



Tips and Tools for K-12 Outreach

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2011 ASMCUE



Defining Outreach

	Awareness	Involvement	Support	Sponsorship	Strategic partnership
Outreach Activities	Providing Materials	Guest Lectures	Equipment loan	Research Experience for teachers	Ongoing collaboration
	Providing Information	Ask a Scientist	Co-teaching	Research experience for students	Teacher/Scientist exchange
	Judging Science Fairs	Advising on/providing materials for science fairs	Teacher professional development workshops	Support for teachers making conference presentations	Outreach training for scientists
			Mentoring students in science fairs		

From Erin Dolan, Education Outreach and Public Engagement, Springer, 2008



How did I get involved?

- ASM Teacher Science Days
- Help daughter's classes
- Visiting students
- Science Fair Projects
- The National Faculty
- Workshops for Teachers



Your Involvement in Outreach

- How many are involved in outreach activities?
- What kinds of activities?
- How did you get involved
- Where do you get ideas for activities?



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Survey of ASM Membership

- 1750 Members
 - ASMCUE listserv
 - MICROEDU listserv
- 10% Response (176)

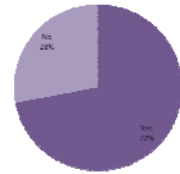


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Science Educators are very involved in outreach

Almost ¾ of respondents are involved in outreach.

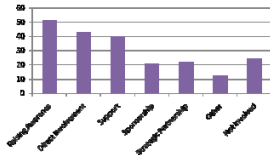
Educators Involved in Outreach



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Awareness and Direct Interaction

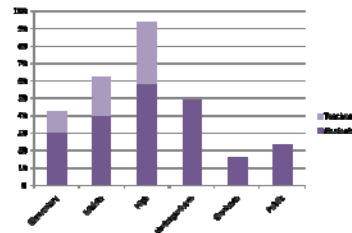
Most respondents indicate their objective is raising awareness, typically through direct interactions such as presentations in schools and hosting visiting students.



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Audience Level

High school students and teachers seem to be the most popular target audience.

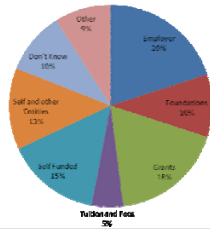




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Funding

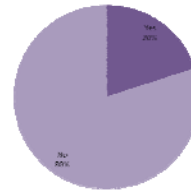
Outreach activities are funded from a variety of sources with employers and grants as the primary sources but many are self funded



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Professional Development

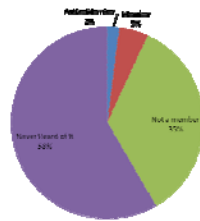
A substantial number of members provide professional development programs for teachers.



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Science Educator Network

Few members are active with the SEN and the majority are not even aware of it.



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What might prevent ASM members from getting involved in outreach?

- Time
- Cost
- Doesn't apply to tenure and promotion
- What to present
- How to effectively interact with K-12



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- **Mission**
 - Engage the community of microbiologists and educators in K-12 outreach, and
 - Promote microbiology in the K-12 community.
- **Key Constituents**
 - ASM members
 - K-12 educators
 - Others interested in K-12 outreach



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1. Provide professional development programs
2. Promote interest in microbiology careers
3. Provide resources for K-12 outreach
4. Identify financial and human resources for programs
5. Support involvement of the microbiology community in K-12 education
6. Increase recognition of microbiology as an integral part of scientific literacy



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ASM resources

- ASM Education Board
 - <http://www.asm.org/education>
 - Access to outreach activities
 - Outreach “toolkit”
 - Request posters and other resources
 - Sign up for Science Educator Network (SEN)
- K-12 Education and Outreach Community
 - <http://community.asm.org/clubs/k12/>
 - Join ongoing discussions
 - Share ideas
 - Provide feedback on activities



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Limitations for teachers?

- Microbiology is not on the test
- What to take out of curriculum
- Fear of microbes
- Cost



What do teachers need?

- A break
- Content that fits the standards
- Grade level appropriate
- Engaging
- Something that works



Example activity

- Build a Microbe



How do I use activities?



GLE, not GLEE

- Grade Level Expectations



- Interdisciplinary - Combine Math and Science



GLE examples

Grade 5: Data and Probability

1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them
 - A. Formulate questions
evaluate data-collection methods
 - C. Represent and interpret data
*describe methods to collect, organize and represent categorical and numerical data
2. Select and use appropriate statistical methods to analyze data
 - A. Describe and analyze data
compare related data sets
3. Develop and evaluate inferences and predictions that are based on data
 - A. Develop and evaluate inferences
given a set of data make and justify predictions
4. Understand and apply basic concepts of probability
 - A. Apply basic concepts of probability
*describe the degree of likelihood of events using such words as certain, equally likely and impossible



GLE examples

Grade 5 Strand 3: Characteristics and Interactions of Living Organisms

1. There is a fundamental unity underlying the diversity of all living organisms
 - D. Plants and animals have different structures that serve similar functions necessary for the survival of the organism
Scope and Sequence – Classification of Plants and Animals
a. Compare structures (e.g., wings vs. fins vs. legs, gills vs. lungs, feathers vs. hair vs. scales) that serve similar functions for animals belonging to different vertebrate classes.
2. Living organisms carry out life processes in order to survive
 - C. Complex multicellular organisms have systems that interact to carry out life processes through physical and chemical means
Scope and Sequence – Classification of Plants and Animals
a. Compare the major organs/organ systems (e.g. support, reproductive, digestive, transport/circulatory, excretory, response) that perform similar functions for animals belonging to different vertebrate classes.
3. There is a genetic basis for the transfer of biological characteristics from one generation to the next through productive processes



