Colorado Learning Analysis Studies:

Ideas from students on making the most of their learning inside and outside the classroom

Project Report No. 1
Summer 2007
CU-Boulder

CLAS Report No. 1 available at:
www.colorado.edu/ftep/research/clas.html

CU-Boulder Students Speak Their Minds: Promoting Student Learning in and out of the Undergraduate Classroom

Colorado Learning Assessment Studies (CLAS) Report

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July 27, 2007

Introduction

The Colorado Learning Assessment Studies (CLAS) program is an effort to determine teaching and learning strategies that promote learning at CU-Boulder. The project sought to extend Richard Light's work at Harvard University. Light (2001) interviewed students at Harvard to discover the most effective aspects of their undergraduate education. As undergraduate experiences at the University of Colorado at Boulder are seen as significantly different from those at Harvard, the CLAS investigators developed a context-specific research project in order to uncover optimal learning on the CU-Boulder campus. The themes that emerged from forty-three student interviews elicit recommendations for CU-professors, for encouraging participation, developing positive relationships with students, and increasing opportunities to learn outside of the classroom.

Research Questions

The following questions were asked of forty-three CU-Boulder students participating in the CLAS study:

Background Questions:

What is your class standing at CU?
What is your major?
Did you transfer to Cu from another college?

Topic 1:

What can faculty do to develop positive relationships with students?
(sample probing questions: Is there a professor you've gotten to know really well? How did this happen? Is it valuable?)

Topic 2:

What can a faculty member do to make the material in his or her courses more interesting to students?
(sample probing questions: Can you give an example of something really interesting in one of your classes? What makes classes boring?)

Topic 3:

What can a faculty member do to increase learning by his or her students out of class?
(sample probing questions: Can you give an example of something you've done outside of class that has been especially helpful in learning class material? What do you think of the work faculty ask you to do outside of class?)

Topic 4:

What can a faculty member do to increase class participation by his or her students?
(sample probing questions: Have you had a class in which you participated a lot by asking questions or contributing to class discussion? What keeps you from participating?)

Topic 5:
What can a faculty member do to increase the likelihood that his or her students will discuss the material in the course outside of class?
(sample probing questions: Can you think of a time when you have discussed material from one of your classes with a friend or family member who's not n the class? What would make it more likely that you would want to do that?)

Methods

In the summer of 2004, freshman, sophomores, juniors, and seniors were interviewed regarding their relationships with professors, participation in courses, and their experiences learning inside and outside of the classroom. Forty three students were interviewed in all, representing engineering, language, physical sciences, social science, humanities, and business departments on campus. Interviews were taped and transcribed, then coded iteratively.

Results

This report describes the patterns that emerged from the data. When available, a number is presented in parentheses following a phrase or concept. The purpose of the numbers is to represent the occurrences of the code in the transcript data. While qualitative data is not dependent on statistical significance or frequency of comments, the numbers allow the reader to understand the extent to which attitudes and opinions were shared among students. Student transcript quotes are also included for each section, to allow student voices to shine through in this report.

In the following sections, the student responses are described for each topic. After each section, a list of recommendations follows. Often the recommendations are taken directly from transcript data, while in a few cases the recommendations were inferred from student comments. For example, many students responded that they went to office hours and got to know professors after their professor suggested in class that students should visit his or her office. A recommendation for increasing positive relationships with students by explicitly inviting students to attend office hours arose from that data.

CU Student relationships with faculty

Students responded to the question "Is there a professor you've gotten to know really well?" The majority of students had developed positive relationships with faculty members. Students interviewed for CLAS described the ways in which these relationships developed with faculty, motivation for students' building

connections with professors, and the type of professors students sought for guidance.

Development of positive relationships

CLAS students described a positive student-faculty relationship as a one-on-one relationship, or a personal relationship in which a professor maintained individual contact with a student. These connections between students and S, Ffaculty progressed through office hour conversations (mentioned by students on 17 occasions), outside academic activities, such as campus academic and social clubs (9 instances), when students enjoyed small class sizes (11), and through undergraduate research experiences (8).

