



Shifting Instruction to NGSS Engineering Practices: Strategies and Lessons Learned from Washington's Statewide LASER Program

Dr. Ann P McMahon, Pacific Science Center

Dr. Ann P. McMahon is Vice President of Science and Education at Pacific Science Center and Co-Director of Washington State LASER (Leadership Assistance for Science Education Reform). A satellite engineer for McDonnell Douglas in St. Louis for ten years before her career in science education, she has taught preschool and elementary school science and engineering and worked as a professional development provider of K-12 inquiry-based science and engineering practices.

Dr. Jacob Clark Blickenstaff Ph.D., Pacific Science Center-LASER

Jacob Clark Blickenstaff, Ph.D. taught high school physics for five years before returning to UC Davis to earn a doctorate in Science Education. He taught teacher education and science education courses from 2004-2011. For two years he worked for the American Physical Society on their PhysTEC project, and in 2013 he joined Pacific Science Center as the Program Director for Washington State Leadership and Assistance for Science Education Reform (LASER).

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: 2

Presenter Name(s):

- 1) Last McMahon First Ann Affiliation Pacific Science Center
- 2) Last Clark Blickenstaff First Jacob Affiliation Pacific Science Center
- 3) Last First Affiliation

Contact Person’s Name: Ann P. McMahon

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Contact Person’s Phone: 2064433641

Contact Person’s Alternate Phone: 3149569331

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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) Dr. Ann P. McMahon is Vice President of Science and Education at Pacific Science Center and Co-Director of Washington State LASER (Leadership Assistance for Science Education Reform). A satellite engineer for McDonnell Douglas in St. Louis for ten years before her career in science education, she has taught preschool and elementary school science and engineering and worked as a professional development provider of K-12 inquiry-based science and engineering practices.

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WORKSHOP INFORMATION

Proposed Title:

Shifting Instruction to NGSS Engineering Practices: Strategies and Lessons Learned from Washington’s Statewide LASER Program

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.

Learn the systemic model and strategies with which Washington State LASER has accomplished:

- 1) Building the capacity of the school districts to deliver quality science and engineering education through an emphasis on curriculum, instruction, assessment, professional development, materials and equipment support and administrative and community support,
 - 2) Facilitating alignment of science and engineering instructional materials to state and national standards and,
 - 3) Establishing a K-8 science and engineering program that is designed to improve teaching and learning in classrooms and schools across Washington State in the 21st Century.
- Immersive engineering experiences and our science/engineering notebook tool will be featured.

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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

LASER (Leadership & Assistance for Science Education Reform) is a Washington statewide effort co-led by Pacific Science Center and Pacific Northwest National Laboratory (operated by Battelle) in partnership with the Office of Superintendent of Public Instruction (OSPI). For 15 years, LASER has catalyzed and supported sustainable innovation and improvement in K-12 science education. LASER is accomplishing two goals: 1) to facilitate the successful adoption of the Next Generation Science Standards (NGSS) across Washington state through professional development and a science/engineering notebook tool to integrate NGSS and Common Core State Standards (CCSS); and 2) to build leadership capacity for high quality STEM education in Washington through a STEM Leadership Institute.

We developed training materials for a science/engineering notebook tool in preparation for professional development funded by OSPI. In Fall & Spring 2014 we hosted two 3-day intensive workshops for LASER Alliance Directors and their teams. These events built on events held in 2011-2014 to provide feedback on early drafts of NGSS, and supported adoption of the final version. We are preparing to hold a 5-day intensive STEM Leadership Institute in summer 2015. The Institute will support the integration of NGSS into CCSS efforts, working with school-based teams of teacher leaders, administrators and community members.

In this workshop, participants will learn the systemic model and strategies with which Washington State LASER has accomplished:

- 1) Building the capacity of the school districts to deliver quality science and engineering education through an emphasis on curriculum, instruction, assessment, professional development, materials and equipment support and administrative and community support,
- 2) Facilitating alignment of science and engineering instructional materials to state standards and Common Core State Standards in order to help student be ready to succeed in college and careers,
- 3) Establishing, maturing and evolving a K-8 science and engineering program that is designed to improve teaching and learning in classrooms and schools across Washington State in the 21st Century.

Immersive engineering experiences and the science/engineering notebook tool used in the intensive workshops delivered by Washington LASER will anchor this workshop. Participants at all levels in the school district will be able to adapt the model, strategies, and immersive

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engineering experiences to their local contexts. In addition to providing immersive engineering experiences that illustrate the engineering practices and connect to CCSS, workshop leaders, who are also Washington LASER’s leaders, will conduct a facilitated experience and interactive discussion of strategies and lessons learned using the model for Washington’s successful statewide systemic STEM network. This model can be replicated in the context of a single school, a school district, consortia of school districts with external partners, as well as at the state level. The Washington LASER model is successful because of strong partnerships among formal education, informal education, and business. Participants who come from any of these sectors will come away from this workshop with a proven model for systemic change in STEM education institutions, strategies for implementing it, and new activities for shifting instruction to include engineering practices in the classroom.

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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:

- Use of an engineering design process that has at least one iteration/improvement
- Attention to specific engineering habits of mind
- 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 experience an iterative engineering design activity co-led by an engineer who is also a K-12 educator and the Co-Director of Washington State’s LASER Initiative. This activity calls out specific engineering practices in the context of the design process. As part of the sense-making following the activity, the presenters address the neurodiversity of students in the classroom and how their diverse ways of experiencing the world strengthen an engineering team and adapt them to specific career roles in engineering.

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):

There are a variety of labels used to describe learners in the classroom (e.g. on the autism spectrum, dyslexic, learning disabled, ADHD, and others). The presenters will highlight the **strengths** that each of these learners bring to an engineering team and how K-12 educators can structure engineering experiences so that these students can experience these attributes as strengths that enable them to contribute valuable input to their engineering team. This approach has been enthusiastically embraced by formal and informal educators who have attended the Washington LASER professional development upon which this workshop is based.

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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:

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:

100

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

This workshop is an adaptation of a multi-day workshop that was delivered to a statewide group of 100+ participants. The workshop leaders incorporate small group and large group activities into the presentation and have experience facilitating these so that all participants remain engaged.

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.”

Not applicable

Reminder:

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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: