

The Academic Center for Engineers and Scientists – Focused Resources and Activities for Student Retention

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Abstract

The Academic Center for Engineers and Scientists or ACES, at the University of Texas at El Paso, is fundamentally a student center. A student center conceptualized, designed, and now managed by undergraduate engineering and science students as part of the National Science Foundation's Model Institutions of Excellence (MIE) Program. The comfortable and modern facility provides space for study, organizational meetings, and contact with a myriad of student development resources. Students in the freshman orientation are introduced to the Center and have the opportunity to use the facility's resources to complete assigned projects that are integral to their orientation experience. The compulsory freshman seminar course, promoting the Center among the entering freshmen, serves to establish the early connections to ACES. ACES was designed to serve as a hub for student connections to study and learning resources, pre-professional employment opportunities, tutors, student organizations, and a host of other specially targeted student development activities. ACES is a part of our retention solution for a campus serving a commuter student population. The ACES Team or student management structure ensures a student-oriented agenda for the Center while facilitating the use of modern computer technology in the form of laptops, current software, peripherals, multi-media presentation equipment, and wireless Internet access. In addition to providing equipment and space, the Center offers workshops to enhance students' personal, professional and academic growth in many topic areas. Visiting graduate schools and corporate representatives utilize ACES for information programs since ACES assures access to the students. Future plans for ACES include the opening of satellite facilities across campus, online posting of class notes and homework solutions, and continuing evaluation of the ACES Model.

Introduction

The National Science Foundation's Model Institutions for Excellence (MIE) Initiative is a groundbreaking project that will produce universities that will serve as models for

improving the quantity and quality of science, engineering and mathematics graduates. MIE, part of a comprehensive plan to institutionalize higher educational reform, is designed to encourage and support our most promising engineering and science students to stay in school, and pursue an advanced degree.

The University of Texas at El Paso (UTEP), as a designated MIE institution, has created a new multi-functional, state-of-the-art facility to serve the needs of undergraduate engineering and science students. ACES or the Academic Center for Engineers and Scientists is the student-support facility, intended to serve as a hub for engineering and science student activities. The Center provides a comfortable, well-equipped space for group and individual study, meetings, workshops, and symposia as well as a place to relax and meet with other students. The Center also includes an active learning center, a quiet study area, multi-purpose rooms, a computer work room, a lounge and vending café, the General Motors Student Conference Facility and Tutoring Center. In addition, the Center serves as a clearinghouse for information regarding graduate and professional schools, and employment opportunities.

But ACES isn't just a facility – it's a reflection of systemic change in the preparation of engineering and science students for the 21st Century. Although it signifies a change in academic culture – valuing integration as well as specialization, teamwork as well as individual achievement, and educational innovation as well as research, ACES hopes to hone the intellectual skills needed by practicing engineers and scientists for the new millennium.

Science, engineering and mathematics fields of college study are rigorous and time demanding. Entering college students may not be prepared for these difficult academic programs depending on their pre-college preparation, e.g. high school curricula, and their general orientation towards university studies. The problem of college preparedness may be more acute on a commuter campus, where students may only remain on campus as long as class hours and laboratories demand. UTEP's student population is typical of major urban universities, serving the academic needs of a regional, place-bound population. Our students are also non-traditional from the standpoint that the majority are ethnic minorities, first in their families to go to college, and balance their academic lives with required part-time, and sometimes, full-time employment. Juggling so many activities often leads our students to minimize their time on campus, and unfortunately, minimizing their utilization of academic support activities.

Findings support that efforts to foster academic and social integration are especially important for commuters¹. A sense of community plays an important role in retention. Campus integration can be achieved by providing students with an academic and social environment that enhances learning and various opportunities to connect with others. The

congruence of the SEM core curriculum lends itself to students forming collaborative networks. ACES provides an environment where these networks can flourish. The Center also provides a foundation outside of the classroom that initiates cooperative group work and reinforces information learned in the classroom.

The Physical Facility

The first floor of the Classroom Building, which is centrally located and serving the instructional needs of the Colleges of Engineering and Science, was totally redesigned and renovated to accommodate ACES. This facility, opened on June 9, 1997, represents approximately a 5,000 square foot (465 m²) space incorporating a number of design and functional elements benefiting SEM students. Three key areas provide study space – the Active Learning Center (group study), individual study (quiet area) and carrels or small group study rooms (see Figure 1). During daily hours of operation any SEM student can pick and choose their study motif. We expressly recommend group study to benefit cooperative learning and team-building skills development^{2,3}.

