

Learning Made Vivid

BY WILLIAM SWART

Into the bowels of an active volcano you go without worrying about melting your shoes or burning your body. Navigate through thousands of feet of rock to find mineral deposits or oil, or maybe try out the machinery in an advanced factory that you and your classmates are designing as part of a senior-class project.

These seemingly fanciful examples are not just what could happen. They are what will happen as the imaginative use of technology expands beyond the traditional confines of the classroom and incorporates into education the emerging field of computer simulation. Computer simulation promises to become an essential tool to create more and better learning in virtually all arenas.

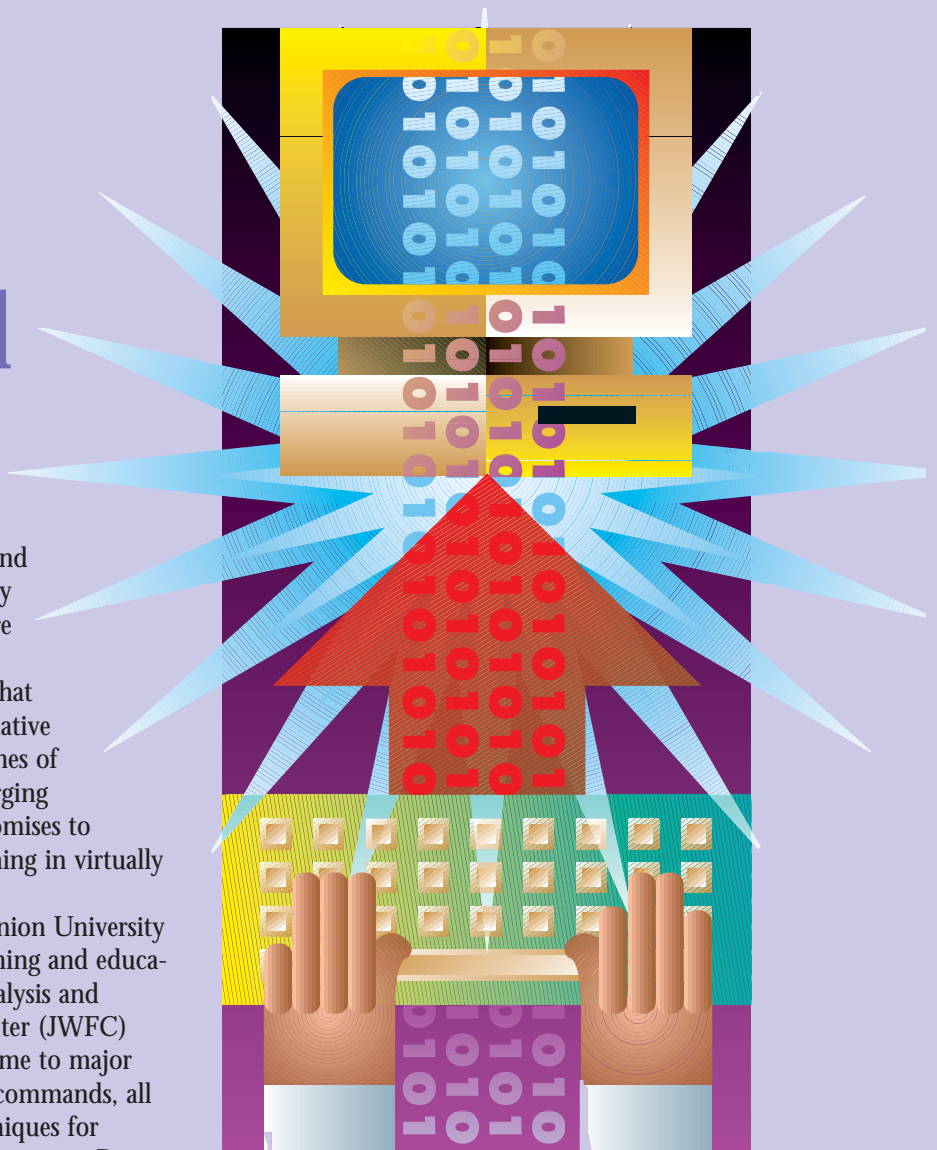
In terms of simulation infrastructure, Old Dominion University is fortunate to be located near three major military training and education centers in Hampton Roads: the Joint Training, Analysis and Simulation Center (JTASC), the Joint Warfighting Center (JWFC) and the Armed Forces Staff College. The area is also home to major service-doctrine commands and numerous operational commands, all of which use state-of-the-art computer simulation techniques for training, evaluation, and operations planning and management. By simulating battles and exercises on a computer, instead of using actual tanks, planes and ships, the military saves time and millions of dollars in resources.

