



Indoor Environment Quality + Workplace Environment Hanson Hall, Report 1

May 2013, 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 Hanson Hall facility (HH) and employees' satisfaction with their work environments. Hanson Hall was designed using the B3 Guidelines (formerly known as the Minnesota Sustainability Guidelines or MSBG) and completed for occupancy in 2009. The B3 Guidelines track specific state-funded 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 work environments. The Sustainable Post-Occupancy Evaluation Survey (SPOES) was developed to assess human outcomes in classroom and workplace settings in compliance with the project tracking requirements for the B3 Guidelines goals. This is the first of two required POE surveys and represent responses at the 24-month post-occupancy period. The survey was conducted in May 2013.

This SPOES report focuses on employees' satisfaction with the physical environment as related to 15 indoor environment quality (IEQ) criteria (hereafter called categories) such as lighting, thermal, and acoustic conditions in their primary workspaces, i.e., offices. Employees' satisfaction with the facility (site, building, and interior) and the effect of the facility's physical environment on their perceptions of their work performance and health are included. Finally, a brief look at employees' commuting and physical activities within the building are also reported. The report provides descriptive information about employees' perceptions of the IEQ of their work environments. In addition, this information serves the broader development of knowledge regarding the influence of IEQ on employees.

2.0 Method

SPOES consists of a self-administered, Internet-based, questionnaire submitted to and completed by employees. The SPOES questionnaire has been tested for **validity** (measures what it is intended to measure) and **reliability** (repeatability or replicability of findings) in studies involving similar facilities and employees. Employees 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 workspaces. They also rate the influence of their physical environment on their perception of their work performance and health on a scale from 1 (hinders) to 7 (enhances). There were no physical measurements taken of environmental conditions such as temperature or acoustic level. This study is limited to employees' perceptions.

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 questions 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:

- 1-3.99 dissatisfied (hinders)
- 4-4.49 neither satisfied (enhances) or dissatisfied (hinders)
- 4.5-7 satisfied (enhances)

An IEQ Score is also calculated for employees’ satisfaction with IEQ in their primary workspaces. This is a statistical combination of all IEQ scores, which results in a single IEQ score for all employees on all IEQ variables and is reported in an IEQ Scorecard.

2.1 Description of the Questionnaire

Employees first rate their level of satisfaction with the facility and the influence of their physical environment on their perception of their work performance and health. Then they respond to questions about their satisfaction with their primary workspaces in relation to the IEQ categories. The questionnaire uses 15 IEQ categories from the B3 Guidelines and relates each of them to employees’ satisfaction with their physical environment.

Categories include (in alphabetical order):

- | | |
|---------------------------------|---------------------------------------|
| 1. Acoustic Conditions | 9. Lighting Conditions |
| 2. Appearance | 10. Personal Adjustability Conditions |
| 3. Cleaning and Maintenance | 11. Privacy |
| 4. Daylighting Conditions | 12. Technology |
| 5. Electric Lighting Conditions | 13. Thermal Conditions |
| 6. Function | 14. Vibration and Movement |
| 7. Furnishings | 15. View Conditions |
| 8. Indoor Air Quality | |

2.2 Limitations

Employees’ participation is voluntary, and responses are self-reported. As is true with all survey research, the responses indicate employees’ perceptions. There were no physical measurements, e.g., temperature, humidity, or lighting levels, of the environment taken.

3.0 Sample Description

3.1 Building Description

Within the Carlson School of Management, Hanson Hall is located on the University of Minnesota’s West Bank campus at 1925 Fourth Street South, Minneapolis, MN 55455. The building (see Figure 1) is a 124,000 square foot, four-story building comprised of nine classrooms, a business center, the Carlson School Office of Undergraduate Programs, the Department of Economics, and an economics learning lab. In addition, it houses a collaborative student learning center and recruiter and undergraduate student lounges. Classrooms are equipped with state-of-the-art audio and visual technology with wireless printing capability. In addition, breakout rooms include plasma screen televisions for student collaboration to reinforce the Carlson School of Management’s commitment to building an environment that advances critical thinking and enhances the practical application of new knowledge.



