INTERACTIVE EDUCATION FOR THE 21ST CENTURY: THE ARMED FORCES STAFF COLLEGE AND THE EDUCATION OF FUTURE DECISION-MAKERS

Professor John R. Ballard, Ph.D. Armed Forces Staff College, Norfolk, Virginia

Raymond D. Kirkwood, Veridian Inc. Hampton, Virginia

ABSTRACT

The Armed Forces Staff College (AFSC) has partnered with Veridian Inc. and other organizations to develop and implement an educational system to meet the needs of America's 21st century warfighters. This Joint Professional Military Education (JPME) program integrates current decision-making technologies, an innovative and thought provoking curriculum, web-based databases, and modern command and control systems into a learning system permitting students to experience and learn from a notional, interactive, 24-hour environment. This learning system will simulate the critical actions students may encounter while serving as members of joint military staffs worldwide, thus preparing them intellectually for future challenges. The goal of this learning system is to provide students a realistic and challenging, information-based setting, supporting both long-term retention of joint doctrine and operational art and focused instruction in special areas of emphasis. This paper outlines the results of the initial 2 tests of this new integrated learning system, conducted during the spring and summer trimesters at AFSC.

AUTHOR'S BIOGRAPHIES

Professor John R. Ballard, Ph.D. is Director of Curriculum Development at the Armed Forces Staff College in Norfolk, Virginia.

Mr. Raymond D. Kirkwood, is a Senior Engineer at Veridian Inc. in Hampton, Virginia. He serves as the project manager for the Advanced Joint and Combined Operations Model at AFSC.

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The Armed Forces Staff College (AFSC) has partnered with Veridian Inc. and other organizations to develop and implement an educational system to meet the needs of America's 21st century warfighters. This Joint Professional Military Education (JPME) program integrates current decision-making technologies, an innovative and thought provoking curriculum, web-based databases, and modern command and control systems into a learning system permitting students to experience and learn from a notional, interactive, 24-hour environment. This learning system will simulate the critical actions students may encounter while serving as members of joint military staffs worldwide, thus preparing them intellectually for future challenges. Now in the fourth of five phases of development, the goal of this learning system is to provide students a realistic and challenging, information-based setting, supporting both long-term retention of joint doctrine and operational art and focused instruction in special areas of emphasis.

This paper outlines the results of the initial 2 tests of this new integrated learning system, conducted with students during the spring and summer trimesters at AFSC. Although the tests did not replicate every aspect of the new system, they clearly demonstrated significant improvements over earlier methods of instruction and shed new light on the future path of joint professional military education in the next century.

BACKGROUND, THE AFSC MISSION

The Armed Forces Staff College (AFSC) is one of the four colleges within the National Defense University, and is located in Norfolk, Virginia in the center of a bustling military complex including major components of all the Services.[1] Its mission is to educate staff officers and other leaders in joint and combined operation planning and warfighting in order to instill a primary commitment to joint teamwork, attitudes and perspectives. It does this under a congressional mandate, which requires mid-grade U.S. officers serving on joint and multinational military staffs to attend the school for no less than 3 months prior to being designated as Joint Specialty Officers. The college's student body is composed of officers from all the military services, civilians from several U.S. government agencies and international officers from a variety of foreign nations.

Learning at AFSC is focused at the application level of Bloom's taxonomy. Additionally, the affective domain receives a great deal of emphasis, as the "development of joint teamwork, attitudes and perspectives" portion of the college's mission is considered equal to the more traditional academic goal of the institution – teaching officers how to think about joint operations and warfighting. This dual objective, how to think and what to value about joint actions, requires a learning environment that mentally places the student in current operational contexts, provides current tools and technology for student use and supports team approaches to problem solving.

The educational process at AFSC centers in seminar groups of 18-20 students mentored by three members of the faculty – evenly spread across all Services and normally including a civilian and an international officer-student. The seminars work as teams called joint planning groups as they wrestle with issues as wide ranging as disaster relief operations, theater ballistic missile defense and asymmetrical terrorist threats to allies. The joint planning groups review national military policies, revise theater-level strategies, formulate contingency plans and wargame solutions to complex problems in a series of group projects and exercises over the twelve weeks of the course.

THE JOINT CENTER OF OPERATIONAL EXCELLENCE

Fifteen student joint planning groups will eventually use the new integrated learning system simultaneously within AFSC's Joint Center for Operational Excellence (JCOE). The JCOE brings together AFSC's model classrooms, 20 new wargaming laboratories, an expanded and technologically advanced research facility and an innovative distance learning center to support student learning in both the cognitive and affective domains. As a key part of the experience at AFSC involves students from different backgrounds and nationalities working together as joint and multinational teams, the JCOE was designed to make contact with the learning environment possible 24-hours per day. This is facilitated by an NT LAN, Web databases and connectivity between the student seminar room, the seminar wargaming laboratory and student billets. It also brings practitioners of the operational art into the classrooms by video-teleconference and links any given planning group to a variety of real and notional locations supporting the planning efforts of the students (for example country teams, supporting CINC staffs, and allies).[2]

EDUCATIONAL CHALLENGES

Five principle challenges have complicated the development of the interactive learning system. The most basic task was developing a curriculum that could meet the school's objectives yet support a broad range of students from very different operational and educational backgrounds working as teams. The curriculum design process began in June 1997; development of the lessons was actually completed concurrent with the design of the technologies that support the learning environment.

The major technological support challenges include producing realistic force employment actions, in an unclassified environment, which replicate the full range of diplomatic, informational, military and economic interactions; producing learning stimuli for students focused at the operational level of war; fully integrating Global Command and Control System (GCCS) functionality in the JCOE; and maintaining a system that permits 15 joint planning groups to develop and learn simultaneously from different employment scenarios based upon their own input over the full twelve week period. The answer to these challenges is the Advanced Joint and Combined Operations Model (AJCOM).

When fully operational, AJCOM will employ an HLA compliant federation of models to respond to student actions in the social, economic, political and military domains. These models will also be federated with the GCCS in such a way that students will interact only with the planning tools available in a realistic joint environment, not with the model itself. All student activities and external influences (opponents, allies, neutrals, subordinates, and even weather effects) have been aggregated at the operational level of war. Each student joint planning group can recommend changes to standard policies and procedures as incidents occur and determine its own path towards attaining national security objectives. Although each student joint planning group will enter the JCOE learning environment with the same tools and will address the same basic issues, faculty will tailor the learning experience to meet the needs of each group.

THE LEARNING SYSTEM DESIGN AND DEVELOPMENT

The foundation for this learning system was framed by an educational requirements analysis process (E-RAP), guided by an integrated working group composed of members of the AFSC faculty and staff and members of three different companies (Advanced Technology Systems, Veridian, Inc., and EDO). Major legislation and policy directives from Congress, the Joint Staff, and the National Defense University were analyzed in light of the techniques used in the current operational environments of the Unified Commands and emerging modeling, simulation and command and control technologies to develop a new curriculum concept. This innovative course of instruction was specifically targeted to the needs of the combatant commands (AFSC's primary customers) and designed to function only with the Global Command and Control System (GCCS) interface. The curriculum was also developed with the potential of distance learning applications in mind.

In addition to the curriculum-model-GCCS integration challenge, development of the model was complicated by two other factors. Delays in building construction (the model bridges two buildings on campus, Normandy Hall, built in 1945 and Okinawa Hall, under construction as the design phase was started) meant that spiral development had to be tied to brick and mortar accomplishments. Secondly, the Defense Information System's Agency (DISA) elected to move the GCCS documentation out of public access to the Secret Internet Protocol Router Network (SIPRNET). Lack of access to GCCS documentation meant that the system interface to the GCCS was constrained to using e-mail and serial interfaces and formal U.S. Message Text Format (USMTF) formatted messages.

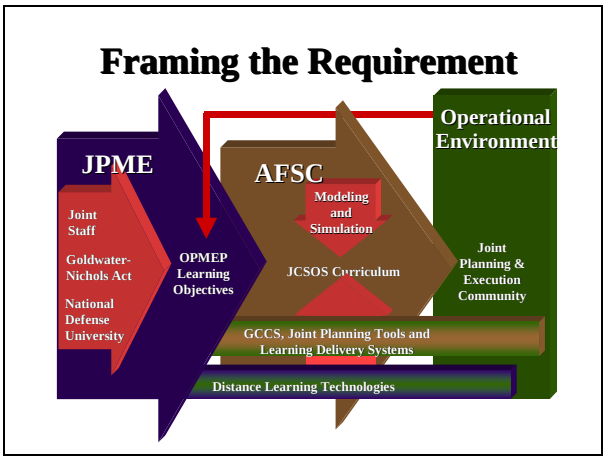

Figure 1. The Requirements Development Process

The major system capabilities identified during the requirements analysis process were force on force, weather, space, and operations other than war (see Figure 1 above). A major design goal was to relieve the instructor staff of as much of their "model management" responsibilities as possible, thus allowing them to spend more time teaching during active simulation operations.

