The reason you will end up doing it is because you know it is the right thing to do. Of course, you want to be politically wise about all of this – you will want to work it so elementary science supports your other priorities such as increased improvement in reading and writing. But ultimately you invest in the people and resources I described earlier, because hands-on elementary science is a wonderful contribution to the children. So it is going to take real courage to keep doing the steady quiet work that is necessary.

Those are my top-10 action items for the Superintendent. I leave you with a plea to think about these things, and to realize how critical your role is. There are many very good people who are willing to work hard to make inquiry based science a reality. They need your leadership and support. With a relatively small investment they can help you create a "gem" of a program in your district.