

WHAT WORKS – A PKAL ESSAY

VISION FOR TOMORROW: PREPARING LEADERS FOR AMERICA, MEETING 21ST CENTURY CHALLENGES

Background

The Mission of the United States Air Force Academy is “to educate, train, and inspire men and women to become officers of character, motivated to lead the United States Air Force in service to our nation.” Each year, nearly 1,000 young men and women proudly walk across the Air Force Academy’s stage, receiving a Bachelor of Science degree, with emphasis in a field of their choice. In taking the Oath of Office of a second lieutenant in the United States Air Force, each solemnly swears to support and defend the Constitution of the United States and promises to “well and faithfully discharge the duties of the office upon which (they are) about to enter.” As they leave Colorado Springs, they join the long blue line of graduates who have faithfully served their country for nearly 50 years.

To prepare these talented young men and women, the Academy and the nation count on a team of roughly 500 faculty members across 21 disciplines. These faculty come from all walks of life. Approximately thirty percent are civilians, most with PhDs or other terminal degrees. The remaining are officers, for which teaching at the Academy is a military assignment. Of these military officers, roughly 30 percent have PhDs or terminal degrees, most have no teaching experience and most teach at the Academy for only three years. After completing that assignment, they will be assigned to another Air Force responsibility. As a result, the Academy typically welcomes about 130 new faculty members each year.

Center for Educational Excellence

It is in this context that the Center for Educational Excellence was born at the Air Force Academy. With such a large number of faculty every year, faculty development has always been important, but historically, this was the responsibility of individual departments. However, toward the end of the 1980s, the Faculty Forum, an organization of senior educators then known as the Tenure Council, began an initiative to increase the use of active- and collaborative-learning techniques at the Academy. The Forum also began to hold faculty-wide orientations, introducing new faculty to Academy policies and to teaching strategies that were common across most disciplines.

In 1992, then Dean of the Faculty Brigadier General Ruben Cubero, formalized this faculty-wide approach when he officially established the Center for Educational Excellence (CEE) as the Academy’s teaching and learning center. The first faculty orientation— sponsored by the Center in 1993— consisted of approximately 20 hours of briefings, interactive discussions, and group exercises in which all new faculty were required to participate. Each department continued its own orientation, building upon the foundation established by the CEE. These departmental orientations, which in some cases continued for three more weeks, included practice teaching before experienced faculty, together with instruction and mentoring on department-specific teaching strategies.

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WHAT WORKS

- ◆ Begin with student learning outcomes as you change the culture from a teaching-focused to a learning-focused paradigm.
- ◆ Have visible support of senior academic administrators.
- ◆ Take time “offsite” for deep discussions about practices and procedures that will more directly support a learning-centered approach.
- ◆ Spotlight local pedagogical pioneers; encourage local and national adaptation.
- ◆ Connect to peers on the other campuses with similar goals; do not reinvent the wheel.



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Through the CEE-led Faculty Orientation and subsequent weekly workshops and seminars new research-based teaching strategies were shared with faculty, including STEM faculty, and passed on from faculty generation to generation. Thanks to the CEE-Faculty Forum partnership, active- and collaborative-learning strategies have been adopted and perfected faculty-wide.

In addition, the momentum developed by this partnership led other departments to sponsor additional active-learning workshops. For example, the Engineering Division brought to the Academy one of the nation's leaders in problem-based education. And the Department of Political Science, in partnership with the CEE, brought Richard Light from Harvard University to teach faculty members how to effectively use the case study method. By the turn of the 20th century, the use of active and collaborative learning strategies in the classroom had become a hallmark of Academy education, ranking the Academy in the 99th percentile on this dimension on the National Survey of Student Engagement (NSSE).

In the mid 1990s, the CEE also developed several successful partnerships with individual STEM departments, especially in the use of technology to enhance learning

- ◆ The Department of Aeronautical Engineering developed an innovative computer-based simulation in partnership with CEE that superbly illustrated the operation of an aircraft engine and the performance sensitivity of various operational parameters. Students could manipulate these parameters in real-time and immediately see the impact on engine performance.
- ◆ The Department of Biology produced “BioLab,” a technology-enhanced strategy that allowed students to design and carry out experiments within predetermined constraints.
- ◆ The Department of Physics ultimately led to the development of Cockpit Physics, a complete course in mechanics patterned after Jack Wilson’s studio physics concept. In 1999, *Physics Today* featured Cockpit Physics in its “Web Watch” section.¹

Although a careful study by Dr. Heidi Mauk Gruner ultimately demonstrated that the Cockpit Physics approach was at best equivalent to the active-learning-based traditional small classrooms at the Academy, it became the springboard for another physics innovation, Just-in-Time Teaching (JiTT), an approach that has spread to at least 300 faculty in 25 disciplines at approximately 100 institutions across the United States, Canada, Europe, and Israel and has been featured in several PKAL workshops.

Dr. Gregor Novak, one of the inventors of Cockpit Physics and JiTT, was recently honored by the New York Academy of Science. They presented him with the 2005 Willard Jacobson award, recognizing the top science educator in America, for his pioneering work developing JiTT.

It should be noted that the Academy’s Center for Educational Excellence has not always been the first to bring an idea to the Academy. Sometimes it finds itself in the important role of helping to share a great idea between departments.

