

Campus-wide initiatives in undergraduate education.

Introduction

The purpose of this section is to highlight a sampler of undergraduate initiatives and programs which are most relevant to a campus-wide perspective; it is not intended to be an exhaustive exposition nor is it intended to repeat the information provided by individual schools, colleges and departments.

The Office of Academic Affairs has adopted a strategic plan, two principal goals of which are to make the undergraduate experience at CU-Boulder more personalized, especially for first and second year students and to expand the undergraduate curriculum to incorporate undergraduate students into scholarly research programs more broadly. The implementation process for these objectives has multiple components, some of which will be described below. In particular, the campus has addressed these goals by (1) expanding and enhancing the concept of 'academic neighborhoods' which experience has shown greatly facilitates the successful adjustment of new students to life on this large research university campus and (2) by expanding the scope of mechanisms through which undergraduates can participate directly in on-going scholarly research. This increased level of participation will markedly benefit the individual students and the entire educational enterprise of this campus.

Best practices and methodologies for undergraduate education

At a national level, numerous institutions and groups with interests in college level teaching and learning issues have thoroughly examined a broad range of topics with a somewhat surprising degree of agreement with respect to recommendations. Perhaps the most visible report from these activities, directly relevant to CU-Boulder, is that of the Carnegie Foundation's Boyer Commission document 'Reinventing Undergraduate Education: A Blueprint for America's Research Universities'. This report provides a roundly condemns many traditional teaching practices at Research I universities and insists that major changes need to be made. Similar recommendations for changing practices of undergraduate education can be found in the National Science Foundation's publications 'Shaping the Future' Vol. I (NSF 96-139) and Vol. II (NSF 98-128).

Briefly, these and numerous other reports advise a shift to a process oriented, student centered educational model for undergraduates and a shift away from the lecture format, sometimes pejoratively referred to as the 'sage on the stage' model of undergraduate education. The 'best practices' models recommend (among other elements) inclusion of inquiry-based education for first year students, broad incorporation of research-based learning into the standard undergraduate curriculum, and improved institutional support of inter-disciplinary education.

Campus-wide responses to ‘best practices’ recommendations

CU-Boulder has incorporated active research participation of undergraduates for many years. However, it is our explicit plan to greatly expand this component of undergraduate education and to do so particularly for first and second year students. Traditionally, many faculty have chosen to employ undergraduates during their junior and senior years largely because it has been assumed they need that level of course work background in order to be productive in the research lab. With the aid of new institutional persuasion and programs, many faculty are now realizing that just the opposite approach may be more effective both for the individual students and for their own research programs. For example, we now have a Summer Undergraduate Research Experience program in place which places incoming students into active research projects in the summer BEFORE they enroll as freshmen. Thus their very first CU-Boulder experience is inquiry-based, active participation, research-based learning. The program has been a resounding success as judged by the student participants and the faculty sponsors. One strong advantage for students and faculty, somewhat unforeseen, is that these students have had a high success rate in becoming ‘permanently’ incorporated into these research programs as they continue their undergraduate careers at CU-Boulder. From the faculty perspective, the initial training investment can pay substantial returns for several years subsequently. A few faculty have now made it a policy to *only* take first or second year students for this reason. From the student perspective, they will have established a substantial record of research, often with publication credit potential and, most importantly, they have experienced undergraduate education in one of the most effective educational models possible.

We also have a large and expanding Undergraduate Research Opportunities Program available to all students from all majors. In the 1997-1998 academic year alone, approximately 450 individual research projects for undergraduates were funded entirely by the campus. Students write proposals, execute research and produce refereed publications with a high level of success based largely on a collaborative learning model of education with faculty. Perhaps this program best illustrates the integrative nature of research-based education for undergraduates and substantially weakens the oft-perceived notion of undergraduate education *versus* research; collaboration between research and teaching, not conflict, characterizes this model. Many students are employed in ongoing research projects funded by individual research grants and many others carry out independent research projects under the supervision of individual faculty. All these categories of opportunities march well with the notion of research participation as a best practices educational model. Ideally, we hope to eventually be able to offer an authentic, research-based educational experience for every undergraduate at least once during their baccalaureate programs.

Multidisciplinary programs constitute a second area where CU-Boulder is initiating campus-wide undergraduate initiatives which respond to the recommendations of the Boyer report. Two initiatives of special relevance are called, respectively, the Norlin Scholars Program and the Chancellor’s Leadership Residential Academic Program. Both

programs have been explicitly designed to be available and valuable to all campus majors: engineers, musicians, art historians, chemists, journalists, etc. The content and structure of the courses being created for these programs are being consciously formulated for classes composed of students representing any major from any campus school or college. More detail will be presented below when these programs are described more fully.

Selected statistical data on undergraduate education patterns

The student body is comprised of about 25,200 students, 81% are undergraduates. Approximately 2/3rds are Colorado residents, 48% are female and about 14% are minorities. ACT scores for the 2nd through 3rd quartiles (i.e. the middle 50%) of entering freshmen ranged from 23 to 28; 540 to 640 on the SAT math exam. Half of all undergraduate class sections enroll 22 or fewer students and 85% of all classes have fewer than 50 students. Average class sizes range from 12 in Music to just over 50 in Business. The trend in average class size is that of a small decrease: approximately 39 in 1990-1991 to a current value of about 33. The average number of credit hours taken by undergraduates is 14-15 per semester. Approximately 65% of our entering freshmen graduate from CU-Boulder in six years; approximately 35% in four years or less. Baccalaureate degrees are awarded in more than 60 majors.