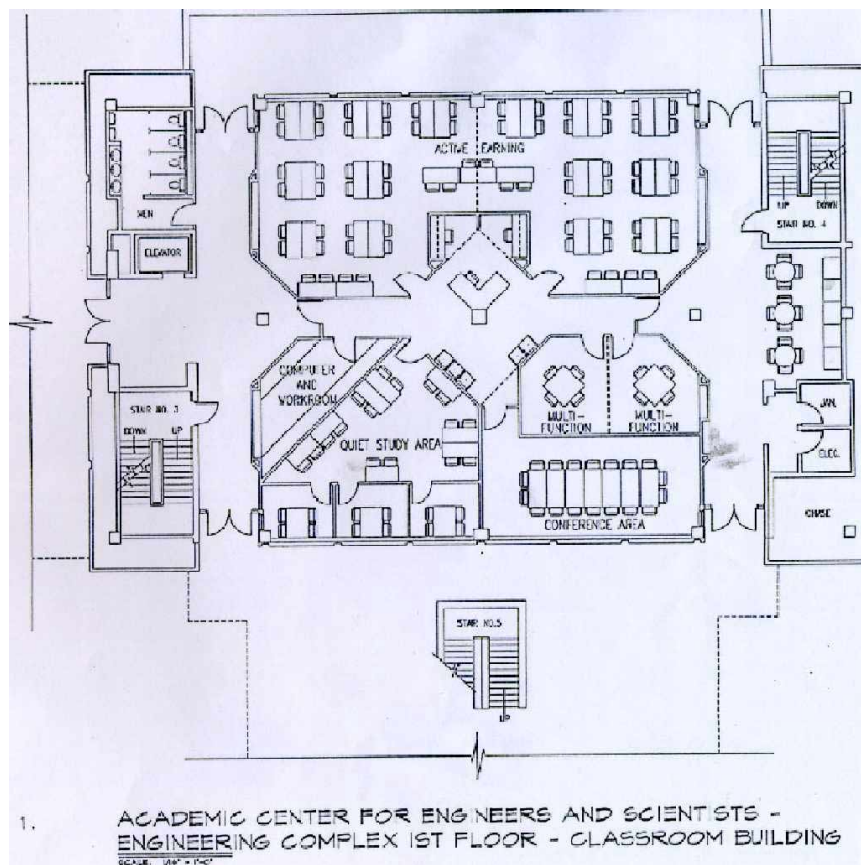


Figure 1. Floor plan for the first floor of ACES.

Other rooms in the facility include:

- Multi-functional rooms for small group interactions
- Resource Room/Information Center
- General Motors Student Conference Center
- Tutoring Center
- Computer/Workroom
- Bristol Café/Vending Machine Lounge
- Administration/Reception area

The furniture in the facility is moveable to facilitate group interaction, particularly in the Active Learning Center. It is also complimentary to the “corporate world environment” setting of the facility in design and functionality (see Photograph 1).



Photograph 1. The Active Learning Center with its modular furniture.

Management Team

The ACES student management team (comprised of 14 students) is not only responsible for the day-to-day operations of the facility, but also significantly contributes to the decision-making process. The management team is tasked with program planning and implementation of student development activities as well as participating in the formulation of policies and procedures governing the Center. A comprehensive training program prepares the students for their management responsibilities. We are also providing students with an opportunity to become involved on campus. Student involvement benefits learning and student development ⁴.

Each student team member is responsible for not only staffing the facility, but also serves on task forces that work on special projects. For example, four of the students are responsible for tutoring and have launched a successful tutoring program. These tutors are available to help students approximately 40 hours per week. The other areas of responsibility are listed as follows:

- Newsletter
- Workshops, special events and recruitment sessions
- Data collection
- Automation of processes
- Graduate school, research and employment opportunities
- Advertising
- Satellite facility liaisons
- Resource management
- Systems administration

The team elects a team leader that assists in the coordination of activities and serves an important communication function. Communication is a vital ingredient to empowering a successful student management team. The ACES team holds regular meetings throughout the semester and also communicates frequently by e-mail, one-on-one interaction, a message board, regular outings, and potlucks. The team meetings further empower students by providing each student an opportunity to chair a meeting. The chair for that week's meeting solicits agenda items from the other team members and all students are encouraged to participate in the discussions. Occasionally training is also a part of the team meetings.

To date, 44 students have been employed at ACES since its inception. Of those 44 students, 15 students have graduated (6 of which are in graduate school, 4 are in medical school and 5 are employed in a SEM field). All but one of the remaining students are still enrolled in an SEM major and many have gone on to accept a research and/or cooperative education positions while still in school. Integration in the campus environment increases the likelihood that students will be retained⁵. The sense of belonging that students get from being an integral part of the campus community has benefits for not only the students, but also the university at large. Students, if given the opportunity, have the skills, talent and knowledge to be effective members of the campus work force. They

have the abilities to contribute to the success of programs and centers and to serve as outstanding peer educators, mentor and tutors. The ACES student management team is an example of how students, once empowered, can provide leadership and help other students achieve their goals.