Figure 1. Hanson Hall (Photo credit: <http://www1.umn.edu/twincities/maps/HMH/>)

3.2 Description of Respondents

The response rate to the questionnaire was approximately 26%. Of those responding, 43% were male and 57% were female. Relating to hours worked in HH, 40.3% of the employees spend 40+ hours in their primary workspace; 25.8% spend 30-40 hours in their primary workspace; 16.1% spend 20-29 hours in their primary workspace; and 17.7% spend less than 20 hours in their primary workspace. The mean age of respondents was 33 years, with a range of 18 to 62 years.

HH is a research facility with offices serving as primary workspaces. Results indicated 36.5% of the respondents work in private offices, 33.3% share private offices, 14.3% work at a desk in an open area with no partitions, 7.9% work in a cubicle with partitions less than five feet high, 6.3% work in a cubicle with partitions greater than five feet high, and 1.6% work in cubicles with both low and high partitions. Results also indicated that 65% of the primary workspaces were located within 15 feet of an exterior window, 31.7% of the employees were not within 15 feet, and 3.3% were uncertain of the distance to an exterior window.

HH was completed in 2011. Of those years, 55.7% of the respondents reported that they had worked at this location for more than 3 years, 11.5% had been there 2-3 years, 14.8% had been there for 1-2 years, and 18% spent less than 1 year at this site. (Note: all percentages reported may not add to 100% due to rounding.)

4.0 Findings and Discussion

4.1 HH Facility (site, building, and interior): Overall Satisfaction, Work Performance, and Health

Employees responded to questions concerning the HH facility (site, building, and interior) and their overall satisfaction with the facility, overall perceptions of their work performance in relation to the facility, and their overall perception of their health in relation to the facility. Table 1 and Figure 2 show a summary and interpretation of their responses.

Table 1. HH facility (site, building, interior) overall satisfaction, work performance, and health

HH Facility (site, building, and interior)	Mean (1-7)	SD	N	Interpretation
Overall satisfaction	5.75	1.18	64	Satisfied
Overall work performance	5.47	1.25	64	Enhances
Overall health	4.81	1.33	64	Enhances