Academic Neighborhoods

The campus has made a significant and increasing commitment of resources to our Residential Academic Programs (RAPs) which are designed to create small neighborhoods of living and learning. Class sizes are kept small, they are held in the resident halls and the students are encouraged to develop common study groups and collaborative learning both in and outside of class time. Approximately 1100 students participated in five RAP programs during the 1997-1998 academic year and that number will increase substantially over the next three years as one program undergoes major expansion and an additional new program is added. At present, we have RAP programs with academic themes in American Studies, Humanities and service learning, Honors, International education, and environmental sciences. The environmental sciences program is being expanded to include all natural sciences and the new Chancellor's Leadership RAP will open in the Fall of 1999.

The RAPs are among the elements of undergraduate education most highly valued by students and parents. They cater primarily to first and second year students and have shown their high value academically and socially. In exit interviews among seniors and in information gathered from current students and alumni, the RAP experience is almost invariably cited as one of the most positive and important of all undergraduate programs. Many students cite particular instances in which they, as individuals, received personal attention from faculty, staff, and peers which played key roles in dealing with difficult situations, some of which may have otherwise led to abandoning college altogether. Partly in response to this demonstrated record of success and partly in response to a high level of unmet demand for these programs, the campus is expanding those already in

existence and initiating an entirely new one in the Fall of 1999. The Baker Hall program in Environmental Studies is being expanded to include all of the natural sciences and is anticipated to grow from its current enrollment of 125 students to at least 400 within three years. The Chancellor's Leadership RAP will begin in the Fall of 1999 with an anticipated enrollment of 75 students and the expectation of reaching 200 in two years. RAP programs are funded approximately 50% by student fees (currently \$600/year) and 50% by other campus sources. Initiation of the Chancellor's Leadership RAP program follows an intensive period of study and piloting funded by the campus, IBM, the Ford Foundation and the Student Leadership Institute.

The campus ROTC programs (Army, Navy, Marines and Air Force) also provide a well-established academic neighborhood which effectively serves the needs of approximately 600 students. They maintain a very strong scholarship program, tutoring services, individual counseling, physical space for cadets to work together and sponsor many other activities which build a strong sense of identity and community among the ROTC students. Statistically, they frequently have the highest grade point averages and are always among those with the highest graduation rates of all our academic neighborhood programs.

Another new initiative directed toward undergraduate education on the campus is called the Norlin Scholars Program. This program is designed for students of exceptionally high academic commitment and individual creativity. Students are being drawn from all majors across the campus and there will be an explicit emphasis in having an academically diverse group: engineers, performing artists, mathematicians, entrepreneurs, philosophers, linguists, etc. This scholarship program has been devised as explicitly interdisciplinary in content and outlook.

New courses are being devised for the Norlin Scholars themselves. One course, for example, will take a multifaceted, team-oriented approach to some central theme. If, say, the central theme chosen for one semester is the Colorado River, the course will first study that entity from the perspectives and viewpoints of an engineer. Topics might include flood control, power generation, dam and highway construction. The group will then study the Colorado River from the perspective of a musician. Topics might include musical compositions such as the Grand Canyon Suite and would focus on how music can communicate certain features of a river and how that communication can affect listeners. Then they might switch to the perspective of a historian. How did the existence of this river affect Native American societies? What role has the river played in the development of the Western U.S. The class might then switch to the perspective of an environmental chemist. How does the chemical composition of the river change from its headwaters near Long's Peak as it winds its way down through Mexico and out to the Pacific? Why do those changes occur? Of what consequence are they? The goal of this style of intellectual endeavor is to develop and encourage holistic, encompassing intellectual attitudes and skills in these academically committed students. Institutionally, it is one of our efforts to give a greater emphasis and significance to interdisciplinary programs, a trend we anticipate stimulating here in the future.

The campus has a long established program called the President's Leadership Class which is a scholarship and academic program operated partially by an independent non-profit group called the Student Leadership Institute. This program selects students for special classes in leadership in conjunction with the scholarship monies they provide. The SLI itself raises the scholarship money, provides classroom instruction and serves as a key resource of visiting experts in leadership, especially from the business and political arenas. This highly successful program generates a strongly loyal group of alumni and is one of the most visible undergraduate programs to the outside community. It serves approximately 120 students each year.

The Boulder campus has committed funds for a new faculty/staff position to serve as a special academic advisor and mentor to students who have strong records or potentials as academic high achievers (Boettcher, Norlin, Honors, PLC, and others). These students are likely to become strong candidates for prestigious fellowships such as Truman, Marshall, and Rhodes. This advisor and mentor will develop specific mechanisms which help students make plans of these sorts and prepare themselves beginning early in their academic careers on campus. This person will also work to develop interactions and a sense of group identity among these high-achieving students at a level not previously found here. Our goal is to substantially increase the sense of academic neighborhood among these undergraduates by providing expanded faculty guidance, counseling and peer interaction.

Faculty Teaching Excellence Program

This program, funded by the campus, is dedicated to enhancing undergraduate teaching. The program includes classroom video taping followed by one-on-one consultations with trained and experienced faculty consults, workshops for faculty dedicated to a suite of classroom teaching issues, and provides access to the pedagogical literature. This program operates entirely independently of the campus evaluation process focusing exclusively on a confidential client/counselor relationship dedicated exclusively to improving undergraduate teaching. The campus invests more than \$400,000 per year in this effort.

Summary

The University of Colorado at Boulder has re-dedicated itself to strengthening the quality of undergraduate instruction and to stimulating efforts to revolutionize the undergraduate educational experience in those areas where research results indicate that such is warranted. We are striving to provide a more personalized, individually sensitive environment to undergraduates, especially in their first and second years of college life. Finally, we are beginning to develop mechanisms and programs which provide for a truly broad, multidisciplinary intellectual experience to supplement the traditional departmentally-oriented degrees. Undergraduate education is our principal mission.