The SAI Guide to Building Effective STEM Education Programs

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The STEM Accelerator Initiative (SAI) is a program of The National Alliance of State Science and Mathematics Coalitions (NASSMC), an umbrella organization for state coalitions of business, education and public policy leaders united for systemic change in science, technology, engineering and mathematics (STEM) education for all students.

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Table of Contents

Introduction	2
Setting Initial Program Parameters	6
Partnership Development	10
The Asset Inventory	15
Program Design	18
Measurement and Evaluation	20
Strategic Reviews	24
Sustainability	28

Appendices

Resources on K-12 Education and Community/School Partnerships	31
About the STEM Accelerator Initiative	35

I. Introduction

Many of today's most promising careers require a solid grounding in mathematics, science, and technology; however, there is substantial evidence showing that we are not preparing enough students to enter fields that require knowledge in these areas, thereby denying them opportunities and cutting off the flow of workers needed by our highest-growth industries. Consider these indicators from the 2006 edition of the National Science Board's Science and Engineering Indicators:

- In both mathematics and science, most students in grades K-12 did not reach a proficient performance level, a level denoting solid performance for their grade based on judgments of what students should know and be able to do in the subject assessed. Only about one-third of 4th and 8th grade students, and even fewer 12th grade students, reached the proficient level in these subjects.
- In 2000, some 76% of postsecondary institutions offered remedial reading, writing, or mathematics courses. At these institutions, 22% of freshmen took remedial mathematics, 14% took remedial writing, and 11% took remedial reading. From 1995 to 2000, more institutions reported that students needed a year or more of remediation.
- Between 1980 and 2000, the total number of science and engineering (S&E) degrees earned grew at an average annual rate of 1.5%, which was faster than labor force growth, but less than the 4.2% growth of S&E occupations.
- Twenty-nine percent of all S&E degree holders in the labor force are age 50 or over. Among S&E doctorate holders in the labor force, 44% are age 50 or over. We are about to see an exodus of skilled workers from our highest-growth fields due to retirement.

While the K-12 education system strengthens its focus on academic equity – ensuring that all children can perform at a set minimal level – other stakeholders have entered the field to focus on promoting excellence, preparing students to meet the challenge of working within the STEM-related industries. These stakeholders include businesses, universities, nonprofit organizations, and individuals (including teachers), working alone or together to give children a head start on a bright future.

Education is a multifaceted, multi-year process, and there are an incredible number of STEM education initiatives designed to address the needs of children at every age level based on their developmental needs and capabilities. Some of these programs focus on enhancing instruction within the classroom, while others highlight after-school or out-of-school opportunities to expose children to science, mathematics, and technology. Some programs avoid working directly with children, opting instead to focus on issues such as teacher training, recruiting, or building support programs (such as raising funds or generating awareness among politicians, business leaders, or community members).

Because there are so many different ways to support STEM learning, and because needs are different among different ages and student populations, it is beyond the scope of this guide (or any guide) to lay out specific and detailed plans for the creation of education initiatives. Rather, this guide will walk you step by step through the process of building your education outreach program regardless of its focus or function.

As you develop and manage your outreach program, you should remember that successful programs are built upon a set of core principles, and that your chances of creating a sustained impact will improve dramatically should you build your program with these principles as your foundation. They include:

Intention

You should approach the design of your initiative, and its day to day management, with a clear and explicit understanding of what it is that you're trying to

Theory of Change

The STEM Accelerator Fund looks for excellence wherever it can be found. Whether that is in the public or private education spheres, or formal or informal institutions, the Fund may support any program that can demonstrate a successful impact on improving the STEM education and workforce pipeline. Both short- and long-term approaches to improving the STEM pipeline may be supported. At each grade level, the Fund emphasizes:

Grades PK-5	Grades 6-8	Grades 9-12	Higher Education
• STEM Fundamentals	• Prerequisite Skills	• Career Choices	• Movement to STEM Disciplines • Teacher Training

Informal Education Programs Across the Spectrum

The Fund is not limited to supporting only these issues or grade-level divisions. Other approaches to improving accomplish. Write out your objectives, and how they fit into the overall academic or personal growth of the children you serve; share those specific objectives with everyone inside and outside your program; and build assessment systems to track your progress on those items.

It may be helpful to envision the "Critical Path" to the desired outcome. Having first clearly established the characteristics of a successful program, you should ask, "What specific things have to happen in order for us to achieve our objective?" Benchmarks essential to success of the program should be established. Obstacles to successful development should be identified and addressed.

In developing the critical path, continued focus on primary objective is essential. It is very easy to lose sight of the goal if it is ambiguous to begin with. Define that future state in which you wish to find yourself, and then determine the necessary steps to reach that state. Only by developing and maintaining a clear focus can you hope to create change.

Collaboration

It takes a great deal of time, talent, and treasure to create and maintain an effective education program – more than one person can manage on his or her own, especially when serving larger groups or working towards significant objectives. There are others in your area who share your interests; these may include people within the school system, such as teachers and administrators, and/or it may include external stakeholders such as social service organizations and other nonprofits, individual businesses, business coalitions, and postsecondary institutions. Make an effort to recruit collaborators, and let your campaign benefit from their support.

Flexibility

As soldiers often say, no battle plan survives first contact with the enemy – meaning, in this case, that your education initiative may play out very differently in reality than you had envisioned. Be prepared to change your tactics as you learn what works and what doesn't.

Just as importantly, keep an eye out for unintended consequences: if you find that you're having an impact in a different area than you intended, consider whether you should revisit your desired outcomes instead of just retooling your efforts.

Do not however, lose sight of the fact that there was a reason that this program needed to exist in the first place. You should anticipate that there may be some opposition and that there will be challenges to overcome. You are trying to change the outcomes of the current system, not reinforce them.

Evaluation

It's not enough to believe that you're having an impact on student knowledge, skills, and/or attitudes: you have to *know*, not only for the sake of the children, but for all of those people (including yourself) who are working hard to make your initiative a success. Programs that can show hard (and preferably, independent) data on their impact are much more likely to gain the support they need from participants, partners, and donors to become sustainable and to grow.

Sustainability

There are countless examples of initiatives that made a difference in the lives of children, but that disappeared when the support that enabled them to launch suddenly disappeared. Remember to work on your program, and not just in it, by focusing on developing multiple sources of support and not allowing your hard work to go to waste simply because your one source of revenue dried up.

