



Why Do You Think So? Asking Effective Questions in Engineering Activities

Ms. Chantal Balesdent, Museum of Science

Chantal Balesdent is a professional development provider for Engineering is Elementary at the Museum of Science, Boston. She received her B.A. in chemistry from Colby College and her Ph.D. in chemistry from the University of Oregon. At UO, Chantal was active in local science outreach, and as an NSF GK-12 fellow she taught hands-on science to elementary school students in rural Oregon.

WORKSHOP PROPOSAL FORM

2015 Annual ASEE K-12 Workshop on Engineering Education
“Authentic Engineering: Representing & Emphasizing the E in STEM”
Presented by Dassault Systems

Saturday, June 13, 2015
8:00 A.M. – 5:00 P.M.
Sheraton Seattle | Seattle | WA

Please complete this form, save it as a PDF file *only* and upload it through the ASEE Paper Management system as shown in the K12 Workshop Presenter’s Kit.

All notifications will be by email from the ASEE Paper Management system.

NOTE: To ensure that emails are not obstructed by spam blockers, please make sure to WHITELIST the email addresses: monolith@asee.org and conferences@asee.org and s.harrington-hurd@asee.org.

Direct questions to Stephanie Harrington-Hurd, ASEE K-12 Activities Manager, at s.harrington-hurd@asee.org. Additional workshop details are available at: <http://www.asee.org/K12Workshop>. Thank you!

Deadline

Friday, January 23, 2015 by 5:00PM EST

Presenters will be notified of acceptance status by March 14.

Late submissions will not be accepted.

Advanced Workshop Registration will open December 6, 2013.

SUBMISSION INFORMATION

Provide the first and last name of each presenter, including affiliations. If there is more than one presenter, designate one person as the organizer and provide only that person’s contact information. The organizer is responsible for communicating to co-presenters.

Number of Presenters:

Presenter Name(s):

1) Last: Balesdent First: Chantal Affiliation : Museum of Science, EiE

2) Last: McManus First : Shannon Affiliation: Museum of Science, EiE

3) Last First Affiliation

Contact Person’s Name: Shannon McManus

Contact Person’s Email: smcmanus@mos.org

Contact Person’s Phone: 617.589.4296

Contact Person’s Alternate Phone: 617.589.4243

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Please provide a one-paragraph bio for each presenter (in the order listed above). The bio should not exceed 70 words and should be written as you would want it to appear on the ASEE website and program materials.

1) Chantal Balesdent is a professional development provider for Engineering is Elementary at the Museum of Science, Boston. She received her B.A. in chemistry from Colby College and her Ph.D. in chemistry from the University of Oregon. At UO, Chantal was active in local science outreach, and as an NSF GK-12 fellow she taught hands-on science to elementary school students in rural Oregon.

2) Shannon heads up the professional development team at Engineering is Elementary. She brings to EiE seven years of experience teaching high school physics and integrated science and additional experience as an outreach coordinator for nonprofits including the Rhode Island Stormwater Solutions Program and the Massachusetts-based Buzzards Bay Coalition. She holds a B.A. in physics education from the University of Delaware and an M.S. in environmental science and management from the University of Rhode Island.

3)

WORKSHOP INFORMATION

Proposed Title:

Why Do You Think So? Asking Effective Questions in Engineering Activities

Abstract: Please provide a concise description that includes the workshop’s learning objectives (maximum 750 characters). The abstract is used on the ASEE website, program materials, and other K-12 Workshop promotional activities.

Developing engineering habits of mind in students requires that teachers ask effective questions that encourage students to think critically about their designs and persevere through failure. In this activity, participants will observe and analyze the process that students go through as they engineer and think carefully about the kinds of questions that they can ask students, specifically as students test their engineered technologies, that will help them to think critically about their design decisions and how they might improve their designs.

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Workshop Description. Please provide a detailed description of the proposed workshop that, at minimum, explicitly addresses the following (maximum 4,000 characters):

- a. Learning objectives
- b. Hands-on activities and interactive exercises
- c. Materials that participants can take with them
- d. Practical application for teachers and outreach staff

How can we delve deeper into students’ thinking around engineering? In this activity, participants gain experience fostering the engineering habits of mind in students, through questioning, as they observe students engaging in an engineering activity, and using the engineering design process to solve a problem by designing a technology.

