STUDENT EXPERIENCE IN THE RESEARCH UNIVERSITY (SERU) PROJECT

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SERU PROJECT TECHNICAL REPORT

Best Practices When Using Student Survey Results in Academic Program Review

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Steve Chatman
Center for Studies in Higher Education
University of California, Berkeley

Using the example of responses from civil engineering students at a very highly ranked participating university, this guide demonstrates the importance of comparative data when using student questionnaire data for undergraduate academic program review. It also emphasizes the advantage of using factor structures for better questionnaire-based reporting. The guide is accompanied by a series of tables from the Student Experience in the Research University (SERU) Survey[1].

Comparison to Other Programs

The most common practice in academic program review is to report results for a given program compared to a college or campus average. There are some instances when these two comparisons can be helpful. For example, comparing satisfaction with access to courses in the major with college and campus averages might discover atypical instances. However, for most purposes there are three reasons why a better comparative measure is the responses of students in the same academic program at peer institutions. First, differences due to academic content, instructional practices of the major, and even the predispositions of students that choose to major in the area significantly affect survey responses[2,3]. Across about 20 major research universities, students in different majors reliably respond differently and those in the same major respond similarly. Second, comparison to college or campus averages helps to illuminate possible differences but cannot distinguish better or worse practices or outcomes that are in common for the college and campus. For example, if the economic pressures facing the University of California have uniformly negative effects on academic programs, then no comparison within the college, campus, or the University of California system will identify that negative impact. Only comparisons to campuses outside California and especially to national peer institutions will reveal these effects. Third, with increased national competition for students, the ability for an institution to make direct comparisons of its programs with a collection of nationally recognized programs is obviously useful.

Factor Scores

It is also common practice to report responses to individual items when evaluating academic programs, campus climate, or even institutional performance. But it is a practice that is often misleading. No one item is perfectly designed, and minor variations in item wording or in the response options presented change the results. A better approach is to ask multiple items that share a common concept and to report results in terms of a common construct or factor. For example, the SERU survey asks three questions about the administrative clarity of communication about academic programs: Do you understand how the requirements of your major combine to

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[1] Called the University of California Undergraduate Experience Survey (UCUES) when administered at UC campus.

[2] Disciplinary Categories, Majors, and Undergraduate Academic Experiences: Rethinking Bok's 'Underachieving Colleges' Thesis" by Steven Brint, Allison Cantwell and Preeta Saxena in *Research in Higher Education, (2011).*

[3] Institutional Versus Academic Discipline Measures of Student Experience: A Matter of Relative Validity by Steve Chatman, *Association for Institutional Research Professional File Series* (2010).

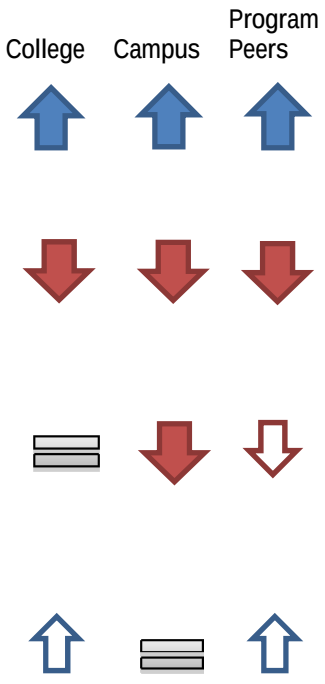
produce a coherent understanding of a field of study? Are department rules and policies clearly communicated? Are the program requirements well defined? These items are both statistically correlated and obviously similar. The subfactor score, clarity of communication, is a better measure than any one of the three. Questionnaire results expressed in terms of factor and subfactor scores are both more accurate and more efficiently reported evidence.

The first page shows SERU factor scores and subfactor scores, followed by one page for each factor score and the items that comprise the subfactors of that factor. The factor structure reduces over a 130 items to a total of 36 measures, 9 principal component factors and 27 subfactors.

The factor structure was determined by a team of researchers and was statistically derived with minor adjustments based on the researchers' judgment[4]. In the tables, differences of less than 1/10th of a standard deviation are not displayed. Positive differences that exceed 1/10th of a standard deviation are in black ink and those exceeding 1/5th of a standard deviation are in bold. Negative differences exceeding 1/10th of a standard deviation are in red and negative differences larger than 1/5th of a standard deviation are in bold. The use of differences expressed as standard deviations is an "effect-size" technique that helps to direct attention to important differences as opposed to those that are only statistically significant.

