


AAAS and NSBA Present

A  Training Program for Board Members

Science, Mathematics, and Technology Education:

WHY DO WE CARE?

Facilitator's Guide

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SESSION SET-UP

A/V Requirements

- ✓ Laptop
- ✓ Projector
- ✓ Audio connections (speakers or connection to “house” sound system depending on location)
- ✓ Large screen

Materials

- ✓ Facilitator’s Guide
- ✓ PowerPoint and video DVD
- ✓ Participants’ Manuals
- ✓ 1 sheet of Post-It-type flip chart paper and 1 or 2 markers per table

Room Set-up

- ✓ Ideally, room should be set in rounds of 6 or 7 with a Participant Manual at each place

Facilitator Guide Key

The Facilitator Guide is divided into three (3) sections:

- 1) Time – the total time allotted for each section/activity.
- 2) Contents – step-by-step facilitator processes and suggested scripts, *in blue italics*, for conducting the workshop. (A note on scripts: These “scripts” include the *content* to be delivered, but facilitators should make the *language* or *voice* their own.)
- 3) A/V and Tools – matches the Content column with accompanying PowerPoint slide numbers (Slide #) and Participant Manual pages (Page #).

Total time for workshop: 2 hours

Science, Mathematics, and Technology Education: Why Do We Care?

Part One: Introduction (42 minutes)

Time	Content	A/V and Tools	
7 min.	<p>I. Introduction</p> <ul style="list-style-type: none"> • Put up Slide 1 and introduce workshop title. • Introduce self and make any other appropriate introductions in the room. • Put up Slide 2 – Acknowledgements. Introduce materials by explaining that this program, the SMarT Training Program for Board Members, is a leadership project from the American Association for the Advancement of Science (AAAS) and the National School Boards Association (NSBA) with funding support from the Ewing Marion Kauffman Foundation. <ul style="list-style-type: none"> ○ Much of this workshop is based on the AAAS Science, Mathematics, and Technology Education Seminar held June 23, 2007, in Kansas City, MO. ○ This module is the first part of a longer workshop that will be described in more detail at the end. • Slide 3 – Repeat workshop title. • Slide 4 – Refer participants to Page 1 of their manuals and review workshop objectives: <ul style="list-style-type: none"> ○ Overall objective of the SMarT 	Slide 1	
		Slide 2	
		Slide 3	
		Slide 4	Page 1

<p>15 min.</p>	<p>Training Program is for participants to gain knowledge and tools that can be used to begin creating solutions for science, mathematics, and technology programs in their districts;</p> <ul style="list-style-type: none"> ○ Specific purpose of Module One is to do this by: <ul style="list-style-type: none"> ▪ Understanding the importance of and the urgency for high-quality science, mathematics, and technology (SMT) education. ▪ Connecting SMT education to their district vision. ▪ Developing key talking points and a plan for engaging local boards on this topic. <ul style="list-style-type: none"> • Start the body of the workshop by saying: <p><i>We're going to be spending some time hearing, thinking and talking about the need for high quality SMT education in our schools.</i></p> <ul style="list-style-type: none"> • Ask participants to read the paragraphs from <u>Science for All Americans</u> on Page 2, then say: <p><i>This Introduction to <u>Science for All Americans</u>, a publication of AAAS, lays out a powerful mission for science, math, and technology education. I'd like to begin by asking you to think about your own education in these subject areas by giving you a little test on a basic concept of science just to see what you learned – and recall – from your science education. You won't have to answer publicly, but take a moment to write your answer on the top of Page 3 of your manual.</i></p> 		<p>Page 2</p> <p>Page 3</p>
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- Put up Slide 5. The acorn will appear first. As you click to bring up the oak tree, say:

Slide 5

This acorn is much smaller than the tree it eventually becomes. Where does the mass of the tree come from? How does an acorn become an oak tree?"

- Allow a minute for participants to write their answers. Then ask:

"How do you think you did?"

- Get some general responses, but don't ask for specific answers here. Then go on:

Some Harvard researchers asked a group of 4th graders this same question. Let's listen to their answers. You have space to jot them down on p. 3 under your response.

