

Graduates – 3/4/07

Question: What will our graduating students need to know and be able to do in the year 2030?

Summary:

Our main recommendations are in three key areas:

- **Graduates' abilities and attributes:** Key attributes that a CU-Boulder education should supply include critical thinking ability, agility, global perspective and understanding, environmental understanding, values and ethics, civic engagement, and deep knowledge of one or more disciplines.
- **Institutional flexibility:** CU-Boulder needs to institute processes and a culture that allows it to consider and make significant institutional changes in response to unforeseen developments. These could include things as fundamental as the structure of course units, majors or degrees; the contractual or rostering patterns for faculty; and the structure of schools and colleges.
- **Interdisciplinarity:** CU-Boulder particularly needs to consider structures that support the hiring and evaluation of faculty engaged in interdisciplinary work, and that support the creation and operation of interdisciplinary academic programs. The campus should seriously considering creating a Dean of Interdisciplinary Studies to advocate for such faculty and programs, and a possible overarching institute structure for interdisciplinary programs.

We recommend an immediate step that would support and exhibit these characteristics:

- **The CU-Boulder Academy:** Create a four-year residential academic program where students gain the suggested abilities and attributes through an approach that is customized for each student. Rather than taking a prescribed set of core courses, the student and advisor would construct a set of curricular and extra-curricular experiences (including, for example, community service and international experiences) that provide the abilities and attributes in a unified and mutually reinforcing manner. The Academy should be regarded as a pilot and an example of institutional flexibility, not the only method of moving toward the goals.

Report:

Assumptions about developments leading to 2030

- Knowledge, facts will be readily available – so main point of education will not be accumulating knowledge, facts, but learning how to access, synthesize, analyze, evaluate and apply information
- Many basic structural characteristics of CU-Boulder will remain:
 - Will continue to emphasize integration of research and scholarship into undergraduate and graduate education, and comprehensive faculty research and creative work contributions.
 - Liberal arts majors/programs will remain large portion of campus/students.
 - Professional majors/programs will remain important aspect of campus
 - Probably will still offer degrees, mainly comprised of individual courses. Student probably still will come here and takes courses. But these characteristics could change.
- The state of Colorado and the nation will be increasingly diverse
- Global and civic issues will be increasingly important in education.
- The increased mobility of learners and teachers will create a need for students and faculty who are more open to culturally different points of view, and more capable of communicating across cultural boundaries, in educational and work settings
- Increasing numbers of incoming students will already have had an international/intercultural experience before coming to CU-Boulder
- Interdisciplinarity will be more important – curriculum, research
 - Interdisciplinary can mean many different things. These can include task oriented team work to solve a problem, different viewpoints within a single department, or combining multiple departments or disciplines.
- Life long learning and continuing education will have increasing role.
 - This includes expanding the scope of instruction beyond the residential campus, an increased role in life-long education of alumni, and more just-in-time learning
 - This includes while student is here, preparing students to continue learning
- Technology changes will strongly influence pedagogy and content.
 - Information is readily available, classroom experience is about how to access, evaluate, analyze, synthesize and apply information.
 - Students will expect more active and visual pedagogy, utilizing technology
- Students and parents will expect that a CU-Boulder education will prepare students for employment and to be able to get a job upon graduation
- Although English may continue to be a dominant international language, increased levels of international interaction will necessitate that more graduates have competencies in other languages
- Employers will expect students to have learned communication and technology skills and be able to integrate them into their study and work

Scenarios: The envisioned scenario in 2030 that CU-Boulder will have to respond to

- We can't predict the future 25 years out. Looking back 25 years shows this clearly. Thus, it is crucial that we create a university that is agile enough to adjust to a future that is unpredictable.
- There are likely trends that show that this will likely be a quite different world in 2030. Students may be more focused on the survival and health of the planet and nation than recent generations have been, and less in the mindset of a generally prosperous society. Some examples of likely influential forces include:
 - The environmental issues that students who are being educated in 2030 will see themselves as facing in the next 50 years of their lives may appear far more daunting than most of us think about now, potentially encompassing massive population redistributions and even the survival of the planet due to global warming and rising ocean levels.
 - Health issues could go in many influential directions. On the one hand, pandemics could have far greater impact than ever before, with the population of the planet reaching a saturation point also playing a role. On the other, we could be looking at 100-200 year life spans at some point which would greatly change the framework of society.
 - Geo-political forces could work in a myriad of ways. It is possible that by 2030 we will see greater destabilization (terror, war) caused by age-old ethnic and religious differences. We are almost certain to see a redistribution of economic and political power towards Asia.
 - Energy issues could reach a critical point, with some of them (e.g. depletion of some oil fields in the Arabian Peninsula) also impacting political stability.
 - Artificial life, ranging from robotic aids to environments that sense and react to human needs to fully functional androids, could enormously change and perhaps ease the human experience. It also is possible that virtual reality will have made the sensory experiences of being in the same space as another person achievable even if people are a great distance apart.
 - At the pessimistic end, it is possible that by 2030 the focus of students' studies will be more on future survival than reaping the rewards of prosperity during their careers. On the other hand, they could be preparing for a life whose length and/or quality is much higher than what we can imagine.
- Our graduates will need the critical thinking abilities, breadth and depth, global perspectives, civic knowledge, values, and agility to contribute in this uncertain world.

Strengths, weaknesses: CU-Boulder's current strengths and weaknesses in responding to that scenario; barriers to and opportunities for responding to that scenario

Note: The subcommittee did not spend much time on this topic, assuming that many of the same statements would come from each group. The following is a partial list of some key overarching strengths and weaknesses of CU-Boulder, coupled with some strengths and weaknesses that are particularly relevant to some of our key recommendations.

Strengths:

- Excellent faculty
- Many high quality academic programs
- Appealing location
- Strong interdisciplinary research tradition, particularly in the institutes, sciences and engineering
- Excellent level of external research funding
- High quality environmental curricular and research programs and strong campus environmental culture
- Strong study abroad program

Weaknesses:

- Poor state funding
- Quality of academic programs not uniformly strong across all disciplines
- Low proportion of graduate students
- Overall quality of undergraduate students not as strong as at the leading public institutions
- Lack of a strong culture of institutional innovation
- Insufficient ethnic and international diversity in student body
- Lack of success in re-examining undergraduate core curricula
- Limited structure for creating and supporting interdisciplinary degree programs
- Insufficient support for success of faculty with interdisciplinary teaching, research and creative work interests
- No overarching campus plan for international engagement

Responses: CU-Boulder's necessary responses to be successful in that envisioned 2030

- A CU-Boulder education should equip our graduates to have the following abilities and attributes:
 - Critical thinking ability -- know how and why to acquire, evaluate and synthesize knowledge, facts.
 - Agility – ability to move from one field to another quickly in order to address problems as they arise. Also ability to work with people in other disciplines.
 - Educated citizens – understanding the world around them, including geopolitical, anthropological, and ecological aspects of the world and world history.

- Global perspective and understanding – of diverse cultures and perspectives within the U.S. and internationally
 - Values, ethics – foundations and applications within their areas
 - Civic engagement – inclination and experience, ability to contribute to the community
 - Appreciation of music, arts, literature, ways of knowing about being human
 - Understanding and appreciation of environmental issues
 - Knowledge of one of more disciplines and the way of thinking and approach in that discipline
 - Ability to navigate between breadth and depth, and between reason and emotion, and to appreciate the roles of each
 - Communication abilities, written and spoken
 - Equipped to get and succeed at a job, including adaptability and ability to change
- CU-Boulder needs the flexibility to make significant changes (potentially including the structure of colleges and schools or other changes of that magnitude) in response to unforeseen developments. To do this, the campus needs an ongoing structure to systematically review institutional issues; a regular “Campus level program review.”
- Given that we cannot accurately predict change and given the fact that the needs of our graduates will in fact change, the campus must put in place processes that will enable us to react quickly, efficiently, and intelligently to developments within higher education. We need to improve our ability to evaluate and to alter programs at all levels, from individual departments and institutes to the campus as a whole. While we should make use of current practices, such as program review, we will need to develop new structures that will be able to move nimbly and have the authority to make real changes.
 - These practices may involve such ideas as regular assessments at the department level of the success of curricular offerings, external advisory panels that might help in steering the direction of colleges and schools, or the creation of a campus entity dedicated to institutional change. In a sense, we want to create a culture of review and planning that would enable us quickly to perform a review on anything from a particular program in an individual department to decisions for the campus as a whole
- The hiring, evaluation and reward structure for faculty must recognize interdisciplinary contributions and abilities.
- As interdisciplinary work becomes more common, the campus should consider whether a new structural approach is needed to foster the hiring and success of faculty engaged in interdisciplinary research and education. Issues include the ability to teach interdisciplinary courses and the recognition of interdisciplinary research, sometimes in areas where established conferences, journals and other mechanisms are young or non-existent. Examples of structural approaches include a new Dean of Interdisciplinary Studies who works with disciplinary deans/chairs in