Resources

SEM students are offered the use of the latest equipment from desktop computers, laptops, Internet access, and up-to-date software and multimedia equipment. Students are given free reign of an atmosphere designed to facilitate the acclimation of students to a world dominated by technology. ACES was not designed to serve as a computer center. However, a few desktop computers are available for student use. We have an inventory of laptop computers that students can check out for use while in ACES (see Photograph 2). This experimental program, the Laptop Computer Learning Initiative, will address the increasing use of technology in higher education and provide students with access to laptop computers to use individually or in-groups. Many of the resources in the facility will be available in a CD-ROM format such as software packages and test bank information. . Desktops or computer workstations are not conducive to group interaction and cooperative learning, so we are conceptualizing a laptop computer facility. The ability to use a laptop computer and its applications are critical tools for these potential engineers and scientists to excel academically and to be better prepared for a professional careers in their chosen fields.



Photograph 2. A view of the quiet study area that contains study carrels and data ports for the laptop computers

In addition to technology ACES represents all of the following for SEM students:

1. A place for group and individual study and cooperative learning

2. A place for academic advising, professional skills development and campus networking.
3. A location for student organizational meetings
4. A facility which serves to supplement classroom and laboratory instruction with tutoring, workshops, and miscellaneous resource materials
5. A satellite for Tutoring and Learning Services, Career Services, Graduate Services, Scholarships and Financial Aid, and other student-support offices on campus
6. A location for students to utilize the presentation aids via computers/software, e.g. *POWERPOINT*, and then use the facility to rehearse for presentations

The Center also serves as an important resource for the students by inviting speakers from on and off campus to do workshops, presentations and training sessions. In addition, the student team maintains a comprehensive library of tests/homework, study guides, as well as information regarding graduate school and employment opportunities. Free tutoring is ongoing throughout the day in courses such as math, physics, chemistry, biology, engineering and English. Students have access to amenities such as telephones, fax machine, typewriter, copy machine, scanner, in addition to the other resources. Extended hours (open 7 days a week during the semester and 24 hours during finals) ensures that our SEM commuter students have access to the resources they need.

Information Exchange

One of the most important functions ACES serves is information exchange; workshops, company information, co-op orientations, and various resume sessions. The Center is also becoming a clearinghouse for information on research, employment, and graduate and professional school opportunities. Corporate and graduate school recruiters are increasingly using the center for recruitment and information sessions. The students also received valuable information on the graduate application process and about graduate programs across the nation. The Center is the distributive hub of applications for various prestigious fellowship programs, undergraduate research programs and scholarships. Examples of ACES sponsored recruitment activities over the last academic year include:

Bell Helicopter/Textron
Boeing
Hewlett Packard
IBM
Lawrence Livermore National Labs

NASA Langley Videoconference for summer opportunities
Nortel Corporation
Raytheon Corporation
Sandia National Labs (California and Albuquerque)
Texas Instruments
Texas Natural Resource Conservation Commission
U.S. Airforce
U.S. Navy
University of California at Berkeley
University of Illinois at Urbana-Champaign

Student Development

Providing students with professional, academic and personal development and training opportunities is an integral part of the ACES mission. To that end, several workshops and training sessions have been offered over the past year. Workshops include information and skills building in creating and delivering effective poster presentations, public speaking, applying for research, graduate school and employment opportunities. A partial listing of the workshops offered through the spring 1999 semester are listed below:

Workshop and Special Events Themes:

Academic Integrity
Improving Communication and Public Speaking Skills
Creating Effective Poster Presentations
Time Management
Stress Management
Test Anxiety Reduction
Strategies for Applying to Graduate School
Why Graduate School?
The Art of Interviewing
Research Opportunities and the Application Process
Applying for a GEM Fellowship
How to Use Engineering Research Databases
Conducting Effective Meetings
Resume Writing
Cooperative Education

Future Plans

ACES or the Academic Center for Engineers and Scientists has served for over two years

as a unique model and facility for student development and retention. Based on our various evaluation tools, we recognize that ACES needs to do more than just serve as model for student support facilities. ACES needs to evolve. The current ACES facility is well utilized and has seen significant growth in the number of users. Active users number 1,390 (an increase of 411 users from academic year 1997-1999). Because of the limited amount of space and number of staff members, it can serve only a fraction of the SEM student population at any given time. The facility has the capacity of serving approximately 70 students in its present state, although there are close to 3,000 SEM students enrolled. A lack of space for providing tutoring services, quiet and group study areas and learning resources has initiated this plan for expansion. Survey research shows that there are two segments of the SEM student population that are currently underserved by ACES, i.e. science and entering students. These segments can be better serviced by increasing capacity and expanding services targeted at science and lower division students. Keeping commuter SEM students on campus has been shown to benefit academic program success through the early years of college study ².