Project objectives

- Objective 1:** To improve student achievement in **math and/or science content areas**.
- Objective 2:** To increase teachers' knowledge and understanding of key concepts in **targeted math and/or science content areas** as aligned with each project's content focus.
- Objective 3:** To improve teachers' pedagogical knowledge and practices that use **scientifically-based research** findings and best practices in inquiry-based instruction.
- Objective 4:** To enhance participants' use of **assessment data** to monitor the effectiveness of their instruction.
- Objective 5:** To demonstrate a **measurable impact on the preparation of pre-service teachers** through improvements in math or science content or pedagogy courses.
- Objective 6:** To enhance participants' ability to strengthen mathematics and science learning through inquiry-based activities that exploits the **synergy between scientific inquiry and mathematical problem solving**.



Survey Results

Questions Posed	How the workshop rate compared to your expectations					Average Score*
	Very Poor	Below Average	Average	Above Average	Excellent	
Content of the institute rate compared to your expectations	0.00	0.00	6.45	38.71	54.84	4.48
Activity based format of institute rate compared to your expectations	0.00	0.00	3.45	17.24	79.31	4.76
Books/ material received rate compared to your expectations?	0.00	0.00	0.00	19.35	80.65	4.80
Quality of instruction of the math instructor rate compared to your expectations?	0.00	0.00	0.00	0.00	100.00	5.00
Quality of instruction of the physics instructor rate compared to your expectations?	0.00	0.00	0.00	22.58	77.42	4.77



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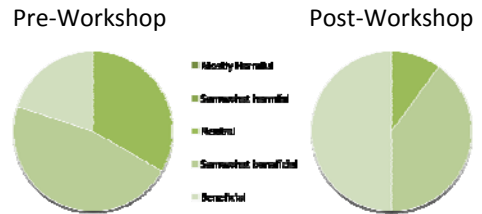
Survey Results

Questions Posed	How the workshop rate compared to your expectations					Average Score*
	Very Poor	Below Average	Average	Above Average	Excellent	
Quality of instruction of the life science instructor rate compared to your expectations?	0.00	0.00	6.45	25.81	67.74	4.61
Quality of help received from ASM Project Team and assistants rate compared to your expectations?	0.00	0.00	3.23	16.13	80.65	4.77
Facilities where the institute was held, rate compared to your expectations?	0.00	0.00	0.00	25.81	74.19	4.74
Overall logistics of the institute rate compared to your expectations?	0.00	0.00	0.00	16.13	83.87	4.84
Overall value of the institute rate compared to your expectations?	0.00	0.00	3.12	9.38	87.50	4.84



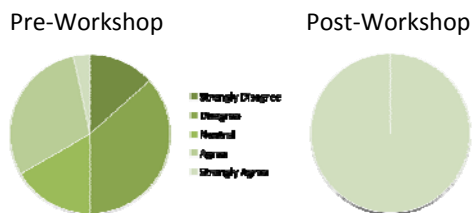
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My Perception of Microorganisms



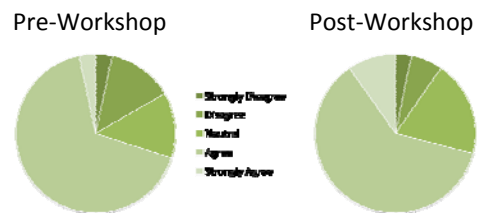
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I am CONFIDENT I can use microbes



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I am INTERESTED in talking about microbes





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I am INTERESTED in using microbes

Pre-Workshop



Post-Workshop



■ Strongly Disagree
 ■ Disagree
 ■ Neutral
 ■ Agree
 ■ Strongly Agree



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Observations



- Teacher interest level is high.
- Working with younger grades can be tough.
- Working with GLE's can be challenging.
- Integrating multiple GLE's helps implementation.
- Teachers and students can be very creative.



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How to get involved

- Volunteer as a mentor
- Volunteer as a reviewer of outreach activities
- Use ASM outreach activities and give us feedback
- Submit outreach activities
- Become active in the ASM K-12 Online Community



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Questions?



Support Bacterial



It's the only culture some people have!



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Proposed Statement on the Importance of Participation of Scientists in K- 12 Science Education

The American Society for Microbiology (ASM) encourages administrators and leaders in institutions of higher education, including medical schools, to give appropriate credit to faculty who participate in formal outreach activities involving K-12 students and teachers. For example, during the appointment, tenure, and promotion process, participation in sustainable teaching activities and curriculum and materials development should be highly valued. Continued public support for microbiology and informed decision making by the public demand an understanding of how microbiology research is critical for scientific discovery and human health and well being as well as for the production of a range of commodities, including food, feed, fuel, and pharmaceuticals. ASM will continue to leverage its expertise, in particular its membership, and provide leadership and organizational infrastructure to improve K-12 science education to achieve the goal of an informed public.