

MINNESOTA



POST-OCCUPANCY EVALUATION

Indoor Environmental Quality + Classroom Environment South Central College-Faribault (SCC-F)

May 2016, Minneapolis, MN
Sustainable Post-Occupancy Evaluation Survey (SPOES)
B3 Guidelines

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1.0 Overview

The purpose of this report is to examine the connection between sustainable design criteria used in the design of the South Central College-Faribault (SCC-F) facility and occupants' satisfaction with their classroom (CR) environments located in this building. As the SCC-F consists of one building that houses both classrooms and offices, a separate survey was conducted for offices and a corresponding report has been written that addresses employees' responses related to the workplace (WP) environment. The SCC-F facility was designed using the B3 Guidelines (formerly known as the Minnesota Sustainable Building Guidelines or MSBG), which were in effect at the time that the renovation and addition were completed for occupancy in August 2014. The B3 Guidelines track specific state-funded, B3 buildings as a means of demonstrating real outcomes aimed at the conservation of energy resources, creation and maintenance of healthy environments, and occupants' satisfaction with their environments. The Sustainable Post-Occupancy Evaluation Survey (SPOES) was developed to assess human outcomes in workplace, classroom, and residence hall settings in compliance with the B3 Guidelines project tracking requirements. This is a report of occupants' (hereafter called students) responses at 19 months post-occupancy. The survey was conducted in late-March through early-April 2016.

This SPOES report focuses on students' satisfaction with the physical environment as related to 23 indoor environmental quality (IEQ) criteria such as lighting, thermal, and acoustic conditions in their primary classrooms. Students' satisfaction with the facility (site, building, and interior) and the effect of the facility's physical environment on their perceptions of their academic performance and health also are included. Finally, a brief look at students' commuting and physical activities within the building are reported. The report provides descriptive information about students' perceptions of the IEQ of their classroom environments. In addition, this information serves the broader development of knowledge regarding the influence of IEQ on students.

2.0 Method

SPOES consists of a self-administered, Internet-based, questionnaire submitted to and completed by students. The SPOES questionnaire has been tested for **validity** (measures what it is intended to measure) and **reliability** (repeatability or replicability of findings). Students rate their level of satisfaction on a **Likert-type scale** (measurement scale) from 1 (very dissatisfied) to 7 (very satisfied) with IEQ of the facility and their primary classrooms. They also rate the influence of their physical environment on their perception of their academic performance and health on a scale from 1 (hinders) to 7 (enhances).

The report provides a descriptive summary of the results stated as a **mean** (average of all responses), **standard deviations** (SD) (how different scores are from each other and the mean), and **number of responses** (N) for each question analyzed. The mean for a 7-point scale is 4.00. Lower or higher means reflect stronger tendencies towards dissatisfaction/satisfaction and hinders/enhances. Means that are close to the center of the scale (4) are considered to be neither dissatisfied/hinders or satisfied/enhances.

When interpreting **mean** responses, the following labels were used:

- 1.00 - 3.50 dissatisfied (or hinders)
- 3.51 - 4.50 neither dissatisfied (or hinders) nor satisfied (or hinders)
- 4.51 - 7.00 satisfied (or enhances)

An IEQ Score is also calculated for students' satisfaction with IEQ in their primary classrooms. This is a statistical combination of category-level IEQ scores, which results in a single IEQ score for all

respondents and is reported in an IEQ Scorecard.

2.1 Description of the Questionnaire

Students first rate their level of satisfaction with the facility (site, building, and interior) and the influence of their physical environment on their perception of their academic performance and health. Then they respond to questions about their satisfaction with their primary classrooms in relation to IEQ criteria from the B3 Guidelines. Additionally, students' physical activities and commuting practices are investigated.

In the SPOES questionnaire, the 23 IEQ criteria listed below are evaluated. There are two levels of criteria, categories and attributes. As shown in the list, the 'overall' criteria are boldfaced and called 'categories' or 'category level' criteria. A category is broader or more general such as Overall View Conditions or Overall Indoor Air Quality. Some categories have 'attributes' or 'attribute level' criteria and provide greater detail about the category. For example, Overall Thermal Conditions is a category level question, and there are four attribute level questions related to thermal conditions such as adjustability, air velocity (draft), humidity, and temperature. Overall Acoustic Conditions is a category with an attribute of students' ability to hear desired sounds. There are 11 category-level and 12 attribute level questions. Means are calculated and reported for all category and attribute-level criteria.