"Well in the Scandinavian program, I guess I've worked a lot with the different professors. I've done an independent study with (*professor name)*, and then I'm the President of the Scandinavian club, so the advisor was the (*subject matter*) teacher. So I worked a lot with him, too."
"I'm working for a research lab in the psych department. I contacted (*a professor in the psych department*). The work is very valuable to me. I get to do an honors thesis. I get to learn a lot more things before everyone else in the psych department."
"My history teacher last semester was this really cool guy…he encouraged people to come to his office hours a lot and talk to him about personal experiences with history."
"I used to go to (*my professor's*) office hours for help a lot, and he kind of singled people out in lectures, and say hi to them in the middle of lecture, ask them how they're doing. He'd always say hi to me in the middle of class, and made me feel he actually cared about me learning rather than me just sitting there listening to the lecture."
"Another teacher I got to know pretty well is *(professor's name)*. She was very open to meeting students and…even though I had a large lecture, she made time to meet with students individually….she had an optional, once a week gathering, where she would teach us more in depth material."
"I got to know one of my *(subject matter)* professors…my first class, initially, I told her I was going to withdraw from the class and she stopped me; so I ended up building a rapport with her off of that, so that's kind of how I got to know her. She was really encouraging, and that was a small class."

Students invariably described these connections with faculty as a student's responsibility—it was a student's job to initiate contact with professors. Positive relationships with faculty members were desired by all students interviewed for CLAS. Those who had not pursued friendships with faculty listed their own time constraints (5), feeling intimated by or fearful of professors (17)

and professor inaccessibility (6) as reasons for not connecting with professors in a one-on-one dialogue.

"I know there are just some professors that I didn't want to talk to. I know my *(subject matter)* professor, I made the effort, but I just didn't feel like I was getting anything back. And a lot of times, I think, in big classes especially, you don't feel like you're being listened to, necessarily."
"I think just some professors have personalities where they don't come across as inviting and wanting to get to know their students more."
"We have clickers and we're all just a number. You have to put forth the effort if you want to get to know your teacher. Usually we were supposed to go to our TAs first (when we had a question)."
"I work full time as well as go to school, so sometimes my schedule is a little difficult to meet with them during their office hours."

Motivations to connect- perceived benefits of faculty-student relationships

Students had a variety of pragmatic, personal, and professional reasons for initiating positive relationships with professors at CU-Boulder. Eight students mentioned they wanted to get to know professors well so that they could ask for letters of recommendation, while four believed a positive relationship might boost their grades in courses. Two CLAS interviewees mentioned that course feedback from professors was desirable, and two more said they felt their positive relationships with professors were responsible for greater academic achievement.

Students engaged in positive relationships with their professors stated they learned better from professors they knew personally (20). The material was more accessible to them when they were able to discuss it with their professors. Students could understand a professors' perspective when they interacted with him or her on a one-on-one context. They benefited from a professor's guidance, and often took more courses from professors they knew personally. Students also show additional effort in courses taught by those they knew personally, and enjoyed their courses more.

CU-Boulder students stated that having positive relationships with professors encouraged them to persevere in a chosen subject (7). Personal relationships with professors even built interest in particular careers for some students (6). CLAS students described professors they knew as individuals who guided them (3) personally and professionally. Their conversations and working relationships gave students the opportunity to apply subject knowledge to real-world problems (4), particularly in scientific research, education, and business.

"(Positive relationships with professors) makes you want to continue in that subject."
"(getting to know professors) makes you want to continue on in that subject. For me, accounting was a subject that I despised going in. I would never have thought to continue…and it's now a subject I am willing to pursue."
"Out of all my professors I went to see him personally more than others, and there are big class sizes in the classes I took, and his openness not only to discuss assignments and help me further with assignments, but just his enthusiasm about mathematics as a study was inspiring and part of the reason that I chose being an engineer…I made sure I had him as a professor the second semester around."
"It's always good to know that you have someone to guide you through stuff and can teach you new things."
"I met *(professor)* in one of my classes called *(course name),* and then she asked me to be on the undergraduate committee. And from there I liked her teaching style so much that I took another class from her called *(course name)*, and then I applied for a position at the department as an undergrad activities coordinator. Now she's my boss. I know her really well."

Professors' characteristics- with whom do students engage in positive relationships?

No particular feature stood out in this category. In fact, students developed positive relationships with a variety of professors at CU-Boulder. The trait mentioned most often was professor accessibility (6). They discussed that they did not want to bother professors who were clearly very busy with their research, particularly when these professors also taught large, lecture based courses. Entertaining (4) and enthusiastic (3) professors were also mentioned by a small portion of students, as well as caring (1), patient (1), young (1), and challenging (1) professors.

Barriers to positive relationships

CLAS interviewers asked students what they thought impeded them from forming positive relationships with their professors. Students mentioned large courses as an obstacle to positive relationships with professors (16) As stated above, many students revealed they were intimidated by their professors, and did not want to "feel dumb" by speaking with them one-on-one (17). Five students perceived that professors were cold, that their own interest in building relationships was not shared by their professors.

"It's hard to approach a particular professor because, you know, they have three sections of like 500 kids. And I didn't really have that many one-on-one questions for them or I didn't take the opportunity, I guess…intimidation (keeps me from

getting to know professors) you're afraid of saying something stupid, but I wouldn't approach them unless I had something meaningful to say."
"I guess I'm not too comfortable speaking to professors."
"Obviously, in the smaller classes I got to know everyone in my class and I got to know my professor, and in the big class, I didn't even try."
"My first semester, I had a hard time getting to know (professors). You know, you're nervous, and you don't really know if you can confront your professors yet."
"I had one professor- you asked him a question and he was like, "that was a really stupid question." Why would I go into office hours and ask more questions or get to know him any better?"

Student recommendations for professors—relationship building

While students thought they were expected to initiate relationships with faculty, they did offer examples as well as suggestions for improving rapport with students.

- *Offer optional class events* Students mentioned getting to know professors during these optional sessions, when fewer students were present and the atmosphere was more relaxed. Some students viewed films with professors, when the topics related to course material. Language courses with popcorn chat sessions were also described. Study sessions held before exams led students to examine the material more deeply as they became more familiar with faculty members.
- *Tell them about your self, and your research* CLAS interviewees were more likely to initiate contact with professors they felt they knew a little about. Students were eager to hear about professors' daily lives, but also about their academic pursuits. This information often helped them understand the field more deeply because they learned the big research questions in play.
- *Invite student interaction- explicitly* Students mentioned that they did not want to bother professors with questions about the subject matter, or with professional guidance. When faculty offered direct invitations (to office hours, to CU-events, and to informal gatherings), they were more likely to attend, and more likely to initiate positive relationships.

Recommendations for students—relationship building

Students described the myriad benefits of developing connections with professors. Some advice for students on building these associations follow.

- *Attend office hours* CLAS interviewees described office hours as the place and time for initiating personal relationships with professors. Students mentioned attending office hours whether or not they had specific questions for the professor.

- *Frequent optional activities* These activities allow students to interact with professors in a less formal environment, with a smaller group of students present.
- *Ask professors about their research* Understanding professional research in a subject matter not only allows for personal interactions with professors, but also helps make academic concepts more concrete.

Interesting course material- what engages students?

Students interviewed for the CLAS project described the course material that was most memorable and effective for them so far in their CU-Boulder careers. They mentioned course presentation and content as particularly important for holding their interest in class.

Course Presentation

Enthusiasm was an element of course presentation mentioned frequently as an effective element of course presentation (16). Students remarked that when professors were excited about the material, they followed suit. Often this enthusiasm changed students' attitudes toward course material they initially had little interest in pursuing.