The GCCS interface was key because the students needed to be confident that the skills they were

learning were directly applicable to the jobs they would be performing as officers assigned to joint staffs worldwide. GCCS was the only system that had current, yet nearly universal usage among the nine Unified commands. The design goal was to develop an easy to use GCCS-like system that had full functionality but did not tie directly into the real system. Linkage to the real system would make student modification of real plans possible – a risk deemed to great to be left to chance. Developing a "looks-like-works-like" GCCS replica was more difficult than incorporating the real system – particularly as GCCS is an evolving system that is being managed at the Department of Defense level. We therefore elected to use the real system, with unclassified databases, as the interface between the students and the simulated world that they are trying to manage.

The HLA federation (mandated by the Defense Modeling and Simulation Office (DMSO)) will make future modification possible. It also brings with it another huge advantage; it allows us to incorporate into our system the results of simulation efforts accomplished elsewhere within the military community. The Advanced Joint and Combined Operations Model (AJCOM)

The AJCOM is composed of multiple interrelated models, which interact to develop unique situations for each student seminar (see Figure 2 below). AJCOM is composed of a game engine, a force on force model, a regional analysis model for military operations other than war (MOOTW), an environment model, an executive monitor, a GCCS interface module, and a game engine.

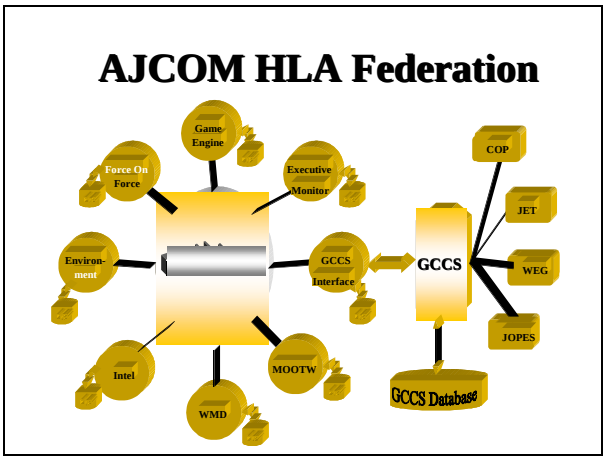

Figure 2. The Components of the AJCOM federation

Game Engine

The Game Engine is the beating "heart" of the AJCOM simulation system. It provides the functionality to move, track, and manipulate the essential elements (i.e. force units, convoys, supplies, etc.) in the simulated world. It also summons the pertinent objects in the game to generate situational reports. The Game Engine relies on the Game Database to provide the startup data of the pre-planned scenario. During the AJCOM execution, the unit movement data will be loaded into the system, and the dynamic situational data will be saved periodically into the Game Database. On the restart of the game the objects will be reloaded into the system and re-join the AJCOM federation. The Game Engine subsystem is implemented as a HLA Federate and, therefore, has a SOM defined for it.

The students should not agonize over tactics or the details of how things are going to be accomplished; their efforts must reflect the strategic and operational concerns of the Unified Commands. Therefor, the model will simulate the operating units and perform whatever tactics or maneuvers are required to carry out higher level orders. For example, if an air mission requires air refueling the simulation will refuel that unit for the students. However, if aerial refueling is expected, the appropriate tanker units must appear in the Unified Command's time phased force and deployment data (TPFDD). If an air mission requires ammunition it does not currently possess, it will notify the students, who must source the requirement from theater-level assets. If a mission is beyond the model's capability, the AJCOM simulation will also notify the students. The weapons loaded on an aircraft are automatic depending on the type of aircraft, mission, threat, and expected target (if any). The intent of the AJCOM simulation is for the students to control units by giving them broad directions appropriate to the operational level of command.

The Force on Force Model

The Force-On-Force subsystem implements the forces engagement/attrition model that monitors, detects, and computes the encounters that occur between two or more force units. This subsystem obtains all the unit information from the Game Engine via the Run-Time Interface (RTI) keeps track of the movement and locations of the forces, and monitors any attrition triggers.

Attrition triggering parameters are based on the relationship between the affected units. The different types of relationships among units include ally, friend, neutral, suspect and foe. Each of the trigger parameter values, multiplied by its level of precedence will be summed to derive an index that will be compared with the pre-established trigger values. Trigger parameters can have either a positive or a

negative value and will adversely or positively affect the possibility of engagement.