The remaining chapters of this guide will provide readers with practical information on the key elements they should work through when designing and managing their education programs. While organizations following these steps are not automatically guaranteed to receive support from the STEM Accelerator Initiative, they certainly become much more attractive candidates – and whether or not SAI plays a role, these programs will be much more likely to become effective, vibrant, and sustainable additions to the communities they serve.

II. Setting Initial Program Parameters

What kind of program do you want to build?

On its surface, this is a daunting question: there are any number of content areas, audience segments, partners, and program models that you might consider as you hone in on the goals and structure of your outreach initiative. But odds are that you've already got an idea in mind, whether it's very rough or somewhat structured.

This section will help you identify and consider the critical elements that make up a successful outreach program. These elements are interrelated, and are presented in no particular order. You may have set one element in stone, so that other facets of your program need to be built around that one piece, or you may find that they all contribute to some degree in structuring your program.

Keep in mind also that program design is an iterative process, which is why the title of this section refers to initial program parameters. You'll likely need to revisit this section based on your responses to questions raised here and in other sections.

Once you have a clear grasp of all the elements that will affect your program design and operation, and once you've worked through the next two sections (on partnership development and conducting an asset inventory), you'll be able to move on to Section V., Program Design.

Interests of the Founder/Leader

The first step is to consider is your interests as the founder of this program. For the purposes of this section, we're assuming that you are the sole driving force behind the creation and launch of this program. At this point, if something needs to be done, you're the one who's going to do it; if something goes wrong, you're the one who's responsible. Your organization is going to live or die based on your work and your dedication.

Given this, it's perfectly reasonable to say that the structure and goals of the organization are going to depend on your interests and priorities. If you hate being outdoors, you're not going to launch a nature center; if you're vehemently opposed to standardized testing, you're not going to launch a test-prep program.

So, when it comes to STEM education, what are your passions? Which subject(s) excite you the most? In what geographic area do you want to work? With which ages and populations of children do you most enjoy working? What do you most want these children to take with them from your program?

Remember, this exercise won't necessarily set the structure and agenda for your initiative by itself – but if the program is going to survive in large part on the passion and energy that you personally will put into it (at least at the early stages), it makes sense to include those things as considerations in program design.

Resources

While you'll build a complete inventory of assets in Section IV, you're likely beginning the planning process with an initial list of resources that you know are available for your program. It may be a budget made available by your company, nonprofit organization, or school; it may be an existing group of volunteers; it may be little more than the availability of a computer lab after school hours; or it may be an embarrassment of riches courtesy of a generous benefactor. No matter what is on this list, it should be included as an initial program parameter. Even though we'll add to it later after additional consideration, its early presence on your list will likely represent an important anchor in program design.

Partners/Sponsors

If you have already recruited partners and/or sponsors, you should consider their interests, and the resources they can provide, as part of this exercise. Find out why they chose to get involved, both in terms of helping kids and in generating returns for their organizations. ("Returns" don't have to be financial: they can include community goodwill, employee morale, development of a future workforce, and the like.) And find out what they're willing to contribute to help you make that happen.

School/District Requirements

If your program is tied to schools, either housed by a school, catering to children in school (such as a museum hosting field trips), or being built to address some academic requirement through an extracurricular initiative, be sure you understand the requirements that will apply as a condition of your involvement. What academic requirements must be met, and how does your program align with those requirements? What about regulations involving parent consent, safety, transportation, collection of student data, liability, and other issues that may relate to your program?

As government institutions, schools and districts have several such regulations; it would be wise to sit down with someone from the administration to make sure there aren't any insurmountable hurdles in your path.

Stakeholder Needs

Every educational initiative has at least a few groups of stakeholders; among these are the children being served, their families, your partners and sponsors, and even your staff and volunteers. Take time to identify what it is that they want to get out of the type of program you're thinking about developing:

- **Children** – You've seen the SAI Theory of Change in the previous section (page 3). What do the children in the demographic you've selected need? And how can you effectively give it to them? If you have research in hand, that's great; if not, you'll need to find it before formalizing your model. And you'll need to find it early: there are too many stories of ineffective programs that decided what they wanted to do, and then tried to compile research that justified their program. In reality, it works the other way: see what the research says and build the specifics of your program around it.
- **Families** – While you may not be serving families directly, you do need to account for their needs and interests when working with their children. Families need to get their children to and from your program; families need to know that children are safe. And families need to understand how your work with their children plays into the larger requirements of their lives for them to choose your program over guitar or swimming lessons.
- **Partners/Sponsors** – There are several reasons why others would contribute to your efforts, and it would be worth your time to find out why your current partners and sponsors have opted to work with you rather than the countless number of other volunteer or educational programs they could support. Some may work with you solely for

charitable reasons, but most will be looking for other returns as well, whether those involve building a workforce pipeline for their businesses, generating community goodwill, boosting employee morale by providing volunteer/charitable opportunities, or grooming certain staff members by giving them leadership opportunities outside the organization. If you want to develop strong and sustained partnerships, find out what returns your partners are looking for, and build your program so that they – and others – can reap these kinds of rewards.

- **Staff/Volunteers** – Other people who may work on your education initiative may or may not have interests similar to yours. For those people who will play a key role in your campaign in its early stages, explore their motivations for working with you. Are they interested in advancing children? Do they want to enhance their skills in some area, such as project management or leadership? Just as your interests as the founder have an impact on the structure of your program, any individuals who will play a material role in the founding of your program should be asked about his or her goals as well.

Again, remember that the program parameters you identify here serve only as a starting point: they reference things that you're aware of before you start to do any more in-depth research in critical areas like partners, assets, and research. By working through subsequent sections, you'll be able to take this rough sketch and turn it into a clear picture of an effective education program.

III. Partnership Development

You may be starting off with one or more sponsors as you plan your outreach campaign; more likely, you're working solo, but hoping to attract a bevy of supporters as you go forward, both before and after you design your initiative.

Types of Partners

When program designers think about partners and sponsors, the first thing they typically look for is a business that will donate money to underwrite their efforts. In reality, the world of prospective partners, and what they can do for you, is much larger than that. Consider which of the following categories, and which local organizations within those categories, would align with your efforts:

- Small **Businesses** – Small businesses can be among the most responsive and versatile partners. You'll often have an opportunity to deal with either the owners or with top management. Their interests range widely: they may be attracted to projects that align with their core products or services (such as a plant nursery wanting to work on a school garden) or on initiatives that deal with a general issue like workforce preparedness.
- Large **Businesses** – Whether you find a branch office or headquarters location in your community, larger businesses tend to have a more structured approach to partnerships: they'll often have a person or team dedicated to community outreach, frequently in a community relations or foundation capacity, and they are more likely to have established guidelines that determine when and how they participate in education initiatives. Larger businesses are more likely than small ones to look only at projects with a track record.
- **Business Organizations** –Chambers of commerce, trade associations, or workforce development boards represent the interests of their members, resulting in a dominant focus on practical outcomes like workforce preparedness. These organizations are more likely to offer expertise and manpower than financial support.
- **STEM Coalitions** – There are 42 state-level organizations affiliated with the National Alliance of State Science and Mathematics Coalitions, or NASSMC; these coalitions are made up of businesses, education, and public policy leaders united for systemic change in STEM education for

all students. NASSMC coalitions are engaged with education in various ways based on the interests of the individual organization.

- **Informal Learning Organizations –** This category includes museums, planetariums, zoos, and other community resources, but can be expanded to include nontraditional groups such as websites and public television stations. They are usually focused on a particular educational mission and can offer a range of resources to partners.
- **Parent Organizations –** Parent Teacher Associations (PTAs), Parent Teacher Organizations (PTOs), and booster clubs of varying stripes can sometimes partner with specific education initiatives if they align with the objectives of the group. These entities most commonly provide funding or volunteers.
- **Foundations –** Whether corporate, private, or community-based, foundations are most likely limited to providing direct financial support, although some offer expertise or introductions as well. Foundations can only provide support to nonprofit organizations, and paperwork requirements can be heavy.
- **Nonprofit Organizations –** This is a broad category, covering community service organizations, national mission-driven groups, and others. Like informal learning organizations, they can provide a variety of resources to partners provided their interests align.
- **Schools/Districts –** Don't overlook schools and school districts: they undoubtedly share your goal of educating children, even if your work addresses an area they're not able to cover within the standard curriculum.

What Partners Can Provide

Most people think only of soliciting cash donations from prospective partners and sponsors; however, partnering organizations can provide a great deal more than a check. Think about the value of the following to your organization when approaching prospective partners:

- **Financial support –** checks are always welcome of course, but recognize that funds can come in other forms, such as grants, contributions from sales (such as donating one dollar for every product sold), employee collections (the United Way model), or having sponsors underwrite the cost of major expenses.

- **Goods and services** – For those partners that produce goods or services related to your program, donations can help you eliminate a major expense category from your operational budget.
- **Manpower** – Partners can supply volunteers and mentors to staff your program.
- **Expertise** – Experienced professionals can serve on your board or in some other temporary or permanent advisory role, offering invaluable guidance on your program and business operations. People in these roles can also support you in a development role , reaching out to others in their networks on your behalf.
- **Exposure** – As part of a larger relationship, some partners will make an effort to highlight your organization in their communications efforts, giving you valuable exposure to targeted audiences that can lead to financial support and new relationships and partnerships.

What Partners Want

The benefits to you of receiving contributions from partners are obvious. But have you considered what your partners get out of the relationship? Few organizations consider this side of the equation – and those that do have a substantial edge in their development work.

While it's the most logical approach, you won't see significant results from your efforts by simply touting yourself as a worthy cause; it's not sufficient to say that "it's all for the kids." Remember that your prospective partners are probably being asked for support all the time, from all sorts of nonprofit organizations. Certainly, education is a worthy cause – but is it more worthy than hunger, animal abuse, cancer, the orchestra, or homelessness?

The determination of what's most worthy is made by your prospective partner – and, while some who share your passions will sign on to your program, you'll be leaving a lot of potential support on the table from organizations that would otherwise work with you if they could just see all that they could get out of it.

For some organizations, helping the kids will be enough – and your viable prospects will be those that say so up front. These include foundations that lay out their interests very specifically in their grant application outlines. There are some who are primarily interested in workforce development – this group includes business coalitions, but will also likely include businesses and trade organizations working in science and technology fields. Some will be interested in finding opportunities to build community goodwill, and will care primarily about getting exposure and credit in exchange for their support. And there are some who will be most interested in the opportunities it gives their staff, in terms of building employee morale and offering volunteering and leadership development opportunities. Others will have different interests, and most commonly, organizations will have a mix of these interests.

How to Recruit Partners

First, understand that waiting for people to find you doesn't work; and, on the flip side, cold-calling long lists of organizations with a canned script - "dialing for dollars" - doesn't work either. (Actually, mass calling efforts may bring in a trickle of revenue, but it's terribly ineffective, and substantially limits what you would otherwise receive from the right prospective partners.)

So what does work? Try following this simple four-step plan:

- **Identify prospective partners** – Based on what it is that you're trying to accomplish in your work, and the ways in which you will operate, look for organizations in the categories listed above that may share some of your interests. Work with staff members, advisors, and other stakeholders on this list.
- **Research** – Take the time to research these prospective partners: make sure they have resources that would benefit your program, and look for evidence of their interests, priorities, and past work. You should be able to prioritize your prospective partner list using this information.
- **Approach** – It's generally better to approach someone through an introduction than through a call out of the blue; this is where your advisory group or your broader network can come into play. Ask them to make the introduction brief, target it to the interests of your prospective partner, highlight an impressive aspect of your program, and request a specific next step. (ex: "I thought you'd want to know about this program due to your shared interest in preparing students to work in biotech. You might want to hear what they're doing – 90% of their program participants go on to work in the field, and they're looking for partners to help them expand their efforts. Can I have him call you?")

- **Present** – Start with what you know about their interests in this area; at this point, with a meeting scheduled, it's worth the time to do additional research in order to better tailor your presentation. Explain your program, but do so in a way that emphasizes the aspects you know will be most appealing to them. Then outline the type of partnership you're proposing, again highlighting the benefits they'll receive from the affiliation. Finally, ask for their support, and determine next steps before you leave the presentation.

The most important thing you can do to attract sponsors is to step into their shoes and see the opportunity from their perspective – do that, and you have an excellent chance to make a presentation that engages them and, hopefully, brings them in as a new partner.

IV. The Asset Inventory

It may seem counterintuitive to think about which assets can be incorporated into a program before the program is designed; however, if you want to maximize your program's impact, you can only do so by fully leveraging the resources available to you, which will influence the design of your program.