"I think the biggest part for me is when the teachers seem really interested… when the teacher is really enthusiastic about it, or when you can tell that they're really excited and it's their passion …you could just tell because our professor was really into it, it made it more interesting for us."
"When a teacher is actually interested, and no matter what, that always makes classes better. When they are excited about it, I always—it makes it more exciting for me, too."
"It was the ecology that interested me, because she would show little clips of video, and you could just tell she was really, really interested in it."
"And if the teacher is really excited about the subject that they're teaching, that helps a lot."
"I think they're more interesting when it's obvious that the teacher's interested in them. The professors that I've had that really liked and learned well from, they're very interested, they give their own insights, about it and maybe share their experiences with it. I think that's what makes a class interesting."

Students appreciated courses in which faculty presented material in a variety of ways (20), through multimedia (including software, videos, newspapers, and journal articles). They also listed personal stories and examples, sharing of artifacts, hands-on activities for students, and demonstrations in class as effective methods for varying course content presentation, and thus increasing student interest.

“Well my anthropology course was really cool because she would bring in stuff that she had excavated from the field, so that was really interesting.”
“Just changing it up a bit—just watching a movie once in a while, trying hard to interact with the students (makes a course interesting).”
“I guess sometimes we’d have group work or we’d have time to like in my writing classes we got to do hands-on work.”
“In sociology, we did a lot of culture-type things. Like we watched Fight Club, and we watched different news tests and read stories in different news magazines, and then related them to sociological studies.”
“Well it was kind of elementary but we were taking gummy bears and forming like the genetic strains, with different colors and different sticks. It was just basic, and you learned it and it was fun, and it was relaxed and you were able to do something not like in lecture.”

Allowing for classroom interaction was deemed beneficial for students’ learning, according to CLAS interview data. Students learned from their peers when professors allowed time for small group interaction (22). Often, students built study groups with their peers during these opportunities, and studied together for exams.

“Sometimes we’d have group work or we’d have time to, like in my writing classes, got to do hands-on work.”
“Courses where you sit down and participate or do something where you are working in small groups or where there is a mix of interaction generally are more interesting.”
“More interactive work, like working groups (would improve interest)”
“In my language classes, everybody gets a chance to participate, which is really helpful.”
“The best experience I had in one of my classes was in one of my French classes we had kind of, we had people in the class who were not average students. We had older students, and I think that was really cooperative.”

Course content

By tying course material to student’s everyday lives, faculty increase student interest, according to CLAS interviewees (25). Students mentioned that course material often felt too abstract, too removed from what they know from more direct experience. When professors drew on student issues and personal experiences to discuss course material, students were more engaged and more likely to remember the information. They appreciate faculty members’ attempts to make their courses relevant to them, beyond the final exam.

“In physiology, the fact that we learned about nutrition, and if we’re runners, what

we should eat before a race."
"The thing I love best about material is if they make it relative to things that I'm learning in my life or giving us living examples. I might be able to have discussions with other students (about the material)."
"When teachers can really relate what they're talking about to their own personal lives or to a situation we may be in, it really helps liven it up. And I have to say my economics professor did occasionally do that, and I loved when he did it."
"He could make anything relate to our lives. Because I mean we were studying ancient Greek philosophy, so it was kind of obscure, abstract. It wasn't really… you don't really think about ancient Greek philosophy when you're walking down the street every day, but he'd just teach it to you in such a way that when I was walking down the street, I would think about it."

Students were drawn to lessons and assignments that allowed them to apply the knowledge they gained in the course to complex, authentic problems in the field (20). This aspect of assignments was mentioned by nearly half of the CLAS interviewees. Project based work and hands-on activities were described as interesting, because they allowed students to test their knowledge in real-world settings, or real-world like settings. Students said these activities allowed them to imagine the professional work of experts in the field, and really "worked their brains", challenging them to stretch their thinking.

"I took (computer science course). Ands some of the labs were interesting. Because it was nice, with that class, you basically used what you were taught and actually got to put it on the board and see what it did."
"(I would like) more hands-on, go out and do research and stuff like that, and less memorize the book and fill out a multiple choice scantron. Most of my courses were pretty good about that."
"For (course title) we had to go to the elementary school every Wednesday morning, playing with the kids. So that was very helpful—good for community service. And we'd teach them about Nutrition. That was a really good program."
"I think whenever you can work with the community—work with community networking. I think that it something that any class can use, any time. It would be more interesting for any student. Besides just classroom work and homework. Get out there and do something with it."