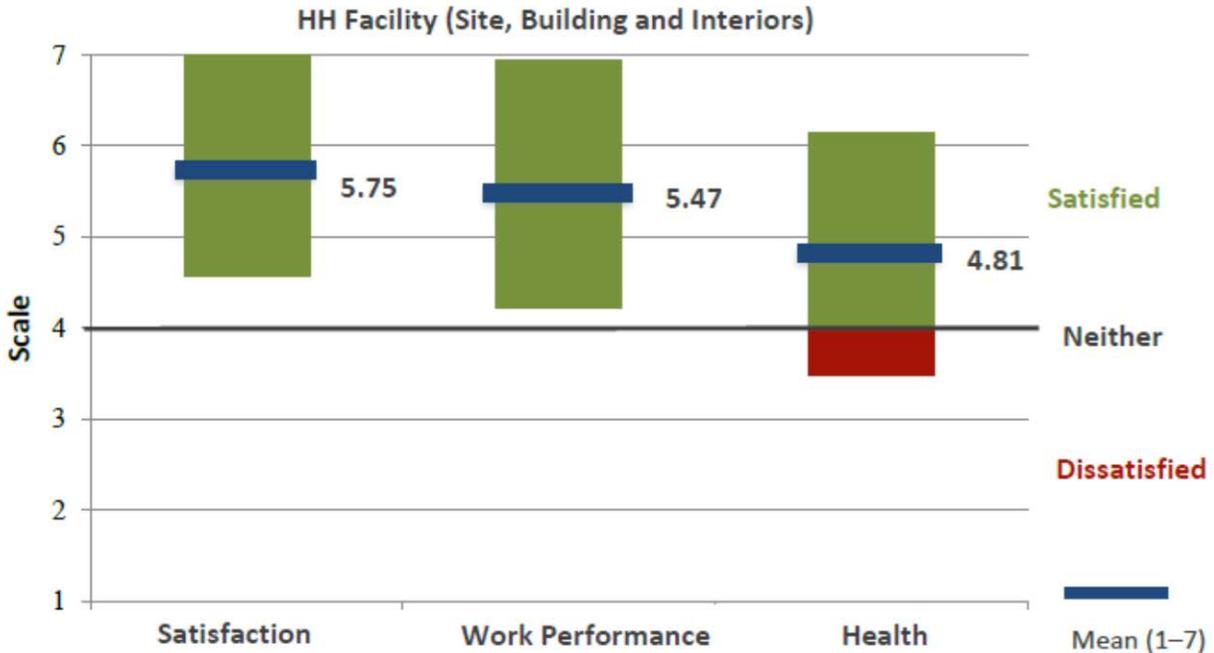


Figure 2. HH facility (site, building, interior) overall satisfaction, work performance, and health

Results indicated that employees were **satisfied** ($M = 5.75$) with the HH facility (building, site, and interior) and reported that their overall work performance was **enhanced** ($M = 5.47$) by the facility. Employees reported that their overall health was **enhanced** ($M = 4.81$) by the facility.

4.2 Primary Workspace: Overall Satisfaction, Work Performance, and Health

Employees responded to questions concerning their overall satisfaction and overall perceptions of their work performance and health as related to their primary workspace (e.g., private office, workstation, or other primary workspace). Table 2 and Figure 3 show a summary and interpretation of their responses.

Table 2. Primary workspace overall satisfaction, work performance and health

Primary Workspace	Mean (1-7)	SD	N	Interpretation
Overall satisfaction	5.42	1.17	63	Satisfied
Overall work performance	4.92	1.21	63	Enhances
Overall health	5.41	1.41	62	Enhances

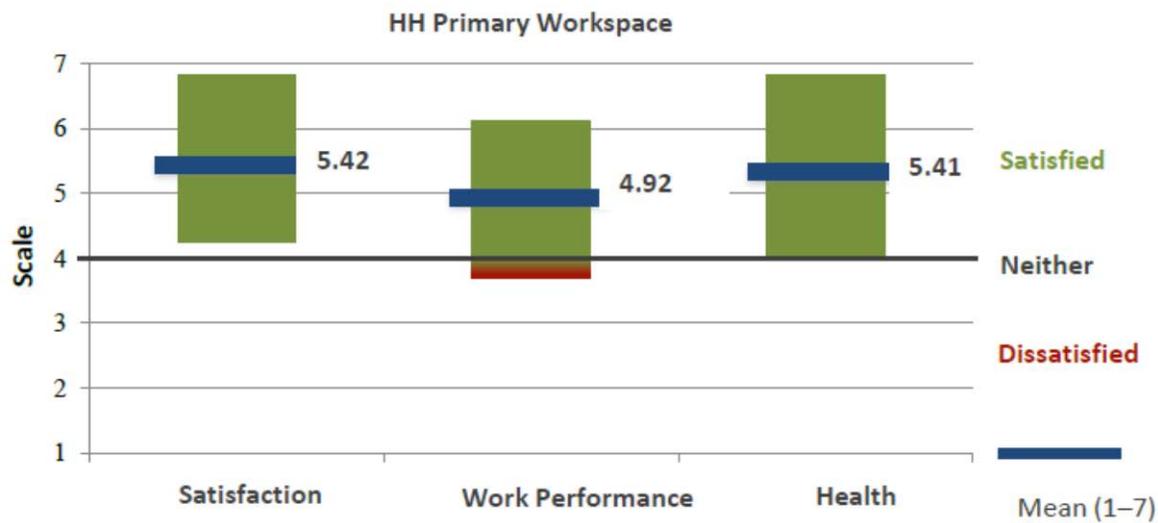


Figure 3. Primary workspace overall satisfaction, work performance and health

Results indicated that employees were **satisfied** ($M = 5.42$) with their primary workspace, their overall work performance was **enhanced** ($M = 4.92$) by their primary workspace and their overall health was **enhanced** ($M = 5.41$) by their primary workspace.