The Center as it has existed will remain and actually expand into the basement. This expansion of an additional 5000 sq. feet (465 m²) would allow some needed modifications of the existing space to improve student services and increase capacity. This additional space would expand services dedicated to student tutors, administration of student development opportunities, expansion of learning resources, support of outreach activities and provide additional quiet and small group study areas. In addition, the CRB will be updated and modernized to provide learning environments that will support active and cooperative learning strategies and multi-media instruction.

Changes in the Physics and Chemistry curriculum have made utilization of our new satellite in the Physical Science Building. In the fall of 2000, ACES opened a satellite that is equipped with 32 PC's. Twenty-eight of these PC's are in a studio classroom that is used for a required computer simulation course in UTEP's introductory physics courses, and these computers are made available for student use for computer-based tutorials in physics when classes are not in session. Teaching assistants from the Physics departments hold these simulation sessions and tutor students in the facility when necessary. Fourteen computers are housed in an adjacent room that was used for chemistry tutorials. ACES provides four tutors that hold regular hours in the new satellite to assist students with the computer based chemistry tutorials and facilitate problem solving reviews for students. Nine students staff the front desk in this area providing students assistance with the computer room and monitoring the use of the entire satellite. Once this satellite is complete, an active learning center will be open to students in the Physical Science Bldg. The active learning center will be very similar to the one that is housed in the Classroom Building, with modular furniture, access to laptops and the internet, and will be available for students to reserve for organization meetings, workshops and visitors from industry.

The MIE program, as well as ACES, is striving to enhance retention and student development on several levels. Better coordination and centralization of student support activities would enhance the development and retention of SEM students at UTEP. Some of the MIE-related student support activities that would be augmented by centralization and coordination are as follows: orientation activities and hands-on sessions, advising, tutoring, graduate school preparation workshops, and training sessions. Peer facilitators from the CIRCLES program would also have a “home” in the proposed plan. By bringing students into ACES as part of the CIRCLES orientation program, they will learn first-hand what ACES can provide for them. We also anticipate a more pro-active approach with Cluster-class instructors and peer facilitators, to connect more of our entering students into ACES. ACES and the REU program will also be collaborating to provide information and support for graduate school preparation as well as opportunities for professional and academic development. The expanded leadership and peer educator training programs will be provided to MIE peer facilitators as well as the ACES student management team.

The evolution of ACES would provide students access to the CIRCLES orientation, to academic programs via program profiles housed in the ACES’ Resource Inventory, to cooperative and active learning classroom/labs, to undergraduate research assistantships and internships, to student professional organizations, etc. By building closer connections to the other MIE components and centralizing services to some extent, ACES would give students access to a vital network of student support. Under one roof students would be orientated, advised, instructed, tutored, and transitioned into academic programs. ACES would provide important connections to student professional organizations and other means to supplement student academic and leadership development. Research shows that efforts to foster academic and social integration are especially important for commuters⁶. A sense of community plays an important role in retention.

Conclusions

ACES is rising to the challenge of educational reform by serving as a model for future student resource centers. It is our intention to provide all of the necessary resources for UTEP engineering and science students to succeed academically, professionally, and personally. This Center also hopes to contribute to students preparing for meaningful careers as engineers, scientists, and mathematicians, and be able to compete in the global marketplace.

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Rosa Gomez

Rosie has been with the MIE Initiative for two years. She has been a Student Development Specialist for Pre-Engineering students for a year and a half with UTEP and has served as ACES Coordinator for one semester. While working on her bachelor's degree in civil engineering at UTEP, she coordinated and participated in outreach programs with the College of Engineering. After graduating from UTEP, she was a flight test engineer with The Boeing Company in Seattle.

Connie Della-Piana

Dr. Connie Kubo Della-Piana is currently the Director of Evaluation for two National Science Foundation projects, the Model Institutions for Excellence and the Partnership for Excellence in Teacher Education funded by the National Science Foundation. She has been involved in the evaluation of projects funded by the Smithsonian Institution, the Red Cross, the National Institutes for Health, the Department of Education. She is also a consultant on the ABET committee in the College of Engineering at The University of Texas at El Paso.

Stephen W. Stafford

Steve Stafford promotes ACES as its task force leader in conjunction with his position as Associate Dean of Engineering. Dr. Stafford has over twenty-five years of experience in recruitment and retention activities and also serves as a Professor of Metallurgical and Materials Engineering at the University of Texas at El Paso.