The trigger parameters are as follows:

- Command Orders: These are orders from a command. Command Orders are always either a negative or positive absolute trigger. For example, orders to proceed past a particular location would be negative Command Order parameter and the unit would attempt to avoid the engagement.
- MOOTW Status: The current standard of living, political stability and state of well being of the region as defined by the MOOTW federate. A Special Operations unit may have a limited capability to positively or negatively affect this parameter.
- Location: A value relative to the distance between two units. A distance within fifty miles will raise the Location parameter.
- Relative Strength: The relative strength of two units. The strength of units can vary based on their size, capabilities, firepower, and technological advances of the faction it represents.
- Supply: the amount of supplies and the replenishment capability available for the sustainment of this unit though an engagement. If the faction this unit represents loses a strategic logistics unit or facility, this parameter will play a negative role.
- Communication: The communication capability available for the sustainment of this unit though an engagement. If this unit loses a strategic communication capability, this parameter will play a negative role.
- Defend Allies: When an allied unit has been attacked, this is the amount of effort a unit will make to defend that allied unit. Allies also include units from the same faction; therefore, multiple units can quickly become involved in an engagement.
- Defend Friends: When a friend unit has been attacked, this is the amount of effort a unit will make to defend that friend unit.
- Defend Neutral: When a neutral unit has been attacked, this is the amount of effort a unit will make to defend that neutral unit.

If the trigger parameters for one unit do not support entering an engagement but they do for another unit, the first unit will attempt to lower the trigger parameters to an acceptable level to avoid attack. For instance, if the distance between the units is close, and thus the Location parameter is a high value, while the Relative Strength parameter is low, the unit will attempt to increase the distance between the units and lower the Location trigger parameter for the other unit.

As attrition occurs, the effects on the region and units involved are calculated using the size and strength of each of the units and the duration of the incident. The duration of an attrition event will be based on the current state of the trigger parameters. All of the trigger parameters will change in the course of an incident. For instance, the relative strength will change as the attrition takes its toll on the forces involved. An incident will end when the trigger parameters for one of the units fall below an acceptable value. At that time, it will attempt to disengage. The new attribute values created by the engagement will be passed to the applicable Game Engine, Environment and MOOTW Federates.

The Regional Analysis Model (RAM) For Military Operations Other Than War (MOOTW)

The MOOTW model used in the AJCOM federation is Spectrum Regional Analysis Model (RAM) developed for the National Simulation Center (NSC). RAM was chosen because it:

- Simulates the political, economic and quality of life of a region, country, providence, or city with the purpose of modeling stability in that region and to measure the effectiveness of policies, programs, and actions in the region.
- Categorizes the region's constituents into different societal groups, institutions, and outside actors with each having a degree of clout to influence the region for power and regional control.
- Depicts real-world situations where the user introduces persuasive policies, programs, and projects to sway the opinion of a group to accept and to support regional policies and objectives.
- Introduces the correlation activities and sensitivities that determine the intrinsic nature of the region as a whole, therefore, allowing the users to be trained to deal with the political and operational implications of their actions.

Cultural sensitivities coupled with the working knowledge of how interagency coordination is conducted allows the users to train within the framework of domestic or foreign policy implications.

During an exercise, Spectrum RAM has the capability to simulate political, economic, and socio-cultural activities of a society over a 3-5 year period. Students can stop the computer simulation at any time to gauge the success of their policies and procedures by reviewing the public opinion polls, and then adjust the policies and then restarting the simulation. During the policy implementation phase of the MOOTW exercise, students must take into account the scarcity of resources, competition of societal groups for those

resources, and the different needs or agendas of each societal group. Due to this constraint, the student joint planning group must make decisions based on negotiation and interaction, which in turn requires the user to balance different objectives.

The MOOTW model provides the AJCOM federation a political-social-economic model of the effects of military peace operations on a society in the grip of a civil war, economic disaster, and natural catastrophe. The MOOTW model is described as an AJCOM federate with difference equations describing the state of the cities and rural districts of a single nation. Each difference equation calculates the change in a state variable as a function of

- current values of other state variables, and
- any exogenous input (from the Seminar Directors actions; scripted or context-triggered events)

Because the MOOTW model is comprised of a series of difference equations that are tightly coupled, a change in one event at the macro level could reverberate throughout the net due to causal linkages among events and factors. It is this capability that allows the students to establish a baseline for investigating a set of different judgement decisions based on systematic changes in definitions, assumptions, or relationships among the state variables to measure the effectiveness of policies, programs, projects, and actions in the region. The ultimate goal of the exercise is to establish stability in a region. Stability is defined as having high population support for the actions taken by the students and low protest levels of the constituents.

The Environment Model

One of the major shortfalls of the previous model used at AFSC was its inability to simulate realistic wargaming environments. The environment plays a critical role in student decision making as the effectiveness of all real weapons systems are impacted by environmental conditions. AJCOM requires students to consider effects of weather and terrain on all of their plans and operations.

Weather conditions in AJCOM originate from a scripted database. The weather script will determine the time, location, duration and severity of each event. The weather script also accounts for seasonal and location effects. Weather patterns vary between the northern and southern hemispheres. Weather events will include precipitation, cloud cover, wind direction, and wind speed. This script will also include disasters such as earthquakes, floods, and the interplay between weather and chemical and nuclear accidents.