Participants will put their “teacher hats” on as they watch classroom video footage of students asking questions about how to capture the wind’s energy to turn the blades of a windmill and exploring different materials as they “catch” the wind from a fan. Participants then examine actual windmill designs that are typical of students’ first windmill designs—however, none of these windmills successfully catch the wind.

Participants are challenged to identify *why* their students’ windmills are not working. Understanding why a student’s design is not working is an important first step when thinking about the kinds of questions a teacher might ask his or her students. They then work in small groups to think carefully about the kinds of questions that they can ask students, specifically as students test their windmills, which will help them to think critically about their design decisions and how they might improve their designs.

As participants share their brainstormed questions with peers, they begin to see how certain questions may target student understanding, while others may scaffold students through the design process. From this experience, participants develop questioning strategies for problem-solving activities that encourage students to access their scientific knowledge, consider material properties, be creative with their designs, and persevere in solving problems.

Authentic Engineering Connection. Identify and describe how you will explicitly address the ways in which your lesson or activity is representative of the processes, habits of mind and practices used by engineers, or is demonstrative of work in specific engineering fields.¹ At least one of those must be within the first four listed, below; i.e., do not only check “other”. Check all that apply:

- X Use of an engineering design process that has at least one iteration/improvement
- X Attention to specific engineering habits of mind

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- Attention to engineering practices (as described in the NGSS/Framework and as practiced by engineers)
- Attention to specific engineering careers or fields related to the lesson/activity
- Other (please describe below)

Provide a description of how you will explicitly address these aspects of authentic engineering in your workshop (maximum 2,000 characters):

Participants will use classroom video to observe students engaging in the engineering design process. After observing the classroom, participants will take a step out of the video to analyze actual technologies that are similar to those of the students. Participants will discuss the kinds of questions they could ask students during the testing phase of the engineering design process that will encourage students to develop their engineering habits of mind and think critically about their designs. As participants brainstorm questions, they will discuss how they might use certain questioning strategies to help develop agency, creativity, and perseverance as students engineer.

Diversity. This year is the American Society for Engineering Education’s “Year of Action on Diversity.” It is essential that we have a diverse engineering workforce to solve diverse problems. To do that and to have an engineering-literate public, it is essential that we reach *every* preK-12 student with high-quality engineering education, drawing on issues of access and equity in the classroom and in the curriculum. Reviewers would like to know how your proposed workshop will address diversity.

Provide a description of how you will explicitly address diversity – e.g., diversity with respect to gender/sex, ethnicity or race, special education inclusion, socio-economic status, or LGBT status – in your workshop (maximum 2,000 characters):

The classroom video footage that is viewed during the activity explicitly portrays diverse elementary students engaging in the engineering design challenge. The workshop will focus on resources and strategies that foster the engineering habits of mind in all students.

Are there any online components to the proposal or presentation? (Note that these online components may only be available to presenters or those who have their wireless subscriptions, since wireless may not be available during the workshop sessions.)

- No
- Yes

Please describe:

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Grade Level Target Audience (check all that apply):

- Primary (EC–2)
- Elementary (3–5)
- Middle School (6-8)
- High School (9-12)

Maximum Number of Participants:

25

If this number is greater than 25, please describe how your workshop will equally engage all participants.

All Seating is Classroom (tables and chairs).

Audio Visual Equipment Requests:

Note: An LCD projector, screen and podium with attached microphone are provided. Requests for additional equipment or resources (e.g., internet connection or laptops) will incur extra charges. If you do not have additional requests, please indicate with “Not applicable.”

Speakers for classroom video.

Reminder:

Presenters must register and pay the registration fee to support their workshop attendance and audio/video costs.

Thank you for completing this proposal form!

Please review this document prior to submitting it to ensure that all items are complete.

ASEE USE ONLY

Date Received:

Received By:

Proposal ID Number: