Extensibility of Simulation Standards Techniques: Developing Criteria for University Curricula

Dan M. Davis
Catholic Polytechnic University
5916 Bixby Village Dr, Ste. 88
Long Beach CA 90803
310 909-3487
dmdavis@acm.org

Frederica J. Stassi
Science Education Consultant
Lompoc, California
frjstassi@gmail.com

Jennifer H. Nolan
Catholic Polytechnic University
Los Angeles, CA
jnolan@catholicpolytechnic.org

Mark C. Davis
Wood Duck Research, Inc.
Mooresville, NC
davismc@ieee.org

Keywords:
Common Curricula, Skill-Sets, Evaluative Weight, VV&T, Metrics

Abstract: *This paper sets forth the contribution of the SISO community's techniques in addressing a very real-world problem: that of what one can expect from a person with an academic credential. While the original goal was to aid the definition of curriculum requirements for a tertiary education technical institute, the approaches considered devolved into a second issue of concern: that of evaluating various institutions in an objective and quantified way. The paper opens with a quick review of typical tertiary education curriculum requirements and their evolution over time. Then some anecdotal and documented evidence is provided of a break-down in the commonality of the curricula requirements and a dichotomy between the academic standards and the expectations of the society that academia seeks to serve. This led to a conception and development of a chain-referral sampling instrument to probe these issues. The use of this type of instrument is defined and defended. Data from the survey is adduced, not to prove a particular thesis, but as an ethnographic study to help the users understand what issues do reside and which ones are deemed most critical. Armed with more than their individual life experiences, the authors then discuss how they sought to develop more optimal curricula for various programs of a technical university. This process was illuminated and enhanced by some of the approaches and organizational methods employed in the simulation community's interoperability efforts. This spawned the realization that the quantifiable characterization of curricula might provide a useful tool for the segment of society that was most in need of a method of evaluating the reliably manifest skill-set from a graduate of any given tertiary institution. By using the quantified value of the skills required to graduate, the paper advances the concept that the direct societal consumer of the graduates, their new employer, may be able to more effectively gauge the utility of a candidate. The paper discusses how in this instance, the evolution of a binary standard into a cardinal rating, may be appropriate. The "consumer" then might be able to better evaluate how much better will one such candidate for employment be than one from a school with a different set of curricula requirements. Two anecdotes are provided to support the need for such an analytic tool. The paper closes with a discussion of future research opportunities and a description of possible metrics to evaluate the impact of the standards-based approach to curricula development over the ensuing decades.*

Authors' Biographies

DAN M. DAVIS, J.D., is 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.

FREDERICA J. STASSI. ED.D. is a Science Education Analyst, working in the Central Coast of California. Her background includes research for the National Science Foundation in which she was funded to study pedagogies and efficacies in U.S. Science museums. This research involved museums from the East Coast to Oʻahu in Hawaiʻi. Her doctoral research was conducted with the advice of Professor William McComas and focused on the development of science standards for the State of California. She received a B.A. degree from Tabor college Hillsboro, Kansas as well as an M.A. Degree and an Ed.D., both from the University of Southern California in Los Angeles.

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,

MARK C. DAVIS, PH.D. is the Chief Technical Officer at Wood Duck Research, Inc, and is semi retired after careers in the US Navy and as a computer design engineer for both IBM and Lenovo. Rising to the level of Distinguished Engineer at Lenovo, he was responsible for the design of laptop computer cross-disciplinary technology, including PC architecture, embedded systems, open source and virtualization. Previous work was with IBM in the areas of software development and architecture involving security, storage and virtualization. Dr. Davis has been granted well over fifty patents that were filed during his service at both companies. He is a graduate of the Duke University NROTC program and was commissioned as an Ensign, attended nuclear power school, and served as a Submarine Officer for twelve years, including one duty tour as a classroom instructor. He left the active duty as a Lieutenant Commander to pursue a PhD. Mark holds a BSEE degree from Duke University and a PhD in Computer Science from the University of North Carolina, Chapel Hill, where his advisor was Professor Fredrick P. Books.