As an example, consider how some businesses structure their contributions to causes they consider to be worthy. When asked for support, airlines are sometimes willing to donate free tickets, which can help nonprofits defray costs or which can be raffled off as fundraisers, while restaurants may provide food for volunteers or vouchers which again can be used in raffles or giveaways. These organizations are leveraging the assets they have in greatest supply, and that cost them the least to provide. Your program can do the same by identifying the assets available to you, and the assets your current and prospective partners can most easily contribute.

These examples also serve as a reminder that, while financial resources are extremely important, there are several other categories of assets that can be used to fuel your program.

You can start building your asset inventory by asking the following questions:

- What assets have been initially provided to launch and maintain this campaign? Financial resources, manpower (paid and volunteer), gifts in kind (free office space, website development services, etc.), and community partnerships should all be included.
- If your program is part of a larger organization, which other departments may have resources you can utilize? If responsibility for some of your target audiences falls within the purview of other departments, you should consider talking with them to see what they may be willing to contribute to your efforts, and how your efforts can help them achieve their objectives in return.
- If you are in a business, what products or services does your company provide to its market, and how can they be used in your education program? As the examples above make clear, these are often very

cost-effective contributions, and as a result can be provided in greater quantities than standard cash donations. If you have business partners, what products or services do they provide, and how can those be leveraged in your efforts?

- If this is a corporate program, what strengths does your company have? Do you have strong brand equity, an excellent distribution network, or some other strength that may be considered? If you have business partners, what strengths do they have that may benefit your efforts?
- What sort of workforce do you or your partners employ? Where are employees located, and what are their skill sets? Are there opportunities to institute volunteering or mentoring programs, or tap into existing programs?
- What relationships do you or your partners have that could be utilized here? Do you have strategic partners, sway within trade associations, access to industry experts, or agreements with celebrities or other prominent personalities?
- What channels (online, mass media, etc.) do you or your partners use for marketing and communications? Can you take advantage of existing campaigns to gain exposure? Would your partners consider some sort of cause marketing initiative in order to raise funds for your program through their sales efforts?
- By joining your organization, board members make a commitment to your efforts and expect to be called into service. Can they serve as ambassadors to prospective partners and to the community, raising funds and recruiting new partners?
- If your organization serves children, consider whether there are opportunities for parents to support your work. Can they volunteer their time, or help you identify other volunteers? Can they find out whether their employers have a giving program or would be interested in serving as corporate partners?
- An often-overlooked source is your existing volunteer base: the people who donate their time to work with program participants may have other talents of equal or greater value. Are there people with organizational skills who could manage facets of your program? Are there writers who would be willing to complete some grant applications? Are there marketing or PR professionals who would be willing to create your communications materials?

These questions should help you build a list of all the assets available to you – not just direct financial support, but an array of potential resources that can help drive your efforts. As you consider soliciting these resources and building your program with them, there are a few things you should consider:

Term of Contribution

While any appropriate contributions to your work will be appreciated, remember that you need to build a sustainable education program, and that it's very hard to do that when most of your resources come in the form of one-time gifts. Look for resources and partnerships that can be developed into annual contributions – they are the lifeblood of your organization.

Nonprofit Status

While requesting and maintaining nonprofit status is a time-consuming endeavor, it will provide a substantial boost to your development efforts. Aside from the message that it sends to prospective partners, the ability for donors to write contributions off their taxes can result in larger and more frequent gifts.

Return on Investment

As highlighted in Section III (Partnership Development), donors and partners alike need to know what impact their support will have. This includes seeing evidence of the impact of your work, something addressed in Section VI (Measurement and Evaluation), but it also includes the impact that their contributions have on their own efforts. Make a concerted effort to show how their support changes the lives of the children you serve by providing them with hard evidence, and work with them to structure their support in a way that provides them with a return on their terms, whether that involves employee morale, community goodwill, staff leadership development, or some other benefit they see as important.

V. Program Design

Up to this point, you've done the following:

- Identified the audience you wish to serve
- Developed broad-stroke campaign objectives
- Listed your initial program parameters
- Defined the program assets available to you
- Identified current and prospective partners

Now you're ready to do the research that will allow you to build your causal model, and start putting all of the pieces together to design your outreach program.

A causal model simply says what the market looks like now, what you want it to look like instead, and what you're going to do (i.e., your intervention, or the function of your program) in order to move your target population from the first point to the second. As an example, you might say that a targeted group of kids are weak; you want them to be strong; so you're going to have them lift weights for a month to help them reach the desired state.

Why did we not create the causal model in the beginning of this process? Because we had not yet established the context we needed to focus our efforts. You might have spent a great deal of time building a model (with research support) and later found that you didn't have the resources needed to impose that intervention, or that none of your current or prospective partners were interested in your desired outcomes.

Now, however, with the information we've gathered to date, we have enough context to begin developing our causal model, and therefore our program design.

Assuming you've got good information on your target audience, a good sense of your desired outcomes (which are shared by your current/prospective partners), and a sense of the resources at your disposal, it's time to conduct some research to structure your intervention.

Notice that you're not going to structure your intervention, then look for research that supports it; that approach leads to faulty models and poor outcomes. Instead, look at the research on creating your desired outcomes and filter it based on what is achievable given your interests and available resources. This will allow you to build a viable and effective model.

From this point on, it's an iterative process, whereby you'll tweak the campaign design and revisit your stakeholder list, asset inventory, and organizational goals as the reality of the program comes into focus. Ultimately you will have optimized all of these campaign components to generate the best results and the most effective use of your resources.

Be sure to involve your stakeholders in this process: program participants, staff, advisors, and current and prospective partners can all provide expertise and feedback as you refine your model. This is a critical element of program design: all of these people want to see you build a campaign that meets their needs, and their feedback will allow you to do just that. For those stakeholders who can contribute to your program, their active involvement in the design of that program will also allow them to feel a sense of ownership, making them inclined to take a greater role in your efforts.

VI. Measurement and Evaluation

When it comes to measurement and evaluation, there are three types of people. First, there are people who don't believe in tracking performance: the fact that the kids seem happy is plenty of feedback for them. Next, there are people who track performance, but only because sponsors require it: They do the minimum in order to maintain funding, but don't use that data otherwise. Finally, there are those who use data proactively, collecting as much relevant information as possible and using it to determine how they're performing and how they can improve. And as you might guess, this is the group most likely to receive support from SAI.

