

Dear Readers,

Welcome to Volume 13, Issue 4 of the Journal of STEM Education: Innovations and Research. As always, our authors' excellent research continues, as readers will find evidenced in the six interesting articles in this issue that describe several new approaches to improving students' learning through hands-on experiences and exposure to real-world case studies.

To accompany the outstanding articles in this issue, we also have the pleasure of presenting a guest editorial by Dr. Chris Rogers, a professor in the Mechanical Engineering Department at Tufts University. Rogers, who is also the director for the Center for Engineering Education Outreach, discusses the importance of achieving engineering 'literacy' for students of all grade levels. Drawing from a wealth of experience, Rogers gives numerous examples of elementary and middle school classrooms that have implemented successful engineering-based projects that have not only introduced students to the world of engineering, but also helped them learn and understand other subjects and skills.

In this issue, we have also had the privilege of being able to publish a special piece about the upcoming London Olympics. The piece is by Ms. Susan Kemnitzer, the Deputy Director of the Electrical, Communications and Cyber Systems Division of the National Science Foundation. It discusses the NBC Learn program 'Science of the Summer Olympics: Engineering in Science,' a series of 10 videos highlighting how engineering is intertwined in this year's Olympics.

The first three articles of this issue are the next in a series of Special Issues featuring results from research conducted for the Laboratory for Innovative Technology and Engineering Education (LITEE) Case Study Dissemination Project. For this project, professors at twenty-six universities across the nation conducted research using case studies developed by LITEE.

To begin the issue, in "Implementation of Case Studies in an Introduction to Engineering Course for 'LITEE National Dissemination Grant Competition,'" Qiang Le shares how Hampton University in Virginia has implemented LITEE case studies in an 'Introduction to Engineering' course. Through her study, Le shows that there is a great need to use multi-media case studies in engineering curriculum to help achieve student learning outcomes like teamwork and higher order cognitive skills, as well as to promote positive attitudes toward the field of engineering in first-year students.

"Comparison of 'Typical' vs. Open-Ended Ethics Case Studies in First Year Engineering" by Kenneth J. Reid of Ohio Northern University describes how to assist first-year engineering students in gaining ethics as a professional skill by using case studies in the classroom. The author outlines how the inclusion of a rich, expanded case study project is useful in a class and can lead to a greater depth of discussion on ethical issues.

Raghuram V. Pucha and Tristan T. Utschig share some learning-centered strategies that have been developed in the Georgia Institute of Technology Woodruff School of Mechanical Engineering in “Learning-Centered Instruction of Engineering Graphics for Freshman Engineering Students.” These strategies are supported by real-world problems and case studies implemented in two different engineering courses, and are meant to foster the required integrative thinking needed for tomorrow’s engineers.

Continuing on to the rest of the issue, Maria Kalevitch, Cheryl Maurer, Paul Badger, Greg Holdan, Joe Iannelli, Arif Sirinterlikei, George Semich, and James Bernauer of Robert Morris University in Pennsylvania bring us “Building a Community of Scholars: One University’s Story of Students Engaged in Learning Science, Mathematics, and Engineering through a NSF S-STEM Grant.” They describe the STEM Living-Learning cohort program that was implemented at their university through an NSF grant and how it has had a significant impact on the retention rate of the students involved, as well as their improved academic performance.

Other ways to improve first-year student experiences are covered in “Enhancing the Programming Experience for First-Year Engineering Students through Hands-On Integrated Computer Experiences,” by Stephen Canfield, Sheikh Ghafoor, and Mohamed Abdelrahman of Tennessee Technological University. The authors discuss how they used microcontroller hardware as an effective programming platform and as a motivating hands-on experience for students in an “Introduction to Programming for Engineers” course.

Seung Youn Chyung, Janet Callahan, Cheryl B. Schrader, and Carol Sevier of Boise State University investigate the effectiveness of using service learning methods in “What Value Does Service Learning Have on Introductory Engineering Students’ Motivation and ABET Program Outcomes.” Service learning modules are another great way for students to learn from meaningful first-hand experiences and have been shown to be significantly effective in terms of positively influencing the interests of students.

As the summer draws to a close, I hope all of our readers can look upon the last few months and see true accomplishments and learning among their students and use suggestions from our authors in the upcoming fall semester. As always, we welcome comments, questions, and suggestions related to the journal, sent by email to jstemed@gmail.com.

Regards,
P.K. Raju
Editor-in-Chief