- overseeing interdisciplinary faculty, a form of matrix management for faculty engaged in centers or institutes (as well as departments), and/or an overarching institute for interdisciplinary studies.
- CU-Boulder needs to significantly increase the diversity of its students and faculty. (We have not expanded upon this item as we expect it will be contained in another subcommittee’s recommendations.)
 - CU-Boulder needs to continually assess the technologies that current students are using in their lives, and consider how these should impact the instructional methods that the faculty uses. There is likely to be a need to provide resources to help faculty bridge the gap between the technologies they are accustomed to and the ones that students use, and to examine which are useful pedagogically.
 - CU-Boulder needs to integrate its curriculum and skills expectations with the Colorado K-12 system, and play a leadership role in the State’s K-PhD educational system.
 - As demands on our graduates increase over the next decades, so too will demands on the State’s entire educational system, from pre-K to post-graduate. CU-Boulder should provide leadership to dramatically strengthen this system to create opportunity for all of Colorado’s children. In particular, CU-Boulder should strengthen its efforts to work with K-12 and community and state college educators and students to improve preparation in science and mathematics, to ensure that that Colorado’s children are not compromised in their opportunity to participate in careers in “high-tech” fields, and to enhance the scientific literacy that is increasingly critical to full participation in civic life. The University should maintain a close partnership with K-12 curriculum developers and evaluators to improve communication and feedback regarding college preparation in all areas.
 - We need to rethink the structure and purpose of continuing education
 - At least two factors will make just-in-time access to lifelong learning opportunities critical for our graduates: the speed of change in most professions, and limited opportunities to return to school for further classic education. CU-Boulder should get ready to provide ongoing access to education for its graduates; perhaps we should even guarantee ongoing educational support for graduates of our institution. This will require us to think about real-time virtual learning environments and non-traditional scheduling. We can’t fully prepare our students for the rapid evolution of IT or its impact on their fields of expertise, but we can help them address their own changing needs into the future.

Actions to implement these responses

Time periods:

- *Short term: Up to 18 months*
- *Mid: 3-5 years*

- *Long term*
- Re-conceiving general education:
Notions of general education have changed several times in the last thirty years and will surely change again in the next thirty. Most often today general education is conceived as a set of courses in various categories that are set up to insure that students get a broad education. This model, enshrined in core curricula, does not insure that the student will get a coherent general education nor does it speak to the quality of that education. As CU moves towards 2030, the campus should engage in a conversation about general education that might move from a smorgasbord of courses to linked groups of courses or a notion including varying kinds of educational experiences (e.g., service learning, hands-on learning, and international education). Steps that might be taken:
 - In the short run, one or more of the residential colleges could be used as a pilot program where faculty and students could experiment with a changed notion of general education. This could involve designing a group of curricular and extra-curricular experiences for each student to foster achievement of the abilities and attributes outlined above, in a unified and coherent manner. (Short and medium term).
 - Another short term possibility is to use the current core curriculum but to advise students to pursue courses that link to one another, that speak to one another in interesting ways. (Short and medium term)
 - In the longer term, the campus should engage in a conversation about re-conceiving general education that would result in a restructuring of the core curriculum, addressing the abilities and attributes outlined above. (Medium and long term)
- Additional steps related to the suggested abilities and attributes for our graduates:

Short term: Next 18 months

- Communicate this vision of our graduates from early recruitment throughout the learning experience.
- Define the University's values and expectations to all members of the University community. Articulate these values through a broad range of media.
- Implement a requirement that all graduates must participate in civic engagement and service learning for 20-40 hours prior to beginning their junior year.
- Implement University 101.
- Define effective and successful communication abilities which support this vision. Assess student communication abilities, written and verbal. Develop a plan of action which addresses gaps.