Program evaluation, far from being an obligatory chore, can be the single most powerful tool available to you in your efforts to build a highly effective education initiative. By identifying the types of information you can use to chart your progress against your stated objectives, you can determine whether your efforts are having the effect that you intended. And, by collecting that data over time, you can compare your current results to those in the past (called "internal benchmarking") to see whether you are becoming more or less effective and efficient in achieving your goals, particularly as you test different approaches.

Before drilling down into the types of data you collect, and what instruments you use to collect it, take a moment to consider the overarching goals of your program and ask yourself:

- Given what I want to accomplish, what does success look like – not only for the participating children, but also for my partners and sponsors in return for their involvement?
- What has to happen for me to know that I've succeeded?
- How can that be represented by information that I can collect?
- What interim steps lead up to those successes, and what data can I collect on those?

What information you gather, of course, will vary based on the audiences you serve, your expected outcomes, and the type of program you run. The evaluation model for a professional development initiative will look very different from one built around a hands-on museum exhibit.

It may help to think about the different aspects of your program that you can measure:

Acquisition

Acquisition refers to the number of individuals who become engaged in your program, and can include those who you serve directly as well as partners and sponsors. For each of these audiences, you could consider capturing information on the following:

- How do you attract recruits to your program, and which methods draw the greatest numbers of interested students? You may be asking teachers to spread the word, posting flyers at community centers, or advertising on the radio. But regardless of your methods, you need to find out which ones generate the greatest numbers of potential participants.
- What is the cost per prospect? Posting flyers may not draw as many people as radio advertising, but it's certainly less expensive. How much does it cost to attract one prospective participant through each channel?
- Not every prospect will join your program. How many prospects do you need to find in order to generate one participant? Does it vary by channel – are some more effective (i.e., have a higher participant/prospect ratio) than others?

Retention

Once individuals are engaged in your program, are you seeing any fallout – and if so, why? You can track dropout rates, but to uncover answers as to why people are leaving, you may need to simply ask them by soliciting their participation in a focus group or by providing them with a survey they can complete and return.

Exposure

Many programs include exposure to the public, or a targeted audience, as a key facet of their work. Examples of this include public or private exhibitions, competitions, awards programs, or media ventures (such as radio, television, or online awareness campaigns), with exposure being measured in terms of attendance and/or in the number of people who simply heard about the initiative. Exposure may be of particular importance to sponsors, some of whom may contribute in order to create public goodwill for their organizations.

Exposure is primarily a tracking issue, making sure you keep tabs on the exposure your ads receive, the number of people exposed to articles or stories about your work, and the number of visits to your website, just to name a few opportunities. As with acquisition, it may be helpful to measure the cost of this exposure against the impact it provided, at least in terms of any paid marketing you initiated.

Experience

While measuring outcomes is a critical element of any evaluation plan, it is just as important to study the ways in which participants interact with the many elements of your program. You can collect data through observation, interviews, focus groups, and surveys in order to capture information on the program experience such as:

- **Use of Resources**—Were the instructional resources used? If not, why not? Were materials used as intended? If not, how were they used, and what were the results? If they were used as intended, what were the results?
- **Experience of Participants**—Did facilitators find the materials to be clear and easy to use? Were students engaged? Did they have fun? Were volunteers engaged? Did they enjoy their experience? Did all parties find the program relevant to their interests?
- **Value—**Were the materials valuable to all audiences? Did they help facilitators achieve the goals of the program? Did they help students understand targeted subject matter better than other available materials?
- **Program Improvement**—What suggestions do participants have for improving this program? What would make it more complete, relevant, or engaging?

Performance Outcomes

No measurement/evaluation effort would be complete without an analysis of program outcomes. Evaluation can include both qualitative and quantitative measures which, depending on the type of program you manage, could include:

- Successful performance in regional, national, and/or international competitions

- Increase in the number of students taking advanced courses in mathematics, science, engineering, and technology
- Increase in the number of persons entering the workforce in technical areas
- Increase in the number of undergraduates taking STEM courses
- Increase in the number of students pursuing post-secondary education
- Increase in the number of teacher candidates with focus in STEM discipline
- Improved achievement in test scores in mathematics and science

Before beginning your evaluation efforts, it is important to determine your baseline – i.e., the current measure prior to introducing your intervention. You should also identify a control group (a group similar to yours that does not receive your intervention) to ensure that the impact you measure isn't caused by something outside of your program.

Financial Performance

In addition to measuring your effectiveness and impact in serving program participants, it is critical to track the effort of the organization itself in order to ensure that the organization is healthy and that it is using resources effectively. A few areas to consider:

- What percentage of your revenue is spent on administration, an area that doesn't contribute to the impact of your program?
- How many months of operating capital do you have set aside, or expect in terms of promised donations?
- What is the cost to serve one participant?
- What percentage of your revenue is spent on marketing and development?

One final thought on measurement and evaluation: if at all possible, find outside independent help to design and oversee the design of your data collection instruments and to handle the collection and analysis of data. Reports on your performance and outcomes will be much more credible, and likely more accurate, if handled by someone who does not have a stake in your program.

VII. Strategic Reviews

The previous section (Section VI, Measurement and Evaluation) highlighted the importance of capturing and tracking information on key aspects of your program. This is a critical element of maintaining effective day-to-day operations, allowing you to determine whether you're making progress towards your desired program outcomes.

However, measurement and evaluation of current efforts are not sufficient on their own to ensure that your program remains vibrant and relevant in a changing marketplace. These tools are like the indicators on the dashboard of your car: they'll tell you how fast you're going and whether you're running low on gas or oil. But they won't tell you what's happening outside the car: they won't tell you whether it's snowing, or whether a bridge is out on the road ahead.

In order to make sure your program responds to the current state of the market – i.e., those external conditions outside the scope of your evaluation "dashboard" – you need to institute a period strategic review of your efforts.

A strategic review is an opportunity to step back from day-to-day operations and review the work you've done to date, the landscape in which you operate, and whether you need a course correction in order to continue providing value to your constituents. For many people, this is an annual exercise, although some people conduct reviews on a more frequent basis (often in markets experiencing more rapid change).

It's best to start planning for your strategic review several weeks prior to any sort of actual retreat: many of the questions you'll need to answer will require some research and synthesis well before you begin brainstorming and strategizing on next steps. It's also wise to include others in this exercise, particularly those who can offer different perspectives, in order to avoid operating in an "echo chamber."

Some of the big-picture items you should incorporate into your strategic review include:

Causal Model

When you launched your initiative, it was based on a causal model: you had a target population that you wanted to move from point A to point B along some axis, and your intervention caused that change. It's time to take a fresh look at all of those elements.

- Is your target population still the correct one? The children (or other population) that you serve – are they still the right audience for your program?
- Are they still at point A? Your program is designed to move program participants ahead in some way – have they moved ahead on their own through some other intervention (such as a change in the school curriculum), eliminating the need for intervention?
- Do they still need to get to point B? Have you seen any evidence that your desired outcome is no longer valid? Has there been any new research indicating that children don't benefit from being proficient in the area you've selected?
- Is the axis of change still the correct one? The thing that you're working to improve, whether graduation rates, test scores, or something else – is it still relevant and important? Is there now a better way to define it, or a way to narrow your focus within that area to better target your efforts and create a greater impact?
- Is your intervention still the right agent of change to reach your goals effectively and efficiently? Has anything come to light, such as new research or new technology, that would allow you to better help program participants succeed?

Competition

No program operates in a vacuum: there are always alternate opportunities to learn. When considering the services you offer to your target audience, are there any new organizations operating in your market, or have existing organizations expanded their service area or capabilities to become new (or better) competitors?

If new competition exists, how well are they meeting the need of the market? If they're doing a good job, does it make sense to rethink your objectives and focus on an area that's not currently served? Are there opportunities for collaboration in order to avoid duplication of effort? Or can you work in a complementary capacity to better fill the needs of your constituents?

Asset Mix

As sponsors and supporters come and go, the mix of assets available to fuel your efforts will inevitably change. What does this mean to your way of doing business? Have you lost certain types of resources that are expensive to replace, such as having to purchase materials that were once donated? Have you gained a new type of asset thanks to the addition of a new partner? This is the time to consider how your program aligns with your asset mix, and if there is a disconnect, to figure out ways to take full advantage of the resources currently available to you.

Feedback

Assuming you've been collecting feedback from program participants and supporters, what are they telling you about your program? This type of feedback, from people who have a vested interest in your work, is valuable and should be given due consideration.

Manpower

The strategic review is the perfect time to consider manpower issues, both in terms of full-time and volunteer positions. Depending on what you want to achieve during the next operational cycle, you may need to increase staff across the board, grow in certain areas, make cuts, or shift people to areas that need attention. Be wary about adding full-time employees: your overhead will grow considerably. Consider first whether your needs are temporary or permanent, and whether you can meet your needs with part time, contract, or volunteer support.

Operations

It should be standard procedure to review business operations on a regular (often annual) basis, and it is particularly helpful to have data on your performance in previous years to use in benchmarking your current efforts. Two areas in particular to consider: make sure that your administrative budget isn't growing out of proportion to other areas of your operation, and look to see whether you're maintaining or increasing the return you see on your investment in development activities.

Growth

If you're achieving the kinds of results you intended, and if you've managed to build a sustainable enterprise, it may be time to consider a path to growth. This could take several forms, including:

- Expansion to different geographical markets
- Broadening your target audience – either serving more children or accepting other groups of children (different ages, different needs), making sure to accommodate them based on their differing characteristics as necessary
- Building on your list of targeted outcomes – adding new objectives, such as content, skill, behavioral, or attitudinal objectives to the list of things you wish to accomplish
- Increasing the channels through which you operate – you may consider expanding to web-based content delivery, a video series, published resources, or other ways of building new outlets to your desired market.

All of these items can and should be addressed during your regular strategic review cycles, along with (and prior to) traditional goal-setting and budgeting activities.

VIII. Sustainability

Perhaps the single most important subject a program designer can address is sustainability: if a program is producing its desired results, how can you ensure its ongoing operation - and even growth - to continue the work being done?

In his landmark book, *Good to Great*, Jim Collins offers the metaphor of the flywheel to describe the process of reaching sustainability. Readers are asked to envision a huge, metal flywheel mounted on an axle, and to think about making it rotate. The first few dozen pulls gradually get it moving; it begins to go faster, and move easier, with additional pulls. Finally it reaches a point where its own momentum does much of the work, with minimal effort on the part of the operator to keep it moving.

This is precisely what program managers must achieve to create a sustainable operation. It takes a tremendous amount of work to take a program from idea to implementation, and continued hard work to keep things moving during its first few years. With ongoing effort and a focus on the right things, however, the program begins to gain a momentum of its own, and at some point becomes a going concern, requiring a greatly reduced amount of effort to keep it in motion.

If it takes a continued focus on doing the "right things" to create a sustainable program, what are those right things?

Financial Stability

Certainly, one of the most important elements of a sustainable program is a stable and viable revenue stream: without enough funding to cover the costs of staff, operations, and program management, your initiative will struggle, and you will spend all your time chasing resources – time that could otherwise be used to manage and grow your venture.

While one-time gifts from supporters are always welcome, it is the recurring contributions, such as multi-year grants or consistent annual gifts, that allow you to build a sense of future cash flow. Of course, while it's always preferable to have a hard commitment for those funds, you can make reasonable estimates based on past performance: if your annual gala brought in $10,000 each of the past three years, you can project that contribution forward with reasonable confidence.

To build financial stability, keep a close watch on expenses, particularly those unrelated to project operations. Costs have a tendency to grow when unchecked, particularly in areas that you don't often think about, such as administrative expenses like phones, rent, and website services. An annual or biannual review of expenses will help minimize such costs.

Advisors

As your program gains momentum, you'll likely attract a group of formal or informal advisors – people with experience, knowledge, perspective, and distinct viewpoints who can help you work through the inevitable issues and crises that come up along the way. Take full advantage of these advisors – actively recruit them, formalize their involvement, keep them informed of your efforts, and do what you can to gain their input and support on small and large issues alike.

Infrastructure

The early stages of a startup operation are exciting: there's lots of energy, and a willingness among the founders to improvise and wear many hats – whatever it takes to get things up and running. But this phase doesn't last forever, and with good reason: the energy dissipates or gets redirected, and the program grows to a point where things start falling through the cracks, and operations become inefficient, when people continue to wing it.

As your program grows, put some serious effort into setting up systems and developing formal roles. Projects will happen more smoothly, things won't fall through the cracks, you'll be more efficient and effective, and your professionalism will be clear to supporters and participants alike.

Planning

As your organization grows, it is your responsibility to begin planning for its future. There are two areas in particular in which you need to focus:

- **Long-Range Planning** – As the saying goes, sharks will die if they don't keep moving forward, and the same is true of organizations. If you've established a successful base of operations, you should begin planning for the future, both in terms of program services (with an awareness of the market) and for the organization itself – staffing, succession planning, and the like.

- **Contingency Planning** – Things don't always go as you expect, and nonprofit organizations can face even greater challenges since some aspects of their work, such as legislation and funding (particularly grant funding), are out of their control. Take the time to plan for the unexpected: think about what would happen if your revenues suddenly dropped (or increased) 50%, if key staff members or partners left, or if the legislative landscape changed dramatically.

Public Awareness

In the early days of your campaign, it's enough to be known only by key partners and the people you serve. As you grow, however, and seek to establish a permanent presence in the community, you would do well to raise your profile, if not to the general public then at least to key audiences such as the education, business, and government communities. Becoming established will involve having a presence in the minds of the people with whom you work, and it will affect the level of support you receive in terms of fundraising, partnerships, program implementation, recruiting, and other areas. And, as a corollary, make an investment in a professional image – logo, website, business cards, and the like. These will reinforce your presentation as an established community organization, and one with whom people will feel comfortable working.

And remember: there's no such thing as perpetual motion. Just because the flywheel is spinning largely of its own momentum right now, it doesn't mean that you can walk away and assume it will continue spinning forever. Your program will always require some amount of work to keep things moving, and it will require even more to expand your efforts (as laid out in Section VII., Strategic Reviews) if growth is part of your plans.

Appendix I: Resources on K-12 Education and Community/School Partnerships

General Market Resources

The Public Education Primer, Center on Education Policy
The primer provides a complete picture of the nation's public schools with data about students, governance, funding, achievement, teachers, and non-instructional services. Free PDF file.
http://www.cep-dc.org/pubs/publiceducationprimer/PublicEducationPrimer.pdf

National Center for Education Statistics, US Department of Education
NCES is the primary federal entity for collecting and analyzing data related to education, and provides relevant information on almost every aspect of the market. Free website.
http://nces.ed.gov/

NASSMC website, NASSMC
Provides information on current events in STEM education through the NASSMC Briefing Service and details on state-level activities through its coalition profiles and newsletter.
http://www.nassmc.org

Business/Education Partnership Forum, DeHavilland Associates
Provides news, information, resources, and a directory of organizations for anyone interested in business/education partnerships. Free website.
http://www.biz4ed.org

Business Leaders Online Toolkit, Achieve Inc.
An online resource where businesses can get the background information, facts, research and practical tools they need to effectively engage in education in their communities and states.
http://www.biztools4schools.org/

Education Week, Editorial Projects in Education
The newspaper of record for the education market. Newspaper with website, $74.94/year.
http://www.edweek.org

Education Week Resource Center, Editorial Projects in Education
Offers research tools, special reports, a glossary, a comprehensive list of education organizations, and other valuable resources. Free website.
http://www.edweek.org/rc/index.html?levelId=2300

Community/School Partnerships: A National Survey, DeHavilland Associates
Results of a survey of school and district leaders on their community partnerships. Free PDF file.
http://www.dehavillandassociates.com/DeHavilland_PartnershipReport_0207.pdf

Business Coalition Leaders Speak Out on Education, DeHavilland Associates
Results of a survey of business coalition leaders regarding their interests and experiences in working with K-12 education. Free PDF file.

http://www.dehavillandassociates.com/DeHavillandCoalitionSurvey_0607.pdf
State and National Standards, Various
Standards define what is to be taught in the classroom, and should be reflected in any content- or skills-based programs developed for classroom use. Free websites.
http://www.statestandards.com (state)
http://eduscapes.com/tap/topic28.htm (national)

Resources on Strategy and Program Planning

The How-To Guide for School-Business Partnerships, The Council for Corporate & School Partnerships
Practical guide to establishing business/education partnerships. Includes worksheets. Free PDF file.
http://www.corpschoolpartners.org/pdf/coke_how_to_guide.pdf

Guiding Principles for School-Business Partnerships, The Council for Corporate & School Partnerships
Principles, survey results, and case studies all related to effective business/education partnerships. Free PDF file.
http://www.corpschoolpartners.org/pdf/guiding_principles.pdf

Partnerships 2000, National Association of Partners in Education
Results of a survey regarding the status and characteristics of school-community partnerships. Free PDF file (32MB).
http://www.napehq.org/survey%20book.pdf

Cause Marketing Forum, Cause Marketing Forum
Presents resources and information on all aspects of cause marketing. Free website.
http://www.causemarketingforum.com

Options in Education Outreach, DeHavilland Associates
This white paper outlines various program models that organizations can use to make an impact on education. Free online article/PDF file.
http://www.dehavillandassociates.com/resources.html

7 Steps to Building Your Education Outreach Campaign, DeHavilland Associates
A step-by-step guide to building an outreach initiative that creates positive outcomes for schools and for the sponsoring organization. Free online article/PDF file.
http://www.dehavillandassociates.com/resources.html

Checklists for Education Outreach Campaign Design, DeHavilland Associates
A series of checklists on designing, promoting, and evaluating education outreach campaigns. Free PDF file.
http://www.dehavillandassociates.com/resources.html

Making the Business Case, Center for Corporate Citizenship
Presents research and case studies demonstrating the ways in which organizations benefit from their investment in public outreach. Free PDF file; registration required.
http://www.bcccc.net/index.cfm?fuseaction=document.showDocumentByID&DocumentID=312

Resources on K-12 Outreach and Communications

The Expert's Guide to the K-12 School Market, Internet Monitor
A collection of articles on reaching the K-12 market from some of the top names in the industry. Includes a resource index. Book, $114.
http://www.sellingtoschools.com/index2.php?lang=ENG&page=p_k12.html

Selling to Schools, Focus Marketing
A website and monthly e-newsletter offering free tips, information, and resources for marketing and selling technology products to schools. Free website.
http://www.sellingtoschools.com

School Marketing Newsletter, School Market Research Institute
A monthly print newsletter devoted to all aspects of marketing to educators and schools. Newsletter, $119/year.
http://www.school-market.com/newsletterpage.html

Successful School Marketer, Market Data Retrieval
Offers information on industry events, summarizes new research, and provides tips on marketing to schools. Free e-newsletter.
http://www.schooldata.com/esubscribe/