Example

A series of eight results, labeled a-h on the first table, illustrate just how critical peer institution comparative results using factor scores are for academic program review:



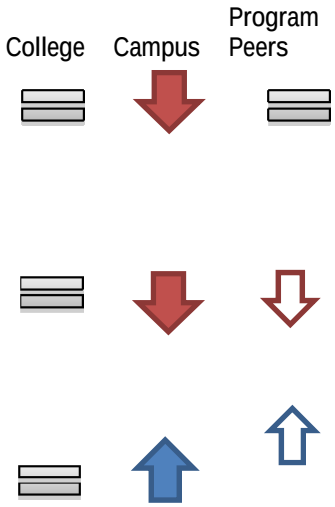
a) This is an example of mutually confirming comparisons. The students in the civil engineering program were both more satisfied than other students in the college of engineering, the university overall, and more satisfied than civil engineering students at the 11 other national research universities.

b) Conversely, the civil engineering students at the home institution scored lower on current skill self-assessment for non-quantitative skills for both local and national peer comparisons. Without the national civil engineering comparison, this deficit might be simply attributed to instructional practices associated with the discipline of civil engineering.

c) The third highlighted comparison helps explain the factor score difference noted in (b). This subfactor reflects items about cultural appreciation and social awareness. Civil engineering students at the home campus did not differ from their college but did differ from the institution and to a much lesser extent from civil engineers at peer institutions.

d) Local engineering students reported higher academic engagement than both college of engineering students locally and civil engineering students elsewhere. This is likely a very positive outcome that would not have been found using only a program to campus comparison, and the college of engineering comparison could have been attributed to differences in major requirements within engineering.

[4] Factor Structure And Reliability Of The 2008 And 2009 SERU/UCUES Questionnaire Core. SERU Project Technical Report (October 2009)



f) This illustrates how a misleading conclusion could have been reached by relying on a program to campus comparison. The absence of differences both when compared to civil engineering students at other campuses and to the local college of engineering suggested that the negative 0.22 difference for the institutional comparison was NOT important.

g) Here the campus comparison suggested a problem that the college comparison did not confirm, but in this case the comparison to civil engineering students at other campuses showed that this might be a problem area.

h) Conversely, here a positive result for the campus comparison not confirmed with the college comparison but confirmed by the peer institution comparison.

Conclusion

Even a well-constructed questionnaire, properly and successfully administered, will be of little value if the results as presented do not include the best comparative data. For undergraduate academic major, the best comparison is to the same major at peer institutions. Comparisons to the college and campus means can provide helpful information. But these comparisons are insufficient and in fact are often misleading when used without comparison with the same major at peer institutions.

Civil Engineering

SERU 2011: Student Experience at the Research University Survey Principal Component Factors	Academic Major	Effect Size Differences > 0.1 Standard Deviation: Home College	Home Campus	Same Major at Other Campuses	
Factor 1: Satisfaction with Educational Experience	5.4	**0.27**	**0.29**	**0.28**	a
Subfactor 1a: Quality of Instruction and Courses in the Major	5.5	**0.27**		**0.37**	
Subfactor 1b: Satisfaction with Access and Availability of Courses in the Major	5.2	0.15	**0.29**	**0.23**	
Subfactor 1c: Sense of Belonging and Satisfaction	5.2	0.15	0.11		
Subfactor 1d: Satisfaction with Advising and Out of Class Contact	5.5	**0.24**	**0.29**	**0.21**	
Subfactor 1e: Clarity of Program Requirements, Policies & Practices	5.7	0.16	0.14	**0.23**	
Subfactor 1f: Satisfaction with Library Support	4.6		-0.15		
Factor 2: Current Skills Self-Assessment (Nonquantitative)	3.9	**-0.20**	**-0.45**	**-0.30**	b
Subfactor 2a: Critical Thinking and Communication	4.0	-0.13	**-0.37**	-0.18	
Subfactor 2b: Cultural Appreciation and Social Awareness	4.2		**-0.39**	-0.18	c
Subfactor 2c: Computer, Research and Presentation Skills	4.2	**-0.30**	**-0.28**	**-0.32**	
Factor 3: Engagement with Studies	4.7	0.12		0.13	d
F3a: Academic Involvement and Initiative	4.5	0.11		0.12	
F3b: Research or Creative Projects Experience	4.6	-0.12		0.16	e
F3c: Collaborative Work	5.6	0.16	**0.37**		
Factor 4: Gains in Self-Assessment of Skills (Nonquantitative)	4.6	**0.20**			
Subfactor 4a: Gains in Critical Thinking and Communication	4.4		-0.14		
Subfactor 4b: Gains in Cultural Appreciation and Social Awareness	4.8	0.16		0.11	
Subfactor 4c: Gains in Computer and Research Skills	4.9	0.17	0.10	0.14	
Factor 5: Development of Scholarship	4.5		**-0.22**		f
Subfactor 5a: Critical Reasoning and Assessment of Reasoning	4.3		**-0.33**		
Subfactor 5b: Curricular Foundations for Reasoning	5.0				
Subfactor 5c: Elevated Academic Effort	4.4		**-0.30**	-0.18	g
Factor 6: Campus Climate for Diversity	5.2		0.13		
Subfactor 6a: Campus Climate	5.3		0.15	0.10	
Subfactor 6b: Freedom to Express Beliefs	4.9			-0.10	
Factor 7: Academic Disengagement (Inverted Scale)	5.0			-0.13	
Subfactor 7a: Extracurricular Engagement (Inverted Scale)	5.2	0.18	**0.30**	**0.32**	
Subfactor 7b: Poor Academic Habits (Inverted Scale)	5.6		0.15	**0.37**	
Subfactor 7c: Non-academic Motivations (Inverted Scale)	4.5	**0.22**	0.17		
Subfactor 7d: Easy Major	5.6		**0.57**	0.11	
Factor 8: Quantitative Professions	6.3		**0.97**	**-0.25**	
Subfactor 8a: Career Orientation	6.1		**0.68**		
Subfactor 8b: Quantitative Skills	6.0		**0.75**	**-0.24**	
Factor T: Use of Time (Academic and Employment)	5.0		0.18		
Subfactor Ta: Time Employed	4.3				
Subfactor Tb: Academic Time	5.9		**0.30**	0.14	h

