EYP/ research

Assessment of the Center for the Sciences and Innovation
Trinity University

Pre- and Post-Occupancy Evaluation Surveys

April 2016

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Confidentiality Statement
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/ Executive Summary

To assess the impact of the Trinity Center for the Sciences and Innovation (CSI), EYP conducted surveys of students and faculty before and after construction of the Center. Pre-construction surveys focused on student and faculty use and their perceptions of three buildings that were razed (Moody Engineering) or renovated (Cowles Life Science and Halsell) as part of the new construction. The surveys produced several key findings:

- Classrooms in the CSI are judged as markedly superior to classrooms in the old STEM buildings. Faculty ratings indicate that the greatest improvements have occurred in size, lighting, acoustics, placement and visibility of white boards, accessibility of technology to students, and flexibility in accommodating different teaching strategies.

- Teaching laboratories in the CSI are perceived as far superior to previous laboratories in Moody and Cowles. Mean ratings of teaching laboratories in the latter buildings were below average on nearly every dimension – from ease of sharing lab space and flexibility in accommodating different teaching styles, to quality of acoustics and safety of the working environment. Ratings of the new teaching labs, by contrast, are well above average and significantly better in every way than the existing labs that respondents were asked to assess. In terms of overall quality, 90 percent of faculty rated the old labs as “poor” or “average,” whereas 80 percent of faculty rated the labs in the CSI as “good” or “excellent.”

- New teaching facilities have encouraged many faculty to make changes in their teaching, including introducing new courses or new topics within an existing course, teaching a course with another faculty, and creating new exercises and assignments.

- Research laboratories are perceived as a vast improvement over the old labs, making for easier operation and enhancing faculty productivity. The faculty rated the labs in the old Cowles and Moody buildings most unfavorably in terms of the level of environmental control, ease of sharing lab space, and the quality of lighting and acoustics. In contrast, the overwhelming majority of the faculty rated research laboratories across the CSI as “good to excellent” in every way.

- The faculty and student ratings of the safety of teaching and research laboratories indicate that the CSI provides a much safer environment in which to work.

- The CSI complex has increased the frequency that students enter STEM buildings at Trinity. Prior to the CSI, many students rarely, if ever, went into STEM buildings; indeed, about a quarter of students we surveyed had never entered Halsell or Moody. The CSI, in contrast, is a common destination: over 95 percent of respondents reported having been in the Center more than 20 times since coming to Trinity, and entering the Center four or more times a week during the fall 2015 semester.

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- The reasons that students enter STEM buildings have changed. Prior to the CSI, the vast majority of students entered STEM buildings to attend class or meet with a faculty member; otherwise, they tended not to go there. Those students who regularly used Halsell or Moody as places to study and meet other students were nearly always computer science and engineering majors. By contrast, a substantial majority of all students choose to study or meet others in the CSI. Among non-STEM majors, for example, 63 percent reported that they visited the CSI to study, whereas only 8.4 percent visited at least one of the pre-CSI STEM buildings for this purpose.

- Students and faculty find the CSI to be a comfortable place to study, meet, and work, and its informal learning areas facilitate learning and intellectual discourse. Faculty members often meet students and colleagues in the Center, where conversations turn to teaching, research, or other scholarly subjects. Similarly, students find its numerous study areas particularly attractive, with almost 90 percent of respondents describing the CSI as a good or favorite place to get together with others to engage in various learning activities, including working on problems and group projects and discussing ideas from class.

- Lab activities, made visible through glass walls, and the CSI as a whole appear to pique students' interest in science and create a stimulating environment in which to work.

- The use of multiple measures of sustainability in the CSI has increased student and faculty awareness of strategies and actions that may be taken to promote a healthy environment.

- Overall satisfaction with STEM buildings has increased significantly. Faculty and students reported that they were not very satisfied with any of the three pre-CSI STEM buildings. They were least satisfied with Moody, which they did not believe projected a favorable image of Trinity University. Upwards of 80 percent of respondents, however, expressed a high level of overall satisfaction with the CSI and nearly all agree that it projects a favorable image of Trinity.

- Student suggestions for improving the CSI centered on extending the CSI's resources by, for example, creating more study areas and keeping the café open longer. Numerous faculty brought attention to problems with classroom technology.

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/ Introduction

At Trinity University, EYP designed a new integrated science complex, the Center for the Sciences and Innovation (CSI), which links all of Trinity's science, mathematics, and engineering programs. To assess the impact of its designs, EYP is carrying out a program of evaluation involving the collection and analysis of a variety of data. This report presents findings from surveys conducted before and after construction of the CSI.

Formerly science and engineering at Trinity were housed in four buildings: Cowles Life Science, Halsell, Marrs McLean, and Moody Engineering. The new design included razing the Moody Engineering Building, the complete renovation of Cowles Life Science Building, relatively minor renovation of Marrs McLean, and new construction. Construction began in June 2010 and occurred in several stages: the first new addition was completed in spring 2012; the renovation of Cowles was completed in September 2013; additional new construction was completed in January 2014, with occupancy and classes beginning that spring; and the renovation of Marrs-McLean was finished in summer 2014. Altogether, new construction and renovation created a complex of approximately 280,000 square feet that provided new classrooms and faculty offices, upgraded teaching and research laboratories, and created numerous formal and informal learning spaces.

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/ Methods

Overview

Prior to razing Moody and renovating Cowles and Marrs McLean and then again, after completing CSI, EYP conducted surveys of the principal users of these buildings: the faculty and students. The faculty surveys were designed primarily to examine faculty perceptions of the quality of the buildings' classrooms and laboratories. The student surveys were designed primarily to gauge students' use of the buildings: how often they visit them, why they go there, what areas they use, and how attractive they find them as places to study and meet others. In July 2012, we filed a report of findings from the pre-occupancy surveys. In this report, we compare these findings with the results of surveys undertaken a year and half after completion of the CSI and present other data from the post-occupancy survey.

Sample

The sample for both faculty surveys consisted of two groups: (1) faculty members in specified science departments and (2) members of other departments who taught in the relevant buildings. Thus, the first or pre-occupancy survey was directed to all tenured and tenure-track members of the five departments most affected by the construction: Biology, Chemistry, Computer Science, Engineering Science, and Psychology. With Computer Science residing in Halsell, and the other four departments in Cowles and Moody, the pre-occupancy survey focused on these three buildings. The second, or post-occupancy, survey was administered to members of all eight departments housed in the CSI, which consists of Biology, Chemistry, Computer Science, Engineering Science, Psychology, Geosciences, Physics and Astronomy, and Mathematics. In addition to the faculty in these specific departments, both surveys were also administered to all other faculty members who had taught in Cowles, Halsell, or Moody (pre-occupancy) or in the CSI (post-occupancy).

Of the 124 faculty members who were contacted, 31 completed the pre-occupancy survey, for a response rate of 25 percent. Twenty-seven faculty respondents were from a STEM discipline, including nine from biology, five from chemistry, five from engineering science, four from psychology, and three from computer science. Of the 183 faculty members contacted post-occupancy, about half of whom were non-STEM faculty who had taught in CSI classrooms, 97 completed the survey, for a response rate of 53 percent.

Both student surveys were administered to a stratified random sample, stratified by science and engineering (STEM) and (non-STEM) majors, of all students enrolled and on campus in fall 2011 (pre-occupancy) and fall 2015 (post-occupancy). A total of 500 students, 250 STEM and 250 non-STEM majors were contacted; 217 students—114 STEM majors and 83 non-STEM majors (20 students did not identify their major)—completed the pre-occupancy survey, for an overall response rate of 43 percent; and 272 students—including 187 STEM and 58 non-STEM majors (27 students did not identify their major)—completed at least part of the post-occupancy survey. (See Table 1 for a complete breakdown or response rates.) The student samples are thus disproportionately STEM majors and not representative of all Trinity students. In addition, due to a combination of factors, including stratifying by major and the fact that Trinity students cannot officially declare a major until their sophomore year, the samples also are biased by academic class, with 67 percent of respondents in the first survey and 70 percent of respondents in the second survey in their third or fourth year. To control for these disproportions, we therefore compare STEM and non-STEM majors and examine class differences where appropriate.

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Table 1. Sample Response Rates, Pre- and Post-Occupancy Surveys

	Faculty Respondents				Student Respondents			
	STEM		Non-STEM		STEM		Non-STEM	
Pre-Occupancy	27/84	32.1%	4/48	08.3%	114/250	45.6%	83/250	33.2%
Post-Occupancy	51/92	55.4%	46/91	50.5%	187/250	74.8%	58/250	23.2%

Procedure

All surveys were conducted through the Internet with the online survey tool SurveyMonkey. The student surveys were carried out between October 31, 2011 and January 16, 2012, and between October 20, 2015 and November 10, 2015; the faculty surveys were conducted between December 1, 2011 and January 8, 2012 and between October 19, 2015 and November 16, 2015. We used slightly different procedures in the pre- and post-occupancy surveys. For the pre-occupancy surveys, we sent pre-survey letters to respondents via campus mail; the letters explained the purpose of the survey, provided the survey link, and assured respondents that the survey was voluntary and either anonymous (students) or confidential (faculty). We also enclosed an incentive of $2 in all student letters. Within two days after the letters were mailed, we contacted all respondents via email, expressing thanks to those who had completed the survey and encouraging those who had not to do so. Finally, at intervals of one week each, we followed up the initial contact with two email reminders to students and two reminders to faculty. For the post-occupancy surveys, all correspondence was via email. The first email contact explained the purpose of the survey, provided the survey link, and assured respondents that the survey was voluntary and anonymous. We also offered all students who participated the chance of winning one of ten $50 gift cards. Then, approximately one and three weeks after the initial email, we sent follow-up reminders.

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/ Results

In designing STEM buildings, EYP establishes several goals. Some goals, worked out in collaboration with clients, are specific to particular projects; others apply to virtually all designs. Below, we present survey findings as they relate to project goals. Keep in mind as you read this report that the full measure of a building's impact requires a range of methods. Surveys are a useful means of assessing occupants' perceptions and, to a lesser extent, their patterns of using the building. We need other methods, however, to determine many effects, such as whether the number of science and engineering majors has increased since building construction or if the building has achieved the highest level of energy efficiency.

GOAL 1: Enhance the effectiveness of science and engineering teaching.

QUESTION	ANSWER
Have the new classrooms and laboratories enhanced the quality of the teaching environment?	Classrooms in CSI are judged markedly superior to classrooms in the old STEM buildings. ***See Figure 2*** - Student Ratings of Pre-CSI (10) STEM and CSI classrooms. For the Pre-CSI STEM buildings, faculty assessed the overall quality of the teaching laboratories as "poor" to "average", whereas 80 percent of the faculty rated the teaching laboratories in the CSI as "good" or "excellent". ***See Figures A, 1, and 2.***
Have the new classrooms and laboratories enabled instructors to change their teaching methods, introduce new courses, or teach new course topics?	New teaching facilities have encouraged many faculty to make changes in their teaching, including introducing new courses or new topics within an existing course, teaching a course with another faculty, and creating new exercises and assignments. ***See p. 13*** for the discussion of changes in classrooms and ***See p. 17*** for dicussion of changes in teaching laboratories.
Have the new classrooms and laboratories enabled instructors to use the time devoted to teaching more productively?	Nearly 30 percent of faculty respondents reported that the new classrooms "enabled them to use class time more productively." ***See p. 13***

Classrooms

There were 17 classrooms in the three pre-CSI STEM buildings that were the targets of the initial surveys. These classrooms ranged in capacity from 10 to 66 students and in design from seminar rooms to tiered lecture halls. To assess faculty perceptions of the quality of these classrooms, we asked faculty members to rate the classroom in which they most recently had taught on several criteria. With only 26 respondents in the pre-occupancy survey, who had taught most recently in 12 different classrooms, there were too few ratings to break them down by classroom. Still, ratings did not differ appreciably across classrooms, and the overall pattern reveals much about faculty perceptions. Table 2 shows faculty ratings across all classrooms, highlighted in blue.

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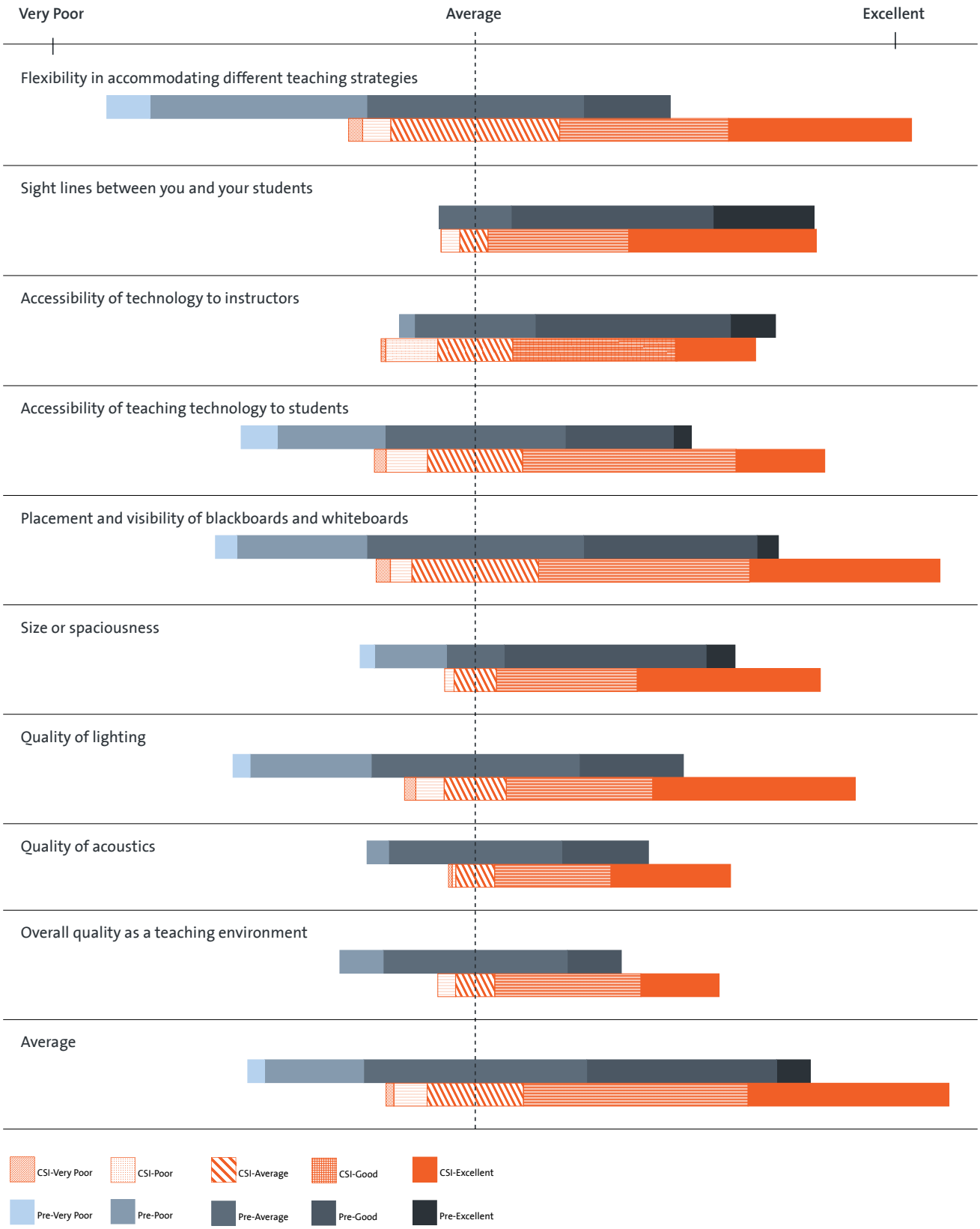
Figure A. Faculty Ratings of pre-CSI STEM (N=26) and CSI Classrooms (N=80) in Percentages



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On only three criteria were classrooms clearly rated as above average: sight lines between instructor and student, accessibility of technology to instructors, and size or spaciousness of the room. On every other criterion, the vast majority of instructors rated the classroom in which they had taught as "average" to "poor." Features most in need of attention appeared to be flexibility in accommodating different teaching strategies, lighting quality, accessibility of technology to students, and placement and visibility of blackboards and whiteboards.

