# A Concept Model for Integrating IT into Education

*A concept model for incorporating information technology in the Air War College educational process addressed process, planning, and relevancy problems*

By **John M. Lanicci**

The United States Air Force's Air War College (AWC) is part of Air University at Maxwell Air Force Base in Alabama. At the AWC, integrating information technology into a graduate-level curriculum focused on strategic military studies has proven challenging. The AWC mission is "to educate senior officers and civilians working for the federal government to lead at the strategic level in the employment of aerospace forces, including joint, combined, and coalition operations, in support of national security."[1]

The 10-month master's-level degree program consists of a core curriculum encompassing

- strategy, doctrine, and air power;
- warfighting and the study of future conflicts;
- national security decision making;
- international security studies;
- leadership and ethics; and
- diverse, supplemental elective courses.

The fulfillment of the AWC mission presents a dual challenge — academic education and professional development. As the senior Air Force professional military education (PME) institution, the AWC annually educates approximately 265 resident and 3,500 nonresident students from all U.S. military services, several federal agencies, and 45 other nations. The student body averages about 20 years of professional service, many with a graduate degree from a civilian institution. A large percentage has commanded at the lieutenant colonel level (the equivalent of upper-level corporate management). With their competitive selection to attend the AWC residence program, students are educated and prepared for the senior leadership positions that they will likely hold in the future.

## The Problem

In 1996, the AWC published its first IT strategic plan. This document outlined IT goals and objectives over a five-year period. It established a corporate planning and integration board within the college to develop IT requirements, and developed a replacement schedule for hardware and software. Considerable effort also went into exploiting the potential that IT provides for researching, archiving, and importing Web-based information.

The AWC Internet Gateway[2] was developed in 1997 for Web-based research. It contains links to more than 20,000 files, plus links to Air Force, Department of Defense (DoD), industry, academic, international military community, and media sites. It consistently appears at the top of search engine relevancy lists for numerous military topics.

Despite the impressiveness of these initiatives, the college was consistently unable to secure adequate funding for IT, instead relying on end-of-fiscal-year reallocations to purchase needed equipment. The strategic plan lacked a way to do the planning, project prioritization, and budgetary inputs systematically, and tie it all together without acquiring inappropriate technology for the faculty, staff, and students. Another problem with IT initiatives involved the piecemeal way in which they were developed, often without a complete appreciation for how they affected the different parts of the institution. Clearly, we needed a starting point for IT planning and integration.

## A Solution

To help address the process, planning, and relevancy problems, we created a concept model for incorporating IT into the AWC educational process (see Figure 1). The model gives us a methodology for integrating IT into the institution in a systematic and organized way.

The model is built around what we consider the cornerstones of senior PME — the faculty, staff, and students. The locations of these entities at opposing ends of the model diagram serve a specific purpose. Any action that we ascribe to the faculty and staff should have an analogue for the students; we want our process to capture this "reflective" quality. We apply IT in the following three primary components of the education process:

1. *Curriculum development.* Our goal is to develop and deliver a quality,

accredited curriculum to enhance student understanding at the strategic level of leadership. We apply IT to enhance the curriculum and also include IT topics as part of the curriculum. On the student side of the model, we apply IT not only to enhance their understanding of a topic, but also to allow the students to learn IT basics and how to leverage IT in their future assignments. The student analogues to the faculty IT goals are important because the reflective aspect of the IT model focuses our attention on relevant applications of technology, thus helping us avoid the "technology for technology's sake" problem.