4.3 Primary Workspace: Satisfaction with Indoor Environment Quality (IEQ)

Employees responded to questions concerning their satisfaction with IEQ categories (thermal conditions, indoor air quality, acoustic conditions, etc.) related to their primary workspace (e.g., private office, workstation, or other primary workspace). Table 3 and Figure 4 show a summary of the means, the standard deviation, and interpretation of their responses.

Table 3. Primary workspace satisfaction with IEQ criteria

	Primary Workspace	Mean (1-7)	SD	N	Interpretation
1	Function	5.65	1.18	63	Satisfied
2	Amount of electric light	5.56	1.32	63	Satisfied
3	Vibration and movement	5.93	1.11	62	Satisfied
4	Appearance (aesthetics)	5.51	1.32	63	Satisfied
5	Ability to hear desired sounds	5.38	1.28	63	Satisfied
6	Furnishings	5.37	1.22	62	Satisfied
7	Technology	5.34	1.34	62	Satisfied
8	Humidity	5.24	1.25	63	Satisfied
9	Indoor air quality	5.03	1.38	63	Satisfied
10	Privacy	5.02	1.5	63	Satisfied
11	Amount of daylighting	4.98	2.21	63	Satisfied
12	Cleaning and maintenance	4.92	1.47	63	Satisfied
13	Acoustic quality	4.92	1.55	63	Satisfied
14	Adjustability of electric lighting	4.90	1.56	63	Satisfied

15	Adjustability of daylighting	4.81	2.24	63	Satisfied
16	Air velocity	4.66	1.63	62	Satisfied
17	Ability to limit undesired sounds	4.63	1.62	62	Satisfied
18	View conditions	4.63	2.21	63	Satisfied
19	Temperature	4.54	1.54	63	Satisfied
20	Thermal conditions	4.48	1.61	63	Neither S/D
21	Adjustability of thermal conditions	3.40	1.85	62	Dissatisfied

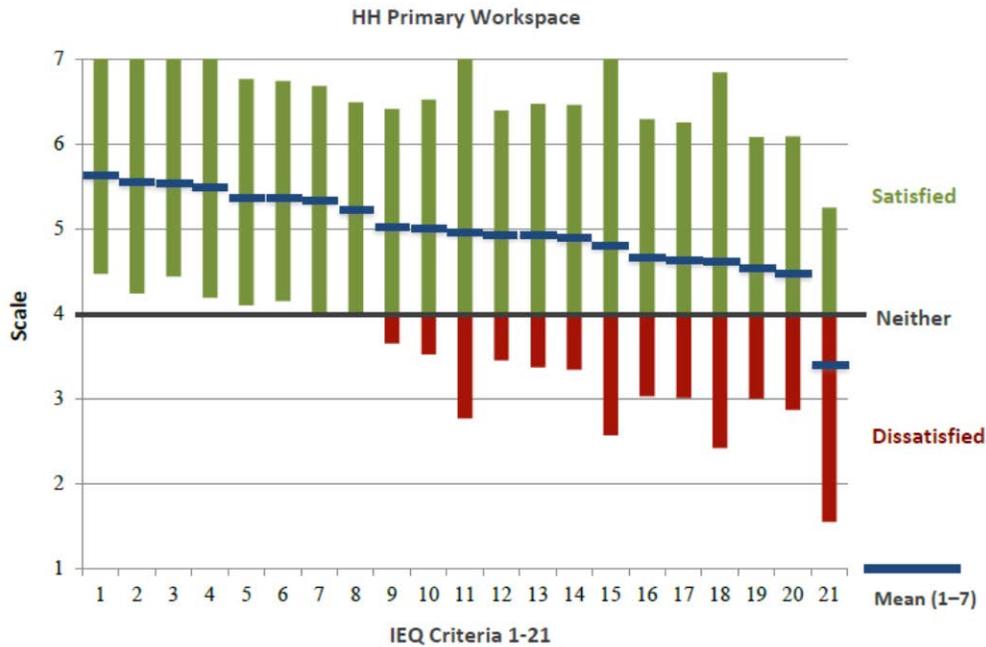


Figure 4. Primary workspace satisfaction with IEQ criteria (IEQ criteria 1-21 are listed in Table 3 above)

