Games, Simulation,
and the
Military Education Dilemma

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THE ERA OF INFORMATION TECHNOLOGY has spurred a cultural shift that is transforming education. This is being precipitated by the first members of the wired generation to enroll in college—a cohort of students who cannot remember when there was not a World Wide Web. Universities face competition from nontraditional educational organizations such as the University of Phoenix and the U.S. Army's eArmyU that employ disruptive technology and techniques such as distributed learning. Even elite business schools are being challenged by corporate-based training centers that provide "just-in-time" education for managers.

The Internet has had a similar transforming impact on the United States military, since its leaders began exploiting the power of distributed information and knowledge. Furthermore, the need for radical changes in military training and education has become clear.

A World Turned Upside-Down

Young people coming of age in this new century have spent years immersed in video games and complex multiplayer games such as Sony's *Everquest*. Army studies show that this "wired generation" is very different in terms of skills and attitudes than its predecessors. Their characteristics include:

- Multiprocessing, the ability to perform several tasks (such as listen to music, talk on a cell phone, and use the computer) concurrently
- Attention span variation in a manner similar to senior executives exhibiting fast context switching
- Information navigation changes that define literacy not only as text but also as images and multimedia
- Shift in focus of learning from passive listening to discovery-based experiential and example-based learning
- Shift in type of reasoning from deductive and abstract to the concrete
- Intelligence organized in easily accessible databases
- Community of practice emerging from sharing tasks involving both tacit and explicit knowledge over a substantial period of time.[1]

For more than two decades the U.S. military has demonstrated interest in commercial games, beginning with the introduction of *Mech War* to the Army War College by James Dunnigan in the late 1970s. Simulation technology has now

become a major strategic capability for the U.S. For example, commercial simulations have had a dramatic effect on the military's education and training programs, and it has incorporated war gaming and simulation into the curriculum of every war college and into the operations of every Commander-in-Chief headquarters. Also, modeling and simulation are considered essential to *military transformation*—the retooling of armed forces for the new realities of the 21st century. These tools present a powerful way for military leadership to visualize the future and assess needs.

A Society Immersed in Technology

The World Wide Web and commercial entertainment technology offer relevant and innovative methods for enabling students and staff to work together as teams in complex virtual environments.

This implies taking advantage of the powerful graphics and multimedia capabilities to which this wired generation of soldiers and officers have grown accustomed. As a public institution, the U.S. military cannot ignore the fact that 73 percent of American teenagers are surfing the Web each week on personal computers in virtually every school and most households in the U.S.[2]

Today's personal computers have the same capabilities that supercomputers had less than a decade ago. They are hooked up to 70 million game consoles that are no longer merely toys,

but far surpass the capability of 1980s minicomputers (such as the Digital Equipment Corporation VAX) that are still used in many military simulation facilities. Microsoft's X-Box has astounding capabilities and provides proof that we are indeed in an era of ubiquitous supercomputers. Along with Sony's Playstation 2, the X-Box is another supercomputer for $300. According to Microsoft, the X-Box performance capability at 146 gigabytes is an order of magnitude greater than the Sony Playstation 2.

Such incredible performance is an outcome of huge investments. Microsoft's more than $2 billion for the development of the X-Box surpasses the Army's annual $1.6 billion science and technology budget. Hence, the Department of Defense (DoD) has sought to leverage these capabilities and investments in its simulations. The military has readily adopted a number of commercial simulations into school curricula and in unit training for a wide variety of purposes (for example, understanding political strategy, exploring unit tactics, and learning command and control concepts). Moreover, several of the armed services are investing in research to add new capabilities to these simulations—running on commercial platforms such as Sony's Playstation 2—to provide more realism and explore new methods of pedagogy.

Strategy and Tactics Games

Strategy and tactics games have been particularly popular with

the service colleges. The commercial fleet tactics game, *Jane's Fleet Command*, is used at the Naval War College. *Fleet Command* was developed by Sonalysts, a defense contractor, which sought to exploit its expertise in naval tactics and technology by developing commercial games distributed by Electronic Arts. According to Sonalysts, the British Royal Navy has asked for a license to modify the game for operational planning.[3] Sonalysts recently released a multiplayer game, *Sub Command*, that lets users command 688(I), Seawolf, or Akula submarines in extended campaigns. The game includes planning for Tomahawk cruise missile operations.

The Army has also adopted commercial strategy games for its officer and noncommissioned officer training. The Armor Center at Ft. Knox has licensed *TACOPS*, a commercial clone of *Janus* (a noncommercial military simulation), for company and battalion war gaming. The USA Command and General Staff College use a turn-based strategy game called *Decisive Action*, originally developed by one of its instructors, retired Lieutenant Colonel James Lunsford, for a corps-level operations course. In a twist, Lunsford commercialized the game and is distributing it through HPS Simulations.

The use of these types of games is so widespread in the military that for the past several years the Air University has sponsored an annual conference called Connections. Connections brings together the military and commercial war gaming community for both technical interchange and concept exploration.[4]

Skill and Team Building

In the past two decades, the DoD has also begun to use commercial games for developing individual and collective skills. The Army used some arcade games in the early 1980s as skill-enhancers, but they were generally not part of a specific training regime. For example, the Army briefly experimented with the Atari tank battle game *Battlezone*, which introduced the idea of the "first-person-shooter" to potentially enhance the eye-hand coordination of armor crews. For this project, the Army modified *Battlezone* to have gunner controls similar to a Bradley Infantry Fighting Vehicle.