What bores students at CU-Boulder?

What is most noticeable about student responses to this item is that no subject-specific patterns emerged from the data. In other words, subject matter was not a significant factor in determining which material was boring to students. CLAS interviewees made it clear that less-optimal presentation of course material dictated whether students were engaged or not.

Lecture courses, particularly courses in which PowerPoint slides mirrored textbook readings were not engaging for students, who felt that the repetition was wasteful of their time (11). Courses that presented material in only one way, using only one modality, were described as boring as well (15).

"One of my lectures first semester, the teacher took PowerPoint presentations from the textbook, excerpts from the textbook, and that just made it awful."
"Every morning he'd have a PowerPoint, and he'd read exactly word for word what was on there and expect us to copy it all down, and he wasn't actually teaching it, he was just reading."
"If the teacher isn't into it, then I'm not either."
"A lot of times, it seemed like there was a lot of lecturing, which I'm fine with. But what one of my teachers would do is, they would put it on PowerPoint presentations that they would put up on the internet, even before the class happened. When you do that there seems like there is not initiative. Why would you go to class if all your notes are on the internet two weeks in advance? And when the notes are on the internet, then I don't feel like taking notes either. So why bother?"

Student recommendations for professors—engaging material

Students use their own experiences at CU-Boulder in recommending effective student engagement in course material.

- *Mix up the course format* Courses with a variety of different activities hold student interest, and allow diverse learners to delve into the subject.
- *Let students talk* Allowing time for student interaction increases pupil's interest in the topic at hand. Peer discussion also allows students to test out their ideas and receive feedback quickly. Students mention that even large lecture courses can allow for this interaction, particularly before answering "clicker" questions posed by the professor.
- *Make course material relevant to everyday life* When faculty point out how their professional fields address common problems and issues, students are more engaged in the topic.
- *Please don't reread the book* Lecture notes and PowerPoint slides that follow the textbook precisely are seen as a waste of time. Students report that they tend to either skip class, or skip reading. Students recommend delving deeper into the course material instead, or allowing undergraduates to apply the knowledge from the textbook during class time.

Student Participation Motivators

CU-Boulder students stated the conditions that motivated them to participate in course discussion. The majority of students interviewed mentioned that an interactive environment, one in which a student "was expected to participate", helped them discuss topics in class (33).Students stated that interest in the course material (12), and students' needs to understand the subject matter also led to greater classroom participation.

Students often remarked that classroom comfort was necessary for their continued participation (27). Explicit faculty encouragement to participate was another motivating factor (17). Professors did this through including participation as an element of course grading, seeding discussions with their own thoughts and questions, and engaging student discussion early in the semester. Controversial topics that inspired debate among students also motivated them to engage in classroom discourse (10).

"Well, if the discussion's lively enough, then you feel like you can participate, and you don't feel, stupid or something like that."
"The attitude of the professor (made me want to participate). He always encouraged us to ask questions, and he would go out of the way and ask us what we think. He'd put somebody on the spot and say 'What do you think?' whether or not you wanted to, he made you participate. I think a lot of the participation is breaking the ice and becoming comfortable with stuff like that. So when he forces you to do it, and you've already done it, then it's no big deal to participate again. He really encouraged it. It was nice."
"It helps more with becoming more comfortable with the kids that you're around and with the professor and stuff."
"When there's participation involved in the grade. It's very important…professors encourage you with a sense of this is worth something. Everybody pretty much, at this level, likes to participate, more than high school."

Student recommendations for CU professors—increasing participation

Students shared recommendations for professors' increasing participation in their large and small courses.

- *Expect student participation* In large courses, students often felt that asking questions was not appropriate. Encourage questions and comments, and build in time during lecture to address student concerns.
- *Call on students, but don't "call them out"* Students expressed a desire to be called on, to be included in the class in this way, but were fearful of being "shot down" by professors' discouraging feedback. Guiding student responses verbally is effective for promoting participation without squelching student morale.