An IEQ Satisfaction Score is also calculated for students' satisfaction with IEQ in their primary classrooms. This is a statistical combination of the 11 category-level criteria only and results in a single, mean IEQ Satisfaction Score for students' satisfaction with the physical conditions of their primary classrooms. Attribute-level criteria are not included in the IEQ Score because unequal weight would be given to criteria that have both category and attribute-level questions.

In the following list, **category (boldface)** criteria are listed in alphabetical order. If a category has attributes, they are listed with the category.

Overall Acoustic Quality

- Ability to hear desired sounds (lecture, video, discussions, etc.)

Overall Appearance (aesthetics)

Overall Cleaning and Maintenance

Overall Daylighting Conditions

- Ability to adjust daylighting
- Amount of daylighting

Overall Electric Lighting Conditions

- Ability to adjust electric lighting
- Amount of electric lighting

Overall Furnishings

- Ability to adjust furnishings

- Function of furnishings

Overall Indoor Air Quality

Overall Technology (presentation, laptop support, etc.)

- Access to electric outlets

Overall Thermal Conditions

- Ability to adjust thermal conditions
- Air velocity (drafty/stagnant)
- Humidity (dry or moist)
- Temperature (hot or cold)

Overall Vibration and Movement

Overall View Conditions (ability to see instructor, screens, etc.)

2.2 Limitations

Students' participation is voluntary, and responses are self-reported. As is true with all survey research, the responses indicate students' perceptions. There were no physical measurements, e.g., temperature, humidity, or lighting levels of the environment taken. The classrooms are shown as a congregate measure, not analyzed individually. This study is limited to students' perceptions.

3.0 Sample Description

3.1 Description of Building

The SCC-F facility is located at 1225 Third Street, Faribault, MN. The building (see Figure 1) is a three-story 108,265 square foot building that includes classrooms and offices. The SCC-F consists of renovated space that includes classrooms, shops and labs, offices, conference space, IT, and other support and storage areas; the addition consists of meeting room, library, open computer lab, and other support spaces. The focus of this report is the 52,075 square foot renovated classrooms (28), which include standard classrooms (13), technical trades labs (6; CIM, MECA, CARP, WELD), allied health labs (5; nursing, MLT, pharm Tech, sim), science labs (2), and a computer lab (1); plus one newly added computer lab (within a 19,000 square foot addition to the building). Only the overall facility and classroom/laboratory spaces noted above were included in this study. The building serves as the facility that offers technical and professional programs that prepare students for a variety of careers and houses the staff that provides administrative and academic support to students.



Figure 1. SCC-F (Photo courtesy of SCC-F)

3.2 Description of Respondents

The SCC-F had approximately 313 students with classes in the renovated classrooms during the spring semester administration of the survey. The response rate to the questionnaire was approximately 11%. Of those responding, 65% were female, 32% were male, and 3% were 'other.' The mean age of respondents was slightly over 27 years; the range was 18 to 47 years.

Students responded that in their primary classroom or laboratory environment, 10% spend 1-2 hours per week in their primary classroom or laboratory environment and 90% spend 5+ hours per week in their primary classroom or laboratory environment. This indicates how much they are exposed to the classrooms' IEQ.

4.0 Findings and Discussion

4.1 SCC-F Facility (Site, Building, and Interior): Overall Satisfaction, Learning Experience, and Health

Students responded to questions concerning the SCC-F facility (site, building, and interior) and their overall satisfaction with the facility, overall perceptions of their learning experience in relation to the facility, and their overall perception of their health in relation to the facility. Table 1 shows the means and standard deviations of their responses as well as how the responses are interpreted. Figure 2 is a graph that shows the mean for each question with a blue mark. The standard deviation is represented by a green/red, vertical bar with green representing satisfied (or enhanced) and red representing dissatisfaction (or hindered). Gray represents the 'neither/nor' range of responses. In cases where there were no dissatisfied responses, the bar will be all grey and green. This graph is simply a visual image of the findings from Table 1.

Table 1. SCC-F facility - overall satisfaction, learning experience, and health

Overall	Mean	SD	N	Interpretation
Satisfaction	5.78	1.05	32	Satisfied
Learning Experience	5.47	1.03	32	Enhanced
Health	5.22	1.24	32	Enhanced

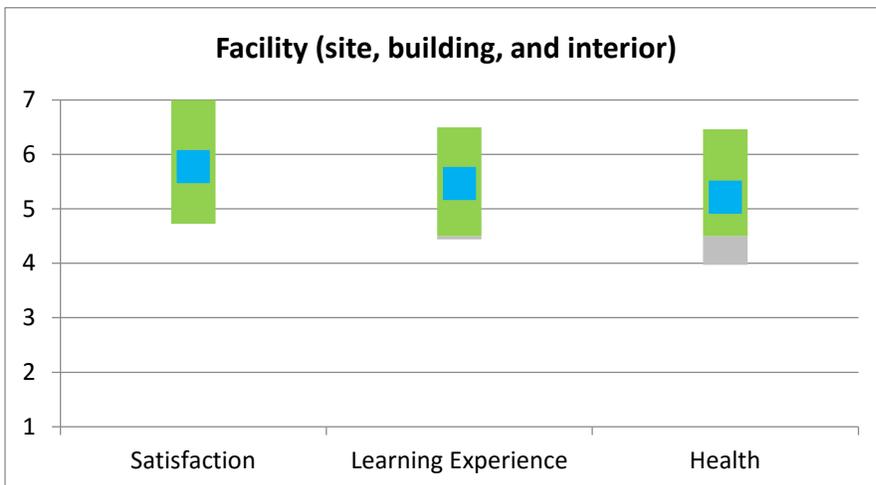


Figure 2. SCC-F facility - overall satisfaction, learning experience, and health

Results indicate that students were **satisfied (M = 5.78)** with the SCC-F facility (building, site, and interior) and reported that their overall learning experience was **enhanced (M = 5.47)** by the facility. Students reported that their overall health was **enhanced (M = 5.22)** by the facility.

4.2 Primary Classroom: Overall Satisfaction, Learning Experience, and Health

Students responded to questions concerning their overall satisfaction and overall perceptions of their learning experience and health as related to their primary classroom. Table 2 shows the means and standard deviations of their responses as well as how the responses are interpreted. Figure 3 is a visual image of the findings from Table 2.

Table 2. SCC-F primary classroom – overall satisfaction, learning experience, and health

Overall	Mean	SD	N	Interpretation
Satisfaction	5.58	1.04	31	Satisfied
Learning Experience	5.03	1.18	31	Enhanced
Health	5.45	1.21	31	Enhanced

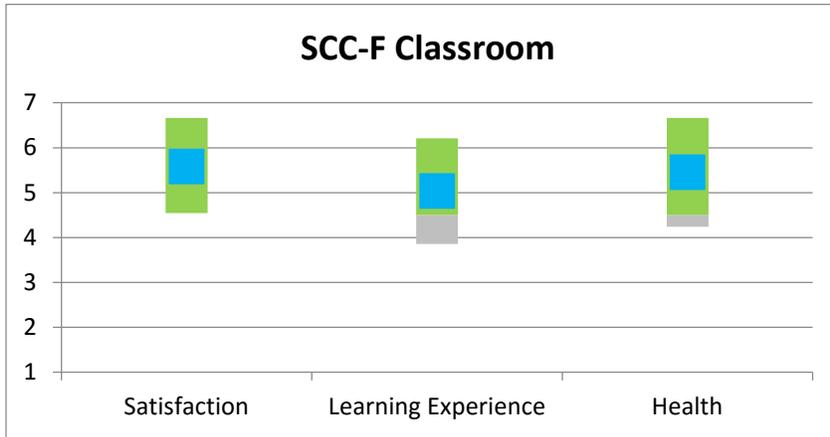


Figure 3. SCC-F primary classroom - overall satisfaction, learning experience, and health

Results indicate that students were **satisfied (M = 5.58)** with their primary classroom, their overall learning experience was **enhanced (M = 5.03)** by their primary classroom, and their overall health was **enhanced (M = 5.45)** by their primary classroom.

