

Workshop, September 18, 2019

Implementing and Assessing Cooperative, Hands-on, Active, Problem-based Learning

**Workshop Leader: Professor Bernard J. Van Wie
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Workshop Abstract. Professor Bernie Van Wie will lead an educational workshop focused on hands-on interactive learning. He will share insights from his pathway toward developing this approach including preparation, a theoretical framework, practical considerations, overcoming pitfalls and assessment. The emphasis will be on the use of miniature, see-through fluid mechanics and heat transfer equipment referred to as Low Cost – Desktop Learning Modules (LC-DLMs). These LC-DLMs find most of their use in a standard classroom with small teams of students gathered around each unit, but where the activities replace lectures on certain days. Other instructors are using them in laboratories, yet the main intent of the work is to tie, in real time, the concepts being taught in lecture to actual equipment. The units are being used in chemical, mechanical, and civil engineering courses, however, the systems have been used in high school science and physics classrooms, and the format is being extended for use in biomass conversion, kinetics, and biomedical engineering. The workshop will include hands-on experiential learning components for the participants. In addition, Van Wie will present both conceptual and motivational assessment components and present data from past and current implementations on effectiveness. He will relay current strategies being used in a National Science Foundation (NSF) Improving Undergraduate STEM Education (IUSE) grant. The IUSE focus is on propagating use of LC-DLMs at over 50 institutions through a regional hub-based strategy.

Biographical Sketch. Bernard Van Wie is a senior professor at Washington State University (WSU). He and his team are propagating the use of miniature hands-on transport equipment in the standard classroom, and rigorously assessing the efficacy of teaching and learning using the approach through a major national dissemination effort across the US. He received his B.S., M.S. and Ph.D., and did his postdoctoral work at the University of Oklahoma where he also taught as a graduate student and visiting lecturer. His 2007-2008 Fulbright exchange to Nigeria led to his receiving the WSU Marian Smith Innovative Teacher Award. He also received the inaugural WSU Innovation in Teaching Award in 2016. His technical research, funded by NSF and the USDA, is focused on cartilage tissue regeneration, cytotoxic T-cell manufacture, and biosensing with medical and environmental applications. He has 112 technical articles, workbooks, and refereed engineering education full length conference papers, has been involved in five US patents and in the writing of two book chapters.

