3.9 THE AIR WAR COLLEGE "STRATEGIC WEATHER" ELECTIVE: LESSONS LEARNED FROM A HYBRID COURSE

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1. INTRODUCTION

This paper describes a first-time, graduate-level course on "Strategic Weather" presented at the Air War College (AWC) during the 2002-2003 academic year. The course was developed to educate senior military and civilian leaders about the importance of factoring the effects and impacts of terrestrial and space weather and climate into planning and executing air and space operations. Throughout the course, weather and climate were considered to be as integral a part of military operations at the tactical, operational, and strategic levels of warfare as intelligence, surveillance, and reconnaissance are (for definitions of these and other military terms used throughout the paper, please see the Department of Defense Dictionary, available at http://www.dtic.mil/doctrine/jel/doddict/index.html). Students were taught that weather and climate are two of many factors that interact with both military functions such as logistics and communications, as well as with political factors such as rules of engagement, collateral damage, civilian casualties, etc. The course was developed and delivered as a "hybrid" course in which carefully selected portions were taught in the classroom while others were conducted on-line using distance learning methods such as threaded discussions and collaborative projects (for more information about hybrid course methodology, please see http://www.uwm.edu/Dept/LTC/hybrid.html).

A brief description of the Air War College curriculum will be given, followed by the rationale for offering this course. The structure of the elective (including the use of the hybrid technique) will be described. The results of the course in terms of student projects and critiques will be presented to illustrate the utility of using a hybrid approach in courses of this type for this level of student. It will be shown that the learning results obtained in this course using the hybrid method are consistent with the experiences of faculty members at other colleges and universities who have attempted this course delivery method.

2. BACKGROUND

2.1 AIR WAR COLLEGE OVERVIEW

The AWC mission is "*to educate senior officers to lead at the strategic level in the development and employment of air and space forces, including joint, combined, and coalition operations, in support of national security.*" (http://www.maxwell.af.mil/au/awc/awchome.htm). Students are competitively chosen to attend the program from the U.S. military services, government agencies, and over 40 foreign countries. The typical AWC student has close to 20 years active duty service and has usually completed a command assignment at the squadron or battalion level. The 10-month master's level degree program consists of a core curriculum encompassing courses such as strategy, doctrine, and air power; Joint warfighting and the study of future types of conflicts; national security decision-making; international security studies; and leadership and ethics. The AWC has a rich selection of diverse elective courses, and it was within this segment that the Strategic Weather course was offered as a first-time elective.

2.2 COURSE GENESIS

The genesis for the idea of an elective course on strategic-level implications of weather and climate on military operations came primarily from the author's experiences during his first two years on the AWC faculty. Meteorological topics receive little to no exposure in the curriculum, save for a mention of the Defense Meteorological Satellite Program during readings on space operations and

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lessons learned from Operation DESERT STORM. From reviewing the available literature, one could draw the conclusion that the only times the natural environment is important in military operations is when considering weather effects on individual weapons, or the accuracies of individual weather forecasts themselves. Additionally, there is virtually no mention whatsoever of space environmental weather and its effects. Institutionally, the Air Force and other military services do a good job of training young officers to consider the effects of weather at the tactical level of war, as evidenced by training manuals such as Air Force Handbook 11-203, vol. 1, *Weather for Aircrews* (HQ USAF, 1997). However, by the time an officer as progresses to more senior grades, his or her "sight picture" of the natural environment has not matured appreciably from what he or she would have received in training as a young lieutenant. The result is a cultural regard of the natural environment as a hindrance that will eventually be engineered out of relevance (i.e., emergence of the idea of an "all-weather" force, a misnomer). According to Lanicci (2003), the need for this course can be best summarized by the observations below:

1. Senior officers tend to look at weather as being tactical because it is not a subject that is taught above an introductory level.

2. The requirements of forecast precision often drive the solution to specifics of time and location (i.e., towards a tactical view).