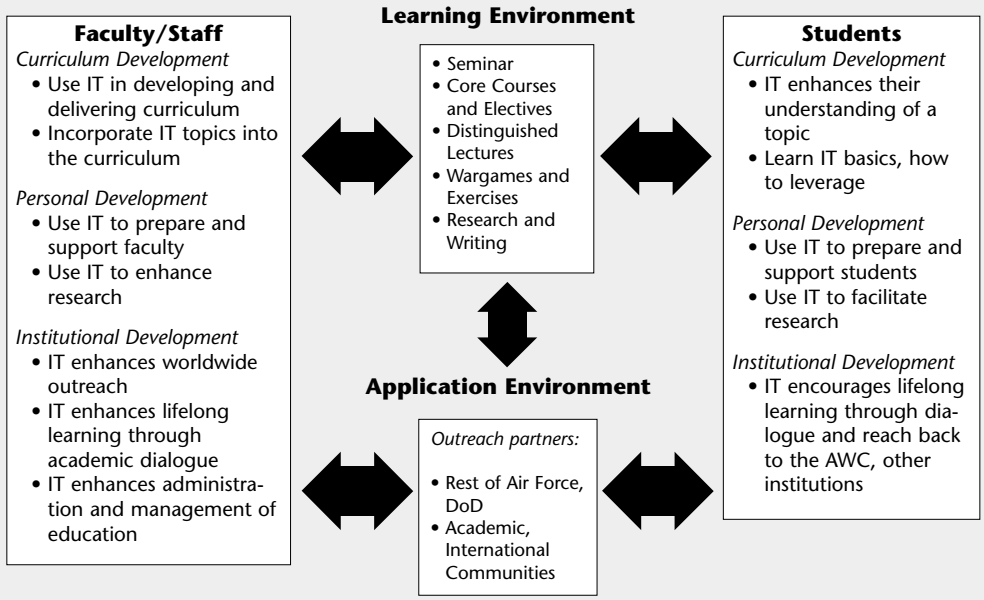
2. *Faculty, staff, and student development.* We intend to create an environment in which we can properly prepare, train, and support our faculty, thereby enhancing their knowledge, teaching, and mentoring skills. The AWC prepares its students to become strategic leaders through seminar and research experiences that promote critical thinking and superior writing skills. We use IT to support this environment.
3. *Institutional development.* The college extends itself beyond its walls to the rest of the Air Force, DoD, academia, industry, and the international community. It encourages students to maintain their professional ties to the institution throughout their careers. Again, the model's reflective character shows that the faculty benefits from this interaction as well, as it enhances their currency on operational issues affecting national and DoD policy. The model would not be complete without our goal of having IT enhance the operation of the college and efficiency of the staff that supports its faculty and students.

Two key components of this model lie at its center — the two equally important environments in which the education process at the AWC takes place:

1. *The learning environment.* This environment lies within the walls of the college itself. It encompasses seminars, courses, the Distinguished Lecture program, wargames and exercises, and the research and writing programs. Information technology is integrated throughout each of these areas.
2. *The application environment.* The environment represents the world outside the college. It is where much of our outreach is accomplished, not only through applications such as the AWC Internet Gateway, but also through faculty participation in professional conferences and other types of professional dialogue.

**Figure 1**

**Air War College IT Concept Model**




The two-headed arrows in Figure 1 symbolize the interactions among faculty, staff, and students, into and out of the learning and application environments. In the learning environment, the students and faculty learn from each other in seminar. In the application environment, a two-way information flow exists — from the outside world into the college, and out of the college to our outreach partners.

## Using the Model

In academic year 2000–2001, the entire content of the Joint Force Employment (JFE) course was put on the AWC local area network (LAN). This marked the first time that an entire course went online, without hard-copy materials available.

Several goals prompted this move, but the most important was to allow access to more current, relevant articles as student reading materials. This objective was accomplished — the percentage of current readings (those published in the same academic year) jumped from less than one-third of the total in 1999–2000 to nearly one-half in 2000–2001. The average length of each reading also decreased, although the total number increased from 100 to 112.

The course also shifted its format. It changed from a Service-Branch–oriented perspective to an issues-oriented one centered on discussion topics coming out of senior-level Air Force wargaming.