Building upon these existing strengths, the university has created the Virginia Modeling, Analysis and Simulation Center, known as VMASC. In addition, the university's College of Engineering and Technology now grants both master's and doctoral degrees in modeling and simulation. At Old Dominion we are in a singular position to use our insights in the field to adapt simulation to significantly augment and expand upon the traditional learning process.

Abstraction Becomes Experience

Through the use of simulation (the term is used in its broadest sense and includes virtual reality, immersive collaborative environments and other synthetic environments) it will be possible to develop courses that allow students to learn based upon personal experience. In simulated learning environments, computers become the new instruments for vicariously extending our senses and intuition. We are discovering that, in creating simulated laboratory experiences for our students, the trick is not to turn experiences into abstractions, but abstractions, like the laws of thermodynamics, into experiences.

Initially, instruction made use of computers to speed up manual calculations, to make typing more productive through word processing, and to expedite financial calculations via spreadsheets. Educators are now doing more of what they have always done, but faster, cheaper and neater, becoming more efficient



within the existing paradigm of education and training. But they — we — can do, and are doing, more. The coming wave of computer-related use and applications in education is a result of faculty, trainers and their management asking the question “To what ends can we put computer technology to work?”

At Old Dominion, for example, we are presently bringing effective classroom instruction to more students and more places. We are putting technology in place and in practice with computerized slides, animations and simulations. Through such university programs as TELETECHNET and Interactive Remote Instruction (IRI), we communicate remotely and interactively with students in distant locations. For the military, the university is able to put training manuals online and be far more effective in distribution and access of those materials.

Multi-media technologies have become intimately linked, if not synonymous, with distance learning and technology use in the classroom. The equipment most requested by faculty in Old Dominion’s College of Engineering and Technology are notebook computers and projection devices to take the “show,” mostly PowerPoint slides of lecture notes, on the road. Thus, at least anecdotally, there seems to be substantial consensus that multimedia helps to create better learning.

At Old Dominion University, bachelor of science programs in engineering technology have been delivered via TELETECHNET to multiple locations. Multimedia routinely and pervasively has been used in the delivery of lectures. However, that technology was not adequate to provide students at remote sites with appropriate laboratory experiences. We are now in the process of determining the most efficient technologies to create and bring virtual

laboratories to our distance-learning students.

A Post-Agrarian Paradigm

The schedule currently followed in most academic and training environments was not designed to facilitate learning outcomes or pedagogy. It evolved from our agrarian roots, when it was essential for students to be on the farm during the summers, to assist with spring planting and fall harvests.

Furthermore, teachers needed a day between lectures to prepare for the next lecture and to grade papers, while students needed the time to absorb the material presented and to do homework. Hence, the semester system with the typical three-credit-hour course became ideally suited to the scheduling and administrative needs of society, the institution, and the instructor’s role as teacher and dispenser of knowledge.

Given a modular, competency-based curriculum in which students take more responsibility for their own learning and faculty act as learning managers, the drawbacks of this model become obvious. Simulation is a new path to walk, one on which students will be able to take greater responsibility for their own learning and faculty can assume more sophisticated roles as managers and mentors.

Universities currently strive to provide access to higher education, especially to historically underrepresented groups such as African-Americans and Hispanics. Too often, however, mere access alone hasn’t served the student well. Students learn best when they can ask questions and seek multiple sources for answers, when challenged with conflicting views, and when they are in a position to communicate and interact with each other, electronically or directly, in a collaborative peer environment.

With learning simulation, the goal shifts from providing access to achieving success. If done correctly, it uses shortfalls in performance as the opportunity to revise learning materials and learning environments as required.

Learning simulations permit faculty to interact freely with students, providing meaning and context for the learning in a myriad of ways that transcend traditional lectures. Teachers can integrate course material into overall student learning, and assess and certify when students achieve competency. As always, they will continue to assess the relevance of course work, improving materials and creating additional content as new knowledge is generated.

In this view of the simulator-classroom of the future, the professor is now focused on the actual learning experience and learning results of the student, as opposed to simply dispensing expertise. The student is now focused upon learning objectives and content as opposed to the next exam. It is this paradigm — the sophisticated combination of simulation, knowledge and virtual but compelling experience — that will, in our view, create unlimited flexibility in the approach to learning styles and the needs of learners and society.



Chuck Thomas

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