The 12 classrooms in CSI range in capacity from 16 to 60 students and in design from seminar rooms to tiered lecture halls. Three rooms are designed as future research labs (330, 430, and 441) and one is designed as a future teaching lab (448). Based on the same set of criteria and same methods as in the pre-occupancy survey, new classrooms in the CSI were rated much more favorably than the classrooms in the pre-CSI STEM buildings. On every dimension shown in Table 2 (highlighted in red), the faculty generally rated the new classrooms as "good" to "excellent."

For ease of comparison, Table 3 presents mean ratings on each dimension for pre-CSI and CSI classrooms and results of a test of statistical significance (t). The ratings of "accessibility of technology to instructors" are nearly identical, and the difference in ratings of "sight lines between you and your students" is not statistically significant. Otherwise, differences in ratings on all dimensions are substantial and statistically significant. The new classrooms thus provide a much-improved teaching environment in terms of size, lighting, acoustics, placement and visibility of white boards, accessibility of technology to students, and flexibility in accommodating different teaching strategies. Figure 3 further compares ratings of the "overall quality of the classroom as a teaching environment." For the pre-CSI STEM buildings, faculty assessed overall quality as decidedly "average," whereas 80 percent of faculty respondents rated the classroom in the CSI as "good" or "excellent."

Table 3. Mean Faculty Ratings[1] of Classrooms in Pre-CSI STEM Buildings (N=26) and the CSI (N=80)

	Pre-CSI		CSI			
Feature	**Mean**	**S.D.**	**Mean**	**S.D.**	**Δ**	**t**
Sight lines between you and your students	4.08	0.69	4.33	0.82	0.25	1.40
Size or spaciousness	3.42	1.03	4.33	0.78	0.91	4.76*
Quality of acoustics	3.23	0.59	4.23	0.83	1.00	5.69*
Quality of lighting	2.88	0.82	4.11	1.03	1.23	5.54*
Overall quality as a teaching environment	3.04	0.60	4.01	0.82	0.97	5.56*
Placement and visibility of whiteboards	3.08	0.94	3.96	0.97	0.88	4.05*
Flexibility in accommodating different teaching strategies	2.62	0.85	3.85	1.02	1.23	5.55*
Accessibility of teaching technology to students	2.92	1.00	3.72	0.97	0.80	3.63*
Accessibility of technology to instructors	3.72	0.74	3.70	1.00	-0.02	0.09

[1] Based on the assigned values of 1 = very poor, 2 = poor, 3 = average, 4 = good, and 5 = excellent.
*$p < .001$

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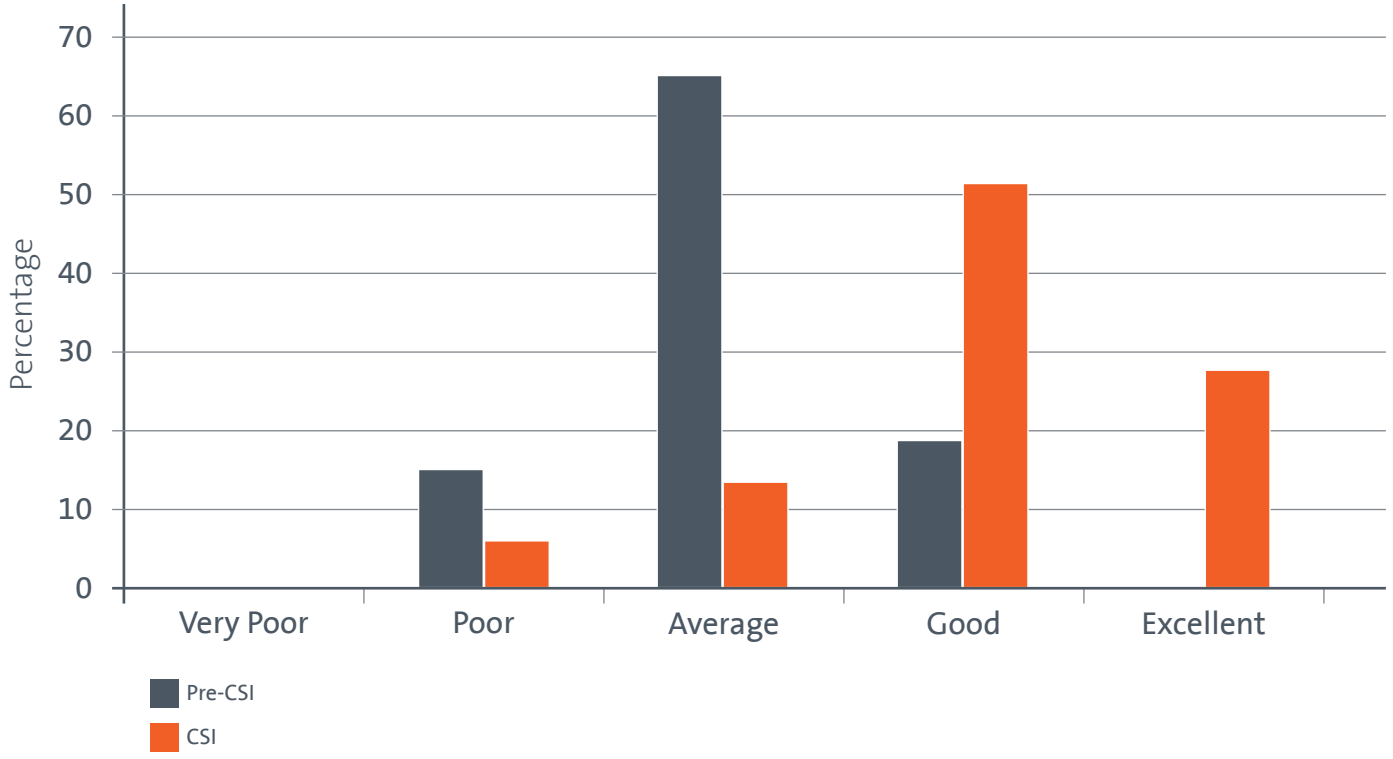
Figure 1. Faculty Ratings of the Overall Quality of Pre-CSI STEM Classrooms (N=25) and CSI Classrooms (N=79) as Teaching Environments



Instructors tend to teach in very few classrooms; in fact, they often teach in the same classroom semester after semester. So, they have little basis for comparing one classroom with another. On the other hand, students have a solid foundation for making comparative judgments because they take courses in multiple classrooms across the campus. We therefore asked Trinity students to rate the classroom (in the pre-CSI STEM Buildings or the CSI) in which they had taken a course most recently. Specifically, the question asked students to assess "the quality and feel of" the classroom "compared with most other classrooms at Trinity University." Table 4 and Figure 2 present these ratings for both student surveys.

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Table 4. Student Ratings[1] of STEM Classrooms in Percentages

Classroom	*N*	One of the Worst	Below Average	Average	Above Average	One of the Best	Mean[2]	S.D.
All Pre-CSI Classrooms	187	7.5	19.8	44.9	22.5	5.3	2.98	0.97
CSI Lecture Halls [3]	204	0.5	1.5	11.8	38.7	47.5	4.31	0.78
CSI Seminar Rooms [4]	41	0.0	2.4	9.8	41.5	46.3	4.32	0.76
All CSI Classrooms	245	0.4	1.6	11.4	39.2	47.3	4.31	0.77

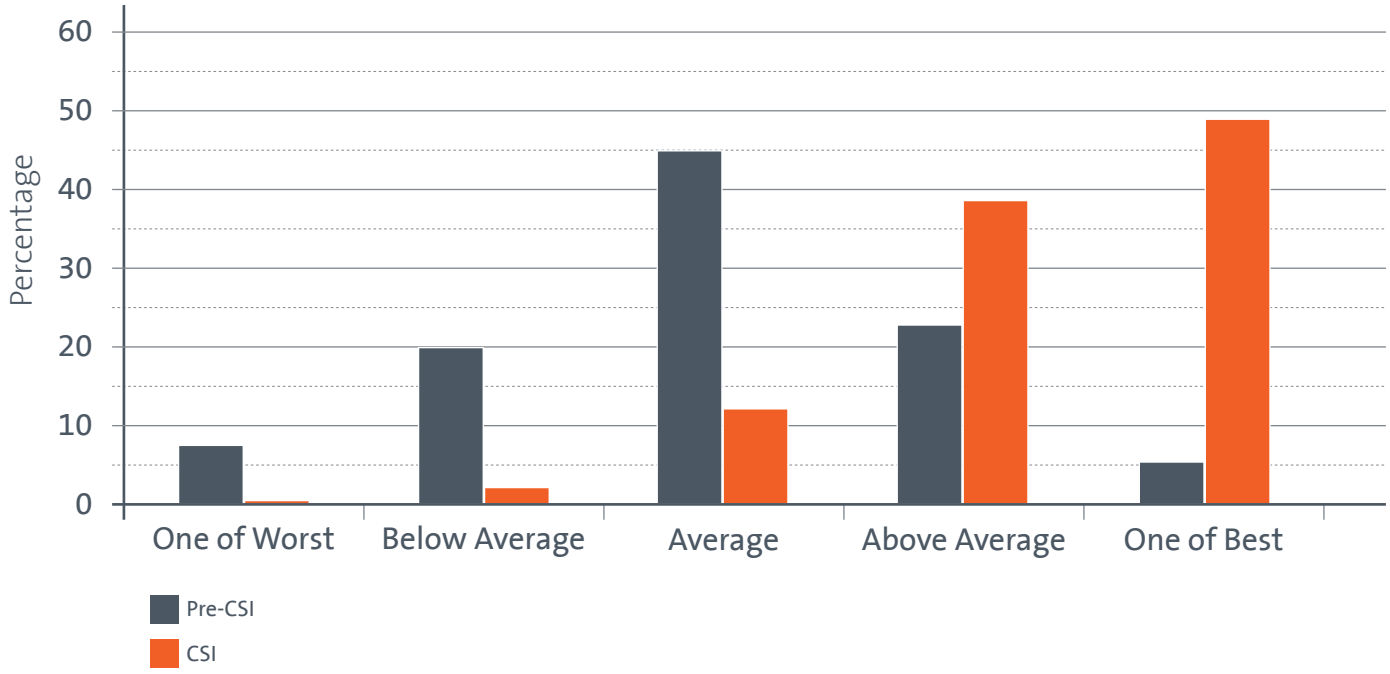
[1] Compared with most other classrooms at Trinity University, which of the following best describes the quality and feel of [this classroom]?

[2] 1= One of the worst; 2 = Below average; 3 = Average; 4 = Above average; 5 = One of the best.

[3] Consists of the following lecture halls and flat-floor classrooms: 102, 104, 140 Marrs McLean, 204, 225, 330, 437, and 448.

[4] Consists of the following classrooms: 356, 430, and 441.

Figure 2. Student Ratings of Pre-CSI STEM (N=187) and CSI (N=245) Classrooms



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With one exception (Halsell 228 was seen as "above average"), all pre-CSI STEM classrooms were rated "average" to "below average"; therefore, the table summarizes ratings across all pre-CSI classrooms. (See Appendix A for a more complete breakdown.) Comparison of student ratings of the old and new classrooms is as striking as the comparison of faculty ratings. Over 85 percent of students rated the new CSI classroom "above average," and almost one-half reported that it was "one of the best classrooms" at the university. Moreover, these ratings applied to both lecture halls and seminar rooms.

We also asked instructors who had taught in a classroom in the pre-CSI STEM buildings if the move had resulted in changes in their teaching. Of the 46 faculty members who had taught in the old and new classrooms, eight reported that they had either introduced a new course or new topics within an existing course or had taught a course with another faculty member as a result of the move to the new classrooms. In addition, 18 respondents reported that they had changed their teaching methods. A quarter or more of these respondents mentioned two changes in particular: (1) easily accessible, ample whiteboard space allows for more board work; and (2) flexibility of furniture allows for more group discussion. One biologist further noted: "More than the classroom has been the process of designing the building that altered the manner in which I teach. The classrooms are much better places to be (nicely designed, clean, and well-lighted)

When asked to compare the new with the old classrooms, 70 percent of the respondents reported that the "quality of the new teaching environment" was "much better," and nearly 30 percent reported that the new classrooms "enabled them to use class time more productively" (over 40 percent were "unsure").

Finally, it should be noted that the CSI has many glass walls intended to make science teaching and research visible to everyone. The walls are most evident in laboratories, but also exist in offices and classrooms. Some of the classrooms have glass along at least a portion of the corridor wall; however, this design feature was controversial as some faculty members thought it would be distracting to them and their students. We therefore asked instructors who had taught in one of these classrooms (N=54) the extent which they thought their students were distracted by people peering through the glass walls into the classroom; 49.1 percent reported that their students were "slightly distracted" and 30.9 percent reported that they were "not distracted at all." When asked how much they themselves were distracted, 36.4 percent reported "slightly" and 41.8 percent reported "not at all." Thus, the vast majority did not perceive the glass walls as a major source of distraction, although a few instructors thought their students or they themselves were "very distracted," and one instructor reported that both he and his students were "extremely distracted."

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Teaching Laboratories

To assess perceptions of the quality of teaching laboratories, we first asked faculty respondents in science and engineering to rate their teaching laboratories on several criteria. In the pre-occupancy survey, 16 faculty members rated the laboratory in which they most recently had taught; nine of the labs were located in Cowles and seven were in Moody. Table 5 (highlighted in blue) shows that the large majority of the ratings were "poor" to "average," indicating that faculty members perceived their teaching labs even more negatively than they did ordinary classrooms. In marked contrast, as highlighted in red in Table 5, a substantial majority of faculty respondents rated the CSI teaching laboratory in which they most recently taught as "good" to "excellent" on all eleven dimensions.

Table 5. Faculty Ratings of Pre-CSI STEM (N=16) and CSI (N=32) Teaching Labs in Percentages

	Pre-	CSI	Pre-	CSI	Pre-	CSI	Pre-	CSI	Pre-	CSI
Criterion	Very Poor		Poor		Average		Good		Excellent	
Accessibility of laboratory instruments	6.3	0.0	12.5	3.2	56.3	16.1	18.8	48.4	6.3	32.3
Safety of working environment	6.3	3.1	37.5	3.1	37.5	9.4	18.8	43.8	0.0	40.6
Flexibility in accommodating different teaching strategies	12.5	6.3	62.5	6.3	18.8	28.1	6.3	37.5	0.0	21.9
Ease with which one can monitor student activities	0.0	3.1	37.5	3.1	37.5	28.1	25.0	15.6	0.0	50.0
Ease with which lab exercises and techniques can be demonstrated	12.5	3.1	31.3	3.1	43.8	25.0	12.5	40.6	0.0	28.1
Ease of sharing lab space with other instructors/courses	18.8	0.0	37.5	6.3	37.5	21.9	6.3	43.8	0.0	28.1
Ease with which students can perform assigned tasks	6.3	0.0	25.0	0.0	37.5	19.4	31.3	38.7	0.0	41.9
Size or spaciousness	6.3	0.0	25.0	6.3	56.3	15.6	6.3	34.4	6.3	43.8
Quality of lighting	6.3	3.1	25.0	12.5	50.0	15.6	12.5	28.1	6.3	40.6
Quality of acoustics	13.3	3.1	40.0	9.4	40.0	18.8	6.7	34.4	0.0	34.4
Overall quality as a teaching environment	0.0	3.1	43.8	3.1	50.0	16.1	6.3	40.6	0.0	40.6

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For ease of comparison, Table 6 presents mean ratings on each dimension as well as results of tests of statistical significance (t). Every difference in this table is statistically significant. The new teaching laboratories thus provide a much-improved teaching environment on every criterion that we measured, from safety to quality of acoustics and lighting to ease in accommodating different teaching strategies. (See Appendix B for a breakdown by department.)