Over the past few years, for example, the Department of Mathematics has developed an outstanding approach to writing across the curriculum, which includes the development of several excellent grading rubrics. At the same time, the CEE Director of Faculty Development, Dr. Robert Noyd, learned of an award-winning writing across the curriculum program at the Colorado School of Mines. Dr. Noyd invited Dr. Ronald Miller and Dr. Jon Leydens, leaders of the Mine’s initiative, to share their insights and program design with Academy faculty at one of the CEE weekly workshops.

At the workshop, Dr. Noyd learned that the Academy’s Department of Mathematics was already implementing many of the features found in the Mine’s program. He then partnered with the Academy’s Writing Center to begin a series of workshops designed to share best practices from Academy departments with the broader faculty. In the inaugural workshop, four departments shared their programs (electrical engineering, English, civil engineering, and the Academy’s Preparatory School).



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As we look to the future, the CEE is participating in its most ambitious initiative to date. Last spring, in concert with the Dean of the Faculty, Brigadier General Dana Born, Dr.

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Noyd assisted the Dean in launching her “Learning-Focused Initiative” by completely redesigning the Academy’s 20-hour Faculty Orientation to embody a distinctively learning-focused approach.

The Dean herself led the 130 new faculty in a learning-focused exercise, designed with the help of CEE staff, to demonstrate her commitment to this philosophy and illustrate her expectations for their own teaching, on the very first morning of Faculty Orientation. That session was followed by a series of learning-focused discussions, exercises, and experiences. The assessment conducted at the end of Faculty Orientation demonstrated that new faculty had indeed internalized the learning-focused philosophy of education at the Academy.

Since the summer of 2005, the CEE team has been working diligently in partnership with the Dean and her Assistant for Curriculum Planning, Dr. Evelyn Patterson, to help the Dean achieve a true paradigm shift at the Academy, changing the culture from a teaching-focused to a learning-focused paradigm.

CARE: Creating Academically Rich Environments

In May 2005, the CEE, the Dean, and Dr. Patterson launched the CARE Group initiative. CARE stands for Creating Academically Rich Environments. Seven groups were formed, one for each of the Academy’s Educational Outcomes. Each group was challenged to develop an operational definition of the outcome that could help the faculty better understand how to design learning experiences that would help students achieve the goals of the outcome.

The CARE groups were also challenged to identify educational strategies already in place that are designed to achieve the outcome, to develop rubrics to measure the success of these strategies, and to identify gaps in the curriculum that currently limit student achievement of the outcome. In parallel, CEE was tasked to lead the effort to develop electronic or digital portfolios that will capture the evidence of student achievement.

In August 2005, with the assistance of the CEE, the Dean began publishing a short weekly essay, sent to every faculty and staff member, designed to help the entire faculty and staff understand what it means to be “learning-focused.” With the help of the CEE, the Faculty Forum went offsite for one day with over 70 of its members to help the Dean develop a clear definition of learning-focused education and to begin the process of identifying practices and procedures that would more directly support a learning-focused approach across the academic program.

The Junior Faculty Council, a group representing the bulk of the Academy’s faculty (those who have not yet reached the academic rank of Associate Professor), worked with the CEE and their membership to develop a list of impediments to the learning-focused approach that will eventually have to be resolved.

In November, the CEE and Dr. Patterson helped the Dean build on the Faculty Forum offsite and develop another offsite event for department heads. At that offsite, department heads expanded their knowledge of research related to student learning, reviewed and critiqued a learning-focused rubric developed by the CEE staff. They then began the process of evaluating the Academy’s substantial core curriculum (96 semester hours) from a learning-focused perspective. Since slightly more than half these semester hours are in STEM courses, the ultimate potential impact on STEM education is enormous.

Throughout its 13-year existence, the Academy’s Center for Educational Excellence has been at the center of major educational issues. While often not the first to initiate a major new educational innovation, the CEE has almost always been key to spreading the “good news” throughout the Academy faculty. In addition, CEE staff members have always stood ready to mentor faculty as they attempted to implement these new ideas in their classrooms.



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Today, the CEE once again finds itself deeply involved in facilitating the work of the Dean and departments as we collectively take the Academy to new levels of excellence, with faculty and students jointly committed to keeping “learning” as the Academy’s central focus.

This year, the Dean of the Faculty is taking us one step further— to think of the entire educational process, including curriculum design, syllabus design, homework design, classroom experience, and assessment from a learning-focused perspective. She asked us to wrestle with some hard questions:

- ◆ How will each of these elements help students become the embodiment of the Academy Educational Outcomes?
- ◆ How can we use the precious little time we have with these students to prepare them for the extraordinary challenges of the 21st century?
- ◆ How can we transform the Academy, itself, into a true “learning institution” that is nimble enough to consistently meet the changing needs of the nation and especially the Department of Defense?

The Academy faculty prides itself on being military and professional role models for our students. With the help of the Center for Educational Excellence, the entire Dean of the Faculty staff, and the faculty are engaged in an institution-wide learning experience, modeling for the students what it means to be life-long learners and to work as a team to “well and faithfully discharge the duties of the office” upon which we have entered. ■

1. Day, Charles. *Physics Today*, June 1999, Vol. 52, Issue 6, p. 57.
2. <http://www.webassign.net>