Recommendations for Students- participating in classes, big and small

These tips were culled from student experiences in CU Boulder courses.

- *Ask questions* Particularly in large classes, interviewees mentioned that once a student "broke the ice" in the classroom, other students felt more comfortable participating. Often, the questions asked in class pertained to concepts others had trouble discerning as well.
- *Address inappropriate responses* If you feel that a professor responds inappropriately to a genuine question, report the incident following the proper channels.

Attitudes towards homework

The majority of students think homework assignments are effective (15) or valuable (16).In other words, 72% of the CLAS interviewees felt that completing homework was positive. Homework often gives students the opportunity to practice their skills (8), which they deem important. Homework can feel like busywork (13), however, when assignments are not graded or when assignments are not discussed in class. Only five students remarked that homework was dull or repetitive. The best assignments, according to one student, are "the ones that make me say, 'hey, I really know my stuff.'"

"Sometimes the homework is harder than the test, and actually makes you think. Other times it's just kind of tedious and seems to be really trying to get fundamentals into your head that you could get just by doing a few problems."
"Well I think that some assignments are just pointless. It's only busywork. It's like I do understand that you're supposed to read all of these things, it's just that some of them are never mentioned again. You have to read them, but it just seems like they did it because there's nothing else to do."
"I think homework where you have to do readings and stuff and where you actually discuss in class, I think that's important so that you're prepared for class. So I guess in those kinds of classes, it feels more important, I mean, more valuable."
"I think what they give us is very effective."
"I found it really helpful to do the reading before class. So I already kind of knew it, and then when the teacher went over it, it was kind of learning it again, or kind of trying to understand it."

Student recommendations for CU professors—homework

Students value homework to the extent it is woven throughout the course.

- *Discuss the homework* Students valued homework that professors discussed in class. The professors' devotion of resources (i.e. class time) could encourage student effort, according to CLAS data.

- *Assign homework that asks students to apply their knowledge* CU-Boulder students revealed that they were most interested in completing assignments that gave them an opportunity to apply the course material to a new problem, not those that ask them to recite known facts. One student phrased it thus: "I like assignments that force me to *digest* knowledge, not just *regurgitate* it.
- *Explain the purpose of homework, and the need to practice* Students feel that once they have performed a skill a few times, they have mastered it. Tell students the virtues and cognitive benefits of extended practice.

Recommendations for students regarding homework-making the most of out-of-class practice

- *Ensure homework comprehension* Make sure that you understand homework assignments, and that you receive homework feedback. Do this in class or during office hours.
- *Ask for extra material for knowledge application* If you don't receive homework that allows you to apply the concepts learned in class, request some extra material from professors. This will help you apply the material from the course, while letting the professor know you are a conscientious student.

Learning outside of class

CU-Boulder students affirmed that their most memorable learning experiences in college frequently occurred outside of the classroom. Students learned outside of class when they engaged in out-of-school programs, activities, and events *voluntarily* (25). Fifty-eight percent of CLAS interviewees revealed that they chose to attend events based on professors' recommendations. Undergraduates at CU-Boulder enjoyed volunteer days, CU-Boulder colloquia, study sessions, films, and plays on campus; these activities increased their learning of course material, according to the students themselves. Students said that some of their professors encouraged this participation and use of similar supplemental material (16). Faculty occasionally proposed extra credit to encourage students' attendance.

Another common experience culled from the CLAS data was the extensive, effective use of peer study groups (22) and peer tutoring (7). S One student said that "you learn it so much better when you are trying to teach the concept to someone else." Another student stated that "sometimes your friends just have a good way of explaining things," which enhances student learning of subject matter. A few undergraduates revealed that their professors encouraged peer study groups in class.

"I always found other kids that either knew it better than I did or didn't know it, and by helping them, it would help me study."