4.3 Primary Classroom: Satisfaction with Indoor Environmental Quality (IEQ)

Students responded to questions concerning their satisfaction with IEQ criteria (thermal conditions, indoor air quality, acoustic conditions, etc.) related to their primary classroom. Table 3 shows the means and standard deviations of their responses in order from highest to lowest mean, as well as how the responses are interpreted. It must be noted that all responses, regardless of the classroom, were combined so these are composite means of all classrooms in SCC-F. Figure 4 is a visual image of the findings in Table 3.

Table 3. SCC-F primary classroom - satisfaction with IEQ criteria

#	IEQ Criteria (1-23) (Category level criteria are bold face)	Mean	SD	N	Interpretation (S = Satisfied) (D = Dissatisfied)
1	Overall cleaning and maintenance	6.06	1.13	31	Satisfied
2	Overall technology conditions	5.53	1.56	30	Satisfied
3	Amount of electric light	5.52	1.27	31	Satisfied
4	Overall indoor air quality	5.42	1.43	31	Satisfied
5	Overall electric lighting conditions	5.42	1.29	31	Satisfied
6	Overall view conditions	5.42	1.36	31	Satisfied
7	Function of furnishings	5.42	1.21	31	Satisfied
8	Overall acoustic quality	5.37	1.33	30	Satisfied
9	Ability to hear desired sounds	5.35	1.38	31	Satisfied
10	Overall appearance (aesthetics)	5.32	1.47	31	Satisfied
11	Overall furnishings	5.29	1.25	31	Satisfied
12	Access to electric outlets	5.13	1.81	31	Satisfied
13	Overall vibration and movement	5.06	1.34	31	Satisfied
14	Air velocity (drafty or stagnant)	5.03	1.64	31	Satisfied
15	Humidity (dry or moist)	5.03	1.79	31	Satisfied
16	Ability to adjust electric lighting	5.00	1.48	31	Satisfied
17	Adjustability of furnishings	4.94	1.46	31	Satisfied
18	Overall thermal conditions	4.90	1.80	31	Satisfied
19	Amount of daylighting	4.90	1.53	31	Satisfied
20	Overall daylighting	4.87	1.60	31	Satisfied
21	Adjustability of daylighting	4.77	1.70	31	Satisfied
22	Temperature (hot or cold)	4.71	1.76	31	Satisfied
23	Adjustability of thermal conditions	4.32	1.91	31	Neither S or D

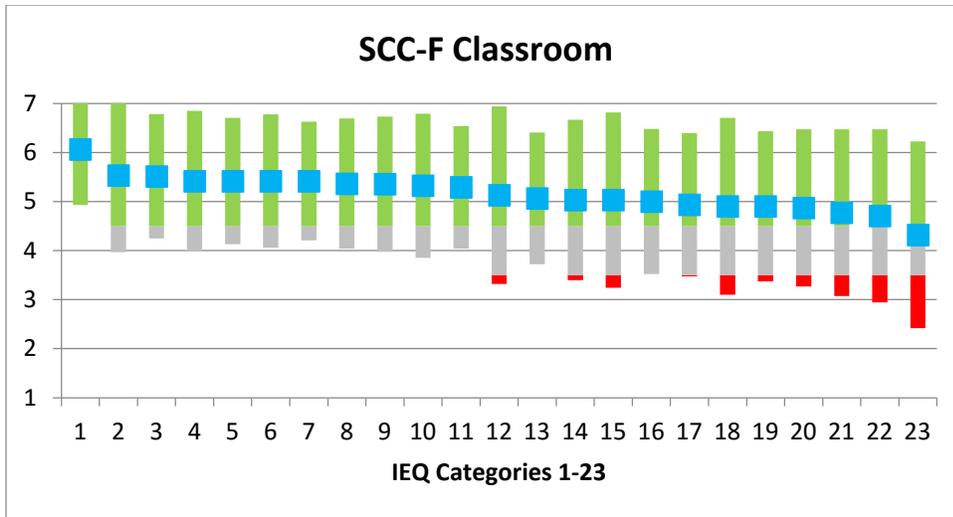


Figure 4. SCC-F primary classroom - satisfaction with IEQ criteria (IEQ 1-23 are listed in Table 3)