The myriad changes to the JFE course resulted in growing pains, evidenced by the need to hold a series of faculty–student working group meetings shortly after the course began to address student concerns. In the working group meetings, the following issues surfaced:

- Concern about the final exam, specifically the potential problem of studying for it without written copies of all assigned readings and related materials.
- Software problems accessing and

manipulating .pdf (Adobe Acrobat Reader) files.
- The desire to have printed copies of many of the most important documents and publications used in the course (for example, National Security Strategy, selected Joint Publications, and so on).
- Access to some of the referenced Web sites from home. (Note: the AWC LAN was not accessible from outside the building; students cited this as a huge drawback on course critiques.)
- Insufficient memory in some of the older student laptop computers to store the entire curriculum. Some students stated that the small screens caused eye fatigue when reading long articles (more than 10 pages).
- A desire by some students for a hard copy of the syllabus (or individual lessons), even if it came in increments (acknowledging that all 26 lessons were not yet ready).

To address the students' major concerns, we issued JFE course "readers" mid-way through the course so that the students would have hard copies of the lesson outlines and some of the longer readings.

## Lessons Learned

Our experience with the first-time online curriculum for the JFE course provided some important lessons. The IT concept model helped us analyze them and suggest solutions to perceived problems.

### *Curriculum Development*

To evaluate curriculum development, we needed to consider both faculty and student experiences with the process.

**Faculty.** This initiative made effective use of IT in developing and enhancing the curriculum. Faculty experienced a good result here — no problems.

**Students.** The initiative exposed students to online access and more current readings, which we considered a benefit. However, based on their comments, these students were accustomed to hard-copy materials and evidently not adequately prepared to deal with a Web-based course.

**Solutions.** Put some of the course materials into a hard-copy "reader" for students. Survey the incoming class to determine their IT literacy. Provide training classes to improve student IT skills and prepare them for Web-based course study.

### *Personal Development*

The personal experience of faculty and students in response to the Web-based course revealed benefits and problems.

**Faculty.** This initiative permitted using IT as an enhancement to lesson preparation — a highly successful application, according to the faculty.

**Students.** Based on their comments, students did not believe that IT adequately supported them in this endeavor.

**Solutions.** Emphasize upgrading laptops and allowing access to curriculum information from outside the AWC. Provide an introduction to Web-based research to students before course work requires them to use these skills.

### *Institutional Development*

The benefits to the institution as a result of this initiative were obvious from the faculty viewpoint. Understanding the extent of those benefits for students must await future evidence.

**Faculty.** Use of a Web-based curriculum expanded the JFE faculty's horizons in the sense that faculty collected and employed a number of reliable and informative Web sites in preparing the course materials.

**Students.** The course exposed students to a number of Web sites. In one lesson they received examples of how an adversary might use the Internet to influence public opinion during times of conflict. Whether the students' horizons broadened as a result of this experience will only be borne out by their subsequent experiences in future assignments.

### *IT Survey Results*

In addition to the course adjustments made using last year's lessons, this year's IT survey of the resident-program students revealed some interesting insights about the Class of 2002:
- More than 25 percent of the respondents do not know how to insert a picture or video clip into a Microsoft PowerPoint briefing.
- Nearly 70 percent of the students have never created a CD-ROM disk on a personal computer.
- Nearly 40 percent of the students do not know how to create a two-column document in Microsoft Word.
- Nearly 45 percent of the students believe they need a class in how to do online research.

The IT training adjustments outlined in the proposed solutions should result in a richer learning environment when the course is taught this academic year.

## The Concept Model as an IT Planning Tool

We use the IT concept model as part of a template for the AWC in its strategic planning process. The concept model provides a context within which educators who want to employ IT as an enabler to educate their students can develop requirements and prioritize them in a meaningful way. Some of the short- and long-term initiatives planned include the following.

### *Short Term Plans: 0–3 years*

In academic year 2001–2002, all core-curriculum lesson outlines are accessible through the AWC Web site from off base and electronically linked to the schedule on the AWC LAN. IT-related topics, such as Information Operations and Information Warfare, appear in the curriculum, and there is an initiative to use personal digital assistants (PDAs) in an elective addressing senior leadership in the digital age and transformational leadership.[3]

In a cooperative project with the Air Command and Staff College, the Air

Force's intermediate ("middle management") PME college, we are pursuing the use of electronic books in several electives. We are consulting with the Institute for IT Applications at the Air Force Academy[4] and the 333rd Training Squadron at Keesler AFB, Mississippi, which have been using e-books on an experimental basis in their courses of instruction.