"In my business class, the papers, they were tedious and horrible to write- the research, later on in other classes, I thought helped because they make you look up really obscure things that at the time you don't understand and you don't think relates to anything. And then later on, either in-currently in my internship and in other classes you come across those and you're like, I've looked at this and I've looked through these and then I didn't understand what I was doing, but it actually helped me see it."
"…And study sessions. My friends and I have study sessions, that helps a lot. They weren't required either, and they weren't set up by teachers, but they kind of suggested it at the beginning of class. And then you got to know people and you make study groups and it helps you study."
"I volunteered a lot with the New Voters project, when they were trying to get people to vote. I think that was very helpful. I learned way more about international affairs and international business and economics. That was a lot more helpful, I think, than most of the stuff than I learned in class."
"In that philosophy class we did a volunteer movie night, which was really good. We'd watch the movie then talk about things that we were going over in class. We would relate it to the movie. That was really helpful."

Students deepen their knowledge of subject matter when they apply their knowledge outside of class as well (13). Undergraduates interviewed for CLAS describe the opportunities they initiated to use the information they incurred at school to decipher real-world phenomena in physics, discuss the meaning of life with their peers, and hone accounting skills to help family members with taxes. Students with undergraduate research opportunities learn out of class (9), and enjoy the added benefits of forming relationships with faculty and earning money for school expenses.

"(CU-Boulder lectures) help me with applications. I mean, they add something different that the faculty didn't necessarily talk about, but fro the knowledge of the class, you're able to relate better to what this person is talking about in their class."
"I just did a class project for a (business) class, and it was helpful. It kind of makes you, like he gave us a case study and we had to apply all the concepts that we had learned up to that point, and I like doing that kind of stuff. Just applying what you know to a situation, type of thing. It was a hard project, but it was interesting because it makes you use the concepts not just reiterate them on a test."
"We took a field trip to a research and development, and I went out there. I've already had an internship at an R&D lab. It was helpful talking to a guy with a similar degree and seeing an engineering bachelor, who had been working there just 3 weeks, and he was just out of CU. Going up to him and being like, "How do you like your job? How are you doing?"
"We studied sea otters, and we actually went to the CU museum over

there…there were some test questions on the visit, so you had to pay attention. Part of the class was science and we looked at critical thinking. It applied."

Student recommendations for professors—improving learning out of class

Students described ways to enhance their learning in the classroom by engaging in myriad opportunities out of the classroom.

- *Encourage or require study groups* Students state that study groups increase their learning out of the classroom, by providing them opportunities to teach content to their peers, and also to gain assistance from peers.
- *Supply additional material for students* Students who chose to engage in outside readings and experiences reported learning out of class. The ***choice*** to utilize the resources provided may influence students' impressions of the experience.
- *Hire an undergraduate student* The undergraduate research opportunity program (UROP) provides funds for professors in need of research assistance. The UROP students said the research experience extended their learning, and also led to positive relationships with professors.

Recommendations for students—maximizing the college experience

CLAS interviewees described ways in which they enhanced their learning outside of the lecture hall.

- *Organize a study group* Meeting with peers to discuss core concepts improves students' understanding of course material.
- *Utilize additional material, and go to voluntary events* Make use of professor-supplied additional readings and multimedia artifacts. Multiple representations of concepts often shed light on difficult topics.
- *Work in your field as an undergraduate* Research opportunities help clarify career aspirations, allow you to form personal relationships with professors, and secure opportunities for learning out of class.

Discussing school concepts out of class

CU-Boulder undergraduates talked about their course work with family (17), peers (10), and anyone they thought would be interested (27) in what they learned at CU-Boulder. Students perceived a variety of subjects to be "interesting to anyone", including physics, genetics, sociology, psychology, business, international affairs, and philosophy.

Students recounted "interesting" facts (7) and relayed well-presented lessons (8), regardless of subject matter. Students were also highly likely to tell about controversial discussions held in class (15), in which peers shared differing

points of view. When the subject matter under review was linked to current events (10), or applicable to a variety of disciplines (8), students were more likely to discuss the concepts as they tended to come up in casual conversations.

Again, the opportunities students had to apply their undergraduate coursework to real-world problems increased the likelihood that an undergraduate would discuss coursework (26). Students also enjoyed sharing and developing this applied expertise with peers from the courses (6).