Results indicate that students were **satisfied** with 22 of the 23 IEQ criteria in their primary classrooms, i.e., means at or above 4.50. Students were **neither satisfied nor dissatisfied** with adjustability of thermal conditions (4.32). Means ranged from **4.32** (adjustability of thermal conditions) to **6.06** (Overall cleaning and maintenance). These findings support a **consistently positive level of student satisfaction** with the IEQ of their classrooms. Further information about their perceptions can be found in Appendix A. Open-Ended Responses.

4.4 IEQ Satisfaction Scorecard

The IEQ Satisfaction Score is determined by calculating a mean of all 11 'Overall' category level IEQ criteria. At this time, all criteria are weighted equally in this calculation as little evidence exists that provides rationale for weighting some criteria heavier than others. The IEQ mean is representative of a moderately high overall IEQ score and can serve as a benchmark of students' satisfaction with the physical environment of their primary classroom. As shown in Figure 5, the **IEQ Satisfaction Score** for SCC-F is **5.33**, which falls at the moderately high end of the satisfied range. The large number of criteria with scores above the mean contribute to moderately high IEQ Score.

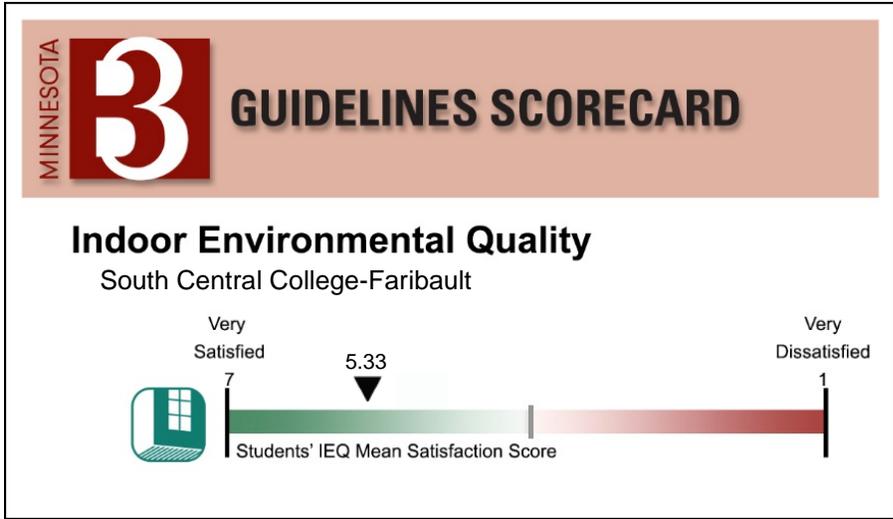


Figure 5. SCC-F primary Classroom - IEQ Satisfaction Score

Overall, the students showed a positive satisfaction level with the IEQ of SCC-F classrooms as indicated by the mean score of **5.33**. As shown in Table 3, all IEQ categories were at or above **4.87**; five categories were at or above **5.42** and helped to increase the IEQ Score. Please note that the IEQ Satisfaction Score only uses the category level criteria (those labeled ‘Overall’; see section 2.1, paragraph 3 for explanation). This IEQ score sets a positive benchmark for continued assessment of students’ satisfaction.

5.0 Physical Activity Engagement and Commuting Practices

In the final section of the survey, students responded to questions regarding their overall physical activity while at SCC-F (site, building, and interior) and their commuting practices.

5.1 Physical Activity Engagement

Providing students with opportunities for alternative paths of travel around the classroom building, e.g., taking stairs as opposed to the elevator, provides opportunities to engage in additional types of physical activities. Engaging in physical travel throughout the learning environment can be associated with healthier lifestyles.