The nonresident program, which has student enrollment from military locations around the world, is developing a streaming video capability that will eventually make resident-program lectures available to nonresident students (and conceivably AWC alumni) in near real-time.

The concept model will help us determine which activities to continue, expand, and improve each academic year, as the integration of IT becomes part of the education culture at the AWC.

### *Long Term Plans: 3–8 years*

As IT advances continue their rapid pace, we must stay aware of the latest IT innovations. We can use the model to evaluate how such advances could enhance the students' experiences at the AWC and prepare them to deal better with the challenges of their future assignments. For example, we are interested in advanced technologies such as wireless connectivity and virtual private networks, and how they could allow both our resident and nonresident students essentially unlimited but secure access to curriculum materials from virtually anywhere.

We are investigating the replacement of laptop computers, currently issued to each student for the academic year, with either a combination of e-books and PDAs, or some yet-to-be-determined, next-generation, hand-held technology. The e-book and PDA studies described above will provide us with critical information for our IT planning strategy.

## Applying this Model at Other Institutions

Two basic applications for the IT concept model at the AWC — as a relevancy check for proposed IT projects and as a strategic planning tool — show its potential power. Examining the IT examples discussed leads to some generalizations about our emphasis areas for the present and future. Most of our current projects and short-term plans (for example, online curriculum, and e-book and PDA pilot projects) focus on the curriculum and personal development portions of the IT model because we want to introduce technology to the students and develop their IT literacy while they are here. The faculty will also improve its IT knowledge in these types of projects.

Long-range planning proposals such as wireless access, virtual private networks, and laptop replacement focus more on the center of the model, in the learning and application environments. They are overarching projects, not intended to introduce IT to students so much as to develop an advanced IT infrastructure.

Ongoing improvements to the Internet Gateway affect all aspects of the model, but mostly involve institutional development and the application environment. These improvements encourage outreach from the college and interaction of outside agencies with our faculty and students.

We believe that there are no right or wrong answers when applying the concept model to an individual institution's IT needs. Even our sister PME colleges might have different applications of the IT model for project development and strategic planning.

The true importance of the IT concept model is that it gives educators who are not IT experts a multifaceted look at their IT proposals and plans, and a context in which to evaluate them over a period of time. A series of questions, developed from the model, can form a common planning template for use by faculty, IT professionals, and administrators together:

- Does the proposed project improve the development or delivery of curriculum, and will it improve students' understanding of a topic?
- Does the proposed project introduce an IT topic that improves the students' IT literacy or knowledge base?
- Can the proposed project improve the personal development of faculty, staff, and students?
- Does the proposed project improve institutional outreach or enhance professional interaction of the faculty and students with their counterparts from other institutions?
- Is the proposed project feasible in terms of existing infrastructure and current IT capabilities of faculty, staff, and students?

This is just a sampling of the types of questions that can be derived from the concept model. With minor modifications, the word "plan" can just as easily substitute for "proposed project" in each question, giving it a strategic view versus a singular project view. Many institutions face serious decisions regarding the direction in which they want to go with IT. We at the AWC believe that this concept model provides a useful starting point for the journey and a "heading check" along the way. *e*

### Endnotes

1. See the AWC home page for more information <http://www.au.af.mil/au/awc/awchome.htm>.
2. See <http://www.au.af.mil/au/awc/awcgate/awcgate.htm>.
3. The Industrial College of the Armed Forces (ICAF), part of National Defense University in Washington, D.C., has devoted an entire course in their Department of Leadership and Information Systems to IT and its impacts on today's senior leaders. Our faculty members have been discussing the proposed AWC lessons with ICAF faculty. An outline of the course, Information Systems for Strategic Leaders, can be found online at http://www.ndu.edu/ndu/icaf/departments/leadinfosystems/issl/content.htm.
4. See <http://www.usafa.af.mil/iita/index.html>.

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