- Show Video – Slide 6

Slide 6

Large group question (get general answers – not from specific individuals).

How did your answers compare with the 4th graders? Do you think you did a better or worse job than they did?

Now let's watch some college graduates from two highly regarded, prestigious, and expensive universities – Harvard and MIT – as they answer the question. Again, there's room on p. 3 to jot down their answers.

5 min.	<p><i>is that carbon dioxide, a gas, is the primary source of the mass of that tree.</i></p> <ul style="list-style-type: none"> • Bring up Slide 9. Refer participants to Page 4 and ask them to consider what they read on Page 2 and the videos they have just seen to answer these questions as they watch the video, “The Challenge: Initiating Efforts to improve Science, Mathematics, and Technology Education.” • Show video – Slide 10: “The Challenge: Initiating Efforts to improve Science, Mathematics, and Technology Education.” 	Slide 9	Page 4
15 min.	<ul style="list-style-type: none"> • Table Talk – Put up Slide 11 and ask participants to take 10 minutes to discuss the questions on Page 4 of their manuals and their reactions to what they have read and heard. After 10 minutes, <i>debrief</i> by soliciting one or two answers to each question. Allow 5 minutes for debrief. (Sample answers below, but responses may vary): <ul style="list-style-type: none"> ○ For students: critical thinking and informed decision-making, job skills ○ For the nation: global competitiveness, innovation and progress; sustained democracy ○ For school boards: prepare ALL students <p>Then ask for and take a few reactions. (NOTE: Watch time and limit comments as necessary.)</p>	Slide 10 Slide 11	

Part Two: Making the Case (40 minutes)

Time	Content	A/V and Tools	
5 min.	<p>II. Making the Case</p> <ul style="list-style-type: none"> Set up by explaining: <p><i>Schools already struggle to find the time and finances for teaching anything beyond “the basics” in language arts and mathematics and have to carefully balance funding for “non-essential” (i.e. doesn’t count toward AYP) programs including the arts, foreign languages and higher-level science, math, and technology (SMT) classes. However, it is crucial that districts pay attention to their SMT curriculum, not only because it is one of the keys to success in the workplace and higher education, but also because it provides ways of thinking and looking at the world that are critical for all students.</i></p> <ul style="list-style-type: none"> Bring up Slide 12 – Making the Case: Where Do We Stand? <p><i>First let’s take a look at where we stand now in terms of the general state of education in these subjects. Listen to what the experts have to say.</i></p> <ul style="list-style-type: none"> Bring up Slide 13 – speaker titles. <p><i>First you’ll hear about some statistics from Joan Abdallah of AAAS, and then some data from Alison Kadlec of Public Agenda, a leading non-profit public-interest research firm. There’s space on Page 5 for you to jot down notes you might want to take.</i></p>	Slide 12	Slide 13
			Page 5