Table 4. Overall physical activity (walking, stair use, etc.) affected by the SCC-F facility

SCC-F Facility (Site, Building, and Interior)	Mean	SD	N	Interpretation
Overall physical activity (walking, stair use, etc.)	5.59	1.15	32	Enhanced

Results indicate that students felt that SCC-F **enhanced (M = 5.59)** their physical activities (walking, stair use, etc.).

5.2 Commuting Practices

SCC-F is located in the southwest quadrant of the city of Faribault, MN, less than one mile east of I-35W and south of Hwy 60. The building has parking available for students, adjacent to the northeast corner of the building.

Table 5 provides results on students' primary mode of transportation; Table 6 summarizes commuting distances between home and the SCC-F facility; and Table 7 summarizes students' ability to commute using alternative choices (walk, public transit, bike, van, or carpool, etc.). These results, although not related to IEQ, do offer the College insight into students' commuting behaviors and opinions. These data can provide important information about commuting practices that can reduce transportation energy consumption.

Table 5. Commuting practices – SCC-F primary mode of transportation

Commuting Practices Home to SCC-F (N=31)	Drive alone (or with children <16)	Car or Van Pool	Walk	Other
Students commuting mode (%)	87%	6%	3%	3%

Related to primary modes of transportation, 87% of students drive alone (or with children under 16), 6% participate in a car or van pool, 3% walk, and 3% use other forms of transportation. Note that as percentages have been rounded, the overall percentage may not total 100%.

Table 6. Commuting practices – SCC-F commuting distance traveled

Miles Traveled One Way (N=31)	0-5 miles	6-15 miles	16-30 miles	31-45+ miles	46-60 miles
Students commuting distance (%)	26%	35%	19%	13%	6%

Results indicate that 26% of students commute 0-5 miles one-way between home and SCC-F, followed by 35% who commute 6-15 miles, 19% commute 16-30 miles, 13% commute 31-45 miles, and 6% who commute 46-60 miles to SCC-F. All commuting mileage is reported as one-way miles. Note that as percentages have been rounded, the overall percentage may not total 100%.

Table 7. Commuting practices – SCC-F location and alternative commuting behaviors

SCC-F Facility (Site, Building, Interior) (N=31)	Mean	SD	N
Ability to commute in alternative ways	4.16	2.28	31

Results indicate that the location of the SCC-F **neither hindered nor enhanced (M = 4.16)** students' ability to commute to class in alternative ways, e.g., walk, bicycle, public transit, van or carpool, etc. However, it should be noted that the large standard deviation indicates a wide variety of responses from hindered (1) to enhanced (7) on the 7-point scale.

6.0 Conclusions

6.1 Summary

A post-occupancy evaluation was conducted of students of SCC-F at approximately 19 months after its renovation and addition was occupied in 2014. About 11% of the students who are enrolled in classes in SCC-F responded to the survey.

The survey included questions related to students' overall satisfaction with the facility (site, building, and interior) and influence of the facility on their overall learning experience and health. Students were **satisfied** with the facility (**M = 5.78**); they found the facility **enhanced** their overall learning experience (**M = 5.47**) and **enhanced** their overall health (**M = 5.22**). When students were asked these same questions about their primary classroom, they reported overall **satisfaction (M = 5.58)** with their primary

classrooms. They also reported that their overall learning experience was **enhanced (M = 5.03)** by their primary classrooms, and their overall health was **enhanced (M = 5.45)** by their primary classroom. As the range of scores was from 1-7, these scores indicate satisfaction is moderately high.

Most of the survey questions related to students' satisfaction with the IEQ criteria in their primary classrooms. Students' responses showed they were **satisfied** with 22 of the IEQ criteria. The satisfied scores ranged from **4.71** (temperature, hot or cold) to **6.06** (Overall cleaning and maintenance). This is a moderately low to moderately high level of satisfaction. However, the consistently positive satisfaction scores are admirable. Only adjustability of thermal conditions scored as **neither dissatisfied nor satisfied (4.32)**.