There are several specific major events in the AJCOM scenario. The scripted weather conditions that occur will logically match these specific events. For instance if a pre-determined flood is to occur in an area the weather script will include several days of heavy rain in the area. Another condition might call for a major earthquake occurrence in a region, the script might include several minor tremors before and after the major quake. These scripted environmental events will be included to enhance the "realness" of the simulation and to make students consider environmental effects in their decision making.

Weapons of Mass Destruction/Effects (WMD/E)

The Weapons of Mass Destruction/Effects model will be implemented in a simplistic manner as scripted events derived from pre-defined scenarios. The main functionality of this subsystem is to provide periodical computation updates on the lethality, and the extent of the spread, of the chemical, biological, or nuclear WMD/Es. When any WMD/E is deployed by a force or air unit, the Game Engine Federate publishes an HLA interaction indicating such deployment. The WMD/E Federate instantiates a corresponding weapon object and will start computing and tracking the effects of the weapon. Periodically, or under request, the WMD/E Federate will publish the computed effects, for the period of time form the beginning of the deployment until that moment, to the other interesting federates.

Intelligence

The Intelligence model serves as the filter that distorts ground truth of the scenario into perception data. This filtering is applied to some extent to both friendly and other than friendly information. Intelligence information modeling will consider information that could be gathered using space and other intelligence assets. This information will be scripted and released to the students through the GCCS system as timed events when requested by the students. The intelligence messages, from space assets, will be passed to the GCCS system from an Intel federate on the RTI.

One of the most beneficial aspects of AJCOM is its ability to add uncertainty to student appreciations of the battlespace. Many simulations fall short of the degree of "fog and friction" existing during modern military operations. As information management and battlespace awareness are highly desired learning outcomes at AFSC, AJCOM has been designed to give the faculty a high degree of control over the information available to student joint planning groups as they interact with the simulation. Effective management of information will result in increased student awareness of activities within the simulation environment. This in turn will permit students to learn that increased awareness can lead to better, more

efficient decision making and more effective operations.

The Executive Monitor

The Executive Monitor is the graphical user interface for faculty Directors of the AJCOM simulation system. As such, it complies with the guidelines laid out in the User Interface Specifications for the Defense Information Infrastructure to insure user compatibility with the GCCS software. The visible components of the Executive Monitor will include the terrain map area, the information area, and the message area. In addition, the Executive Monitor includes easy to understand external dialog areas for utilizing email; building and viewing reports; and inserting exogenous events.

The terrain map consists of a visible map of the physical terrain, including roads, rivers, mountains, and cities, as well as symbols designating the owner, type, and location of units in the current scenario. Interactions with the terrain map include the ability to manipulate the size and detail of the map view and to access information on the regions and units within this visible scope. Also, a marker-placing feature provides a user with the capability of placing markers on the terrain map. This marker is tied to user-defined information about that specific point on the map.

The Executive Monitor provides three modes of operation based on the needs of the Director; these modes of operation include:

- Director,
- Scenario Editor, and
- Playback.

The Director Mode is further divided into two different viewing modes: (1) the actual view of the ground truth, and (2) the filtered view based on intelligence information received by the students. Also, the Director mode provides the capability for editing federation attributes and provides the capability to insert exogenous events. Editing federation attributes is accomplished several ways. First, a Unit or Region can be found by either locating it on the terrain map or using the Find Unit/Region dialog. When the Unit or Region is found and selected it is highlighted on the map and its attributes are displayed in the editable information area of the Executive Monitor. Another method of editing the attributes uses the appropriate federates menu structure. Each federate has a specific menu that provides an ample set of commands to quickly find and edit its attributes. The menu will also provide access to dialog boxes that provide the capability of inserting exogenous events relating to the specific federate.

The Scenario Editor mode is the second mode of operation and provides the director with the additional capabilities for editing the overall scenario. The scenario editing tasks supported include loading previously built scenarios from the AJCOM database, editing the scenario attributes, adding units to the scenario, and saving new and edited scenarios to the AJCOM database. The tools necessary for completion of these tasks are provided by both the menu structure and a toolbar.

Finally, the Executive Monitor provides a "Playback" mode, which can be entered during or after runtime. When the Executive Monitor is acting as a playback device, the Executive Monitor retrieves and displays information based on the current replay position in the scenario playback. Playback of a scenario can be paused, moved backwards or moved forward in scenario time. The tools necessary for completion of the playback tasks are provided by both the menu structure and a toolbar.