Table 6. Mean Faculty Ratings[1] on Eleven Dimensions of Teaching Laboratories in Pre-CSI STEM buildings (N=16) and the CSI (N=32)

	Pre-CSI		CSI			
Criterion	Mean	S.D.	Mean	S.D.	Δ	t
Ease with which students can perform assigned tasks	2.94	0.93	4.23	0.76	1.29	5.14
Safety of working environment	2.69	0.87	4.16	0.95	1.47	5.19
Size or spaciousness	2.81	0.91	4.16	0.92	1.35	4.81
Accessibility of laboratory instruments	3.06	0.93	4.10	0.79	1.04	4.05
Ease with which one can monitor student activities	2.88	0.81	4.06	1.11	1.18	3.78
Ease of sharing lab space with other instructors/courses	2.31	0.87	3.94	0.88	1.63	6.07
Quality of lighting	2.88	0.96	3.91	1.17	1.03	3.04
Ease with which lab exercises and techniques can be demonstrated	2.56	0.89	3.88	0.98	1.32	4.53
Quality of acoustics	2.40	0.83	3.88	1.10	1.48	4.74
Flexibility in accommodating different teaching strategies	2.19	0.75	3.63	1.10	1.44	4.71
Overall quality as a teaching environment	2.62	0.62	4.13	0.98	1.51	5.61

[1] Very poor =1; Poor = 2; Average =3; Good = 4; Excellent = 5.
*Except for "quality of lighting" ($p < .01$), all differences are statistically significant at $p < .001$.

The last question in Tables 5 and 6 and one other question we asked provide good overall measures of the perceived quality of the teaching laboratories. First, Figure 3 compares pre-occupancy and post-occupancy ratings of teaching laboratories in terms of "overall quality as a teaching environment." For the pre-CSI STEM buildings, faculty assessed overall quality as "poor" to "average," whereas 80 percent of faculty rated the laboratory in the CSI as "good" or "excellent." Second, Figure 4 shows how strongly faculty respondents in science and engineering agreed with the following statement: "The teaching laboratories in [Cowles/Moody/the CSI] are adequate for my instructional needs." For the pre-CSI STEM buildings, the majority of respondents "disagreed" or "neither agreed nor disagreed" and no one "agreed strongly." That is, the faculty generally did not believe that the teaching laboratories were adequate for their instructional needs. On the other hand, over 75 percent of respondents "agreed" or "strongly agreed" with respect to the CSI.

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Figure 3. Faculty Ratings of the Overall Quality of Pre-CSI STEM (N=16) and CSI (N=32) Teaching Laboratories as Teaching Environments.

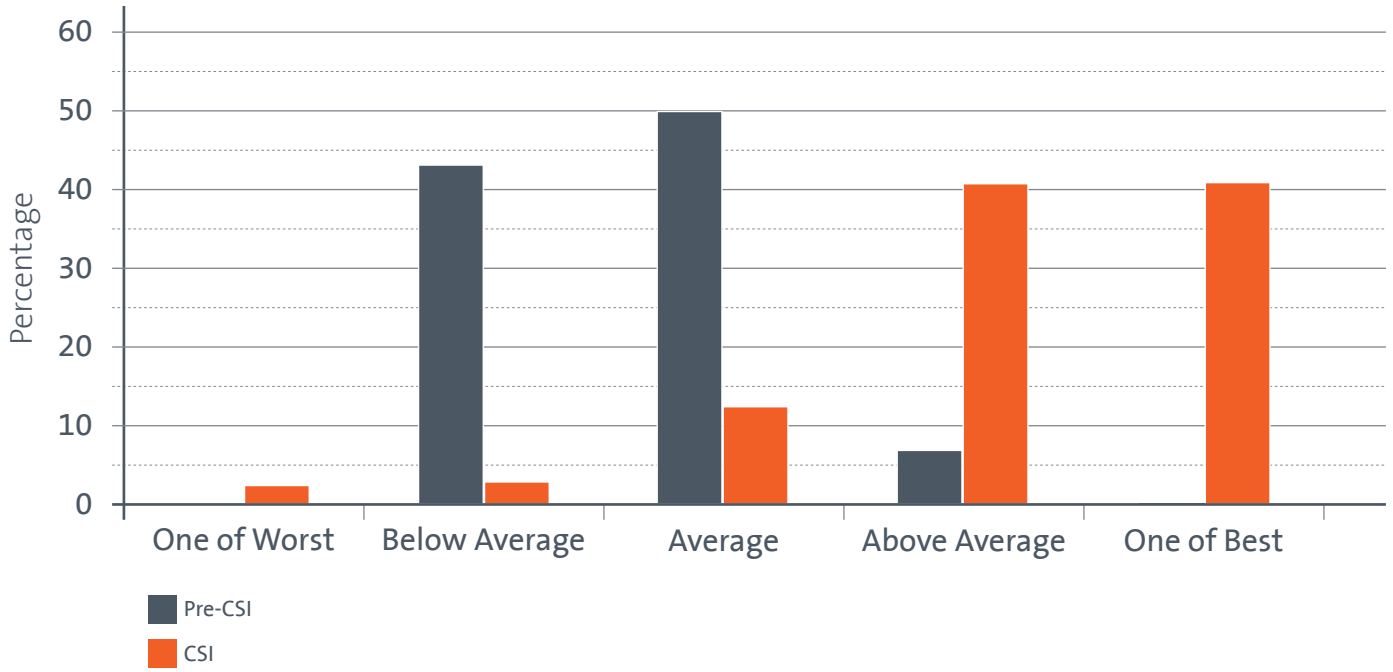
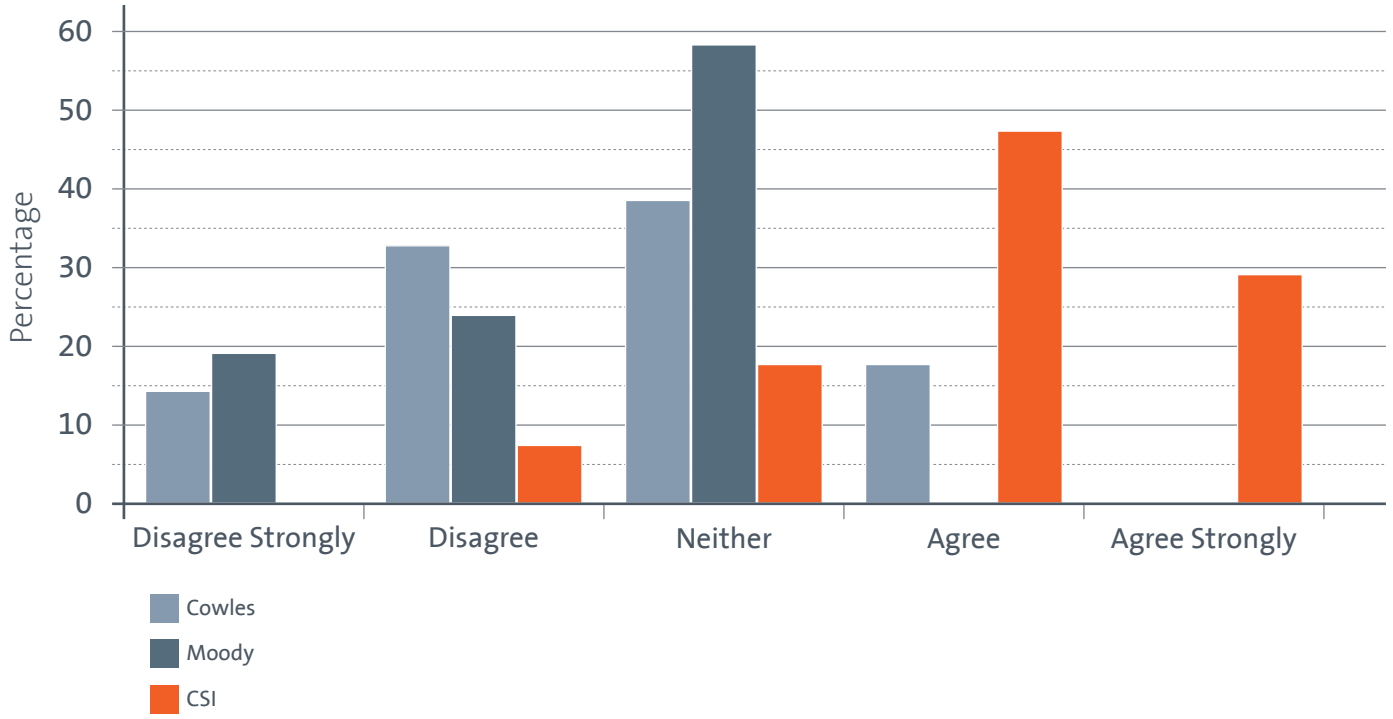


Figure 4. Faculty Responses to the Question: "The Teaching Laboratories in [Building] Are Adequate for my Instructional Needs"; Cowles (N=21)/ Moody (N=21) / the CSI (N=48).



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Twenty respondents in the post-occupancy survey had taught a laboratory course in one the old STEM buildings. More than half of these respondents reported that they had changed their pedagogy as a direct result of the move: 10 had introduced new exercises or assignments, and eight had changed the way they conducted the lab. These respondents referred specifically to the spatial arrangement of labs, additional storage space, and new equipment as instrumental in the changes they made. For example, one respondent reported:

- Two features of these laboratories are huge improvements. They offer the ability to switch easily from lecture to discussion to lab. This is due to the proximity of the tables to one another . . . The amount of storage space that allows several different types of labs (and courses) to be taught in the same room. Again, they are also just beautiful spaces.

Another responded, expressed his gratitude for the CSI by expounding on the transformative effect of the new labs:

- Before CSI, my teaching lab in Moody sucked, and I didn't really have a lot of equipment. I REALLY had second thoughts about coming to Trinity when I interviewed . . . But I did see the opportunity to grow and work with faculty/staff/administration across the ENTIRE university to make change, so I took a leap of faith. And CSI answered my prayers (literary) . . . Pedagogically: I have been able to FINALLY revise my . . . Lab and . . . Lab NOW that I have equipment. Making this major revision in two courses . . . has been quite a challenge, but it has and continues to be a labor of love. There is enough equipment to conduct a wide range of experiments that better match their results to the theory, and a better match to the lecture course. I was able to buy quality equipment that has held up well . . . I love the lab!!! It has storage to place and organize equipment, so things are not all over the place like in Moody. The AV instructor's station is nice and functional. I can use one of the screens for overheads, and on the other side use the white board to write out equations. Being able to slide the multiple white boards up and down is great for students to stay on track. The space is amazing. There are enough stations for students to work . . . The room has plenty of lighting. When there are special events, such as Trinity in Focus, or tours, I can lay out all the equipment to highlight the lab!!! Overall, future: The space has given me an opportunity to improve my lab courses, and to conduct outreach using the new lab equipment . . . SO, THANK YOU, THANK YOU, THANK YOU!!!

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GOAL 2: Advance faculty and student research.

QUESTION	ANSWER
Do the laboratories enhance scientists' ability to conduct research?	The faculty rated the labs in the old Cowles and Moody buildings most unfavorably in terms of the level of environmental control, ease of sharing lab space, and the quality of lighting and acoustics. In contrast, the overwhelming majority of the faculty rated the research laboratories as "good" to "excellent" in every way. ***See Table 8.***
Have the new laboratories increased scientists' level of productivity?	Research laboratories are perceived as a vast improvement over the old laboratories, making for easier operation and enhancing faculty productivity, ***See Table 9.***

Twenty-five faculty respondents in the pre-occupancy survey reported that they currently had a research lab—including 14 in Cowles and 9 in Moody—where they had worked an average of 8.32 years. During the academic year, the faculty spent a mean of 7.88 hours per week in the research lab, which increased to 17.88 hours in the summer. On average, between five and six students worked in the lab during the academic year and two students were in the lab in the summer. In the post-occupancy survey, 31 respondents currently had a research lab, with 27 of these respondents from four departments: biology, chemistry, engineering science, and psychology. These faculty members spent an average of 8.1 hours per week in the lab during the academic year and 19.48 hours in the lab during the summer. Nearly all faculty respondents had students working in their lab during the academic year, with the number of students ranging from 1 to 25 and, on average, between five and six. During the summer, about 80 percent of these faculty employed from one to eight students with a median of three.

Faculty assessment of the pre-CSI STEM research labs was no better than the teaching labs. Table 7 shows lab ratings on nine dimensions. The three highest ratings, each slightly above "average," were accessibility of lab instruments, safety of working environment, and ease of performing assigned tasks. The faculty was especially critical of the level of environmental control in the lab, followed by the quality of lighting, ease of sharing lab space with other instructors, and quality of acoustics. On the all-important criterion of the lab's overall capability of supporting a research program, two-thirds rated their lab as "average" or worse than "average." By contrast, in the post-occupancy survey, 83 percent of the ratings across all nine dimensions were "good" or "excellent," and the ratings differed significantly from pre-CSI STEM ratings on every dimension (see Tables 9 and 10).

The last question in Tables 7 and 8 and one other question are good overall indicators of the perceived quality of the research laboratories. First, Figure 5 compares pre-occupancy and post-occupancy ratings of research laboratories in terms of "overall capability of supporting a research program." For the pre-CSI STEM buildings, faculty with research labs generally assessed overall quality as "poor" to "average," whereas over 90 percent of faculty rated their CSI laboratory as "good" or "excellent." Second, Figure 6 shows how strongly faculty respondents agreed with the following statement: "I am generally satisfied with the research facilities in [Cowles/Moody/the CSI]." With respect to the pre-CSI STEM buildings, only a few respondents agreed (i.e., were satisfied) with Cowles, and no one was satisfied with Moody. On the other hand, over 75 percent of respondents expressed satisfaction with the CSI.

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Table 7. Faculty Ratings of Pre-CSI STEM Research Labs in Percentages (N=25)

	Pre-	CSI	Pre-	CSI	Pre-	CSI	Pre-	CSI	Pre-	CSI
Criterion	**Very Poor**		**Poor**		**Average**		**Good**		**Excellent**	
Accessibility of laboratory instruments	0.0	0.0	20.0	0.0	32.0	6.7	36.0	43.3	12.0	50.0
Safety of working environment	4.0	0.0	8.0	0.0	48.0	6.7	32.0	33.3	8.0	60.0
Level of environmental control	16.7	0.0	66.7	13.3	16.7	33.3	0.0	23.3	0.0	30.0
Ease of sharing lab space with other researchers	16.0	0.0	20.0	7.1	48.0	14.3	12.0	32.1	4.0	46.4
Ease with which students can perform assigned tasks	0.0	0.0	16.0	0.0	52.0	10.0	32.0	30.0	0.0	60.0
Size or spaciousness	12.0	0.0	28.0	3.3	32.0	10.0	12.0	43.3	16.0	43.3
Quality of lighting	4.0	3.3	44.0	0.0	36.0	10.0	12.0	36.7	4.0	50.0
Quality of acoustics	12.0	0.0	20.0	6.7	48.0	20.0	20.0	36.7	0.0	36.7
Overall capability of supporting a research program	4.0	0.0	32.0	0.0	32.0	6.7	24.0	36.7	8.0	56.7

Table 8. Mean Faculty Ratings[1] of Research Laboratories in Pre-CSI STEM buildings (N=25) and the CSI (N=30)

	Pre-CSI		CSI			
Feature	**Mean**	**S.D.**	**Mean**	**S.D.**	**Δ**	**t**
Safety of working environment	3.32	0.90	4.53	0.63	1.21	5.85
Ease with which students can perform assigned tasks	3.16	0.69	4.50	0.68	1.34	7.23
Accessibility of laboratory instruments	3.40	0.96	4.43	0.63	1.03	4.77
Quality of lighting	2.68	0.90	4.30	0.92	1.62	6.57
Size or spaciousness	2.92	1.26	4.27	0.79	1.35	4.84
Ease of sharing lab space with other researchers	2.68	1.03	4.18	0.95	1.50	5.61
Quality of acoustics	2.76	0.93	4.03	0.93	1.27	5.04
Level of environmental control	2.00	0.59	3.70	1.06	1.70	7.14
Overall capability of supporting a research program	3.00	1.04	4.50	0.63	1.50	6.59

[1] Very poor =1; Poor = 2; Average =3; Good = 4; Excellent = 5.
*All differences are statistically significant at $p < .001$.

