Guest Editorial: Catching the Excitement of STEM Education—Its Challenges and Successes

by Cindy P. Veenstra, ASQ Education Division Chair

Special thanks to Nicole Adrian, editor of *ASQ Primary and Secondary Brief* and *ASQ Higher Education Brief*, for the opportunity to introduce the third-annual joint issue of these briefs on science, technology, engineering and math (STEM) education topics and to share with you upcoming networking events on STEM education.

Some background

This special issue on STEM education comes to you during **Engineers' Week** (Feb. 20-26) to celebrate engineering, and, at the same time, recognize the importance and excitement of all STEM fields. Three years ago, we started with the idea that ASQ members would like to hear more about how they could participate in K-12 outreach STEM projects and improve student interest in STEM college majors and careers. As it turns out, we were at the forefront of the STEM education interest. Since then, the STEM movement has received national priority among STEM educators and policy leaders.

In his 2011 State of the Union address, President Obama referred to the need for more innovation and research for the United States' economic future growth as "our generation's Sputnik moment" and tied to this innovation is improving the "race to educate our kids."[1] In the 1960s, the space race with Russia to land on the moon led to educational reform in preparing high school students for STEM college majors and careers.

Today, in this Sputnik moment, the STEM education effort centers on three challenges:

1. U.S. college students are not being attracted to science and engineering (S&E) degrees to the extent that is needed for competitive economic growth. Of all bachelor's degrees, only one-third are degrees in S&E. In many countries, more than 50% of bachelor's degrees are in S&E.[2] To attract more students to S&E careers, efforts for developing an engineering education curriculum in primary and secondary schools are underway.[3]
2. In an international comparison of math and science knowledge, U.S. high school students are ranked lower (by country) today than a decade ago.[4] In the 2009 National Assessment of Education Progress (NAEP) tests, only 21% of U.S. 12th graders were considered proficient in science. [5]

3. More diversity is needed in the STEM workforce for continued innovation and economic growth. Underrepresented minorities and students from low-income families are not participating in the STEM disciplines at the same rate as their percentage of the population, and at the rate needed to grow a STEM workforce.[6] In addition, women are underrepresented in engineering—only 17% of the bachelor's degrees in engineering are awarded to women. [7]

STEM education innovation

Despite these challenges, this is an exciting time for STEM education. This issue includes articles with ideas on STEM education innovation and best practices that you can use in your school system, university or organization. Some of the articles may give you ideas for contributing your time at a local school.

In particular, I would like to highlight the systems thinking discussed in the lead article, "Quality STEMs from Planning Process at the University of Wisconsin-Stout," by Julie Furst-Bowe. As provost of the UW-Stout, she describes the quality management processes that have transformed her university into a leader in STEM education, which includes using the strategic planning inherent in the *Baldrige Education Criteria for Performance Excellence.*

In 2001, UW-Stout received the prestigious Malcolm Baldrige National Quality Award in the education category. As a result of its strategic planning, the university has seen significant increases in STEM enrollment, developed significant K-12 outreach programs and has a graduate job placement rate of more than 95%—a true success story!

Conference networking opportunities

With the ASQ Education Division's continued interest in STEM education, we have developed two networking events. At ASQ's World Conference on Quality and Improvement, set for May 16-18 in Pittsburgh, the division is sponsoring the ICQI workshop "**Science, Technology, Engineering and Mathematics (STEM) Education: Changing the Direction**." Its purpose is to network about ideas and best practices that will change the direction of STEM efforts for increased student participation. We welcome your participation, your questions and ideas.

As a continuation of the ICQI workshop session, the Education Division and UW-Stout are sponsoring the **Advancing the STEM Agenda in Education, the Workplace and Society**

Conference July 19-20 in Menomonie, WI. We recognize that national policies make the STEM fields a basis for the evolving knowledge industry, innovation and economic global growth. This conference is exceptional in two ways:

- It will blend quality and quality management ideas with the STEM national agenda, which will have the potential to generate more significant progress in STEM education.
- It will include three conference tracks that span the life cycle of STEM education: K-12 STEM, higher education STEM and STEM workforce transition.

The abstracts for our conference call for papers are due March 16. We welcome abstracts with your ideas, research and success stories. The papers can answer questions such as:

- How do we interest our children and young adults in S&E innovation and exciting opportunities through their STEM studies or activities?
- How do we keep them engaged in college and help them transition to a successful career in STEM?

I hope this conference will be a stepping stone to meaningful conversations for innovative solutions to address STEM education challenges. Enjoy this issue, share it with your colleagues and consider networking on STEM issues with us.

References

1. Barack Obama, "Remarks by the President in State of Union Address", Jan. 25, 2011, www.whitehouse.gov/the-press-office/2011/01/25/remarks-president-state-union-address.
2. National Science Foundation, "Science and Engineering Indicators: 2010," 2010, www.nsf.gov/statistics/seind10/c8/c8i.htm.
3. Greg Pearson, "Guest Editorial: Engineering Education in the K-12 Classroom", *ASQ Education Brief*, February 2010, http://asq.org/edu/2010/02/engineering/guest-editorial-engineering-education-in-the-k-12-classroom-.html?shl=097477.
4. National Science Foundation, see reference 2.
5. National Center for Education Statistics, "The Nation's Report Card: Science 2009," U.S. Department of Education, Jan. 25, 2011, http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2011451.
6. National Science Foundation, see reference 2.
7. Cindy P. Veenstra, "Improving the Educational Experience of STEM Majors," *ASQ Higher*

Education Brief, May, 2008, http://asq.org/edu/2008/05/best-practices/improving-the-educational-experience-of-stem-majors-en.pdf.

Cindy P. Veenstra, Ph.D. is the director of Veenstra and Associates and consults on STEM college student success. She is the chair of the ASQ Education Division and co-chair of the ASQ STEM Agenda conference. She can be reached at cindy@veenstraconsulting.com