- Complete a climate assessment of the campus, with particular attention to the climate for those of diverse backgrounds. Identify issues and develop a plan for response.
- Enhance CU-Boulder's performance and reputation for academic excellence and high academic standards, perhaps by increasing focus and emphasis on critical thinking, effective oral and written communication, broad intellectual content, and complex problem solving skills suitable for all undergraduate degrees. Accomplish via developing new pathways for degree options with concomitant curriculum modification and emphasis plus highly visible statements in recruiting, admissions, etc. which point to these points of focus. Consider the addition of a senior thesis requirement.
- Enhance CU-Boulder's performance and reputation for graduating students who are well prepared to be active, ethical participants in a dynamic, democratic society. Possible pathways to accomplish could be via additional or different curriculum requirements such as portfolio requirement, service learning requirement, community service/civic engagement requirement, registration and/or voting in at least one national or local election requirement or other means. Expand and strengthen the 'residential college' idea to include opportunities for students in all four undergraduate years.

Medium term: 3-5 Years

- Implement the communication abilities plan (mentioned above).
- Implement the recommendations of the climate assessment plan. Re-assess the climate every two years.
 - Identify and implement the strategies and resources needed to support recruitment and retention of diverse staff and faculty.
 - Identify the strategies and resources needed to support diverse student recruitment and retention with the goal that the campus enrollment demographics, at minimum, reflect the State of Colorado high school graduate demographics. Ensure programs which support these students receive requisite funding and support.
- Require all students complete 20-40 hours of civic engagement and service learning each year as a condition of academic advancement. Develop the infrastructure which supports students' connecting with and achieving this expectation, including financial aid that makes this experience available to all students regardless of financial means.
- Enhance the Office of International Education to include the role of coordinating curricular offerings to students as well as all other aspects of international intersection within the University.
- Provide the infrastructure and the intellectual leadership to enhance the international perspective in student body composition, curricular offerings, and exchange programs. For example, given sufficient infrastructure, we could double the current proportion of students who have a 'study abroad' experience to 50% of undergraduates. In the longer term, require a study

abroad experience of each undergraduate student. Couple this requirement with significant financial aid to make this experience available to all students regardless of financial means.

- Require some endeavor by each student that contributes to the objective of creating a green campus.
- Identify formal and informal practices and traditions which detract from achievement of the vision for our graduates. Engage the campus in supporting the elimination of these practices.

Long Term:

- Continue assessing the climate of diversity for our campus. Implement actions and identify resources needed to continue resolving and responding to issues.
 - Consider whether there should be a College of Interdisciplinary Studies or other structure to support curricular as well as research objectives.
 - Commit to be a green campus.
- Adapting to an ever-changing environment for higher education:
Given that we cannot accurately predict change and that the needs of our graduates will change, the campus must put in place processes that will enable us to react quickly, efficiently, and intelligently to developments within higher education. We need to improve our ability to evaluate and to alter programs at all levels, from individual departments and institutes to the campus as a whole. In a sense, we want to create a culture of review and planning that would enable us quickly to perform a review on anything from a particular program in an individual department to decisions for the campus as a whole. Steps that might be taken include:
 - Articulate “principles for a flagship” to help guide institutional level strategic planning
 - Revise the Program Review process to make it a more nimble way to engage in planning at all levels. (Medium term)
 - Periodically (say every 3-5 years), constitute an ad-hoc task force consisting of a small number of particularly creative thinkers who have a campus-wide perspective to assess the need for significant cultural, structural or other changes at the campus level, with the understanding that the recommendations of this group then will be seriously reviewed and considered by the campus. (Medium term)
 - Create a campus entity dedicated to institutional change. That is, form a body (e.g., “The Chancellor’s Committee on Agitation”) that has the task of agitating for change. (Medium term)
 - Institute regular assessments at the department level of the success of curricular offerings
 - Charge external advisory panels to help in steering the direction of colleges and schools