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Figure 5. Faculty Ratings of the Overall Capability of Pre-CSI STEM (N=16) and CSI (N=30) Research Laboratories in Supporting a Research Program.

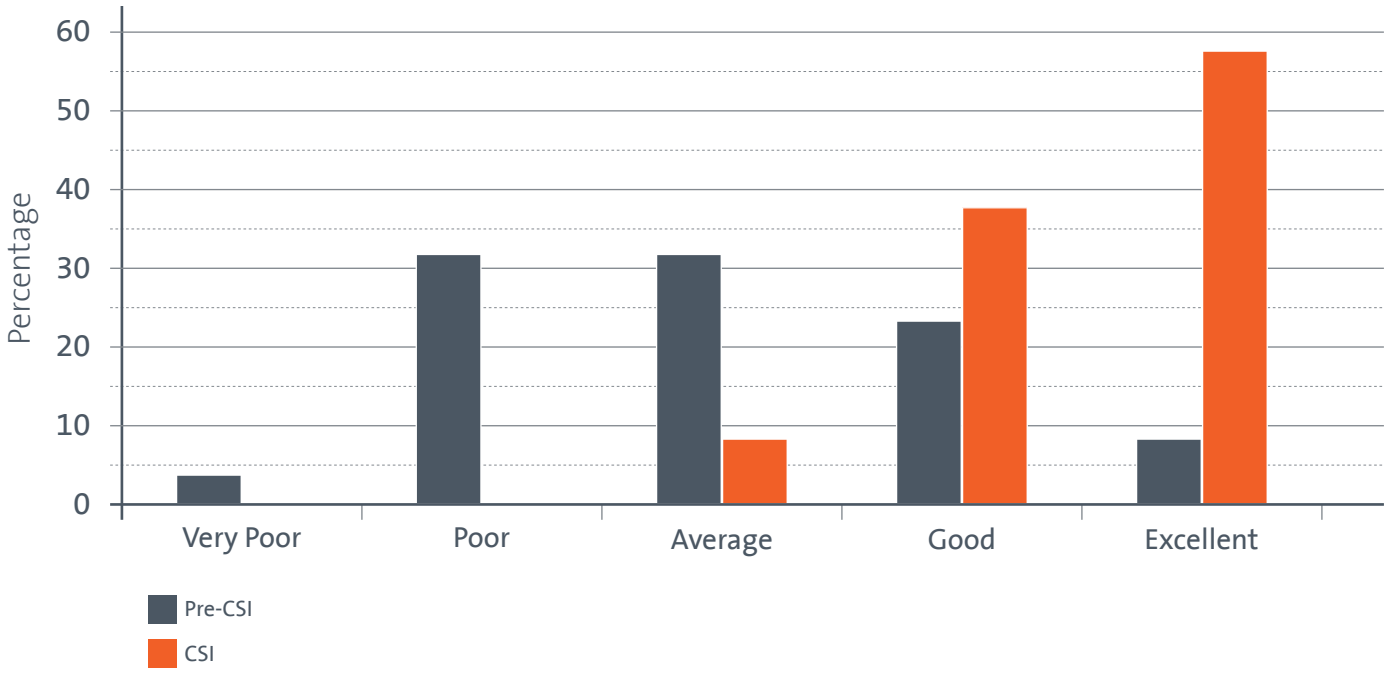
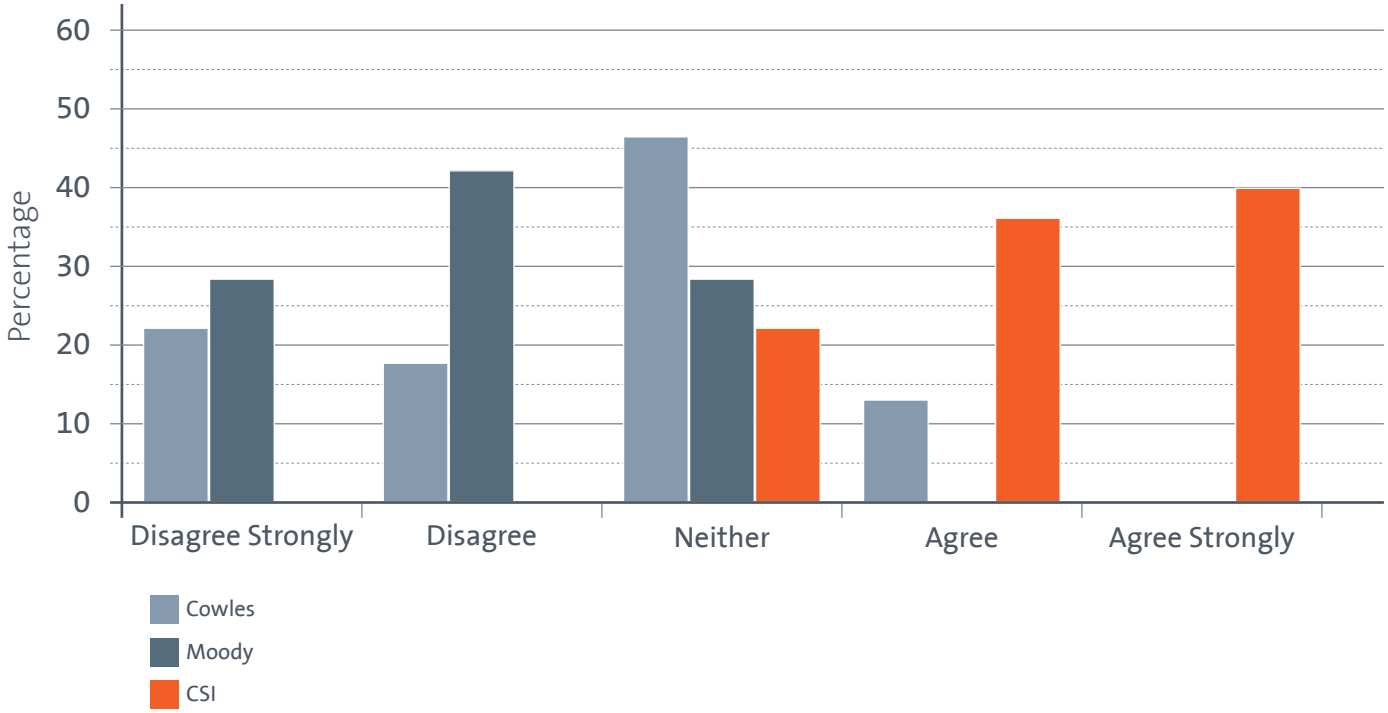


Figure 6. Faculty Responses to the Question: "I AM Generally Satisfied with the Research Facilities in [Building] "; Cowles Life Science Building (N=22)/ Moody (N=21) / the CSI (N=48).



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For one final point of comparison, we asked faculty members with a research lab in the CSI who also had a research lab in one of the pre-CSI STEM buildings to compare the new lab with the old. The 21 faculty respondents in this group reported that the new lab had a positive impact in several ways (see Table 9). In terms of the operation of the new lab, two-thirds or more of the researchers agreed or strongly agreed that "it is easier to access laboratory instruments," the "new laboratory is a safer working environment," and "students are better able to perform research tasks." As indicators of enhanced productivity, over 70 percent agreed or strongly agreed with these statements: "I have more options in designing research" and "I can carry out research more quickly and efficiently." Relatedly, three in four respondents believed that "my new lab has given me renewed optimism about my research." Finally, 75 percent found it easier to collaborate with other faculty.

The new CSI research facilities clearly have had a profound impact on how Trinity faculty think about and engage in research. In a sense, as one faculty member commented, they have "improved the research culture . . . at Trinity."

Table 9. Faculty Comparisons of New Research Labs with Old Research Labs in Percentages (N=21)

Criterion	Disagree strongly	Disagree	Neither	Agree	Agree Strongly	Mean *	S.D.
It is easier to access laboratory instruments	0.0	9.5	23.8	42.9	23.8	3.81	0.93
New laboratory is a safer working environment	0.0	4.8	23.8	14.3	57.1	4.24	1.00
It is easier to share lab space with others	0.0	14.3	14.3	33.3	38.1	3.95	1.07
It is easier to collaborate with other faculty	0.0	9.5	14.3	42.9	33.3	4.00	0.95
I have more options in designing research	0.0	9.5	19.0	33.3	38.1	4.00	1.00
Greater environmental control has increased re-producibility of experiments	4.8	4.8	47.6	28.6	14.3	3.43	0.98
I carry out research more quickly and efficiently	0.0	9.5	14.3	57.1	19.0	3.86	0.85
My research output is greater	0.0	14.3	42.9	28.6	14.3	3.43	0.93
I have pursued new lines of research	4.8	9.5	28.6	23.8	33.3	3.71	1.19
Students are better able to perform research tasks	0.0	4.8	4.8	23.8	66.7	4.52	0.81
My new lab has given me renewed optimism about my research	0.0	9.5	14.3	38.1	38.1	4.05	0.97
Average	**0.9**	**9.1**	**22.5**	**33.3**	**34.2**	**3.91**	**0.97**

* 1 = disagree strongly, 2 = disagree, 3 = neither, 4 = agree, and 5 = agree strongly.

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GOAL 3: Create a safe environment.

QUESTION	ANSWER
Do users perceive CSI laboratories to be safe places to study and work?	As reported above, all comparisons of faculty ratings of the safety of teaching and research laboratories indicate that the CSI provides a much safer environment in which to work. Table 10 summarizes these results. Whereas the majority of faculty in the pre-occupancy survey rated the safety of pre-CSI teaching labs as "poor" to "average" and the safety of the research labs as "average" to "good," 84 percent of lab instructors and 93 percent of those with research labs rate the safety of the CSI labs as "good" or "excellent."

Table 10. Faculty Ratings of Teaching and Research Labs on "Safety of Working Conditions" in Percentages

Teaching Labs	N	Very Poor	Poor	Average	Good	Excellent	Mean *	S.D.
Pre-CSI STEM	16	6.3	37.5	37.5	18.8	0.0	2.69	0.87
CSI	32	3.1	3.1	9.4	43.8	40.6	4.16	0.95

Research Labs	N	Very Poor	Poor	Average	Good	Excellent	Mean *	S.D.
Pre-CSI STEM	25	4.0	8.0	48.0	32.0	8.0	3.32	0.90
CSI	30	0.0	0.0	6.7	33.3	60.0	4.53	0.63

*1 = disagree strongly, 2 = disagree, 3 = neither, 4 = agree, and 5 = agree strongly.

We also asked students who had taken a laboratory course to tell us whether they were ever concerned about their safety while working in the lab. When we examined this question for four different sets of disciplines, we found that in three of the four (biology/psychology, engineering science/physics, and geosciences), over 95 percent of the students who had taken a lab course reported that they were "never" concerned. Although 90 percent of students who had taken a chemistry lab also were never concerned, 16 students said they were concerned "sometimes" and three were concerned "often." We suspect, however, that these concerns are not due to the physical environment or architecture of the lab. Rather, they are likely to be a product of students' awareness that they are working with chemicals that may be hazardous to their health and well-being if they do not follow safe laboratory practices. Such awareness thus may be a good sign of students understanding the impact of their behavior in the lab.

Students further indicated that safety was one of the criteria that made the CSI an attractive place to study. Among 232 respondents, 86 percent indicated that it was "moderately," "very," or "extremely important" to them that the CSI was a "safe place to be."

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GOAL 4: Create a welcoming place to congregate, study, and learn.

QUESTION	ANSWER
How heavily used is the CSI?	As reported above, all comparisons of faculty ratings of the safety of teaching and research laboratories indicate that the CSI provides a much safer environment in which to work. Table 10 summarizes these results. Whereas the majority of faculty in the pre-occupancy survey rated the safety of pre-CSI teaching labs as "poor" to "average" and the safety of the research labs as "average" to "good," 84 percent of lab instructors and 93 percent of those with research labs rate the safety of the CSI labs as "good" or "excellent." ***See Table 10***
Why do students choose to come to the CSI?	Students are far more likely to go to CSI by choice. For example, 84% of STEM majors and 63% of Non-STEM majors reported that they visited the CSI to study or do homework alone; by contrast 43.9% of STEM majors and 8.4% of Non-STEM majors visited at least one of the Pre-CSI STEM buildings for this purpose. ***See Table 13***
Do users perceive the CSI and spaces within it as attractive places to meet, study, and work?	4 in 10 students in the pre-occupancy survey reported that Moody was a good or favorite place to study and meet with others; by comparison 9 in 10 students rated the CSI as a good or favorite place to study and meet with others. ***See Figures 7 and 8***

As part of the construction and renovation, numerous study spaces were designed into each level; a café was added; and extensive glass and improved lighting created a sense of openness. Most study spaces are conveniently located near main circulation, and many are located in quieter "eddies" within the building. In addition, many study spaces (and teaching labs) are placed adjacent to windows so that they are flooded with daylight and look directly outside or out onto "Broadway," the day lit central circulation spine connecting CSI as a complex to the existing Mars McLean Building to the south, and to Chapman Hall, the major classroom building on campus, to the north.

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Data from the surveys indicate a shift in the number of students who enter the STEM buildings and in the reasons they go there. In the pre-occupancy survey, nearly all students reported that they had entered Cowles; however, as Table 11 shows, many students never or seldom had been in either Moody or Halsell. Most of the students who entered Moody on a regular basis were science and engineering majors, and most of the relatively few students who regularly visited Halsell majored in computer science. By contrast, only one student, in her first-year, had never entered the CSI; 97 percent of respondents reported that they had been in the Center more than 20 times since coming to Trinity; and 95 percent reported entering the Center four or more times a week during the current semester. While the majority of these daily visitors were STEM majors, four out of five non-STEM majors reported visiting the Center at least two to three times a week.

Table 11. Number of Times Students Enter STEM Buildings Since Coming to Trinity University and During the Current Semester in Percentages

Since Coming to Trinity	N	Never	1-20 Times	> 20 Times
Cowles Life Science	217	7.8	10.6	81.6
Moody Engineering	215	21.4	17.2	61.4
Halsell	211	27.5	23.2	49.3
CSI	272	0.4	1.1	98.5

This Semester	N	Never	.5-3 Times/wk	4+ Times/wk
Cowles Life Science	205	32.7	34.6	32.7
Moody Engineering	193	49.2	21.2	29.5
Halsell	190	71.1	18.9	10.0
CSI	268	1.1	3.7	95.1

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Why do students frequent these buildings? Almost nine out of ten respondents had taken a course that met in one of the three pre-CSI STEM buildings. Thus, when we asked about the purposes that brought students to these buildings, they reported that the primary reason was to "attend class." Table 12 shows the percentage of students who reported each of eight purposes among those who identified any purpose at all. As the table shows, students tended to go to Cowles either to attend class (86%) or to meet with a faculty member outside class (52%); otherwise, they tended to have no reason to go there. Moody and Halsell were more likely to be used for various other purposes. However, by comparison, students are far more likely to enter the new CSI for the purposes of studying and meeting with other students. For example, whereas 37 percent of students used any of the three pre-CSI buildings to study or do homework alone, 79 percent of students used the new CSI for this purpose.