"I would say in my sociology classes, just because even facts I would just want to blurt out to people. Like did you know this, or whatever. It relates to life and, I think that a thing that's good in classes is sociology, they can relate stuff to current events, and I think that helps people connect to material."
"My friend X is a biology major, so he's always telling me about some crazy new drug they have or this experiment that they did on monkeys and I always tell him about politics and stuff like that. You know like the national debt…We're both interested and curious. We'd always talk about stuff all the time. Politics, philosophy… a lot of things that I was learning."
"Well my parents will be like, oh so what are you doing in school and what are you learning about? What do you think of this? And my dad will try and think he's smarter and give me a question. And I'll go, actually, dad, it's like this."
"I think I've used physics some actually. Some just random times I've just figured out why something was doing something because we were curious. And I'd just be able to use some of it. Not all the crazy exact equations, but just the general concepts."
"If there was anything that just simply shocked you that you learned in class. That's the first thing. And if there's anything that was especially interesting just because you could relate to it more than the other material. Or if it had something to do…if you come across material that relates to current events or what's going on, you know something you saw on the news, like in economics, *(professor)* does current events every day. And sometimes, he'll relate the economic cycle to what's going on. Things like that can really make it more interesting to discuss."

Student recommendations for CU professors—increasing student discussions out of the classroom

- *Highlight controversies that arise in your field* Student appreciated the opportunity to learn about controversial topics, often because the interaction with other students stretched their thinking, allowing them to examine different points of view, and develop critical thinking skills.
- *Relate the subject matter to current events* Course material that was applicable to what students read in the newspaper on the internet gave students the opportunity to address the subject with friends—the topic was

more likely to arise with friends and family, giving them access to new knowledge and an opportunity to apply what they know.

Conclusion:

The CLAS group plans to disseminate this report among students and professors, so that professors might maximize effective teaching and students might make the most of their college careers. Deans and department chairs are asked to communicate these findings to all instructors. We recommend CU 101 instructors share these findings with new freshman, and provide opportunities to discuss and practice the strategies suggested.

Topics for future CLAS research

Intimidation was described by CLAS interviewees as a barrier to personal relationships with professors as well as an obstacle to classroom participation. Students referred to feeling insecure in class and unprepared to ask questions they suspected they should know. CLAS interviews were uncomfortable visiting office hours, for they felt professors were too busy to assist them in their course material. The Colorado Learning Assessment Studies group plans to address this topic with future student interviews. In particular, we hope to uncover the reasons for students' feelings of intimidation, as well as professor's views on students' perceptions. Conversely, students also described feelings of comfort in the classroom. Further CLAS work will focus on these issues of intimidation and comfort, to see what facilitates comfortable classroom learning.

Contemporary college students are working now more than ever and increasingly raise families as they study. Non-traditional college students have different needs than traditional students, including flexible office hour schedules, evening and online coursework, and alternative assignments. The CLAS team would like to explore these needs further with more student interviews, and propose interviewing select professors would shed light on effective practices in maximizing non-traditional student learning.

CLAS interviewees described varying motivation and effort in classes. Students report courses in which they did little work outside of class hours, and others that consumed much of their time. CLAS will discover what elements of courses and professors promote student motivation and effort.

Extending best teaching practices at CU-Boulder

Through the CLAS project, 43 CU-Boulder undergraduate students shared their attitudes about and experiences in college. They depend on professors to establish a comfortable climate for their learning, one that encourages active participation and critical thinking. Teaching strategies that allowed students to delve deeply into a subject were most effective, particularly when professors revealed information about their own experiences with the subject matter. Students took responsibility for initiating close relationships with faculty, but

needed encouragement to attempt contact. Above all, students craved the opportunities to test out their knowledge in real-world applications and settings.

Many of the recommendations listed in this report came not from students' idealistic notions of what undergraduate coursework *should be,* but from students' positive experiences on campus. In effect, many of the best practices are already in play at CU-Boulder. The purpose of this report is to highlight student views of their learning on campus: what they deem valuable, interesting, and relevant to their schooling and future careers, what motivates them, and which teaching strategies promote optimal learning.