From the students' responses, an IEQ Score was developed and shows their satisfaction with the IEQ of all category level criteria. For SCC-F, the IEQ Satisfaction Score was **5.33**. This score reflects a **moderately high satisfaction** level with IEQ categories. Finally, students reported that SCC-F **enhances (5.59)** their physical activity, which is one of the sustainable design criteria that influences occupant behavior.

6.2 Recommendations

The satisfaction scores are certainly in the positive direction, however, it is important to continuously work on IEQ criteria before there is dissatisfaction. Specifically, for the SCC-F, a closer look at thermal conditions seems necessary. For example, for IEQ categories that have physical measurement possible, e.g., thermal, acoustic, and lighting, it is recommended that these measurements be taken in classrooms. Other recommendations follow that could help the College keep occupants' satisfaction positive.

Acoustic Conditions

- Identify acoustic criteria for overall requirements.
- Determine if any task areas differ now from their original spatial layout/use (e.g., classrooms adjacent to noisy spaces).
- Develop specialized acoustical performance requirements to support functional programming occupants' tasks (e.g., sources of recurrent noise that need to be controlled, special user populations that may have distinct auditory performance limitations, or multiple uses of building spaces that may have different acoustic criteria). Identify and apply appropriate acoustics modeling software for the project.
- Measure acoustic performance onsite with full building systems (heating, ventilation, and air conditioning) running.
- Identify occupants' privacy concerns via focus groups and/or log complaints relative to acoustical conditions for further evaluation.
- Consider occupants' tasks within shared spaces to determine if spatial layout changes can be made for increased acoustic control.

Lighting Conditions

- Identify occupants' lighting performance criteria that are to be met to achieve goals by conducting onsite measurements of existing illumination and compare them to standards for occupants' tasks as identified by the Illuminating Engineering Society (IES).
- Determine if any task areas differ now from original intent to be sure illumination level and quality of lighting are not impeded by physical changes to the space (i.e., walls, ceilings, furnishings, fixtures, or equipment).

- Develop additional quality lighting criteria as needed for special facility (e.g., influence of daylight quality or quantity) or occupant (e.g., age, task duration) issues.
- Log complaints related to lighting conditions for further evaluation.
- Identify poor lighting conditions caused by a lack of control over daylighting, which can cause glare and eyestrain.

Personal Adjustability

- Determine if adjustability issues arise with temperature, lighting, or furnishings via a focus group.
- Identify personal, individual problem areas and relate them to other IEQ issues via a log of complaints relative to adjustability.
- Provide education to occupants about any existing/achievable adjustment options, e.g., furnishings, air diffusers, lighting, temperature control, etc.

Privacy Conditions

- Identify occupants' privacy concerns via focus groups or log complaints relative to privacy to determine if visual or audio privacy is most affected.
- Determine if any task areas or responsibilities differ from original intent and develop alternatives or modifications.
- Consider adding noise masking equipment and/or visual screening depending on the nature of the complaints.
- Document and compare acoustic privacy problem areas with acoustic measurements to pinpoint specific problem areas.

Thermal Conditions

- Measure thermal performance conditions on site.
- Log complaints related to thermal conditions for further evaluation.
- Determine special thermal comfort requirements or problems that may be encountered in the building due to physicality of work activities, duration of sitting, or design/layout considerations. Focus groups can be useful in identifying problem locations.
- Determine if any occupants' task areas differ now from original layout to determine if air flow is meeting systems design intent.
- Review conditions that affect thermal comfort using ASHRAE Standard 55-2004 or Human Factors Design Handbook (see B3 Guidelines).

This study investigated students' satisfaction with the SCC-F facility and primary classrooms. IEQ satisfaction is individual, but the results of the survey show a central tendency of low to moderately high satisfaction with the facility and most IEQ criteria. The results can be used as a diagnostic tool to aid in improving IEQ conditions for students and to set the benchmarks from which improvement can be measured in the future.

Appendix A. Open-Ended Responses

Students had the opportunity to raise specific concerns on the overall facility and their primary classrooms. Important information can be gleaned from the open-ended survey responses. SCC-F students raised some concerns related to acoustics, maintenance, daylighting/lighting, furnishings, indoor air quality, spatial layout, and thermal conditions. The comments do give insight into specific issues that should be addressed by building management. And finally, there are a few comments noted below that were made by employees at SCC-F in response to the same questions on their workplace survey, however, their responses were about classrooms. Generally, the comments are shown as written.

