

## Inculcating Metacognition and Critical Thinking: Pedagogical Infrastructures Employing Virtual Human

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**Comment [U1]:** You could just say, Secondary School Educator if Huntington USD has rules about teachers publishing (most school districts do NOT)

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### ABSTRACT

This paper reviews the issues of deficiencies in metacognition and critical thinking skills in today's ~~personnel~~ ~~poor~~ ~~workforce~~, identifies some current constraints on effectively addressing those issues, and reports on advances in virtual human interfaces that can enhance efforts to ~~ameliorate~~ ~~address~~ current educational impediments. The authors assert that these approaches would not only be ~~efficacious~~ ~~effective~~ at all levels of education, they present their case that instantiating these pedagogical ~~infrastructures~~ ~~approaches~~ at the earliest point in the educational evolution of the student capabilities would bear the most fruit in operational settings. The paper opens with a view of the need for both metacognition and critical thinking skills in today's environment and a report on the number of leaders, analysts, and staff who decry the current state of those skills. The ability and need to begin this training with the youngest students is ~~supported~~ ~~advanced~~. Then, a review of the recognized pedagogical approaches to improving these ~~se~~ ~~germane~~ proficiencies is ~~offset~~ ~~countered~~ by an explication of the many personal, organizational, and social hurdles to implementing these approaches. The last major section is a description of recent advances in the modeling and simulation community leading to the availability of conversationally facile virtual humans and other computer agent avatars with the capability of ~~overcoming~~ ~~counteracting~~ the obstacles currently hampering the training and education required. Some of the obstacles addressed are class sizes, operational schedule overloads, geographic isolations, and personnel proclivities, preferences, and proficiencies of both educator and student. Recent research outcomes are offered as examples of current capabilities and future research efforts are outlined, previewing new tools that will soon be available to the professionals in this discipline. These capabilities are described with sufficient detail to allow the reader to see if these programs might be applicable in their own work, either now or in the years to come.

### ABOUT THE AUTHORS

**Dan M. Davis** 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 ~~2074~~ ~~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.

**Teresa L. Stewart** is an education administrator and teacher serving as the Program Director of the FBC Weekday Preschool, Alexandria Virginia. Teri currently focuses her professional activities on providing developmentally appropriate learning and social experiences in a Christian-friendly environment. Her school's curriculum features classes designed to provide an early childhood program that supports the individuality of each child. Part of that individuality process is nurturing the child's natural inclination to study and master new concepts in a Piagetian evolution of cognitive development. Teri is an enthusiastic advocate of Blended Schooling and its extensibility into other educational environments. She received a XX degree from the University of Y Y in Z, Z.

**Jocelyn X. Joiner** is an educator and currently teaches at the Ocean View High School in Huntington Beach California. Her primary interests have been in studying the failure of her students to recognize the between their math and their elbow. Her training has been in the mis-behavioral sciences and she applies the insights from that background to both her teaching methodology and to her research into pedagogical disasters imposed by the Department of ~~T~~autological Redundancy Department. Ms. Joiner received a B.A. in Juvenile Apathy from the California State University, Indifference and is currently pursuing an EdD. at the same university.

**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 O'ahu in Hawai'i. Her doctoral research was conducted under the guidance 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 in Hillsboro, Kansas as well as an M.A. Degree in music performance and an Ed.D., both from the University of Southern California in Los Angeles.