Marine Doom was probably the first 3D video game to be used for collective training. The commercial version of *Doom* was adapted using editing tools to create an environment akin to an urban combat scenario. Non-player characters—the artificial intelligence bad guys—were transformed from monsters to opposing forces. *Marine Doom* was a project of the Marine Corps Modeling and Simulation Management Office (MCMSMO). In 1996, MCMSMO adapted the game *Doom II* for training four-man fire teams in concepts such as mutual fire team support, protection of the automatic rifleman, proper sequencing of an attack, ammunition discipline, and succession of command.

Though much hype surrounded these efforts, their deepest impact was to stimulate the development of noncommercial military training simulations such as *SIMNET*, the first net-

worked armor combat simulation (similar to *Battlezone*), and to heighten the military's interest in commercial games.

The program manager for Soldier Systems, for example, commissioned Novalogic to modify that game company's popular *Delta Force 2* to include features found in the Army's *Land Warrior* system. *Land Warrior* is a complex, integrated system that includes a self-contained computer and radio system, a Global Positioning System receiver, a helmet-mounted liquid crystal display, and a modular weapons system that adds thermal and video sights and laser ranging to the standard M4 carbine or M16A2 rifle. The Army is evaluating how this realistic game can improve soldier performance.

Recently, Ubi Soft Entertainment has agreed to allow LB&B Associates Inc. to adopt the game engine used in the best-selling *Red Storm* game, Tom Clancy's *Rainbow Six Rogue Spear*, to help train U.S. soldiers. The game engine could enable the training of military personnel in conducting military operations in urban terrain. *USA Today* reported that Ubi Soft claims that the U.S. military is using the game to train against terrorists.[4]

Flight Simulator

Perhaps the most successful use of commercial games for training has been Microsoft's *Flight Simulator*. The Navy conducted an extensive study on the training value of *Flight Simu-*

lator and found that students who use "microsimulation" products during early flight training tend to have higher scores than students who do not use the software. Fifty-four percent more of the former group received above-average flight scores. The study was prompted in part by the realization that the majority of Navy flight training students were using *Flight Simulator* at home.

Now the Navy issues a customized version of the software to all student pilots and undergraduates enrolled in Naval Reserve officer training courses at 65 colleges. The office of the Chief of Naval Education and Training has also installed *Flight Simulator* at the Naval Air Station in Corpus Christi, Texas, and plans to install it at two other bases in Florida.

New Research

The U.S. military's experiences with commercial computer games has led to a number of research efforts to further explore the use of commercial entertainment technology and content for training and education. In 1999, under the direction of Michael Andrews, Deputy Assistant Secretary for Research and Technology, the Army established the Institute for Creative Technology (ICT) at the University of Southern California.

The ICT focuses on the development of the art and technology for synthetic experiences that are so compelling that the participants will react as if they are real. The goal is to bring

verisimilitude—the quality or state of appearing to be true—to synthetic experiences. Participants will be fully immersed physically, intellectually, and emotionally, and will be capable of full three-dimensional mobility. Participants' behavior will be propelled through engrossing stories stocked with engaging characters, which may be either virtual or real—the high quality of the virtual characters will make it impossible to distinguish them from real characters. The ICT is exploring the development of synthespians (synthetic actors) and intelligent tutors that represent smart opponents, allies, friends, and even robots in the future. The ultimate goal is to revolutionize how the military trains and rehearses for upcoming missions. These virtual reality experiences will generate a quantum leap in helping the Army prepare for the world, soldier, organization, weaponry, and mission of the future.

The ICT is working closely with the game community to develop two games for PC's and game consoles that incorporate these concepts:

- *C-FORCE* will be a console title by Sony Imageworks/Pandemic Studios. The story line puts an infantry squad leader in a hostile urban environment in which his squad's survival depends on his quick decisions and careful tactics.
- *Combat Systems XII* is by Quicksilver Software. The game focuses on company command and emphasizes strategy, communication, and careful resource management,

which can make the difference between success and disaster for the company.

The Future

The U.S. military is undergoing a major policy shift in its approach to training and education. In essence, it is trying to avoid its version of Christensen's "innovator's dilemma" known as "The Victory Disease." The victory disease is

> ". . . the affliction that is caught by most armies and nations after they have won a war. The disease is characterized by arrogance, a tendency to believe myths as to the underlying reasons for victory, and firm conviction that future conflicts should be fought the same way ("It worked so well before, why change?")." [6]

Ironically, computer games owe much to the military as the developer of the first pilot training simulator. Edwin Link initially sold the trainer to amusement parks while awaiting contracts with the Navy. During World War II, the Link Trainer proved the training value of flight simulation and convinced the Navy to commission the Massachusetts Institute of Technology to develop a computer, eventually driving the development of the first computer graphics technology. What has changed dramatically is the emergence of a military culture

that accepts computer games as powerful tools for learning, socialization, and training.

ENDNOTES

1. These data are documented in the *Army Science Board Summer Study 2001*.

2. See http://www.ntia.doc.gov/ntiahome/dn/html/execsum.htm.

3. See http://www.sonalysts.com/entertainment/ent_fleet_command.html.

4. See http://www.cadre.maxwell.af.mil/wgweb/wgn/connections/default.htm.

5. M. Saltzman, "Army Enlists Simulation to Help Tackle Terrorists," *USA Today*, 2 October 2001.

6. J. Dunnigan and M. Macedonia, 1993, *Getting Right—American Military Reforms After Vietnam to the Gulf War and Beyond* (New York: William Morrow, p. 21).

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