Academic Peers are 100 randomly selected civil engineering majors from each of the following: Michigan, USC,Texas, Pittsburgh, Berkeley, UCLA, San Diego, Davis, Rutgers, Florida, Irvine, and Minnesota (excluding the campus of this program).

Civil Engineering

SERU 2011: Student Experience at the Research University Survey First Principal Component Detail	Academic Major	Effect Size Differences > 0.1 Standard Deviation: Home College	Home Campus	Same Major at Other Campuses
Factor 1: Satisfaction with Educational Experience	**5.4**	**0.27**	**0.29**	**0.28**
Subfactor 1a: Quality of Instruction and Courses in the Major	**5.5**	**0.27**		**0.37**
Quality of teaching by graduate student GSI's (TA's)	4.7	0.17	0.13	**0.33**
Quality of upper-division courses in your major	4.2			
Quality of faculty instruction	4.8	**0.27**		**0.33**
Quality of lower-division courses in your major	4.9	**0.25**	0.19	**0.35**
Subfactor 1b: Satisfaction with Access and Availability of Courses in the Major	**5.2**	0.15	**0.29**	**0.23**
Opportunities for research experience or to produce creative products	4.0			-0.13
Ability to get into a major that you want	5.0	0.11	**0.40**	
Access to small classes	4.2	**0.31**	**0.38**	**0.26**
Access to faculty outside of class	4.6	**0.28**	**0.32**	
Availability of courses for general education or breadth requirements	4.4	0.19	0.15	**0.23**
Availability of courses needed for graduation	4.5	0.11	**0.28**	**0.26**
Variety of courses available in your major	4.4			0.16
Subfactor 1c: Sense of Belonging and Satisfaction	**5.2**	0.15	0.11	
UC grade point average	3.5			-0.18
Value of your education for the price you're paying	4.4		0.13	**0.20**
Overall academic experience	4.6	0.15	0.10	0.10
Overall social experience	4.4	0.14	0.12	-0.12
Knowing what I know now, I would still choose to enroll at this campus	5.1	0.19	0.16	0.14
I feel that I belong at this campus	4.8	0.12		
Subfactor 1d: Satisfaction with Advising and Out of Class Contact	**5.5**	**0.24**	**0.29**	**0.21**
Are students treated equitably and fairly by the faculty?	1.1		-0.17	
Do faculty provide prompt and useful feedback on student work?	1.2	-0.18	-0.16	-0.14
Are there open channels of communication between faculty and students regarding student needs, concerns, and suggestions?	1.1	**-0.21**	**-0.27**	-0.17
Advising by student peer advisors on academic matters	4.3	0.12	0.18	0.19
Advising by school or college staff on academic matters	4.4	0.20	**0.23**	0.17
Advising by faculty on academic matters	4.3	0.11		
Advising by departmental staff on academic matters	4.6	**0.30**	**0.25**	**0.23**
Subfactor 1e: Clarity of Program Requirements, Policies & Practices	**5.7**	0.16	0.14	**0.23**
Do you understand how the requirements of your major combine to produce a coherent understanding of a field of study?	1.0	**-0.32**	**-0.21**	
	1.1			0.14
Are department rules and policies clearly communicated?	1.1	-0.10		-0.20
Are the program requirements well defined?	1.0	**-0.24**	-0.17	**-0.21**
Subfactor 1f: Satisfaction with Library Support	**4.6**			
Educational enrichment programs (e.g., study abroad, UCDC, internships)	4.1		-0.11	
Availability of library research materials	4.6		-0.13	
Accessibility of library staff	4.3		**-0.23**	**-0.26**