3. Weather data collection and utilization have not been considered priorities in battlespace sensing strategies.

4. Real-time weather information delivery to the cockpit has not been considered a priority despite its potential to reduce weather-related aborts and speed up the target "kill cycle."

5. Weather information is not fully integrated into the Air Operations Center, which is the "hub" from which the air war is conducted.

It was on this basis that the AWC course "Strategic Weather" was created and offered during the academic year 2002-2003.

2.3 WHY CHOOSE A HYBRID APPROACH?

The hybrid structure for this course was appropriate for several reasons. First, the elective was offered during the fall, during a very busy period in which students are picking and researching their Professional Studies Paper topics, are in the midst of the core courses of Strategy, Doctrine, & Airpower and Leadership & Ethics, and are planning their Regional Studies trips, which is an important component of the International Security Studies segment.

A second reason for offering a hybrid course is to expose the students to new ways of using information technology. The AWC made a commitment to finding better ways to incorporate technology in the curriculum as a means to produce graduates who can be "technology conversant" when they move into positions of senior leadership later in their careers. For more information about the AWC technology model and its applications, the reader is referred to Lanicci (2002).

3. COURSE STRUCTURE

The Strategic Weather elective was divided into five major blocks, each described below.

Block 1: Introduction and Basic Concepts (two lessons, in-class). In this block, students were taught using a traditional, in-classroom lecture/discussion format to give them a "baseline" understanding about weather and climate. In order to get them ready for the on-line portion of the course, they were given a HQ USAF position paper entitled, *"The All-Weather Air Force,"* and asked to go on-line to discuss it outside of class. The format was kept simple: a threaded email discussion in which students simply appended their comments on the position paper to those of previous students (always using the "Reply All" option so all would see). An interesting development during this initial assignment was the number of emails appearing during the evening hours from the students' home addresses. The threaded discussion exercise was terminated after about a week of dialogue, during which time students started finding and sharing on-line articles related to the subject matter.

Block 2: Study of Weather and Climate Impacts on Military Operations at the Tactical and Operational Levels of Warfare (three lessons, in-class). In this block, the baseline was built upon by introducing the students to the effects of weather on weapon system performance and how weather information is incorporated into theater-scale operations at places such as the Air

Operations Center (AOC). There were two items of note in this block: 1) the keen interest in space weather shown by the students, especially those who relied on high-frequency communications during trans-oceanic flights; and 2) the guest presentations from weather officers who had served in the AOC during Operation ENDURING FREEDOM.

Block 3a: Strategic-level Weather I: Introduction to Weather at the Strategic Level (four lessons; one in-class, three on-line). This block introduced the class to an on-line assignment in which each student had to pick articles from a topic-area list having to do with military operations impacted by the weather at the strategic level of war (e.g., D-Day Invasion, Challenger Disaster). The primary sources for the topics came from the two course texts (Fuller, 1990; Winters, 1998), but students used a great deal of outside material as well. Each student was required to write a summary and analysis of the readings and address the following questions:

1) What was the strategic impact or consequence of the weather and/or climate on this event/operation?

2) Was this simply a failure to anticipate and appreciate the impacts of weather and/or climate or was that beyond the state of the art for that era?

3) What lessons learned could you draw from this event for possible application to future planning and execution of military operations?

The written analyses were posted to a course folder on the local area network (LAN) so that all the students could have access to them if interested. During this assignment, students were also paired off together; each student read his partner's analysis and was required to counter with three "comeback" questions to which his partner must respond. The dialogue between the student pairs was conducted through threaded discussions to include the instructor as a courtesy recipient. Students were graded on the quality of their written analyses, the questions they posed to their partners, and the responses they gave back during the email dialogue.

Block 3b: Strategic-level Weather II: Instructions for Group Presentation Assignment and Threaded Discussions (one lesson in-class and three on-line). This block was an extension of the previous one in which the students stayed with their original partners. In this segment each student pair was to build a group presentation to be given in class during the next-to-last class session. They were given the option of picking a new topic area or continuing the study of the topic from the writing assignment. As before, all final versions of the presentations were posted to the course folder on the LAN. Student groups were also given the option of choosing outside collaborators to work with them on the project; however, the name(s) and affiliation(s) of the collaborator(s) were to be provided to the instructor prior to approval.