Table 12. Why Students Go to STEM Buildings, Pre- and Post-CSI, in Percentages

Purpose	Cowles (*N*=145)	Moody (*N*=111)	Halsell (*N*=69)	Any (*N*=166)	CSI (*N*=265)
Attend class	86.2	78.4	73.9	93.4	87.5
Meet with a faculty member outside class	52.4	58.6	37.7	72.9	54.7
Conduct independent research	13.1	17.1	8.7	24.1	21.5
Work in a work/study job	6.9	13.5	11.6	17.5	14.7
Attend sessions at Peer Learning Center	6.2	30.6	4.3	24.1	14.7
Study or do homework alone	6.9	33.3	30.4	37.3	79.2
Study or work on group projects with others	15.9	37.8	34.8	48.8	68.7
Hang out with other students	6.9	20.7	26.1	25.3	43.8

In short, students most often entered the pre-CSI STEM buildings because external forces required them to be there, such as to attend a class or meet with a faculty member in his or her office; relatively few students went there by choice. As Table 13 further shows, STEM majors were much more likely than non-STEM majors to choose a STEM building as a place to study, work with others on group projects, or hang out with others. Results from the post-occupancy survey on the CSI tell a very different story. Students, including a relatively large percentage of non-STEM majors, are far more likely to go to the CSI by choice. For example, 84 percent of STEM majors and 63 percent of non-STEM majors reported that they visited the CSI to study or do homework alone; by contrast, 43.9 percent of STEM majors and 8.4 percent of non-STEM majors visited at least one of the pre-CSI STEM buildings for this purpose.

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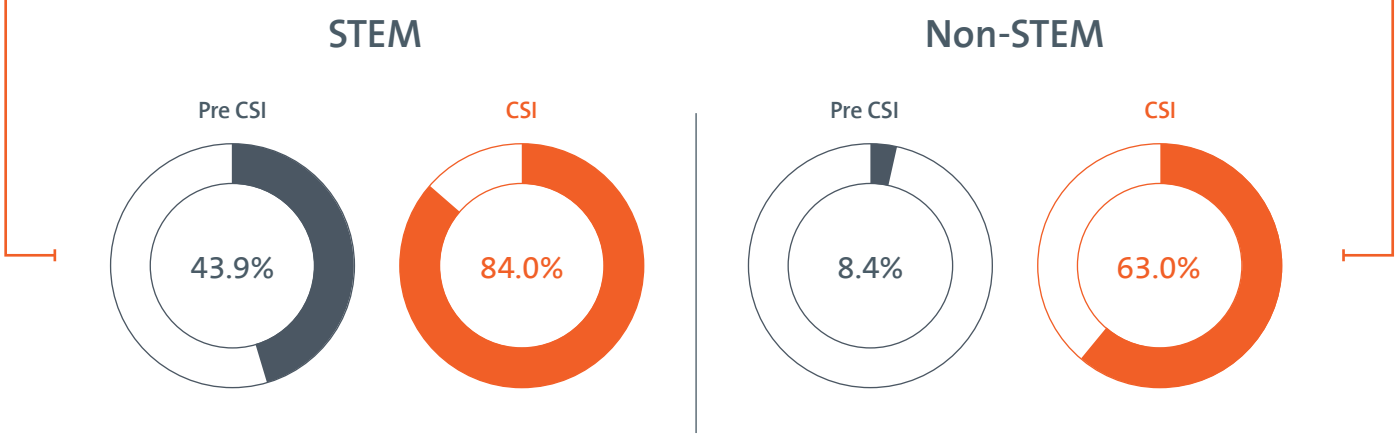
Table 13. Why Students Go to STEM Buildings, Pre- and Post-CSI, by STEM and non-STEM Majors in Percentages

	Pre-CSI		CSI	
Feature	STEM (N=114)	Non-STEM (N=83)	STEM (N=187)	Non-STEM (N=54)
Attend class	87.7	57.8	92.0	74.1
Meet with a faculty member outside class	72.8	38.6	67.9	13.0
Conduct independent research	28.1	7.2	28.9	0.0
Work in a work/study job	18.4	7.2	17.1	3.7
Attend sessions at Peer Learning Center	21.9	15.7	18.2	5.6
Study or do homework alone	43.9	8.4	84.0	63.0
Study or work on group projects with others	57.0	13.3	73.3	51.9
Hang out with other students	28.1	8.4	48.1	25.9
No purpose given	8.8	33.7	0.0	3.7



According to the pre-occupancy survey, students were more likely to choose Moody than Cowles or Halsell as a place to study alone and to study or work on group projects with others. Figures 7 and 8 show the ratings of Moody as a place to study and to meet others as compared with ratings of the new CSI. In both surveys, only students who used the buildings for these purposes were asked to rate the buildings. The figures show that even among these respondents there is a sharp difference in ratings before and after completion of the new science complex. Four in 10 students in the pre-occupancy survey reported that Moody was a good or favorite place to study and to meet with others; by comparison, almost 9 in 10 students rated the CSI as a good or favorite place.

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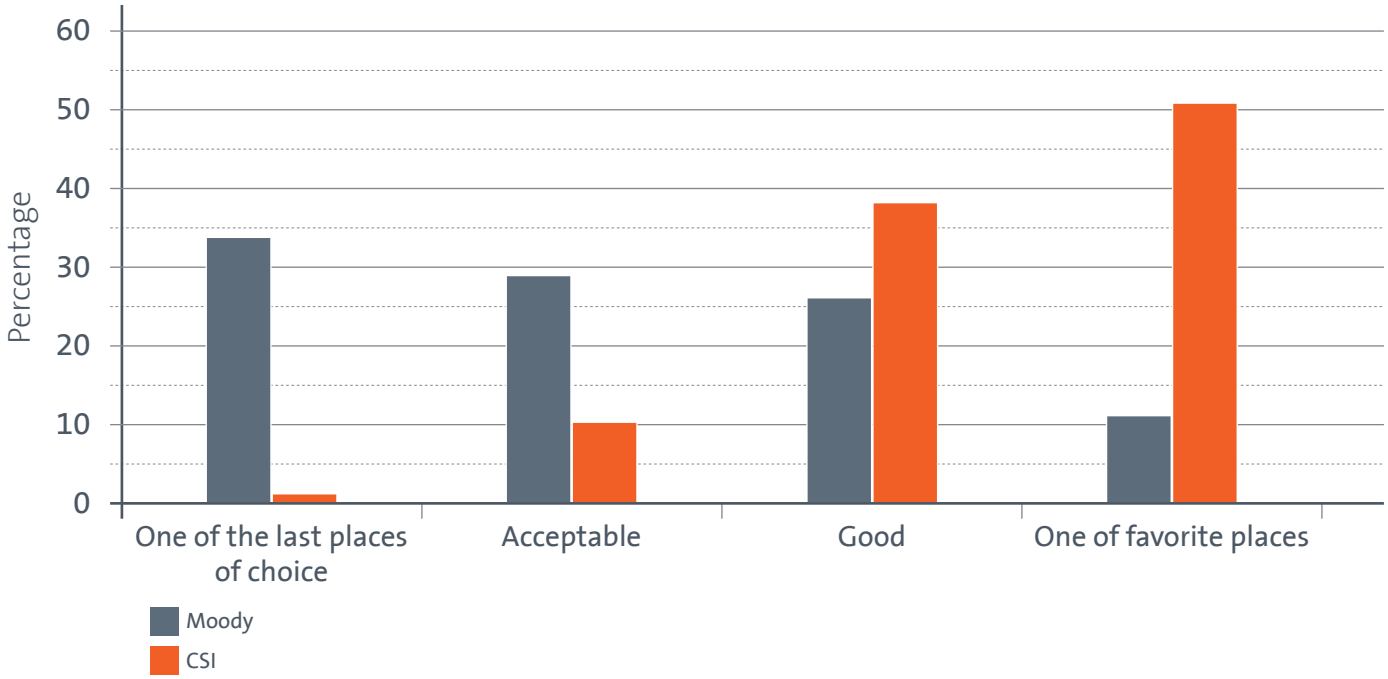
Comparisons of ratings by major and class year further show the positive impact of the CSI on all Trinity students. In the pre-occupancy survey, nearly all the students who gave favorable ratings to the STEM buildings as places to study and meet others were third- and fourth-year STEM majors. For example, of the 28 students who rated Moody as a good or favorite place to study, 25 were STEM majors and 23 were in their third or fourth year; none of the non-STEM majors rated it as a favorite place and only 1 in 5 rated it as a good place to study. By contrast, in the post-occupancy survey, almost 80 percent of non-STEM majors and 90 percent of first- and second-year students rated the CSI as a good or favorite place to study.

Figure 7. Student Ratings of Moody Engineering and Science Building; (N=35) and CSI (N=234) as a Place to Study.



Whether studying or meeting others, the most popular areas in the pre-CSI STEM buildings were the Engineering Core Room (Moody 328), the Chemistry Lounge (Moody 220), and Peer Learning Center. Otherwise, students tended to use open classrooms or laboratories. In the new CSI, the students choose a wide variety of places to study. The most popular places, chosen by more than 40 percent of respondents who study or meet others in the CSI at least once a week, are the group study areas, with and without doors, and the atrium “Broadway” seating areas. More than 20 percent of the students who study in the CSI also used the Innovation Lounge, the open computer lab, and research lab write-up areas.

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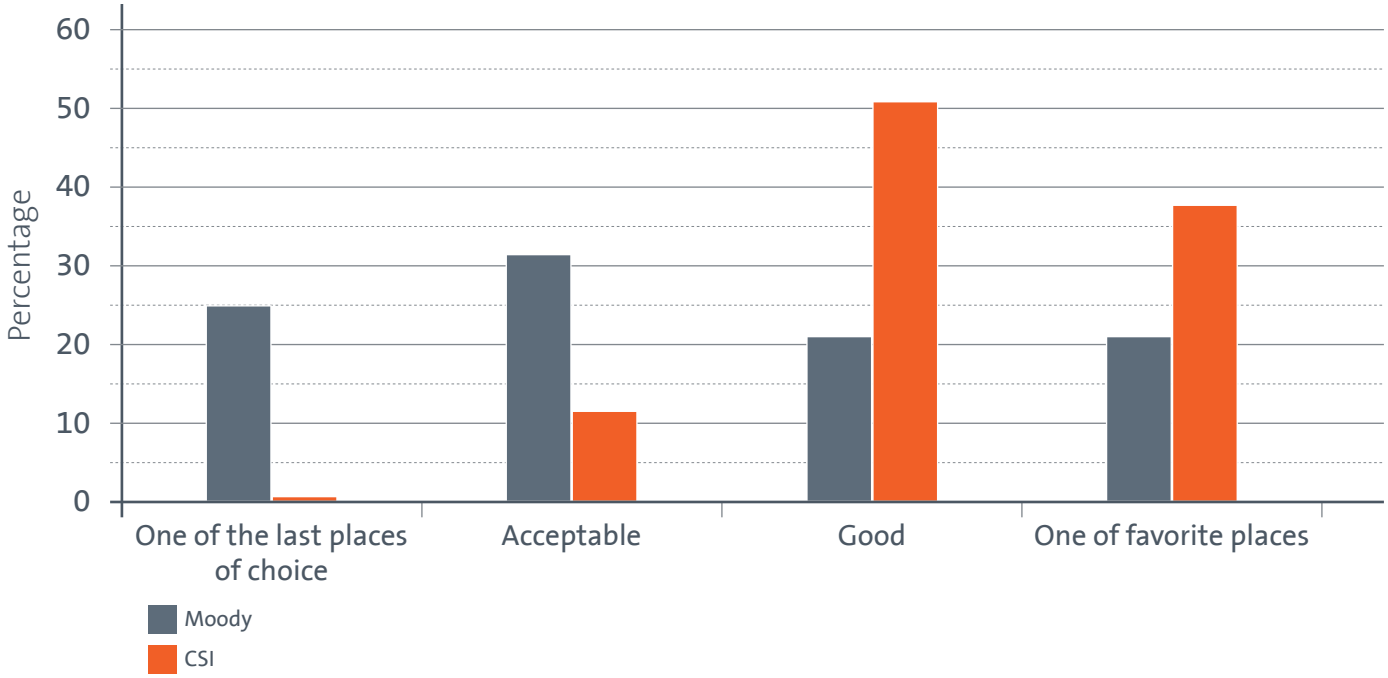
Figure 8. Student Ratings of Moody Engineering and Science Building; (N=159) and CSI (N=214) as a Place to Meet with Others.



What draws students to these buildings to study or to meet with other students? Having accessible areas to meet, especially rooms earmarked for specific majors, was clearly important in the pre-CSI STEM buildings. Nearly all of the engineering science majors (26 of 27) reported that they studied or met others in the Engineering Core Room. Similarly, the majority of the biochemistry majors reported that they did the same in the Chemistry Lounge. On the other hand, studying and meeting others occurred throughout the CSI, perhaps because of the far greater range of available areas. Indeed, students referred repeatedly to the number and variety of public spaces as a source of attraction to the CSI in their comments about what they like best about the Center:

"I love how there is so many places you can study but also the different types of places!!"

"I really like all the open spaces available for studying. All the tables and boards make it easier to study or do homework between classes."
"Even when it's full it's never crowded, there are so many studying spaces and you are never denied a place to study."

"I really enjoy having a variety of study spaces to go to depending on what I'm studying and who I am studying with. Sometimes I need an enclosed room, but other times I need a big table and whiteboards, and usually there is a place that fits my study needs."

"I like that it gives me a variety of choices for study settings (open or closed, small or large, and lab rooms)."

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To further explore the attraction of study and meeting areas, we asked students to rate the importance of several features in making each pre-CSI STEM building as well as the CSI "an attractive place to study" and "an attractive place to meet with other students." Tables 14 and 15 report these results for the CSI. As the tables show, most students deemed every aspect of the CSI at least "moderately important" in attracting them. The CSI's most important attractions as a place of study were its lighting and the availability of private areas or enclosed rooms; also important were that it is generally quiet, safe, and close to classes. Making it most appealing as a place to meet others was the availability of tables and chairs and enclosed study rooms, followed by lighting, safety, having comfortable furniture, and proximity to class.

Table 14. Importance of Various Features in Making the CSI an Attractive Place to Study in Percentages (N=232)

Feature	Not at all Important	Slightly Important	Moderately Important	Very Important	Extremely Important
Convenient place to be before and after class	3.4	8.2	21.9	38.6	27.9
Comfortable furniture in public spaces	3.8	10.3	24.8	35.9	25.2
Good lighting	0.4	4.3	14.8	44.8	35.7
Generally quiet	1.3	6.8	20.5	40.6	30.8
Safe place to be	3.9	10.3	15.5	30.6	39.7
Pleasing décor	8.6	20.3	31.5	25.9	13.8
Openness and spacious- ness of public spaces	10.0	26.8	29.4	23.4	10.4
Many friends go there	18.7	32.6	26.5	15.2	7.0
Availability of food and drinks in the café	9.1	15.5	33.2	24.1	18.1
Availability of private areas or enclosed room	2.1	4.3	13.3	33.9	46.4

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Table 15. Importance of Various Features in Making the CSI an Attractive Place to Meet with Other Students in Percentages (N=202)

Feature	Not at all Important	Slightly Important	Moderately Important	Very Important	Extremely Important
Convenient location	3.0	9.9	27.1	37.4	22.7
Comfortable furniture in public spaces	3.5	6.5	30.2	39.2	20.6
Good lighting	1.5	9.4	22.8	42.1	24.3
Generally quiet	3.5	8.9	29.7	40.6	17.3
Safe place to be	5.4	10.9	21.3	29.7	32.7
Pleasing décor	8.9	20.8	29.2	28.7	12.4
Openness and spacious- ness of public spaces	5.4	18.2	32.5	31.0	12.8
Availability of tables and chairs	2.0	2.4	11.2	40.0	44.4
Availability of enclosed study rooms to meet	2.5	5.4	18.1	34.8	39.2
Availability of food and drinks in the cafe	6.9	16.7	28.4	27.0	21.1

The pattern of ratings or relative importance of the various features was nearly identical in the Cowles Life Science and Moody Engineering Science buildings. Moreover, students' ratings of features in these two buildings are fairly similar to their ratings of the CSI. As a point of comparison, Table 16 presents the mean ratings of each feature for Moody and for the CSI as a place to study on a scale from 1 to 5, where 1 = not at all important and 5 = extremely important. In both cases, good lighting is most important; being generally quiet, convenience, and safety tend to be rated as "very important" on average; and having a pleasing décor, openness of public spaces, and friends who go there are least important. However, with one exception, openness of public spaces, features of the physical environment are seen as more important sources of attraction in the CSI than in the pre-CSI STEM buildings. Thus, good lighting, comfortable furniture, and an aesthetically appealing décor may seem more important if these features are built into the environment. This may be particularly true of one feature that we did not specifically ask students to rate, but which was identified by more than a dozen students as what they liked best about the CSI: natural lighting.

