

COMMUNICATIONS EDUCATION & TRAINING: THE SCHOLARSHIP OF TEACHING AND LEARNING



Dave Michelson



Peter Ostafich



Carolyn Ottman

The Scholarship of Teaching and Learning (SoTL) encourages teachers and educators to examine their own classroom practice, record their successes and failures, and ultimately share their experiences in a formal and scholarly way so that others may reflect on their findings and build upon existing teaching and learning processes.

SoTL acknowledges that concerns for privacy and other ethical issues associated with studies involving human subjects place limits on the types of research that can be conducted in the classroom setting. Nevertheless, SoTL provides a mechanism for raising the standard of discussion concerning teaching and learning in the literature. The Scholarship of Research and Supervision (SoRL) is a related concept that invites the same reflective approach to improving the quality of training through research, especially that conducted at the postgraduate level.

This Feature Topic on SoTL is intended to hasten the incorporation of SoTL and SoRL into communications engineering curricula by providing educators and researchers with an opportunity to share their experience, best practices, and case studies. The articles in this Feature Topic run the gamut from case studies in experiential learning and research-oriented courses to a comprehensive study of student understanding of key concepts to a novel framework for conducting lab-based courses. The work presented provides a fascinating glimpse at the worldwide effort to reflect upon and improve the quality and effectiveness of university teaching.

In “Combining Teaching and Research through Barcode Experiments,” Xinbin Wang and colleagues from Shanghai Jiaotong University in China introduce an experimental research-oriented course that they developed for junior-year students that uses original research tasks rather than conventional lecture and laboratory approaches to develop student skill and insight. Based on a cutting-edge research project, the course progresses through introduction, demonstration, research, and evaluation phases and concludes with a three-dimensional topic, work achieved, and written report evaluation framework. Outcome and experiential evaluations show that students developed important research skills through this process.

In “Incorporating Experiential Learning in Engineering Courses,” Atousa Hajshirmohammadi from Simon Fraser University in Canada presents the results of her efforts to incorporate experiential learning into a common core, first-year course on logic circuits. The experiential approach may be considered to be an intermediate step between conventional lab assignments and full projects that encourages development of higher-level skills than conventional assignments but with a far smaller commitment of time and effort than a full project. She presents the results of students’ feedback on this method of learning compared to conventional approaches and reflects on how the lessons learned may be applied to courses in analog and digital communications.

In “Insights into Students’ Conceptual Understanding of Operating Systems: A Four-Year Case Study in Online Education,” Sonia Pamplona and her colleagues from Universidad a Distancia de

Madrid and Universidad Politecnica de Madrid address the need to know where and why students are experiencing gaps or misconceptions in their conceptual understanding of technical concepts. In particular, their SoTL-based study provides insights into why students have conceptual understanding gaps or misconceptions in an online operating systems course. They present the results of a four-year qualitative case study of 78 online students in order to identify misconceptions and their root causes. Their results indicate that the natural-language meaning of technical terms can be a significant barrier to good understanding. This has led to their development of a methodology for discovering misconceptions and its causes. Finally, they consider how such a study could benefit developers of communications engineering courses.

In “The iLab Concept: Making Teaching Better, At Scale,” Marc Oliver-Pahl from the Technical University of Munich in Germany shows how lab courses can be managed in a way that efficiently supports learners while significantly reducing the workload of teachers. His iLab concept consists of a blended learning teaching methodology and the lab system eLearning platform that was especially designed for supporting the teaching methodology. The concept reduces administrative and organizational overhead so that the focus of both instructors and students can return to teaching and learning. In this manner, the iLab concept enables teaching more content in less time. More than 1500 students have benefited from the iLab concept between 2004 and 2017. Assessments and evaluations have confirmed the effectiveness of the approach.

The next Feature Topic on Education and Training will focus on Humanitarian Engineering and Community Engagement in Education and will appear in May 2018. See the Call for Papers on the *IEEE Communications Magazine* website for additional details.

BIOGRAPHIES

DAVID G. MICHELSON (davem@ece.ubc.ca) leads the Radio Science Lab at the University of British Columbia, where his research focuses on wireless communications. He completed the UBC Faculty Certificate Program on Teaching and Learning in Higher Education in 2011, served as ComSoc’s Director of Education and Training from 2012 to 2013, and has been a member of the ComSoc Educational Services Board from 2012 to present. He is also an elected Member-at-Large of the ComSoc Board of Governors (2013–2015, 2017–2019).

PETER OSTAFICHUK (ostafich@mech.ubc.ca) is a professor of teaching in the Department of Mechanical Engineering at the University of British Columbia. His research interests focus on aerodynamics and hydrodynamics. His teaching interests focus on team-based learning, active learning, outcomes-based assessment, and team dynamics. In 2015, he was awarded a fellowship from the Society for Teaching and Learning in Higher Education, in partnership with 3M Canada. The fellowship recognizes his leadership in engineering curriculum advancement.

C. KELLY OTTMAN (ottman@msoe.edu) is a professor in the Rader School of Business at MSOE University. She was a Teaching and Learning Center Scholar at the University of Wisconsin-Milwaukee. There, in 2005, she was awarded the Outstanding Teaching Award. Her SoTL research addresses understanding participation and learning in traditional and online environments, the use of teams in large lectures, and international short-term immersions. She served as the SoTL Chair for the Team Based Learning Collaborative (2009–2014).