5 min.	<ul style="list-style-type: none"> • Show video – Slide 14. • Bring up Slide 15 – What Are the Benefits of High-Quality SMT Education for Students as... <p><i>Now, let's examine more specifically just a few of the benefits that high-quality science, math, and technology education provide.</i></p> <ul style="list-style-type: none"> • Click to bring up “future employees” line. • Bring up Slide 16 – Employment Opportunities. <p><i>We will begin with student employment opportunities. Scientific, mathematical and technological literacy are essential in all career fields, and will only continue to become more so in an increasingly specialized economy. Let's listen to what some of the experts have to say on this topic.</i></p> <ul style="list-style-type: none"> • Bring up Slide 17 – speaker titles. <p><i>First you'll hear from Barry Burke of the International Technology Education Association answering a specific question posed by a board member at the Kansas City seminar, followed by Alison Kadlec talking about some research conducted by Public Agenda. You have room to make notes on Page 5 of your participant's manual.</i></p> <ul style="list-style-type: none"> • Show video – Slide 18. <p>Summarizing points:</p> <p><i>1) SMT literacy is now a requirement in all</i></p>	Slide 14 Slide 15 Slide 16 Slide 17 Slide 18	
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<p>5 min.</p>	<p><i>areas of employment, not just in a few white-collar fields.</i></p> <p>2) <i>The level of science, math, and technology education that is necessary in today's workplace is much higher than it was ten or twenty years ago, and part of the responsibility of school board members is to ensure not only that they set their standards to a high enough level to adequately prepare their students, but that they communicate with parents about why these higher standards are important.</i></p> <ul style="list-style-type: none"> • Bring up Slide 19 – What Are the Benefits of High-Quality SMT Education for Students as... [Click to bring up next line] Innovators? • Bring up Slide 20 – Innovation and Progress. <p><i>A higher standard of SMT literacy is not only important for our students as individuals, but also for our society as a whole as we consider innovation and progress.</i></p> <ul style="list-style-type: none"> • Bring up Slide 21 – speaker title. <p><i>Let's listen again to Barry Burke as he addresses this important point. Again, there's a place for any notes you might want to make on p. 5 of your manual.</i></p> <ul style="list-style-type: none"> • Show Video – Slide 22. <p>Summarizing Points:</p> <p>1) <i>Our society, and the world as a whole,</i></p>	<p>Slide 19</p> <p>Slide 20</p> <p>Slide 21</p> <p>Slide 22</p>	
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<p>10 min.</p>	<p><i>relies on SMT literate students to innovate the future. SMT literacy allows students to identify solutions to problems we can't even imagine today. As Barry said, real SMT literacy includes the ability to use, manage and understand science, math, and technology as they work together.</i></p> <p>2) <i>High-quality SMT education, beginning in our public schools, can provide the basis for developing the innovators and technicians needed by our country and society as a whole.</i></p> <ul style="list-style-type: none"> • Bring up Slide 23 – What Are the Benefits of High-Quality SMT Education for Students as... [click to bring up next line] Critical Thinkers and Informed Decision-Makers? • Bring up Slide 24 – Critical Thinkers and Informed Decision-Makers. <p><i>One of the frequently overlooked benefits of a strong SMT education is the way in which it fosters rational thought and informed decision making as well as supports learning in a variety of subject areas.</i></p> <ul style="list-style-type: none"> • Bring up Slide 25 – speaker title. <p><i>Let's listen to a few of Joan Abdallah's comments on this topic. You have a space for note-taking on Page 5 in your manual.</i></p> <ul style="list-style-type: none"> • Show Video – Slide 26. <p>Summarizing Points:</p>	<p>Slide 23</p> <p>Slide 24</p> <p>Slide 25</p> <p>Slide 26</p>	
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- 1) *A good science curriculum fosters critical thinking and the ability to gather evidence from real-world situations and draw conclusions. Considering multiple viewpoints and making informed decisions are important skills for any member of society, and are both integral parts of scientific literacy.*
- 2) *Because all scientific knowledge is on some level uncertain, and because technology is evolving so rapidly that what cannot be done today could be entirely possible next week, a strong foundation in these areas encourages flexibility, open-mindedness and a willingness to take risks and be wrong.*
- 3) *SMT fields can also strengthen students' achievement in other areas. Technology can be integrated throughout the curriculum—from learning software, to hands-on learning experiences such as using a camera for an art project or journalism—making those classes more interesting and more topical. Science can also be an exciting topic for students to read and write about at any grade level, whether it is a third-grade paper on dinosaurs or a twelfth-grade essay on the implications of new medical technology. And emerging research suggests a strong connection between science competency and reading and writing skill in addition to the more obvious science-math connections.*

- Conclusion – Ask participants to read the quote from Bill Daggett on the top of

15 min.	<p>Page 6:</p> <p><i>While Daggett, a leading thinker and researcher on the topic of educational change and excellence, wasn't referring directly to SMT education and literacy, this quote pulls together many of the key concepts you've just heard and presents a real challenge to public schools and the boards of education that govern them.</i></p> <ul style="list-style-type: none"> • Table Talk – Put up Slide 27 and ask participants to discuss the question on Page 6 of their manuals. They will have 10 minutes to talk after which someone from each group should be prepared to report out. After 10 minutes, <i>debrief</i> by asking for a couple of volunteers for each question. Allow 5 minutes for debriefing. 	Slide 27	Page 6
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NOTES:

<p>23 min.</p>	<ul style="list-style-type: none"> • Table Talk. [<i>Facilitator Note: Two options for processing this section are presented. Option 1 is for use in a regional or statewide workshop setting where board members from multiple boards are in attendance. Option 2 is for use with an intact board or boards that can begin having this conversation at a local level. You will be using Slides 32 and 33 for Option 1 only. If working with an intact board, skip these slides.</i>] <p>➤ Option 1: Ask participants to turn to page 8 of their manual, then explain:</p> <p><i>The next step in creating the SMT program your district needs is to develop a specific vision for what your schools can achieve. This vision will provide something for you to come back to again and again as you try to align your resources, set your standards, and make other decisions for your district.</i></p> <ul style="list-style-type: none"> • Draw their attention to the Key Vision Questions at the top of the page: “What do we want for our students and community when it comes to quality math, science and technology programs? How can/should we balance science, mathematics, and technology education within the demands of our overall curriculum? What is the purpose of technology in our district?” Point out that these are policy-level questions that boards need to address. Then continue: 		<p>Page 8</p>
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<p>23 min.</p>	<p>heard many good ideas as you walked around the room and you would like to give them time to “borrow” ideas from other tables as well. Allow 10 minutes for a “Gallery Walk” where participants can view Key Talking Points from other tables and record them in their manuals.</p> <ul style="list-style-type: none"> • Skip to Conclusion [Facilitator Guide Page 12]. <p>➤ Option 2: Ask participants to turn to Page 8 of their manual and draw their attention to the Vision Key Question at the top of the page: “What do we want for our students and community when it comes to quality math, science and technology programs? How can/should we balance science, mathematics, and technology education within the demands of our overall curriculum? What is the purpose of technology in our district?” Then say:</p> <p><i>The next step in creating the SMT program your district needs is to develop a specific vision for what your schools can achieve. This vision will provide something for you to come back to again and again as you try to align your resources, set your standards and make other decisions for your district.</i></p> <p><i>Your vision is something that the whole community needs to have a say in. In that respect the board’s role is to plan and implement a process to obtain that input. On</i></p>		<p>Page 8</p>
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	<p><i>page 8 of your manual you will find five (5) questions designed to help you do that work – a plan to plan. Take a few minutes now to begin talking about these questions.</i></p> <ul style="list-style-type: none"> • After about 20 minutes, stop the conversation and ask the board(s) to take a few minutes to decide how and when they will continue their planning. Indicate that Pages 9 and 10 are to be skipped. There is space for them to record their work on Page 11 of their manuals. • Continue on to the Conclusion. 		<p>Page 11</p>
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Part Four: Conclusion (10 minutes)

Time	Content	A/V and Tools	
10 min.	<p>IV. Conclusion</p> <ul style="list-style-type: none"> Put up Slide 34 and introduce final video by saying: <p><i>I'd like to end today with a short video clip called, "Creating Opportunity," which illustrates the results of one district's vision.</i></p> <ul style="list-style-type: none"> Show Video – Slide 35: "Creating Opportunity." Conclude with: <p><i>It's true that we may not all have Loudoun County, VA's opportunities, with a Howard Hughes medical research facility in our back yard. However, without a compelling vision for what they wanted from their science, math, and technology programs – to "produce lovers of science, not just doers of science" – it is much less likely that this partnership would have been so successful. The challenge for you is to find your compelling vision and see where it takes you.</i></p> <ul style="list-style-type: none"> Wrap-Up: Remind participants that this workshop also serves as the introduction to a longer workshop on boards' roles in assuring high quality SMT education in their districts. Reference Page 12 of the Participant Manual to overview the full workshop's contents, and put up Slide 36 – 	Slide 34	Slide 35
		Slide 36	Page 12

	Workshop Sections. Then show slide 37 – Resources, and go through the web sites of the supporting organizations, emphasizing that more resources are available to them on the project Web site (www.smartschoolboards.org).	Slide 37	
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