# Learning Analytics and Deep Learning: Emerging Standards for Training Metrics

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**ABSTRACT:** *The better quantification of results, analysis of efficacy, and enhancement of training techniques is now being facilitated by advances in emerging technologies. This suggests the need for implementations of these techniques in the Modeling and Simulation (M&S) discipline. Learning Analytics, Deep Learning, Neural Net Training, and Meta-Disciplinary approaches to the evaluation, selection, and preparation of instructional personnel are now feasible. Across the millennia, history reports that sages, trainers, and mentors have been sought to help prepare people for productive contributions. Most of the evaluation to date has been based on subjective and unquantified impressions, often generated by the trainers themselves. The obfuscation caused by human emotions has masked even the modest ability that previous generations had to evaluate pedagogical effectiveness. This paper adduces data to show how this conflation of the trainer's personal charisma has predestined early attempts to evaluate trainer skills to disappointment. During research into virtual conversational interfaces, the authors observed a number of issues concerning trainer evaluation. The very act of replacing "live humans" with computer-generated avatars is potentially insightful. Researchers have made significant strides in Learning Analytics suggesting Artificial Intelligence communities may have observations that could be useful in live-instruction environments. Also, several emerging capabilities in the computational sciences have showed both results and future promise. These new technologies are outlined and reviewed. The paper disuses emerging capabilities of machine learning and learning analytics. That leads to the concomitant need for salient standards in the M&S community. Such standards would help quantify improved evaluation of human trainers. All of these issues are then synthesized to produce a viable path to a new set of psycho-metric tools for a better pre-selection evaluation, tailored training, and final competency assessment of instructional personnel. This is an especially pressing current concern of the authors.*

Learning metrics
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## Author Biographies

**DAN M. DAVIS** is a Research Associate Professor at Catholic Polytechnic University (CPU) and is also active as a consultant at the Institute for Creative Technologies, University of Southern California (USC). He is currently focusing on large-scale DoD simulations and virtual human implementations. Prior to retirement, he was the Director of the JESPP project at USC for more than a decade. As the Assistant Director of Advanced Computing Research at Caltech, he ran Synthetic Forces Express, bringing HPC to DoD simulations. He has 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.

**JENNIFER H. NOLAN, PH..D.** 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 Cogmed provider. 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 the University of California 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 University, Los Angeles and a Ph.D. in Neuro-Psychology from the Dept. of Cognitive Science at the University of California, Irvine.

**JEROME C. PLACIDO** serves on the Advisory Board for Catholic Polytechnic University in the San Gabriel Valley, California. He also is the Director of Software Application Development at Workday, Inc. in the Bay Area. With over a decade of experience in higher education technology and his primary research interests are in organizational effectiveness and concrete applications for combinatorial optimization in student success scenarios. He has also held leadership and technology positions at Envisions in Irvine California and while serving on the board for YCP Silicon Valley. His continuing professional interests are in developing an integrative understanding of the human/machine interfaces in application to service delivery. Jerome received a B.S. degree in Computer Science from the University of California Riverside and an M.S. degree in Psychology from Divine Mercy University.

**JOHN J. TRAN** 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 sys-tem 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 he was an advisee of Dr. Robert F. Lucas.

**JUDITH L. JACOBUS** is retired from conducting speech therapy as a Speech and Language Specialist for more than two decades. Her experiences were in public schools settings in Orange County. California. She also previously taught for 12 years as a classroom trainer in multi-cultural communities there. Judith currently volunteers her professional skills for a local police department, so has extensive experience with dysfunctional adults and children in a variety of both every-day and traumatic situations. Her participation in amateur theatrics has more fully familiarized her with the characteristics of human behavior as they are projected via verbal, facial and body-language cues. This experience has also exposed her to the skill and art of the selection of appropriate persons for specific on-screen roles. Judith holds a lifetime Special Education Credential in Speech and Hearing Therapy, K-12 from the State of California. She earned a B. A. Degree in Speech Communications from the California State University Long Beach and an M. A. Degree in Training and Trainer Leadership from the Grand Canyon University in Glendale, Arizona.