Results indicate that employees were satisfied with IEQ criteria 1-18, with the highest level of satisfaction with Function (**M = 5.65**) and the lowest level of satisfaction with Temperature (**M = 4.54**). Employees were neither satisfied or dissatisfied with the Thermal Conditions (**M = 4.48**) and dissatisfied with the Adjustability conditions of Thermal Conditions (**M = 3.40**) in their primary workspaces.

4.4 IEQ Satisfaction Scorecard

The IEQ Satisfaction Score is determined by developing weighted factors of all categories, which is more representative of a fair overall IEQ score. For example, it might be more important for an employee to have satisfying thermal conditions than to have satisfying indoor air quality. Thus, if the employee gives a high thermal satisfaction score and a lower indoor air quality satisfaction score, the overall IEQ satisfaction will be scored much higher than one with the inverse statistics.

The weighted scoring system was developed by employing the following procedures:

1. **Factor analysis** (a multivariate statistical procedure) was conducted to determine the importance of various IEQ categories.
2. The factor loading of each IEQ category was regarded as the individual weight.
3. The weighted sum score was used to calculate the final mean score illustrating how well a particular building performed in terms of satisfying its occupants' IEQ needs. This becomes the

As shown in Figure 5, the IEQ satisfaction score for HH is 5.19.



Figure 5. Primary workspace IEQ Satisfaction Score

Overall, the occupants showed a positive response with a moderately high level of satisfaction with IEQ as indicated by the weighted mean score of **5.19**. Satisfaction with **Function** of employees’ primary workspace was identified as the category that contributed most to the IEQ Satisfaction Score, followed by satisfaction with the **Furnishings** of the primary workspace. They determine IEQ satisfaction more strongly than other categories and differ slightly from the ranking of the mean scores where **Function**, **Electric Light**, and **Vibration and Movement** were the top satisfaction scores. Overall **Thermal Conditions** was the least contributing category to the IEQ Satisfaction Score. This concurs with the low satisfaction scores for **Temperature**, **Thermal Conditions**, and **Adjustability of Thermal Conditions**.

This score of **5.19** validates the overall satisfaction score in Table 2 (**5.42**). They are similar but the IEQ Score is slightly lower because it may reflect some other factors beyond IEQ such as location or size of primary workspace. The IEQ Score gives us more refined knowledge.

5.0 Physical Activity Engagement and Commuting Practices

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

5.1 Physical Activity Engagement

Providing employees with opportunities for alternative paths of travel around the workplace, 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 work environment can be associated with healthier lifestyles.

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

HH facility (site, building, and interior)	Mean(1-7)	SD	N	Interpretation
Overall physical activity (walking, stair use, etc.)	5.13	1.04	62	Enhances

Results indicated that employees felt that HH **enhanced (M = 5.13)** their physical activities (walking, stair use, etc.). Further, of the 62 respondents to this set of questions, 66% said they were **satisfied** with the facility’s influence on their overall physical activity; 32% said they were neither **dissatisfied nor satisfied**; and 1.6% of employees were **dissatisfied**.

5.2 Commuting Practices

HH is located on the northeastern side of the East Bank of the University of Minnesota. The East Bank campus is located north of metropolitan hub providing bus and light rail transit service through the campus environment. The University provides several parking facilities, bike paths, and sidewalks throughout the campus and adjacent to the HH facility.

Table 5 provides results on employees’ commuting mode of transportation. These results, although not related to IEQ, do offer the University insight into employees’ commuting behaviors and opinions. These data can provide important information about commuting practices that can reduce transportation energy consumption.