Overall Positive/Negative

- It's a beautiful campus and I enjoy attending class there.
- If I lived closer, I would ride a bike or walk, but I live in the country.
- The recent additions at South Central College-Faribault has dramatically improved the environment and learning opportunities at this school.
- The classrooms are always VERY clean, including the rest of the building. Maintenance has been doing a fantastic job.
- The environment looks clean and it's understandable for the labs being cold due to the venting system.

Acoustics

- The air compressor is in the MECA lab and when it kicks in, the lecture can difficult to hear.
- Downstairs classroom you can hear the next class and what they are talking about. It is very distracting.

Maintenance

- I think the things that we work with should be checked at least once a month to make sure things are running properly, like the gas valves and water faucets.
- Some bathroom faucets have heavy water pressure and spray all over.

Daylighting

- Most (maybe all) standard classrooms have no exterior walls, so there's no windows and thus no daylight or any way to 'adjust' daylight.

Indoor Air Quality

- There is a distinct odor as you walk into the school and in some of the classrooms. I'm not sure if it's oils people use but it causes lots of us headaches.
- There are no fans or windows in the basement classrooms, too hot and still.

Lighting

- The only way adjust the electric lights is to turn them all on or off—there's no way to turn some of them off or on.
- CIM, each machine should have its personal light.
- Basement classrooms are too dimly lighted.

Furnishings

- We don't have swiveling chairs in classrooms, but they do in Mankato; the standard plastic stackable chair is functional, but it isn't very comfortable for long periods of time, and it strains the back, so for students (any age) who have back problems those can be untenable in that they cause extreme pain, especially in the lower lumbar region.
- It would be nice to have seats that were more comfortable to sit in with being in a lab there is times that we are sitting and on uncomfortable chairs it makes me want to stand for the 2 hours instead and I have plenty of times.
- Wish they had more bulletin boards around the campus about programs and extracurricular activities like Student Senate, Honor Society, gym/lounge area where students can go and interact with other students.

Spatial Layout

- Wish the weld lab booths were a bit bigger.

Thermal Conditions

- Students and faculty can't adjust the temperature of any room.
- Basement classrooms are too hot in summer and there is not a way to get fresh air in there.

Miscellaneous Comments Related to Classroom Space from the WP Report Findings

- The motion controlled lighting does not come on until the first person has gone 15 to 20 feet into the classroom. When the room is dark, this is dangerous.
- In computer lab C112, there is clanking noises coming from heating system students test in there and it is distracting.
- Some classrooms are really warm, even students complain about it.

Appendix B. Glossary

Descriptive statistics

Statistics used to summarize large sets of data (i.e., means, frequencies, medians). Descriptive statistics describe only the sample under consideration and are not intended to infer results to the larger population.

Frequency

A descriptive statistic that provides information about how many of a particular response or measurement are observed.

Likert-type scale

A measurement technique, employed in questionnaires and interviews, that utilizes a range of standardized response categories such as strongly agree, agree, etc.

Mean

The average score of a set of data calculated by adding all scores together, then dividing by the number of scores.

N

The number of subjects or participants responding to the questions, or a single question, in the study.

Reliability

The repeatability or replicability of findings; the same results are produced each time. Instruments and procedures should produce the same results when applied to similar people in similar situations, or on a second occasion.

Standard deviation

A statistic used to measure the variability of a group of scores (how different scores are from each other and the mean). For example, if the range of scores is 1-7 and the mean (average) is 5.0 with a standard deviation of 1.0, then the scores are closely clustered around the mean, i.e., there is one unit of variation among all scores. If the mean was 5.0 and the SD was 3.0, there is a broader range of variation among the scores...a smaller SD means the scores are similar and the mean score is likely to be more accurate and more useful (this is better!).

Validity

The extent to which an instrument or procedure measures what it is intended to measure (internal validity). The generalizability of results to another population (external validity).