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Civil Engineering

SERU 2011: Student Experience at the Research University Survey Second Principal Component Detail	Academic Major	Effect Size Differences > 0.1 Standard Deviation: Home College	Home Campus	Same Major at Other Campuses
Factor 2: Current Skills Self-Assessment (Nonquantitative)	**3.9**			
Subfactor 2a: Critical Thinking and Communication	**4.0**			
Understanding international perspectives (economic political, social, cultural etc.)	4.2		**-0.39**	
Understanding of a specific field of study	4.5		-0.13	-0.13
Ability to speak clearly and effectively in English	4.7		**-0.31**	**-0.32**
Ability to be clear and effective when writing	4.3		**-0.25**	
Ability to read and comprehend academic material	4.4		**-0.28**	-0.14
Analytical and critical thinking skills	4.5	-0.17	**-0.28**	**-0.32**
Subfactor 2b: Cultural Appreciation and Social Awareness	**4.0**			
Self awareness and understanding	4.6		**-0.31**	**-0.29**
Ability to appreciate the fine arts (e.g., painting, music, drama, dance)	4.3		**-0.29**	
Understanding the importance of personal social responsibility	4.7	0.16	**-0.22**	-0.17
Ability to appreciate, tolerate and understand racial and ethnic diversity	4.7		**-0.29**	-0.11
Ability to appreciate cultural and global diversity	4.6		**-0.34**	
Subfactor 2c: Computer, Research and Presentation Skills	**4.2**			
Ability to prepare and make a presentation	4.3		-0.12	-0.19
Library research skills	3.9		**-0.36**	-0.15
Other research skills	4.0	-0.13	**-0.29**	-0.12
Computer skills	4.5	**-0.35**		**-0.35**
Internet skills	4.7	**-0.29**	-0.18	**-0.28**

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Civil Engineering

SERU 2011: Student Experience at the Research University Survey Third Principal Component Detail	Academic Major	Effect Size Differences > 0.1 Standard Deviation: Home College	Home Campus	Same Major at Other Campuses
Factor 3: Engagement with Studies	**4.7**	0.12		0.13
F3a: Academic Involvement and Initiative	**4.5**	0.11		0.12
Chosen challenging courses, when possible, even though you might lower your GPA by doing so	4.0		0.18	**0.33**
Made a class presentation	3.3	0.16	0.17	**0.21**
How many professors do you know well enough to ask for a letter of recommendation in support of an application for a job or for graduate or professional school?	2.3	**0.20**		**-0.24**
Communicated with a faculty member by email or in persor	3.7	0.12		-0.11
Found a course so interesting that you did more work than was required	3.2			**0.41**
Talked with the instructor outside of class about issues and concepts derived from a course	3.2	**0.22**	0.20	0.14
Had a class in which the professor knew or learned your name	3.6	**0.32**	0.12	
Interacted with faculty during lecture class sessions	2.9			
Contributed to a class discussion	3.5		**-0.30**	0.13
Brought up ideas or concepts from different courses during class discussions	3.0		**-0.27**	**0.22**
Asked an insightful question in class	2.9		**-0.27**	
Worked with a faculty member on an activity other than coursework (e.g., student organization, campus committee, cultural activity)	2.2		**0.23**	0.11
F3b: Research or Creative Projects Experience	**4.6**			0.16
Work on **creative projects** under the direction of faculty with course credit	1.8		-0.14	
Work on **creative projects** under the direction of faculty for pay without course credit	2.0			
At least one student research course (e.g., course 99)	1.7		0.15	-0.13
Work on **creative projects** under the direction of faculty as a volunteer without course credit	1.9			
Assist faculty in **research** for pay without course credit	1.9	0.13		
Taken a small research-oriented seminar with faculty	1.8			**0.20**
Assist faculty in **research** as a volunteer without course credit	1.9	0.19		**-0.24**
At least one independent study course (e.g., 199)	1.8	0.12	0.12	
Assist faculty in **research** with course credit	1.9	**0.42**	**0.31**	
F3c: Collaborative Work	**5.6**	0.16	**0.37**	
Sought academic help from instructor or tutor when needed	3.6	**0.24**	0.14	
Helped a classmate better understand the course material when studying together	4.0		**0.26**	-0.12
Worked on class projects or studied as a group with other classmates outside of class	4.4	0.11	**0.45**	