Table 5. Primary mode of transportation

Primary mode of transportation used	Drive alone (or with children < 16)	Carpool or van	Public transit	Bicycle	Walk	Motorcycle Moped
Commuting	43.5 %	6.5%	25.8%	8.1%	12.9%	3.2%

The most frequent mode of transportation to HH was driving alone (or with children under 16) (43.5%), followed by public transit (25.8%), walking (12.9), bicycle (8.1%), and motorcycle/moped (3.2%).

6.0 Conclusions

6.1 Summary

A post-occupancy evaluation was conducted of employees of HH at approximately two years after it was first occupied. Nearly 26% of the employees responded to the survey.

The survey included questions related to employees’ overall satisfaction with the facility (site, building, and interior) and influence of the facility on their overall work performance and health. Employees were satisfied with the facility (**M = 5.75**); they found the facility enhances their overall work performance (**M = 5.47**) and enhances their overall health (**M = 4.81**). In addition, similar results were reported when employees were asked these same questions about their primary workspaces (private office, shared office, laboratory, etc.). They reported overall satisfaction (**M = 5.42**) with their primary workspaces, and that their overall work performance (**M = 4.92**) and overall health (**M = 5.41**) was enhanced by their primary workspace. Scores that showed satisfaction are in a mid-level range on a 1 – 7 scale.

Most of the survey questions were related to employees’ satisfaction with the IEQ categories in their primary workspaces (private office, laboratory, etc.). Employees’ responses showed they were satisfied with the majority of the IEQ categories. The mean satisfaction scores ranged from **3.40** (dissatisfied with their Adjustability of thermal conditions) to **5.65** (satisfied with the Function). Employees responded

neither dissatisfied nor satisfied to Thermal Conditions, with a score of **4.48**. Lastly employees were dissatisfied with Adjustability of Thermal Conditions with a score of **3.40**.

From the employees' responses, an IEQ Score was developed and shows respondents' satisfaction with all categories and the contribution of each category to that satisfaction score. For HH, the IEQ Satisfaction Score was **5.19**, with satisfaction with Function and Furnishings of their workspaces as the two categories that influenced employees' satisfaction level most. This score reflects the moderate satisfaction level of the other categories. Finally, employees reported that HH enhances 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, improvement may be possible. For IEQ categories that have physical measurement possible, e.g., thermal, acoustic, and lighting, it is recommended that these measurements be taken in both overall workspaces and primary, individual workspaces. Recommendations follow:

Thermal Conditions

- Determine special thermal comfort requirements or problems that may be encountered in the building due to work activities or sitting or design considerations.
- Determine if any task areas differ now from original intent.
- Review conditions that affect thermal comfort using ASHRAE Standard 55-2004 or Human Factors Design Handbook.
- Measure performance variables on site.
- Log complaints related to thermal conditions.

Lighting Conditions

- Identify performance criteria that are to be met to achieve goals.
- Determine if any task areas differ now from original intent.
- Develop additional quality lighting criteria as needed for special facility issues such as employees' ages, duration of task, influence of daylight quality or quantity.
- Conduct onsite measurements using Illuminating Engineering Society standards for employees' tasks.
- Log complaints related to lighting conditions.

Acoustic Conditions

- Identify acoustic criteria for overall requirements.
- Determine if any task areas differ now from original intent.
- Develop any additional special acoustical performance requirements to support functional programming of building, 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. Investigate and choose appropriate acoustics modeling software for the project.
- Measure acoustic performance onsite with full systems running.
- Log noise and other sonic environment complaints.

Privacy Conditions

- Identify employees' privacy concerns via focus groups or log complaints.
- Determine if any task areas or responsibilities differ from ordinal intent.
- Consider adding noise masking equipment and/or visual screening depending on nature of complaints.
- Compare acoustic privacy problem areas with acoustic measurements to pinpoint specific problem areas.