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Table 16. Mean Ratings1 of Importance of Various Features in Making Moody Engineering Science Building (N=141) and the CSI (N=232) Attractive Places to Study

	Moody		CSI	
Feature	**Mean**	**S.D.**	**Mean**	**S.D.**
Good lighting	3.95	1.11	4.11	0.84
Generally quiet	3.62	1.22	3.93	0.95
Safe place to be	3.68	1.43	3.92	1.15
Convenient place to be before and after class	3.68	1.30	3.79	1.05
Comfortable furniture in public spaces	3.43	1.30	3.68	1.08
Pleasing décor	2.97	1.34	3.16	1.16
Openness and spaciousness of public spaces	3.14	1.36	2.97	1.15
Many friends go there	2.75	1.42	2.59	1.16
Average	**3.40**	**1.31**	**3.52**	**1.07**

[1] Not at all important =1; Slightly important = 2; Moderately important =3; Very important = 4; Extremely important = 5.

In sum, the large variety of public spaces in the CSI make it very attractive as a place to study and meet others. In addition to their number and variety, these places appear to enhance attractiveness in several ways, depending on the desires and needs of students. These sources of attraction are most apparent in what students say they like best about the CSI. Besides natural lighting, several students mentioned the availability of “quiet” places to study (11 students) and chalkboards or whiteboards (7), which 85 percent of students reported using at least some of the time when working together with others.

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Other Goals

In addition to creating a welcoming place to congregate, study, and learn, and to improving the teaching and research facilities at Trinity, the CSI was designed to achieve other goals that were not directly measured or measurable in the pre-CSI STEM buildings. For example, the CSI houses a café and numerous gathering areas to stimulate interaction among students and faculty; contains glass-walled laboratories that make scientific work visible; and was designed to meet the highest green building and performance standards. The post-occupancy survey, therefore, contained questions that examined the success of goals related to these CSI features.

GOAL 5: Promote interaction among students and faculty.

QUESTION	ANSWER
Do the public areas in the CSI facilitate interactions among students?	When getting together with others in the center, students are most likely to study or work on problems together and discuss ideas from class. ***See Table 17***
How often do students use public areas in the CSI as learning spaces?	Over 58% of the time students are working on learning activities. ***See Table 17***
Do the public areas in the CSI facilitate interactions among the faculty?	Over 80% reported having a conversation in a public space with a faculty colleague from another department.
How often do faculty members interact with colleagues?	Over 40% reported that they had conversations with colleagues about research, teaching, or a scholarly subject a few timesa month or more.
How often do faculty members meet with students outside their office, classroom or laboratory?	70% reported meeting with students outside their office, classroom, or laboratory.

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We were not able to measure patterns of interaction in the pre-CSI STEM buildings; so we cannot provide a direct estimate of the impact of the CSI on student and faculty interactions. Short of that, we asked faculty respondents the extent to which they agree that "public areas in the CSI make it easy to socialize with colleagues" and "easy to socialize with students." Eighty percent of respondents "agreed" or "agreed strongly" with both statements; only two people disagreed.

We further found that faculty respondents often use these public spaces to meet others. Seventy percent reported meeting students in the CSI outside their office, classroom, or laboratory at least a few times during the current academic year. In addition, over 80 percent reported having a conversation in a public space with a faculty colleague from another department. Not surprisingly, faculty members with offices in the Center were far more likely to report meeting with others in the Center's public spaces. Thus, over 90 percent of those with CSI offices, as compared with 55 percent of other faculty respondents, reported that they had interacted with students in public spaces in the Center. Whether meeting with students or faculty, the most popular meeting places were the first and second floors of the atrium "Broadway" seating area.

To determine the extent to which faculty interactions went beyond mundane greetings and exchanges, we asked faculty members how often their conversations with colleagues in the CSI were about research, teaching, or some other scholarly subject. Over 90 percent reported that this occurred at least once or twice during the academic year, and over 40 percent reported that it happened a few times a month or more.

We also asked students what they do when they get together in the CSI. As reported earlier, almost 90 percent of student respondents consider the Center to be a good place or their favorite place on campus to get together with other students. Students who had met others there reported that they engaged in several activities, as shown in Table 17. When getting together with others in the Center, students are most likely to study or work on problems together and to discuss ideas from class. Respondents also spend at least some of the time studying independently and working on group projects for a class. In short, a good deal of learning takes place in the CSI as students meet informally outside the classroom. Furthermore, students acknowledged this in their comments about what they liked best about the Center; for example, "CSI is a beautiful and comfortable place to study and learn" and "the space inspires learning."

Table 17. Reported Frequency of Students Engaging in Various Co-Acting or Group Activities in CSI in Percentages (N=173)

Activity	Never	Rarely	Some of the Time	Most of the Time	Always
Work on group project for a class	1.5	11.2	28.8	42.0	16.6
Study or work on problems together	1.5	4.4	22.1	52.5	19.6
Study on your own	3.4	11.2	22.0	42.4	21.0
Discuss ideas from class	1.5	4.4	29.6	50.0	14.6
Just hang out	13.4	35.1	33.7	12.9	5.0
Get a drink or something to eat	7.3	24.8	38.8	20.9	8.3

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Although we cannot say whether informal interactions were more likely to occur as a result of the increase in common areas throughout the CSI, the data clearly show that students and faculty are making extensive use of these areas to meet others. Further, in comments about what respondents like best about the CSI, faculty members appreciated the "mingling of the disciplines" and how the CSI "fosters collaboration and interaction" and "brings many departments together." Another said that he liked "the openness and ability to see people and have conversations." And one student described the CSI as "my favorite place on campus to hang out, study, work on projects and meet up with friends."

GOAL 6: Enhance students' interest in and attitude toward science and engineering.

QUESTION	ANSWER
Do students have a more favorable attitude toward science and engineering?	40% of the Non-STEM majors "agreed" or "strongly agreed" with the statement: "Being in the Center for the Sciences and Innovation (CSI) inspires me to learn more about science and engineering."
Does the visibility of laboratories and scientific instruments pique students' interest in science and engineering?	Over half of student respondents "agreed" or "strongly agreed" with the statement: "Seeing students working in the science and engineering labs arouses my interestin science and engineering."

Without knowing student attitudes toward science and engineering prior to matriculating at Trinity, we cannot know for sure how much the CSI has affected those attitudes. We do know that a sizeable majority of students, including non-STEM majors, find the Center a comfortable place to study and learn. And while there, they can see science in action as they peer into the glass-walled laboratories. To get some sense of how much the CSI kindles students' interest in science, we asked respondents how much they agreed with two statements: "Seeing students working in the science and engineering labs arouses my interest in science and engineering"; "Being in the Center for the Sciences and Innovation (CSI) inspires me to learn more about science and engineering." Over half of the respondents "agreed" or "agreed strongly" with each of these statements; most of the remaining students were neutral, and few disagreed. One student commented: "I love how there are glass walls everywhere, allowing you to see what is going on. Science on Display." Another student liked how the CSI "projects an environment of openness and transparency to encourage interest in the sciences."

Such views are likely to be tempered by pre-existing attitudes toward science and engineering. To get a sense of how attitudes may affect the impact of the CSI, we created an "attitude toward science" index by summing responses to three items, to which respondents indicated their level of agreement: "I enjoy taking science courses"; "Science is boring"; and "I am not very interested in science." As expected, STEM majors and those with more positive attitudes toward science were much more likely to report that the labs aroused their interest in, and the building inspired them to learn more about, science. Yet, perhaps indicative of the building's positive impact, around 40 percent of non-STEM were also inspired.

The physical environment, especially the glass-walled laboratories (and classrooms), also positively affects the faculty. Similar to piquing students' interest in science, 80 percent of faculty respondents agreed or agreed strongly that "the glass walls throughout the CSI create a stimulating place to work."

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GOAL 7: Create an energy-efficient, sustainable environment. Enhance students' interest in and attitude toward science and engineering.

QUESTION	ANSWER
Are users aware of sustainable measures employed in the CSI?	Over 60% of faculty and 50% of student respondents knew 5 or more of the sustainable measures. ***See: Table 18***
Do instructors use the CSI to teach about sustainability?	Eleven faculty members reported using CSI's sustainable measures to teach about sustainability.

According to its website, "Trinity University is dedicated to a sustainable future. Our curriculum explores environmental issues; student groups and activities integrate these changes into the life of our campus community and beyond; and our Sustainability Committee works to reduce Trinity's global footprint." Evidence of the university's commitment to sustainability is its participation in the Leadership in Energy & Environmental Design (LEED) green building certification program. Phase 2 of the CSI earned a LEED Gold certification, and Phase 3 awaits certification.

LEED Gold certification validates the success of the building design in accomplishing the general goal of sustainability. As an educational institution, however, we believe the university would want the CSI to educate users about sustainability by making students and faculty more knowledgeable of sustainable practices in building design. To gauge faculty and students' knowledge of the CSI's sustainable features, we asked if respondents were aware of the nine sustainable measures incorporated in the building design. Table 18 shows the percentage of faculty and students professing knowledge of each measure.

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The general level of awareness was slightly higher for faculty than students: Over 60 percent of faculty respondents and over 50 percent of student respondents reportedly knew five or more of the measures we identified. Respondents were least aware of the energy-recovery wheel, which is hidden from view on the top floor of the CSI, followed by low-flow fume hood system that is present in all teaching and research labs. They were most aware of the savings on energy consumption provided by natural lighting, exterior shading, use of "greywater" system for flushing toilets, and the "living plant" roof.

Table 18. Percent of Faculty (N=95) and Students (N=242) with Knowledge of Sustainable Measures Employed in CSI

ActiSustainable Measure	Faculty	Students
Daylight to regularly occupied spaces	84.2	83.6
Use of removed live oaks for benches and counters	78.9	59.3
"Greywater" system used for flushing toilets	72.6	74.1
"Living plant" roof to reduce energy consumption	71.6	57.2
Exterior shading to reduce energy consumption	54.7	38.2
High-performance lighting system	52.6	50.4
Bio-swale and cistern used to collect water for irrigation	51.6	43.0
Low-flow fume hood system	33.7	33.6
Energy recovery wheel	16.8	12.8
Average	**57.4**	**50.2**

STEM faculty were more likely than non-STEM faculty and STEM majors more likely than non-STEM majors to report awareness of the sustainable measures. Although the level of professed awareness was lower for students than faculty, students and faculty were about equally likely to report that that the CSI had increased their "awareness of strategies and actions that may be taken to promote a healthy environment": 51.4 percent of students and 46.3 percent of faculty respondents indicated that their awareness increased "somewhat" or "a great deal." Eleven faculty members also reported that they had used the CSI's sustainable measures to teach about sustainability. Finally, over 80 percent of faculty respondents agreed that "sustainable measures employed in the CSI make it a better environment in which to work."

The eco-friendly nature of the CSI was sometimes identified among the features that students and faculty like best about the building. One student commented: "As a pretty energy-conscious person, I appreciate using natural resources in buildings, and sunlight is easier on the eyes than classroom lights are."

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General Impressions

We also included a few items that measured general impressions of the Trinity STEM buildings. Thus, we asked faculty respondents, "How satisfied overall are you with the [Cowles Life Science Building/Moody Engineering Science Building/Halsell Building/CSI]?" As Figure 9 shows, more than two-thirds of faculty respondents were no better than "slightly satisfied" with any of the three pre-CSI STEM buildings, and almost three quarters reported that they were "not satisfied at all" with Moody. In sharp contrast, over 80 percent were "very" or "extremely satisfied" with the CSI.

Figure 9

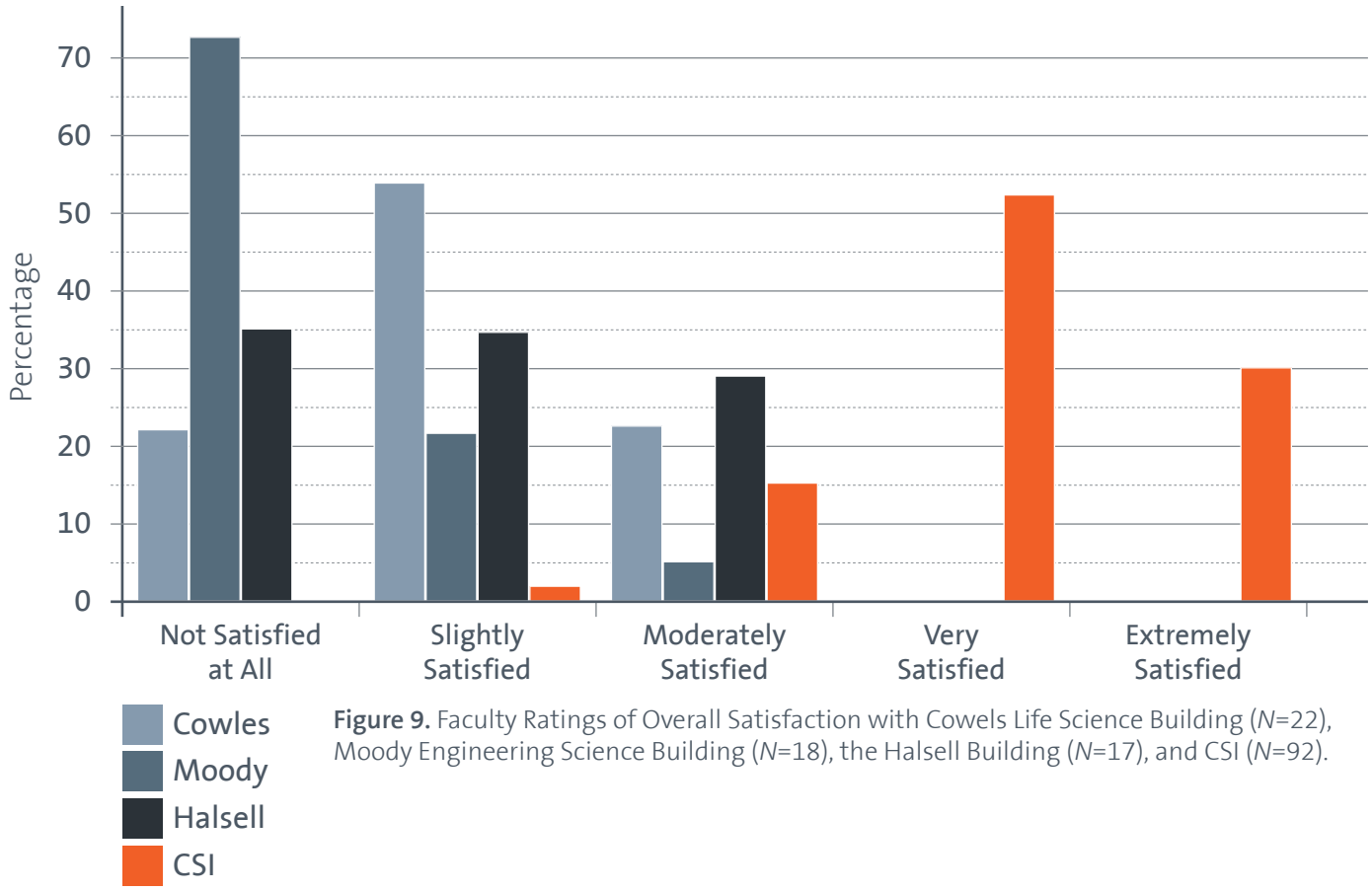

Figure 9. Faculty Ratings of Overall Satisfaction with Cowels Life Science Building (*N*=22), Moody Engineering Science Building (*N*=18), the Halsell Building (*N*=17), and CSI (*N*=92).