The GCCS Interface Module

The GCCS Interface is implemented as an HLA federate running on an HLA RTI network (see Figure3 below). As a federate it communicates to other federates via the "publishing" and "subscribing" mechanisms provided by the RTI. The users of the AJCOM system (students and faculty Directors) mainly use the GCCS Common Operational Picture (COP) to interact with the AJCOM simulation system. Through the COP, the users gain the situational awareness of the area, and to issue command and control instructions to the units, being simulated by the AJCOM federates.

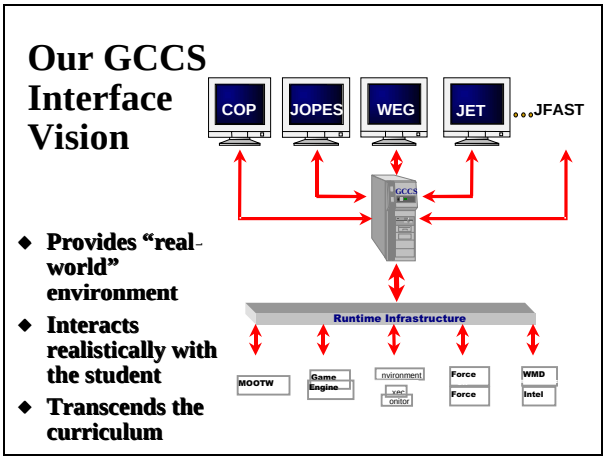

Figure 3. The GCCS Interface for AJCOM

Through the GCCS Interface federate, the AJCOM federation has two way communication with the GCCS to obtain control and command messages, and to relay simulation exercise data including environmental conditions. The AJCOM federation

periodically updates information about simulated events to GCCS. GCCS in turn, provides the real world interface to the students to make joint command decisions to the simulation. The AJCOM federation interacts with the GCCS in three different ways:

- Sending messages to the GCCS, in order to enable the COP to display situational data.
- Receiving command and control messages from the GCCS, conveying decisions made by the users.
- Retrieving any necessary data from the GCCS database that are not obtainable via messages.

Each student planning group is supported by a laboratory wargaming cell in Okinawa Hall at AFSC (see Figure 4 below). Each group has its own AJCOM support so that the students can make decisions and affect activities in their area of responsibility independent of the other planning groups at the school.

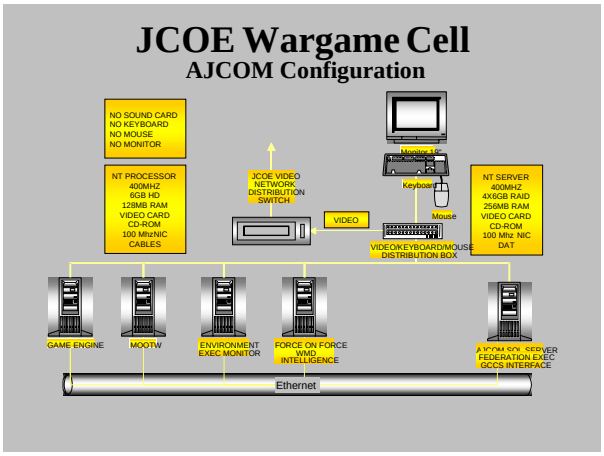

Figure 4. The AJCOM Seminar Configuration

USAFCOM – THE INTERACTIVE THEATER OF OPERATIONS

With the advent of AJCOM and its GCCS interface, education at AFSC could be based on a high level of wargaming stimuli – but, it still required a realistic world situation to provide context for student activities. This situation was developed as a fictional theater command labeled US Africa Command or USAFCOM.[3] In this command students needed to find all manner of the tools, policies, and issues that they were likely to encounter while serving in the real joint commands worldwide. To replicate these important issues, the AFSC faculty developed and mounted in web-databases a series of key materials, including a Theater Strategy, Theater Engagement Plan, Theater Standard Operating Procedures (SOP), and several plans (including noncombatant evacuation, humanitarian assistance and theater ballistic missile defense.) Additionally, unclassified versions of a host of actual documents were also modified to create USAFCOM versions of the Unified Command Plan (UCP), Joint Strategic Capabilities Plan (JSCP) and similar documents.

To create a geo-strategic "sandbox" for student activities, access to the CIA Factbook and other information systems was created for all countries, groups and actors within the USAFCOM area of responsibility (AOR). Threads of activities were also created to support storylines linking the key players in the theater to a background scenario running for 24 "months." This 2-year period of activities was further linked to AJCOM so that events in the background scenario could be continuously updated by the force on force module or RAM and made visible through the correct GCCS tools.