Personal Adjustability

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

It seems obvious that employees' satisfaction can be improved by addressing the categories that had 'dissatisfied' or 'neither dissatisfied nor satisfied' scores. The above recommendations can help address change in these categories. The areas employees were dissatisfied with (**Adjustability of Thermal Conditions**) or more neutral about (**Thermal Conditions**) can be addressed by the above recommendations. Exploring these areas in more detail and making adjustments may increase overall satisfaction at the primary workspace.

This study investigated employees' satisfaction with the facility and primary workspaces. IEQ satisfaction is individual, but the results of the survey show a central tendency of **moderate satisfaction to satisfaction** with the facility and most of the IEQ categories. The results can be used as a diagnostic tool to aid in improving IEQ conditions for employees and to set the benchmarks from which improvement can be measured in the future.

Appendix A. Open-Ended Responses

Employees had the opportunity to raise specific concerns on the overall facility and their primary workspaces. Important information can be gleaned from these open-ended responses. HH employees raised specific concerns about the following themes: thermal conditions, cleaning and maintenance, technology, windows, building services amenities, furnishings, indoor air quality (IAQ), lighting, space organization/layout/function, and acoustics (noise). Many comments were about the cleaning and maintenance of the rooms as well as unsatisfactory thermal conditions. There were positive comments as well, which included an overall satisfaction with the building. These qualitative responses can be helpful in understanding areas that may need improvement. The following are qualitative responses to the above noted themes.

Overall Positive

- I enjoy working in such a modern and bright building. It has really been fun to move into Hanson Hall as a new building and to enjoy the lovely views and surroundings. I really appreciate and enjoy my work space every day.
- It is a nice facility.
- Love all the sunlight!
- My office is beautiful.

Overall Concerns

Acoustics

- Vent loud and on too high. Not sound proof.
- Is there something that can be done about sound proofing offices? I can hear every word being said in the neighboring offices.

Building Services and Amenities

- Can you replace the drinking fountains with the ones that fill water bottles? Hanson Hall really is a beautiful building and I feel lucky to work here.
- One bathroom for the 2nd floor is sucky.
- It would be good to have a bike shelter or be allowed to take bikes indoors. My bike is too valuable to get soaked/snowed on/stolen.
- The security arrangements of the small elevator are terrible. Please change the machine so the ID card can be used by proximity not by swapping it.

Commuting / Alternative Options and Building Services and Amenities

- I commute to Hanson Hall by bike. Even though there is a bike rack right in front of the building, the security neglects it completely. I had a rear wheel stolen from my bike on a regular day, around 9 pm. And no, it wasn't attached on a quick release! It was screwed to the bike body very firmly. The thief must have arrived with a set of tools and had enough time to unscrew and dismount the entire wheel. My question is: what was the security person doing at that time (who is supposed to be sitting literally several feet away, right at the entrance to the building)? Another question: how can the management of the HH possibly ban the employees from keeping their bikes in their offices since absolutely no security is provided over the main rack right in front of the building? Thank you.

Cleaning and Maintenance

- Please vacuum the office more often.
- Does anyone vacuum the offices in Hanson Hall? Please go back to vacuuming.
- Regarding the overall cleaning and maintenance, the morning/day facilities crew at Hanson is AMAZING and the electricians/etc. that fix the heat/other things are awesome too. I rated that question low because the evening crew is not vacuuming offices and sometimes garbage is missed at night in central areas. Our office is rarely vacuumed and it looks real bad when we're presenting our site to prospective students and employers.
- Would be nice to get the exterior windows WASHED!
- The bathrooms (specifically 2nd floor women's) could use a bit more cleaning once in a while. Toilets and sinks are obviously done every day, but the floors and other surfaces are not.
- PLEASE VACUUM!!! This room was built for Recruiters. When our corporate partners come to campus they have access to this room for lunch and during breaks. It should be clean. The UBCC monitors the cleanliness of the room but often the tables and counters are dirty from something that happens at night. Cleaning crews have been spotted taking their breaks in the lounge, which is not a problem as long as they clean up after themselves and leave the room as clean as they found it.
- The room is used for a lot of meetings with meals and can be messy because of that.