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A majority of student and faculty respondents also "disagreed" or "disagreed strongly"—only two faculty respondents "agreed"—that any of the three pre-CSI STEM buildings "projects a favorable image of Trinity University"; indeed, with respect to Moody, 82 percent of the faculty "disagreed strongly" with this statement. Once again, by sharp contrast, 94 percent of student respondents and 90 of 92 faculty respondents either agreed or agreed strongly (77 percent "strongly") that the CSI projects a favorable image of the university. As one student said: "What I like most about CSI is how much it has changed the overall appeal and beauty of the campus. I believe it has truly changed minds on how many think of Trinity University and has given an amazing impression to potential students." (Appendix C provides figures for the data on the extent to which the CSI projects a favorable image.)

Finally, Figures 10 and 11 report results of two other similar questions asked of faculty and student respondents: [building] "is a comfortable place to work" (faculty) and "is a comfortable place to study and learn" (students). Only two of the faculty respondents "agreed" that any of the pre-CSI STEM buildings was a comfortable place to work. For Cowles and Moody, the pattern of responses on the latter item closely corresponded to the faculty's overall satisfaction with the buildings; that is, Cowles was perceived somewhat more favorably than Moody. On the other hand, 86 percent of faculty respondents agreed or agreed strongly that the CSI is a comfortable place to work.

Figure 10

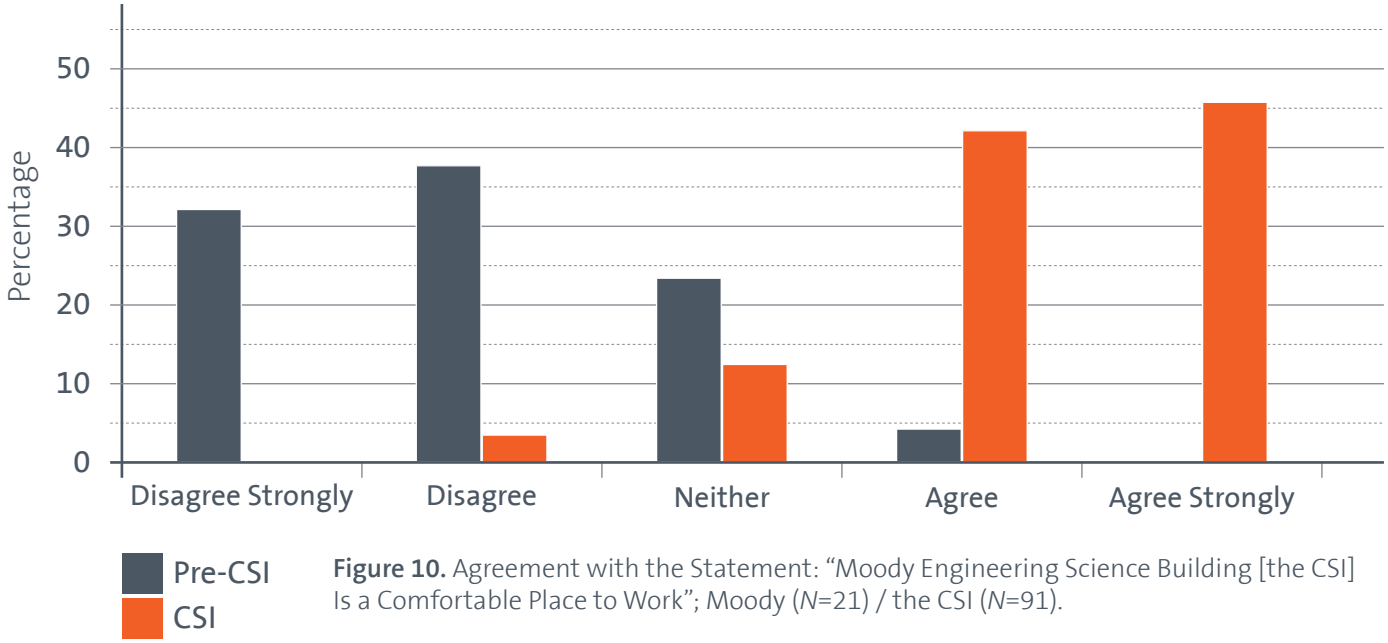

Figure 10. Agreement with the Statement: "Moody Engineering Science Building [the CSI] Is a Comfortable Place to Work"; Moody (*N*=21) / the CSI (*N*=91).

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As shown in Figure 11, the question asked of students evoked a similar pattern of response, except that students were not quite as negative as the faculty about Moody. That is, a near majority of students disagreed that Moody was a comfortable place to study and learn, whereas 92 percent agreed that the CSI is a comfortable place to study and learn. Further, when asked what they liked best about the CSI, students frequently used the word "comfortable," as in these two comments: "The building is beautiful and makes you feel comfortable while in it"; "the openness of the space . . . is very inviting and comfortable to be in."

Figure 11

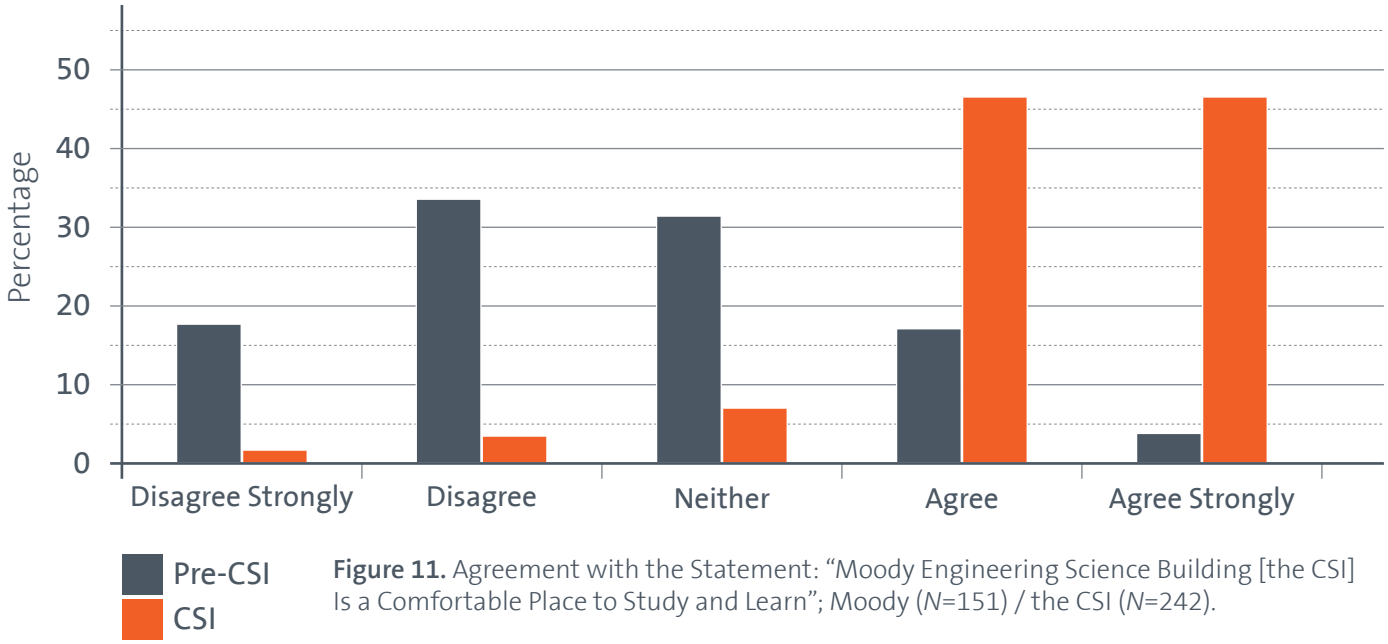

Figure 11. Agreement with the Statement: "Moody Engineering Science Building [the CSI] Is a Comfortable Place to Study and Learn"; Moody (*N*=151) / the CSI (*N*=242).

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The following comment sums up what many students think about the Center:

- It's not limited to only STEM people and is available as a place to study for all students. It's very spacious, a great place for ideas and answers to be shared, and a great building overall. I feel safe and productive while studying there and pulling all-nighters. I'm so glad that I have CSI as an option when choosing where I want to study. It's my favorite place on campus to hang out, study, work on projects and meet up with friends.

These brief faculty comments likewise capture what many faculty appreciate most about the CSI:

- Overall airy feel, soft spaces, sustainability initiatives, serves as campus hub.
- The open design, light, great work areas outside of classrooms.
- Beautiful design, extreme functionality, bright, quiet, etc.
- Open, collaborative, green, design.

Suggestions for Improvement

To gauge perceived deficiencies in the CSI, we asked both students and faculty: What suggestions do you have for improving the Center for the Sciences and Innovation (CSI)?" About half of the respondents offered a wide array of complaints and suggestions; however, some common responses indicate issues that the College should consider addressing.

As Table 19 shows, many student suggestions centered on extending the CSI's resources. Because so many students use the Center as a place to study and meet others, it often is crowded with few spaces available, especially at night. Therefore, there were numerous suggestions for expanding the available areas. Some students simply recommended adding more study spaces or rooms; others suggested creating additional study space by adding tables and chairs; and several students wanted greater access to existing classrooms and labs. As one student said:

- One suggestion that I would make is maybe opening up some of the classrooms after hours. I'm lucky in that I have a lab that I go work in, with computers and desktops and plenty of table space. However, there are students who don't have this luxury and so unlocking some of the classrooms would be awesome.

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Table 19. Student Suggestions for Improving the CSI (N=132)

	N	Percent of Cases	Percent of Responses
Add more study spaces or study rooms	34	25.8	22.1
Keep café open later	15	11.4	9.7
Greater access to classrooms and labs	9	6.8	5.8
More food and beverage options	7	5.3	4.5
Disable door alarms	7	5.3	4.5
More tables and chairs	6	4.5	3.9
Improve temperature control	6	4.5	3.9
Greater access for non-STEM majors	5	3.8	3.2
Provide more whiteboards	5	3.8	3.2
More quiet areas	4	3.0	2.6
Improve quality of fountain water	4	3.0	2.6
Improve Marrs McLean	3	2.3	1.9
Provide more comfortable furniture	3	2.3	1.9
More food places and/or vending machines	3	2.3	1.9
Fewer glass-walled classrooms	3	2.3	1.9
Other	40	30.3	26.0
	154	**116.1**	**99.6***

**Does not add to 100 due to rounding error.*

Five students claimed that the problem of accessibility to classrooms was particularly important to non-science and engineering majors. For example, a political science major wrote: "[Either] Don't lock all the doors or make it accessible with all Trinity IDs, not just science students." This was echoed by a business administration major:

> I wish there were more rooms for people to study in. CSI is the only place on campus where students can stay late and study (the library closes at 12). I think its [sic] unfair how a lot of the engineer/science/computer people have access to every room in the building, but ordinary people don't have that access.

Given the long hours they spend in the CSI, students want easy access to a variety of food and drinks. Therefore, other frequent suggestions included extending the hours of the CSI POD (café), which currently closes at 10 p.m., putting in more vending machines, and providing more food and beverage options. Finally, five or more students suggested that their use of the CSI would be more pleasurable if (1) the door alarms were disabled, (2) they could better control building or room temperature, and (3) there were more whiteboards. That is, some students found the door alarms annoying, distracting, and unnecessary; some thought the building was too cold; and some wanted more whiteboard space or more areas with whiteboards.

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Table 20 summarizes suggestions for improvement made by faculty respondents.
Although the faculty offered a wide range of suggestions, one problem stood out: classroom technology. These suggestions took many forms. First, with reference to several different classrooms, faculty members pointed out that the audio-visual equipment was difficult to use and unreliable. Appendix D provides a complete list of complaints and suggestions about A/V technology. The following comments are representative:

- The iPads that control the audio-video are not particularly reliable.
- Fix AV system in 225 MMH, simplify A/V systems in classrooms, they are overkill, waste energy and have unreasonable support costs.
- Better electronic projector equipment in the classrooms. I waste a lot of classroom time dealing with the projectors.
- Fix the technology in 204 (and 205), and treehouse. Tech is so unreliable it discourages me from using it as much as I might otherwise use it.
- The A/V technology in the seminar room that I used (406) was cumbersome and generated a lot of heat.
- Some of the technology is a bit finicky and harder to engage than in the other buildings. (And I say that as both a millennial and someone who does quite a bit of computer simulations and coding in my research).
- The A/V panel in CSI 104 is very cumbersome to use. The touchscreen requires multiple steps to coordinate the selected devices/media and the actual projected image. It is not self-explanatory and no instructions are included on the screens.

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Table 20. Faculty Suggestions for Improving the CSI (N=53)

	N	Percent of Cases	Percent of Responses
Fix or improve classroom technology	19	35.8	30.2
Provide better technology support	5	9.4	7.9
Re-position or add classroom whiteboards	4	7.5	6.3
Install permanent computers in classrooms	3	5.7	4.8
Address electrical problems	3	5.7	4.8
Improve temperature control	2	3.8	3.2
Renovate Marrs McLean	2	3.8	3.2
Install shades for glass walls	2	3.8	3.2
Maintain sustainability features	2	3.8	3.2
Provide more shade for outdoor areas	2	3.8	3.2
Add signage for building navigation	2	3.8	3.2
Add solar panels	2	3.8	3.2
Other	15	28.3	23.8
	63	**119.0**	**100.2***

*Does not add to 100 due to rounding error.

Second, several faculty referred to problems with computer technology. For example, one faculty member reported that the "computer interfaces are unreliable." Three others lamented "the lack of a permanent computer" in certain classrooms, such as CSI 406. As one person explained, this "was a major problem for student presentations—a number of students had to check out computers (or Mac adapters) from the library . . ." Another said, "Having designated computers in each class and lab would really help to increase our ability to focus on teaching strategies. I mess around with the computer system for something like 2 hours on average per semester." One other person noted that some of the software installed on computers (e.g., SPSS) had licenses that "were not up-to-date."

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Third, for five faculty members the problems with classroom technology took the form of a need for better technical support. These people recommended, for example, that the university "improve ASO" or "rethink and redo the concepts behind the Administrative Support Office."

A small number of faculty and students made a few similar suggestions. Reinforcing a student suggestion mentioned above, two faculty members had problems with the temperature control in the CSI, which they thought was too cold in the summer. A few students and faculty wanted more shaded outdoor areas. Two other faculty members and one student thought that the building was difficult to navigate and needed better signage. As one person said:

> Anybody who walks into CSI for the first time including parents and visitors are completely lost. They have absolutely no idea where to go. One such visitor told me it was like walking to a big Walmart. It is huge and nice but there is nobody to help you find your way.

Finally, it is worth noting that two faculty members mentioned the need to maintain the sustainability features of the CSI. As one person said: "Keep the sustainability element intact . . . as auto flush elements go out they are replaced with the cheaper manual flush systems. WHY???"

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/ Summary & Conclusions

In fall 2011, before Trinity University began construction on a new center to integrate its science and engineering programs, EYP conducted surveys of faculty and students to assess the quality of three STEM buildings: Cowles Life Science, Halsell, and Moody Engineering. Findings strongly supported the plan to upgrade these buildings. The faculty found the classrooms deficient in several ways, including lighting quality, accessibility of technology to students, and flexibility in accommodating different teaching strategies. They also expressed dissatisfaction with the teaching and research labs in Cowles and Moody, which they saw as inadequate to meet their teaching needs and to support their research programs. Further, neither the faculty nor students found the buildings to be comfortable places to study, learn, and work. Indeed, a large percentage of students, especially non-science and engineering majors, seldom entered the buildings, except when they had to attend classes or meet faculty in their offices.

A year and half after the new Center for the Sciences and Innovation (CSI) was completed, in fall 2015, EYP again conducted surveys of Trinity faculty and students. Comparisons of these data with the pre-construction surveys show that the new CSI classrooms and teaching laboratories have enriched the teaching environment and encouraged many faculty to change their teaching methods; the new research laboratories have enhanced productivity, renewed faculty optimism about their research, and created much safer places to work; and numerous public spaces have made the CSI a favorite student destination and campus center of learning and a welcoming place for faculty to meet students and colleagues.

Other survey results indicate that the glass walled laboratories, which increase the visibility of scientific work, create a stimulating environment that piques students' interest in, and inspires them to learn more about, science; and sustainable measures included in the design and construction of the CSI have increased awareness of actions that may be taken to promote a healthy environment.

While there is a high level of satisfaction with the CSI and both faculty and students almost unanimously agree that the CSI projects a favorable image of Trinity University, there also were some voices of discontent. When asked to make suggestions for improving the CSI, students generally wanted more of what makes the building attractive to them: more places to study and meet others, greater access to classrooms and labs, and longer hours for the CSI café. A sizeable number of faculty, on the other hand, complained about unreliable classroom technology.

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/ Acknowledgements

This assessment of the impact of the CIS benefited greatly from the helpful feedback we received from several Trinity staff and faculty as we prepared and pretested the questionnaires and analyzed the findings. We especially thank David Ribble, Professor of Biology; Fred Rodriguez, University Registrar; Sheryl Tynes, Associate Vice President for Academic Affairs; and Leslie Bleamaster, Science Facilities Manager and Adjunct Professor of Geosciences.

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/ Appendix

A. Table A1 provides a more complete breakdown of student ratings of individual classrooms in the Pre-CSI STEM buildings. Note that more than half the students rated Moody 103 and Moody 105 below "average."

Table A1. Student Ratings[1] of pre-CSI STEM Classrooms in Percentages

Classroom	N	One of the Worst	Below Average	Average	Above Average	One of the Best	Mean [2]	S.D.
Cowles 149	30	3.3	23.3	46.7	20.0	6.7	3.03	0.93
Cowles 336	17	11.8	5.9	64.7	17.6	0.0	2.88	0.86
Cowles 421	14	7.1	35.7	57.1	0.0	0.0	2.50	0.65
Moody 103	12	33.3	16.7	50.0	0.0	0.0	2.17	0.94
Moody 105	14	14.3	50.0	28.6	7.1	0.0	2.29	0.83
Moody 322	14	14.3	7.1	64.3	14.3	0.0	2.79	0.89
Moody 323	11	9.1	18.2	36.4	27.3	9.1	3.09	1.14
Halsell 228	23	0.0	4.3	21.7	56.5	17.4	3.87	0.76
Other [3]	48	2.1	20.8	41.7	29.2	6.3	3.17	0.91

[1] Compared with most other classrooms at Trinity University, which of the following best describes the quality and feel of [this classroom]?

[2] 1= One of the worst; 2 = Below average; 3 = Average; 4 = Above average; 5 = One of the best.

[3] Classrooms in which fewer than 10 respondents had taken a course: Cowles 124, Cowles 128, Cowles 320, Cowles 321, Cowles 344, Cowles 349, Cowles 438, Moody 206, and Halsell 340.

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B. Science laboratories differ markedly by discipline; and so it is possible that faculty from some disciplines may be more or less satisfied with the new facilities than faculty from other disciplines. Table B1 presents average ratings on each criterion for the three departments with more than three survey respondents: biology, chemistry, and engineering science. The ratings are favorable across the three disciplines; however, overall the biologists were most satisfied and the engineers least satisfied with the new teaching labs. Both the chemists and engineers were least satisfied with the quality of acoustics and the lab's flexibility in accommodating different teaching strategies.

Table B1. Mean Faculty Ratings[1] of CSI Teaching Labs by Department

Criterion	Biology	Chemistry	Engineering Science
N	11	8	7
Accessibility of laboratory instruments	4.27	4.00	3.86
Safety of working environment	4.64	3.88	4.14
Flexibility in accommodating different teaching strategies	4.00	3.50	3.57
Ease with which one can monitor student activities	4.73	4.25	3.57
Ease with which lab exercises and techniques can be demonstrated	4.18	3.88	3.71
Ease of sharing lab space with other instructors/courses	3.91	4.25	3.71
Ease with which students can perform assigned tasks	4.45	4.14	4.00
Size or spaciousness	4.27	4.50	4.00
Quality of lighting	4.18	3.75	4.29
Quality of acoustics	4.45	3.63	3.43
Overall quality as a teaching environment	4.45	4.38	4.00
Average	**4.32**	**4.01**	**3.84**

[1] Very poor =1; Poor = 2; Average =3; Good = 4; Excellent = 5.

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C. Figures C1 and C2, respectively, display faculty and student responses to the question: "projects a favorable image of Trinity University."

Figure C1

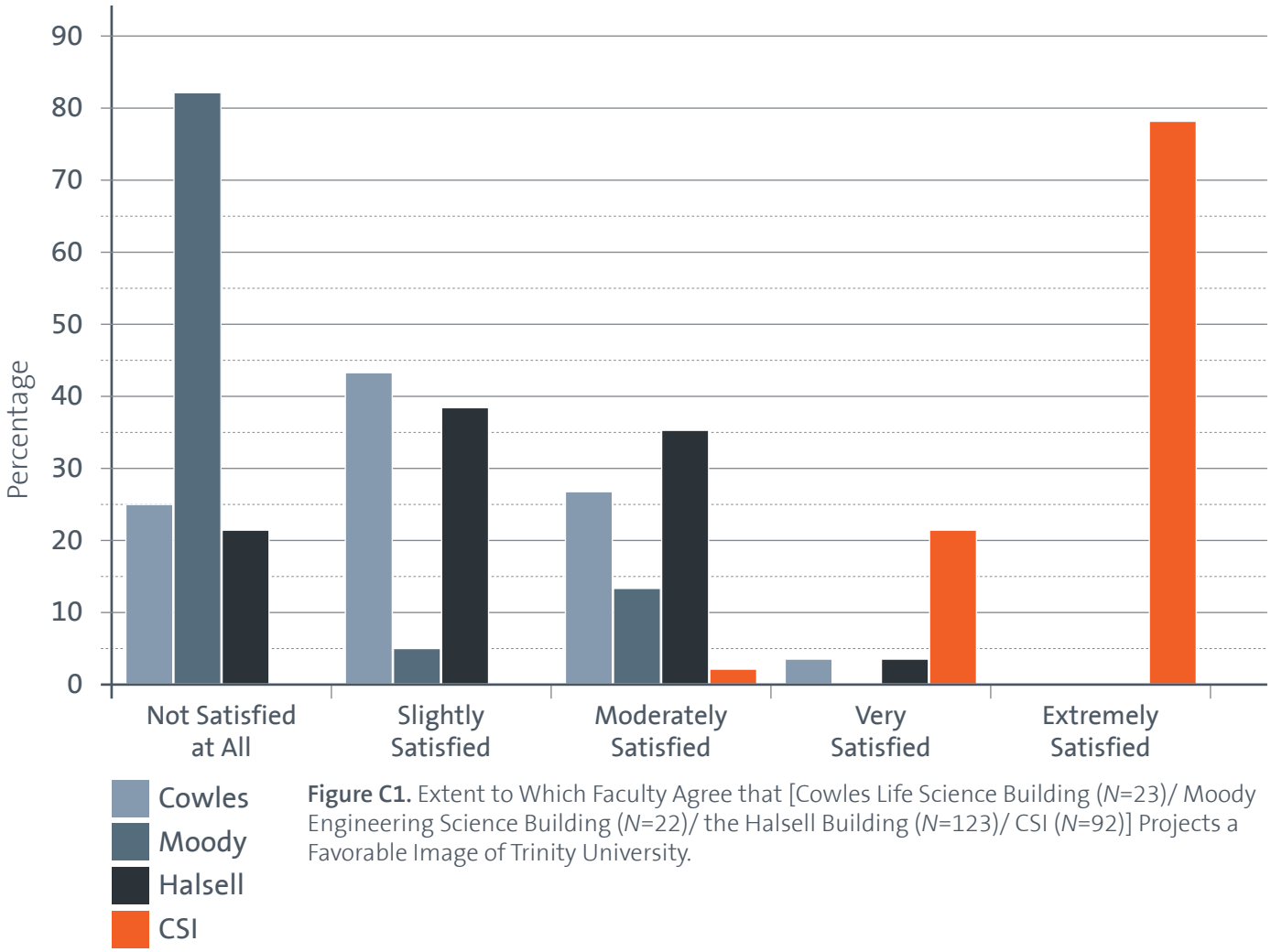

Figure C1. Extent to Which Faculty Agree that [Cowles Life Science Building (*N*=23)/ Moody Engineering Science Building (*N*=22)/ the Halsell Building (*N*=123)/ CSI (*N*=92)] Projects a Favorable Image of Trinity University.

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Figure C2

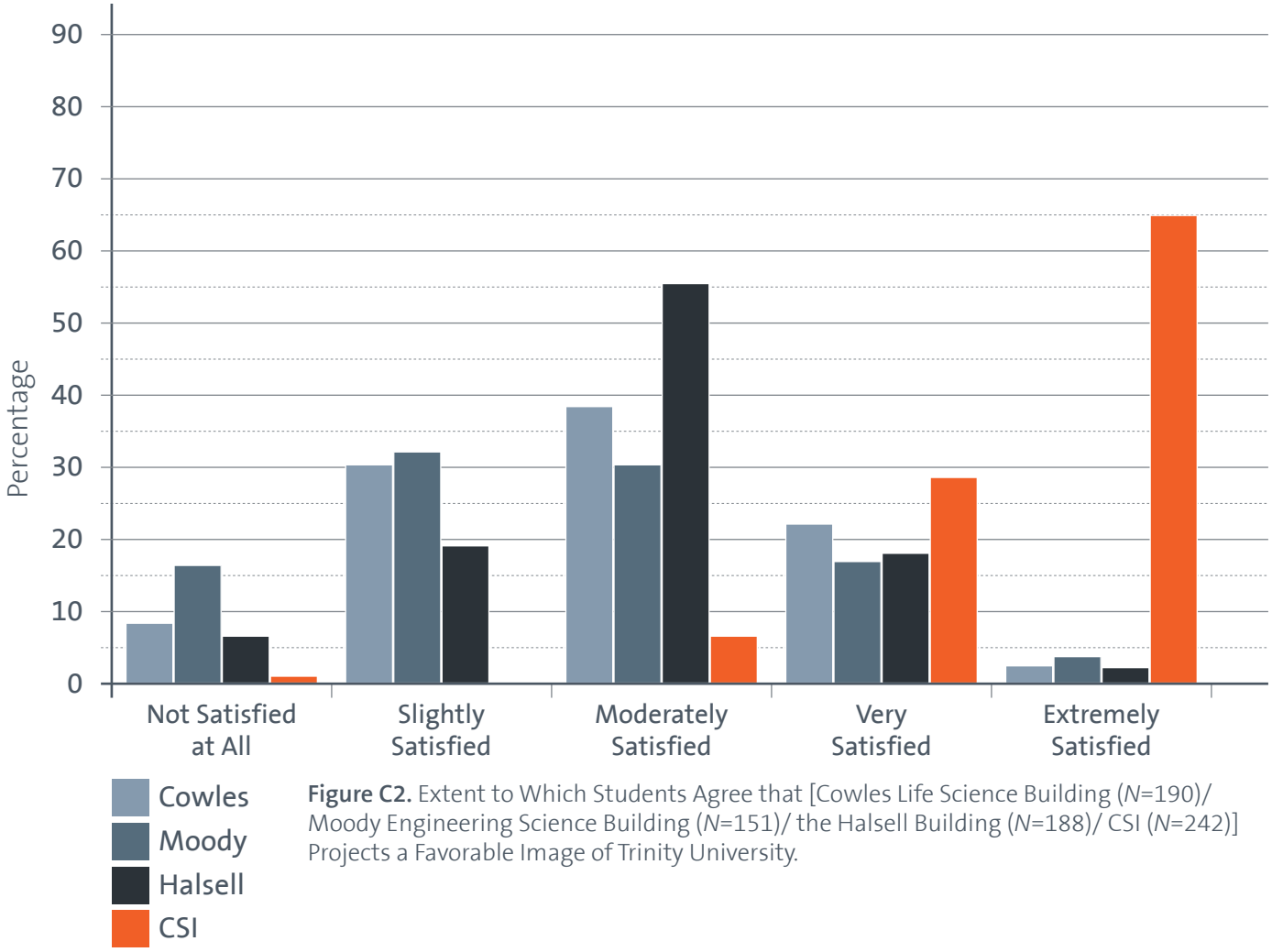

Figure C2. Extent to Which Students Agree that [Cowles Life Science Building (*N*=190)/ Moody Engineering Science Building (*N*=151)/ the Halsell Building (*N*=188)/ CSI (*N*=242)] Projects a Favorable Image of Trinity University.

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D. Below is a complete list of the suggestions for fixing the problem of classroom technology.

The iPads that control the audio-video are not particularly reliable. CLT is fantastic, but this equipment seems prone to crashing. It usually just needs to be rebooted, but we don't have the necessary passwords.

Fix A/V system in 225 MMH, simplify A/V systems in classrooms, they are overkill, waste energy and have unreasonable support costs.

I had a lot of technical troubles in the classroom where I taught last, therefore, some of my dissatisfaction reflected in some of the questions of this survey.

Install a JumboTron or large scale projection screen in the Cube to facilitate large groups or classes watching something together (when teaching a large class there, projections on normal screens are too small because the students are too spread out and far from the screen!

Please change the "floor box" instructor's computer in room 204. It was fine last semester, but I have only been able to get it working once this semester. YES - ONCE.

As noted previously, our department very much needs better projection systems in the classrooms.

Fix the projector control panel in CSI 302. Get a common interface for the white boards.

The IT and projection component has been a bit frustrating. It seems like IT and CLT was not up to the task and they still struggle.

CSI 204 needs a new teaching podium and A/V set-up.

I had trouble communicating problems about the classroom (e.g., malfunctioning teaching technology, electronic door-locks, etc.) to the appropriate person. The phone number of the ASO (or whatever it's called—the "secretary pool") should be available in each classroom, as should that of CLT—preferably programmed into the phones.

Better electronic projector equipment in the classrooms. I waste a lot of classroom time dealing with the projectors.

The video technology and computer interfaces are unreliable.

Projection system in CSI 488 Arrangement of computers in CSI 488; insufficient & poor placement of data drops & electrical outlets. Double shades allows light from the edges to create a glare on the computer screens & projection screens. Need more security on the iPad controlling the projection system.

Fix the technology in 204 (and 205), and treehouse. Tech is so unreliable it discourages me from using it as much as I might otherwise use it.

The A/V technology in the seminar room that I used (406) was cumbersome and generated a lot of heat.

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Some of the technology is a bit finicky and harder to engage than in the other buildings. (And I say that as both a millennial and someone who does quite a bit of computer simulations and coding in my research). If you have time, in CSI 337 (or any of the smaller classroom spaces), try projecting something from the computer to the overhead. Then switch to the overhead projector. I'm also curious about how the smartboard works, but there are no instructions included, and I have no time to visit any training sessions.

I recognize that this is not architecture; however, we really need to get the technology to meet the innovations of the building. Having designated computers in each class and lab would really help to increase our ability to focus on teaching strategies. I mess around with the computer system for something like 2 hours on average per semester. Might not seem like a lot but it comes at the beginning of class and can be stressful. We also never know when the systems are going to be "down." The computer system in 406 is silly. When your computer is plugged in students have to jump over the cable. If you want to plug into the floor you climb under the table. And in the floor there is no computer jack (analog or HDMI) and the "smart" board is non-functional...

The A/V panel in CSI 104 is very cumbersome to use. The touchscreen requires multiple steps to coordinate the selected devices/media and the actual projected image. It is not self-explanatory and no instructions are included on the screens.

More consistent technology in the classrooms. Every room has a different set up.

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