Establishing and Fulfilling Career Readiness Standards: Contributions from Simulation Disciplines

Jennifer H. Nolan, Dan M. Davis & John J. Tran
Catholic Polytechnic University
5916 Bixby Village Dr, Ste. 88
Long Beach CA 90803
310 909-3487
{jnolan, ddavis & jtran}@catholicpolytechnic.org

Keywords:
STEM Education, career requirements, standards analysis, figures of merit, Metrics

Abstract: *This paper discusses the more focused use of a constructivist approach in deeply involving STEM students in academic research, by including them in meaningful ways at each stage of the project. The well-documented national need for Science, Technology, Engineering and Mathematics (STEM) professionals has not been entirely mitigated by responses for government and educational organizations. While there are many causes for the continuing short-fall in numbers, this paper focuses on another parameter: career-readiness. There seems to be great consensus about the courses that constitute preparation at the Bachelor's, Master's and Doctoral levels, the authors adduce evidence of dissatisfaction among the "consumers" of the graduates in terms of preparation to fully and skillfully ply their STEM training. Similarly, the first-term/first-year migrations from the Schools of Engineering to the College of Arts and Sciences is a feature in virtually all campuses, as student abandon the difficult regimen of math and physics classes for the more entertaining classes in political science, the behavioral sciences, history and literature. The authors are currently addressing both of those major concerns with an innovative approach of engaging the STEM students in exciting and on-going research projects, often targeted on their own demographic groups. Many of the insights useful in the authors' efforts flow from their work with young students, with whom on finds very little foundation for making career choices. This paper addresses these efforts and identifies the existing need to parameterize and quantify issues such as technical degree retention rates and career-readiness. Based on the authors' experience in the academic research and development environment, they set forth their analyses of the needs to generate figures of merit as they implement this approach. They report on their prior experience with student research assistants at both the under-graduate and graduate student levels. The questions and critiques of those programs are outlined. Their quest of a more fruitful approach is discussed, along with the concomitant need for both short-term metrics and longitudinal studies of enduring efficacy. The extensibility of techniques developed in the simulation communities is described and discussed. The new approach of focusing on providing the students with opportunities for epiphanies is reported. This is contrasted with the method of just plugging them into a project with its own goals, which often conflict with the educational goals of the student. The conclusory remarks briefly set out long-term research efforts, as well as emerging technologies to assist in, the optimization the efficacy of this initiative and the impact on the STEM disciplines communities.*

Authors' Biographies

Jennifer H. Nolan, PhD, is the President of Catholic Polytechnic University and Professor of Psychology in their College of Arts and Sciences. Her earlier work specialized in memory, dementias, stroke and insulin resistance. She is a brain plasticity specialist and certified to administer Cogmed training. Previously, she was the C.O.O. and co-founder of a stroke and brain injury rehabilitation center. Dr. Nolan has taught university courses at UC Irvine, Loyola Marymount University, and Glendale Community College. She has conducted local and nationwide clinical trials, and published in both scientific journals and popular magazines. She received a BA in Psychology from Loyola Marymount and a Ph.D. in Psychology from the Dept. of Cognitive Science at the University of California, Irvine,

DAN M. DAVIS, J.D., is a Research Associate Professor and is also active as a consultant at the Institute for Creative Technologies, University of Southern California (USC), focusing on large-scale DoD simulations and avatar uses. Prior to retirement, he was the Director of the JESPP project at USC for a decade. As the Assistant Director of Advanced Computing Research at Caltech, he ran Synthetic Forces Express, bringing HPC to DoD simulations. He also served as a Director at the Maui High Performance Computing Center and in computer research roles at the Jet Propulsion Laboratory and Martin Marietta. He was the Chairman of the Coalition of Academic Supercomputing Centers and has taught at the undergraduate and graduate levels. As early as 1971, Dan was writing programs in FORTRAN on one of Seymour Cray's CDC 6500's. While in the Marine Corps, he saw duty in Vietnam as a Cryptologist and retired in 2002 as a Commander, U.S.N. He received B.A. and J.D. degrees from the University of Colorado in Boulder.

John J. Tran, PhD is the Chairman of the Computer Science Department of the Catholic Polytechnic University and he is a Major in the California Air National Guard. He has worked at ISI, USC, the Stanford Linear Accelerator Center, Safetopia, and Intel Corporation. At USC, he focused on Object-oriented software engineering, large-scale software system design and implementation, and high performance parallel and scientific computing. Air Force tours included the White House Communications Agency and Kirkuk Regional Air Base (Iraq), where he was the Communications Squadron Commander. He received both his BS and MS Degrees in Computer Science and Engineering from the University of Notre Dame and was awarded his PhD in Computer Sciences at the University of Southern California, where his dissertation advisor was Dr. Robert F. Lucas.