Function / Furniture / Space Organization and Layout

- Stupid pillar in the middle of the office - makes 50% of the space totally unworkable - the architects were clueless.
- Small office. The desk is small (not enough space for legs).
- The desks are too short for taller people. The ergonomics in the building are very poor, and I've had to make several adjustments to my work station in order to avoid injury.
- Whoever designed the workspace does not do office work. The desk is small and can be difficult to work on multiple projects in the space provided.
- A standing desk would make a world of difference!
- Desk makes me slouch.
- The design of the stairs is terrible. Hard to use.
- It is terrible to have the doors next to the whiteboard and not in the back. Very disruptive.
- If I had designed my department Kitchen/Copy room, I would have added much more counter space, a table for lunching in with co-workers and more storage space.
- A triangular space just does not work - again, clueless architects and ANOTHER stupid pillar in the middle of it all.
- Wish had more seating space in winter. Otherwise, great.
- Could the two "coffee tables" that only stand about 6 inches off the floor be replaced with ones of regular height? As they stand right now they are not functional.

IAQ

- Occasional odor from Rm 4-136.
- Odors from venting sometimes occur.
- The room can sometimes smell like sewage. We understand it has to do with the drains in Starbucks and FM can usually take care of it in a day or so. The room is used for a lot of meetings with meals and can be messy because of that.
- Air quality needs to be tested. Not sure if it ever was, but we have a ton of sick people in my space, and as the building is relatively new with NO ventilation, I think this should be addressed.

Technology

- Please remove the computer monitor in the classroom 4-175. It hinders sight of the blackboard.
- The LCD screen is consistently difficult to use with a laptop in that it won't always connect, the room is usually hot, and we can't always get on the internet, either with cable or wireless.
- The projector in this room has never worked well. Every few weeks we waste 10-15 minutes of a presentation trying to make it work. Even then (when it works) it's subpar, lots of flickering light on the screen, etc. This is a poorly conceived room.

Thermal

- My office is NEVER in right temperature. Always much colder than I want. I left my office in the middle of day at least 2 days a week this winter because of this, and this is despite calling in building services more times than I can remember.
- Frequent issues with heat/cooling - maintenance staff is very responsive!
- Cannot change temperature on my own.
- Overall, it's usually a bit cold.
- It is impossible to adjust the AC in the office. I have being really cold even now that it is May, they have come to check (really nice woman), but some days is so cold that all the people in my office have to wear coats. It is really unpleasant and affects my health negatively.
- Always the wrong temperature, and the air through the vents is like working [officing] on a landing strip.
- We have had temperature problems in this space since the building opened. Some office are consistently hot and some cold.
- I am the front desk person in a large common area. It is warm at my desk (two computers put off some heat) so I have a fan going.
- For a brand new building the thermal condition is unacceptable. I have had two separate offices in different parts of the buildings, both with extremely poor heating/cooling properties. I know that all faculty on the 4th floor are suffering from similar issues. We have raised this issue many times over the years to no avail. I end up going to coffee shops to do work I need to do in my office. This is unacceptable.
- IT can be cold and breezy in that corner, but work around that.
- Cold and drafty.

Windows (Daylight / View / Function)

- No windows.
- I would love windows that open.
- I have an interior office, so I have no windows and my door faces out to a bare wall. This is not a complaint and doesn't impact my general satisfaction (having an office is better than being in a cubicle), but it's the only reason my scores aren't uniformly high.
- Window draft.
- Well I work in the basement so it's hard to adjust the amount of daylight. Not much that can done about that.

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.

Factor analysis

A multivariate statistical procedure that is used to identify and group together general dimensions or factors that underlie a large number of variables in a set of data. The procedure transforms the variables into new principal components or orthogonal factors. Variables within each factor are related to each other but have no relationship to variables in other factors.

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 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).