This entire notional AOR database was mounted on the college Intranet in web format. Each student planning group now has its own WebPage, which can be modified by the students to reflect any modifications they may deem necessary to reflect changing dynamics of the theater (forces, policies and environment.) Over the 12 weeks of the course at AFSC students interact with this AJCOM supported, web-based AOR on a daily basis. The planning group WebPage provides daily "News You Can Use" to the students addressing a wide range of information - some critical to success and some simply interesting. The students must develop and manage situational awareness from information systems in order to develop battlespace awareness just as they will in their real assignments.

INTERACTIVE EDUCATION - LIVING WITH DECISIONS

A revised curriculum, AJCOM and the web-based USAFCOM AOR together permit AFSC students to learn in ways that were never available before. AJCOM brings the AOR to life, demonstrates the linkages between strategies and events in the region, and permits students to understand the real scope of their ability to influence global events. With this vibrant yet notional theater, students can and do review and revise policies and procedures based upon workable real-world models instead of creating schoolwork, which has no understandable connection to real nations and groups. What we have created is a learning environment that allows, in fact encourages student planning groups to make changes to processes and procedures, based upon a relevant, developing scenario; the faculty can then discuss the implications of students actions, or inaction, in order to illuminate the important issues that form the essential elements of the curriculum.

For example, the UCP is a critical driver for CINC actions. It not only sets boundaries for the theaters, but also establishes regional tasks. It is a contentious document, whose elements are argued annually by the CINCs; it has several unanswerable problems that will forever plague its authors.[4] To teach these issues we invite our students to consider the northern boundary of their USAFCOM Theater (which is originally established right through the middle of the Mediterranean Sea.) In our learning environment change is always available, should they elect to recommend a shift of the theater boundary to include all or completely exclude the Mediterranean, the faculty could freely accept such a modification. From that point on the students must deal with the consequences of their changes. Often, what seems to make sense in week two may be extremely problematic after many months of interaction among the national and cultural (Spectrum RAM supported) players who affect the region's stability. In the same way we encourage students to change forces, modify procedures and set engagement priorities – any one of which may be a driving factor in the final endstate of the theater.

This kind of technique can be used with numerous similar issues during the 12-week curriculum. Command and control structures, engagement priorities, force locations, treaties and multinational agreements, and plans and orders can all accept student revisions and teach the implications of decisions made. This capability has significantly increased student activity and the relevance of the course of instruction. At the end of the 12-week period, we have completely different situations within each student planning groups. Each situation is a reflection of student knowledge, experience and creativity – a system tailored to student background and need. The student planning groups naturally compare activities and compete to achieve the best results, raising the level of discussion and learning yet another notch. Permitting such a broad range of student modifications to an already complex scenario storyline is a risky educational technique, which requires a high level of faculty engagement and judgement, yet such faculty engagement with student needs is exactly what we should expect of adult education in the higher levels of the taxonomy. Our goal after all is not to teach what to think but how to think at the very misunderstood and eminently important operational level of war.

SUMMARY OF INITIAL TEST RESULTS AND CONCLUSIONS[5]

Already the initial systems test has revealed a significant increase in student learning. Pre- and post-test result increases have grown from 7-10 percentage points under the former system to an impressive 28 points using the new notional theater documents and the first elements of AJCOM.[6] The other benefits of this new system have already been demonstrated in several areas, most notably in battlespace awareness, level of learning, curriculum relevance and relational factors in military operations.

Executive Monitor Prototype Display

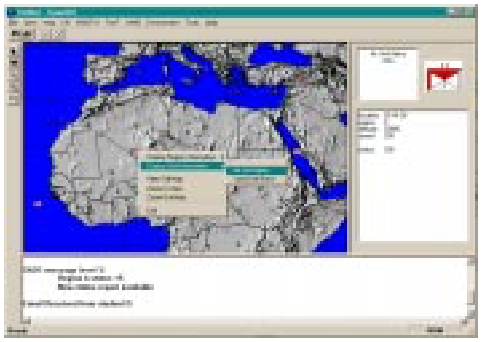

Figure 5. Battlespace Awareness from the Monitor

Battlespace awareness has always been a challenging learning point for educators. Yet, it is a critical aspect of planning and execution at the operational level. To teach the impact of critical decisions, students must be aware of the decisive points and results of force-on-force actions in an operational context. Before this appreciation was rarely attained by most participants, even in major joint exercises. AFSC's web-based databases have been accessed at ever increasing frequencies over the course of instruction and students have readily remarked that they were able to understand for the first time what these important operational concepts actually meant, in realistic understandable and measurable terms. The AJCOM executive monitor has given students a real feel for actions within the USAFCOM Theater (see Figure 5 above).