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Civil Engineering

SERU 2011: Student Experience at the Research University Survey Fourth Principal Component Detail	Academic Major	Effect Size Differences > 0.1 Standard Deviation: Home College	Home Campus	Same Major at Other Campuses
Factor 4: Gains in Self-Assessment of Skills (Nonquantitative)	**4.6**	**0.20**		
Subfactor 4a: Gains in Critical Thinking and Communication	**4.4**			
Self awareness and understanding	0.7	0.15		
Ability to appreciate the fine arts (e.g., painting, music, drama, dance)	0.3			
Understanding the importance of personal social responsibility	0.7	**0.33**	0.14	0.20
Ability to appreciate, tolerate and understand racial and ethnic diversity	0.5	0.17		0.17
Ability to appreciate cultural and global diversity	0.5	0.13		0.14
Subfactor 4b: Gains in Cultural Appreciation and Social Awareness	**4.8**	0.16		0.11
Understanding international perspectives (economic political, social, cultural etc.)	0.7	0.12	**-0.22**	0.11
Understanding of a specific field of study	1.3	0.15	0.11	
Ability to speak clearly and effectively in English	0.2		-0.14	
Ability to be clear and effective when writing	0.4		**-0.25**	-0.16
Ability to read and comprehend academic material	0.7			
Analytical and critical thinking skills	0.8	0.18		
Interpersonal (social) skills	0.5		-0.11	**-0.23**
Subfactor 4c: Gains in Computer and Research Skills	**4.9**	0.17	0.10	0.14
Ability to prepare and make a presentation	0.8	**0.34**	**0.32**	0.13
Library research skills	0.7	**0.30**	-0.16	0.16
Other research skills	0.7	0.13	-0.13	0.10
Computer skills	0.8		**0.45**	
Internet skills	0.5			

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Civil Engineering

SERU 2011: Student Experience at the Research University Survey Fifth Principal Component Detail	Academic Major	Effect Size Differences > 0.1 Standard Deviation: Home College	Home Campus	Same Major at Other Campuses
Factor 5: Development of Scholarship	**4.5**			
Subfactor 5a: Critical Reasoning and Assessment of Reasoning	**4.3**			
Used facts and examples to support your viewpoint	4.4		**-0.43**	
Create or generate new ideas, products or ways of understanding	3.9	-0.18	**-0.31**	
Judge the value of information, ideas, actions and conclusions based on the soundness of sources, methods and reasoning	4.4	0.14	-0.10	
Incorporated ideas or concepts from different courses when completing assignments	4.2		-0.13	-0.14
Reconsidered your own position on a topic after assessing the arguments of others	3.9		**-0.22**	
Examined how others gathered and interpreted data and assessed the soundness of their conclusions	3.9		-0.17	
Subfactor 5b: Curricular Foundations for Reasoning	**5.0**			
Break down material into component parts or arguments into assumptions to see the basis for different outcomes and conclusions	4.7			0.16
Recognize or recall specific facts, terms and concepts	4.8		-0.15	-0.14
Explain methods, ideas, or concepts and use them to solve problems	5.1		0.15	
Subfactor 5c: Elevated Academic Effort	**4.4**			
Raised your standard for acceptable effort due to the high standards of a faculty member	3.4	0.11	-0.16	-0.10
Extensively revised a paper at least once before submitting it to be graded	3.4		**-0.26**	-0.12