Block 4: Class Presentations (1 lesson; in-class). Each student pair gave their presentations in class. Several interesting topic pairs resulted from this assignment. For example, one student did his written analysis of Napoleon's invasion of Russia; he partnered with a student who did a similar analysis of Hitler's invasion. The group presentation was a study comparing and contrasting the impacts of the weather on Napoleon and Hitler's invasions of Russia. Interestingly, a major portion of the presentation highlighted the role that the personalities of both Napoleon and Hitler played in their invasion planning regardless of any knowledge held about Russian climatology by the respective military staffs. Another interesting pair looked at the ways in which weather information was included in the planning and execution of the Son Tay Prison Raid during the Vietnam War, in stark contrast to Operation EAGLE CLAW (a.k.a. Iranian Hostage rescue attempt). One of the more poignant moments in the course came when the student doing the Son Tay Raid portion of the talk had a revelation mid-way through his portion of the presentation about the strategic-level implications of weather in what was originally considered to be a tactical operation.

Block 5: Weather Operations in the Transformation Era (1 lesson, in-class). In this class the instructor gave a presentation on the future of weather operations as a result of the revolutionary advances in information technology and changing world events, taken largely from Lanicci (2003). The only really negative criticism of the course came at this point, in which the students unanimously felt that this lesson, which essentially acted as a culminating point for the course, should have been given earlier, as it would have better guided the students as they prepared their class presentations.

4. CONCLUSIONS

The results of the elective course could be considered very successful for a first-time offering. The unique mixture of the class had an effect on the dynamics of the course. All six students were Air Force lieutenant colonels or colonels (to include a Venezuelan), but only two were military meteorologists. Despite the demographics, the weather officers had no subject matter advantages over their non-weather counterparts due to the way in which the course was constructed. Of the six students, at least two expressed initial skepticism about the strategic importance of weather and climate. By the end of the course, all of the students, several of whom will be entering positions of senior Air Force leadership in the near future, were unanimous in their changed point of view about the importance of the natural environment at the theater and strategic levels. This should be considered a major success of the course and points to the need for similar courses to be taught at the Nation's other Senior and Intermediate Service Schools.

A second important result was the confirmation of the success of the hybrid course methodology. A 10-month master's degree program is very compressed, and time is at a premium for these students. The student critiques for this course confirmed the usefulness of the hybrid method as a means for instruction, receiving a score of 4.67/5.00 in the area of Instructional Methods. Written comments were equally favorable, especially regarding the threaded email discussions, which many students saw as a highlight of the course. The ability to use the time outside the classroom as they saw fit was especially important. One comment representative of that viewpoint was this one: "*The independent study time was superb. This is how grad level should be. This allowed us to do more in-depth study/research that benefited all of us*." Results such as this are consistent with other faculty experiences with the hybrid method. This is largely because hybrid courses, if constructed correctly, potentially combine the best aspects of both traditional in-class methods and distance learning. The on-line portion fosters independent research and enriches discussions when the class returns for an in-class session (also see Martyn, 2003).

The combination of in-class instruction and on-line independent studies gave students the opportunity to analyze, synthesize, and present their ideas on how the natural environment influences events at the strategic level of military operations, and discern lessons learned for application to operations today and in the future. The end result was a better understanding of the natural environment in planning and executing Joint and Combined military operations. The student evaluations for this first-time course were very encouraging, and point to a need for additional investigation into using this methodology for other courses. As the Nation's military forces become smaller and more expeditionary, the need for education will not drop off, but the availability of time for resident instruction will. As time constraints become increasingly stressed, we will need innovative approaches to ensure that our Nation's fighting forces continue to be the best organized, equipped, trained, and *educated*.

5. REFERENCES

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