Learning at AFSC has always been targeted at the application level. Before the advent of the new system, many of the same tools were used to reach towards this higher level that the Service intermediate schools used to instruct at the comprehension level. AFSC created a Joint Armed Forces Staff College Wargaming System (JAWS) in the 1980s to help in this challenge. JAWS helped move towards application-level instruction, but the added value of AJCOM and the improved USAFCOM Theater planning tools have set new standards for the depth of analysis and understanding of the relationships among the elements of national power which are at play in modern military operations. Never before have we been able to model

socio-economic effects on military operations. The impact of real weather effects and the tyranny of time and distance are also much more obvious using the new learning system.

Improved curriculum relevance has been a tremendous boon to our instruction. The model policies and plans are so valuable that users in the real CINC staffs are calling to obtain copies. Students are dog-earing, highlighting, copying and most importantly debating a new range of issues that are now visible in the documents they must understand and revise. Perhaps even more interesting at this point is the accelerating growth in the quality of our teaching tools as we take recommendations from one set of student planning teams and make them available to the next set of incoming students. After just one full exchange (2 classes of students) our documents and tools have already been improved by actual practice and serving officer insight in ways we never expected.

Relational factors among the key elements of national power (diplomacy, economics, information and military actions) are obvious in modern military operations. The linkage between these elements made possible with our WebPage tools and AJCOM has finally permitted students to see the very real effects of lost synergy and even dissonance between diplomatic actions and the use of military or economic power. As we move forward with our integration of AJCOM tools, we expect even more visibility on the importance of information in the execution of national strategy. Students see now the importance interagency coordination due to their own wargaming and the results they achieve; they no longer must rely on text or guest speaker explanations – this is a major achievement for the school.

Our major conclusions reveal the tangible value of interactive decision-making in our curriculum. For mid-grade officers engaged in humanitarian assistance exercises, theater ballistic missile defense operations or a smaller-scale contingency scenarios the capability to observe the effects of their decisions on the progress of operations is invaluable. The use of realistic documents and GCCS tools reinforces the relevance of the instruction and increases retention. All of this directly affects the preparedness of these officer-students to execute responsibilities in joint commands worldwide. Providing appropriate stimuli and then permitting the students to learn and retain the salient lessons required by the curriculum is finally possible due to the interactive nature of the learning environment.

FUTURE APPLICATIONS

The test described in this paper completed phase four of five phases of implementation for the new curriculum and model. Beginning in January, the new integrated learning environment will be used for three classes of students (Class 00-1 in January, 00-2 in March and 00-3 in June). Based upon the lessons learned during those three classes, the curriculum and model will be refined a second time in October, 2000. The full system implementation will be complete in January, 2001. That month however, will not signal the full use of the integrated learning system – several additional applications are planned based upon the increased capability of the new system.

The next significant expansion of the system's use will actually start with the development of a pilot course for a new School of Advanced Joint Education (SAJE) during academic year 2000. This school will build upon the new curriculum by adding classified applications and linkages with actual Unified Command products via the SIPRNET. SAJE students will use additional GCCS tools to gain an even deeper understanding of the operational art.

Coincident with the development of the SAJE, the Armed Forces Staff College will embark upon a major distance education initiative, which will bring students from across the globe in contact with the integrated learning environment. Basic Internet support to students and alumni will be expanded and modules of the AFSC curriculum will be made available to a broad range of users.

[1] The local region includes the headquarters of the former US Atlantic Command, now Joint Forces Command, as well as NATO's Allied Command Atlantic, the Air Forces' Air Combat Command, the Army's Fort Eustis, the Navy's Atlantic Fleet, and Marine Forces Atlantic.

[2] Thus far students have primarily interacted with Department of State representatives via VTC. The inputs of serving and former political advisors and Ambassadors have served to significantly raise student awareness of and appreciation for the diplomatic element of national power.

[3] AFSC had used a similar yet much less robust construct known as US Mediterranean Command since the late 1940s. The fall of the wall and the end of bipolar international relations drove an extension of the theater to encompass the emerging issues of the full African continent.

[4] One need only point out the conundrum of setting theater boundaries in relation to Israel to illustrate this point. The dividing lines between India and Pakistan and he difficult problem of the Caspian Sea also illustrate the fact that

the UCP is a guidance document – one which must be flexible in the execution of a host of difficult crisis which do not readily lima themselves to boundaries.

[5] Data has been compiled from two tests conducted during the March and June classes. The initial conclusions were refined during a faculty after action review in late September 1999. The final test-spiral of AJCOM will be evaluated by a full faculty exercise during the first week of December and the model will then be used for the FY 2000 cycle of classes starting in January. Final assessments will be completed in October, 2000.

[6] March class data.