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Civil Engineering

SERU 2011: Student Experience at the Research University Survey Sixth Principal Component Detail	Academic Major	Effect Size Differences > 0.1 Standard Deviation		
		Home College	Home Campus	Same Major at Other Campuses
Factor 6: Campus Climate for Diversity	**5.2**		0.13	
Subfactor 6a: Campus Climate	**5.3**		0.15	0.10
Students are respected here regardless of their sexual orientation	4.8		0.10	**0.21**
Students are respected here regardless of their economic or social class	4.8		**0.22**	0.14
Students are respected here regardless of their race or ethnicity	4.7		0.17	
Students are respected here regardless of their gender	4.9		0.11	
I feel free to express my religious beliefs on campus	4.6		0.10	-0.14
Students are respected here regardless of their political beliefs	4.5		0.15	-0.19
Students are respected here regardless of their disabilities	4.9	0.11	0.18	
Subfactor 6b: Freedom to Express Beliefs	**5.3**		0.15	0.10
I feel free to express my political beliefs on campus	4.6			
Students are respected here regardless of their religions beliefs	4.7			

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SERU 2011: Student Experience at the Research University Survey Seventh Principal Component Detail	Academic Major	Effect Size Differences > 0.1 Standard Deviation: Home College	Home Campus	Same Major at Other Campuses
Factor 7: Academic Disengagement (Inverted Scale)	**5.0**			
Subfactor 7a: Extracurricular Engagement (Inverted Scale)	**4.6**			0.16
Turned in a course assignment late	1.7	-0.19		-0.17
On average, how much of your assigned course reading have you completed this academic year?	6.8		**-0.23**	
Skipped class	2.5	**-0.34**	-0.10	
Gone to class without completing assigned reading	3.5			
Gone to class unprepared	2.8	**-0.20**	**-0.20**	
Subfactor 7b: Poor Academic Habits (Inverted Scale)	**5.2**	0.18	**0.30**	**0.32**
Pursuing a recreational or creative interest (arts/crafts, reading, music, hobbies, etc.)	2.0	**-0.21**	**-0.27**	-0.18
Watching TV	2.0			**-0.36**
Using the computer for non-academic purposes (games, shopping, email/instant messaging, etc.)	3.4	-0.13	-0.10	
Partying	1.8			**-0.29**
Socializing with friends	3.1			**-0.22**
Subfactor 7c: Non-academic Motivations (Inverted Scale)	**5.6**		0.15	**0.37**
Participating in student clubs or organizations	2.4			0.11
Participating in physical exercise, recreational sports, or physically active hobbies	2.3			**-0.24**
Attending movies, concerts, sports, or other entertainment events	1.9		-0.11	**-0.22**
Community service	1.6		**-0.27**	
Subfactor 7d: Easy Major	**4.5**	**0.22**	0.17	
Easy requirements	1.9		**0.31**	
Allows time for other activities	1.9		**0.65**	**0.20**

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Civil Engineering

SERU 2011: Student Experience at the Research University Survey Eighth Principal Component Detail	Academic Major	Effect Size Differences > 0.1 Standard Deviation		
		Home College	Home Campus	Same Major at Other Campuses
Factor 8: Quantitative Professions	**6.3**		**0.97**	
Subfactor 8a: Career Orientation	**6.1**		**0.68**	
Prepares me for a fulfilling career	1.0	**-0.24**	**-0.52**	
Prestige	1.3		**-0.43**	
Leads to a high paying job	1.3		**-0.53**	0.17
Subfactor 8b: Quantitative Skills	**6.0**		**0.75**	
Quantitative (mathematical and statistical) skills -- Gain in Skill Level	0.7	0.18	**0.60**	
Quantitative (mathematical and statistical) skills -- Current Skill Level	4.7		**0.84**	**-0.36**

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Civil Engineering

SERU 2011: Student Experience at the Research University Survey Use of Time Factor First Principal Component Detail	Academic Major	Effect Size Differences > 0.1 Standard Deviation: Home College	Home Campus	Same Major at Other Campuses
Factor T: Use of Time (Academic and Employment)	**5.0**		0.18	
Subfactor Ta: Time Employed	**5.9**		**0.30**	0.14
Of your total hours spent working for pay, about how many hours did you work on campus?	1.9			
Of your total hours spent working for pay, about how many hours were related to your academic interests?	1.6			
Paid employment (include paid internships)	2.0		-0.11	-0.20
Subfactor Tb: Academic Time	**5.9**		**0.30**	0.14
Attending classes, discussion sections or labs	4.9		**0.26**	0.12
Studying and other academic activities outside of class	4.8		**0.23**	0.16

Academic Peers are 100 randomly selected civil engineering majors from each of the following: Michigan, USC,Texas, Pittsburgh, Berkeley, UCLA, San Diego, Davis, Rutgers, Florida, Irvine, and Minnesota (excluding the campus of this program).