Educator Buying Trends, Market Data Retrieval
This report, based on a 2002 survey, presents information on educators' opinions and experiences regarding their classroom-related buying patterns and preferences. Report, $159.
http://www.schooldata.com/mdrreports.asp#trends

Tools for Marketing Your Education Outreach Program, DeHavilland Associates
A white paper identifying channels for marketing to educators. Free online article/PDF file.
http://www.dehavillandassociates.com/resources.html

Communications Toolkit, Cause Communications
A thorough resource offering practical information in virtually every area of communications. Not education-specific, but valuable for anyone developing and implementing a communications plan. Free PDF file; requires registration.
http://www.causecommunications.org/CC/CC_news06_1.html

Evaluation Resources

Handbook of Practical Program Evaluation, Jossey-Bass
A comprehensive resource on evaluation, outlining multiple methods for assessing program results. Book, $68.
http://www.josseybass.com/WileyCDA/WileyTitle/productCd-0787967130.html

Guidelines and Standards for Measuring the Effectiveness of PR Programs and Activities, Institute for Public Relations
This guidebook helps to define standards in measuring and evaluating the effectiveness of PR efforts against pre-determined outputs, outtakes, and outcomes. Free PDF file.

http://www.instituteforpr.org/index.php/IPR/research_single/measuring_activities/
Considerations for Measuring Public Affairs' Value, Public Affairs Council
Provides insight on defining the value of public affairs, articulating its value proposition, and aligning cost with value. Paid report, $30.
http://www.pac.org/page/Publication-22903.shtml

How to Measure the Performance of Your Outreach Programs, DeHavilland Associates
A white paper outlining key concepts in tracking outcomes and measuring ROI. Free online article/PDF file.
http://www.dehavillandassociates.com/resources.html

Public Relations Generally Accepted Practices (GAP) Study III, Council of Public Relations Firms
This 2005 report examines how organizations view, use, and organize their in-house public relations departments. Includes information on the frequency of measurement tool usage. Free PDF file.
http://www.prfirms.org/docs/council_publications/2005/GAP_2005-08-10.pdf

Appendix II: About the STEM Accelerator Initiative

An initiative of the National Alliance of State Science and Mathematics Coalitions, providing second-stage support to education programs proven to impact the STEM pipeline

> *"My company, Intel, invests more than $100 million a year to improve the quality of US education. But if the world's best engineers are produced in India or Singapore, that is where our companies will go. This is not a threat, but a reality in the modern world. We locate facilities where we can find or import talent to produce our products. "The harsh fact is that the US need for the highest quality human capital in science, mathematics and engineering is not being met," says the US Commission on National Security for the 21st Century. Nor is it likely to be met soon, judging by US student performance on international math and science tests. In a recent study, 15-yearolds in the USA ranked 24th out of 29 industrialized nations on practical math applications."*
>
> -Craig Barrett
> *Educational Complacency Will Make US Feel the Pain*
> USA Today, February 23, 2005

At a time when US companies such as Intel and many others are forced to look overseas for qualified workers, we find ourselves facing an education crisis in the fields of science, technology, engineering, and mathematics (STEM). There are simply not enough qualified workers in the STEM pipeline to meet demand. Countless commissions, panels, boards, agencies, academies, and associations have described the causes, issues, and implications in great detail. Solutions, however, have been more elusive.

The fact is, however, that there are solutions to these challenges. There are programs already in place that are increasing student interest, knowledge, skills, and career choices in STEM fields. These islands of excellence can be found all over the country, inside and outside the classroom, engaging students and helping them to succeed in science, mathematics, and related areas in real and measurable ways.

It is these programs that the STEM Accelerator Initiative serves: programs that have been proven to expand the flow of capable workers into STEM related careers, but that require support to become sustainable and to grow.

About the STEM Accelerator Initiative

The STEM Accelerator Initiative is administered by the National Alliance of State Science and Mathematics Coalitions (NASSMC), an alliance of 42 state coalitions of business, education, and public policy leaders working for comprehensive systemic change to improve STEM education for all students. The Initiative answers an unmet need and occupies a unique niche in STEM education reform efforts by identifying, recognizing, and rewarding diverse programs with demonstrated positive impact on the STEM workforce pipeline. These programs flourish or die depending on whether or not they are recognized and supported. Specifically the Initiative provides:

- An exclusive focus on growing the STEM pipeline across the education spectrum, from instilling basic knowledge in the early grades to increasing the pool of capable workers at the high school to increasing the number of college undergraduates entering the STEM disciplines
- Support only for those programs that can provide clear evidence of their effectiveness
- Support specifically intended to help successful programs become sustainable or to help sustainable programs scale
- A range of support services – not only financial but also partnership development, community relations assistance, and operational expertise

In short, the Initiative makes significant and varied investments in helping proven educational programs move towards the next stage of success.

Second Stage Support for Proven Programs

The Initiative focuses exclusively on established programs that have proven their effectiveness in expanding the STEM pipeline, and independently evaluates those programs prior to making any awards. Examples of types of measurement used to identify and evaluate programs include:

- Successful performance in regional, national, and/or international competitions
- Increase in number of students taking advanced courses in mathematics, science, engineering, and technology
- Increase in the number of persons entering the workforce in technical areas
- Increase the number of undergraduates taking STEM courses
- Increase in number of students pursuing post-secondary education
- Increase the number of teacher candidates with focus in STEM discipline
- Improved achievement in test scores in mathematics and science

Once confirmed as a selected program, Initiative managers work with applicants to design a multifaceted support package that will allow the program to become sustainable – or, for those programs that are already sustainable, to increase their scope of service.

The Value of a Network

One of the great strengths that NASSMC brings to this endeavor is the network of 42 state-level business, education, and policy coalitions. These organizations act as representatives of the Initiative within their states, and their experience and relationships within their markets make it possible for the Initiative to more completely and effectively support the successful programs it identifies. State-level coalitions help to build awareness of the Initiative, evaluate applicants, provide guidance and support to selected programs, and offer direct feedback from the field to Initiative managers to help them ensure the continued relevance and value of the program.

To Learn More

To learn more about the STEM Accelerator Initiative, please visit:

www.nassmc.org/sai.html

or contact Jim McMurtray, executive director of the National Alliance of State Science and Mathematics Coalitions, by email at jmcmurtray@nassmc.org or by phone at 703-516-5973.

nassmc

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