- Hiring, evaluation and reward structure for faculty
The hiring, evaluation and reward structure for faculty needs to recognize interdisciplinary contributions and abilities:
 - Create a Dean of Interdisciplinary Studies who works with disciplinary deans/chairs in overseeing interdisciplinary faculty. (Short term)
 - Consider whether a new structural approach is needed to foster the hiring of faculty engaged in interdisciplinary research and education, and their success including the ability to teach interdisciplinary courses, and the recognition of interdisciplinary research and creative work. Examples of structural approaches include a form of matrix management for faculty engaged in centers or institutes (as well as departments), or a new overarching institute of interdisciplinary studies.
 - Implement the new structure suggested by the above process. (Short to medium term.)

- Integration with K-12:
Short term:
 - Participate in the Workforce Innovation in Regional Economic Development (WIRED) initiative and other efforts to assess the current status of K-12 programs in Colorado and develop strategies for improving the State's educational system.
 - Initiate a campus-wide process of evaluating our existing outreach programs to determine what is and isn't working, and benchmarking outreach strategies with other universities across the country, to identify strategies to enhance the pipeline of diverse students attending CU-Boulder.
 - Expand existing outreach and teacher training programs aimed at increasing preparation and participation in science and mathematics by diverse students, with a special focus on creating strong, long-term partnerships with targeted K-12 schools with high enrollments of minority/economically disadvantaged students.
 Medium term:
 - Expand science, mathematics, and engineering outreach and teacher preparation programs to reach at least 25% of the middle and high school students in the state, targeting school districts with high percentages of minority/economically disadvantaged students and using remote delivery methods as appropriate.
 - Utilize a process of continuous evaluation and improvement to sharpen the value of outreach programs across the University.
 - Participate with other educational partners to raise funds to guarantee in-state tuition assistance for all Colorado students who qualify, so that tuition costs are not a barrier for any student.
 Long-term:
 - Collaborate with others to provide sustained funding to guarantee access to in-state higher education for all qualifying Colorado students.

- Achieve diversity at CU-Boulder that mirrors the diversity of the State's high school graduates..
- Continuing education
At least two factors will make just-in-time access to lifelong learning opportunities critical for our graduates: the speed of change in most professions, and limited opportunities to return to school for a classic education. CU-Boulder should get ready to provide ongoing access to education for its graduates; perhaps we should even guarantee ongoing educational support for graduates of our institution. This will require us to think about real-time virtual learning environments and non-traditional scheduling. We can't fully prepare our students for the rapid evolution of IT or its impact on their fields of expertise, but we can help them address their changing needs into the future.

Short term – 18 months:

- Assess delivery mechanisms for bringing just-in-time continuing education options to our graduates. (Web classes, scheduled chat sessions, virtual world meetings such as in Second Life)
- Pilot one such outreach course for graduates, on the topic of IT and its impacts on your profession.

Medium term – 3-5 years:

- Survey graduates 3-5 years out of CU for what type of educational experience do they wish they could get from us at this point in their lives.
- Pilot at least 10 alumni educational experiences online, surveying for effectiveness

Long-term:

- Guarantee to every graduating student that there will be a certain number (say 10) of free educational online experiences available to them. These might be 1-hour chat sessions, virtual world interactive sessions, or some other form of delivery.
- Provide for-fee in-person educational experiences on the CU-Boulder campus over long weekends or vacations for those who want to come back and recharge their intellect.
- Enhancement of teaching:
Enhance CU-Boulder's performance and reputation for effective teaching by placing greater emphasis (resources and rewards) on employing 'best teaching practices' such as more research participation, service learning, individual student projects, IT, and, perhaps, senior theses. Primary pathway will be revision of reward and evaluation structure for merit pay, tenure and promotion to be broader, more inclusive and well publicized.
 - Consider a process that achieves this goal. For example, all annual merit pay allocations could be mandated to be awarded, and justified, in a proportional allocation manner, e.g. 40% to teaching merit, 40% to

research/creative work merit, and 20% to service merit. To get highest raises, faculty would need to be excellent along all three dimensions and salary decisions for each category would be made independently of each other. (Short term)

- Implement a process that achieves this goal (Short to medium term)