

1. TUT 125 Team 121 Final Presentation → Everyone

- Each member introduces themselves

2. Disclaimer → Done

A disclaimer that this presentation is created by a group of first year engineering students, and had not been reviewed for its technicalities by a professional engineer or architect.

13 Slides total

Problem Description and Hook

3. HOOK → Aileen (30 seconds max)

- So! One pertinent question to our project is: does UofT need a wellness room?
- From a 2017 survey conducted to over 4000 UofT students, over 70% share sentiments of being overwhelmed and exhausted, and from a 2019 insights of over 300 UofT student interviews, the typical student experience is also characterized by high levels of stress and worry
- Okay! That's scary!
- And these articles from CTV and CBC news from 2019-2020 raise plenty of issues; access to uoft's mental health resources take a long time
- Given this gap, you'd expect the Wellness Room on the 28th floor of Chestnut residence to be perfect to fill it and br overused. And yet...

4. Problem Statement Slide → Akshaya and Warrick

Akshaya:... the Wellness Room is actually underutilized. This is the current room and its typical availability for booking.(show room and availability side by side). As you can see this room is always unoccupied, as not a single person booked the room for an entire week. But why?

We believe this is because the wellness room is not an environment that promotes mental wellness and user comfort. There is currently only one binary light switch controlling a ceiling light panel with no optimizations according to the time of the day or season, nor considerations for what lighting is most comfortable for users. Next, we observed this buzzing sound (**play buzzing sound**) from the neighboring study room's HVAC system on our first site visit, which can be heard in the wellness room too. This sound may not be permanent, but it means the user has little insulation against intrusive sounds. Lastly, the room attempts to utilize natural aspects. While numerous university studies have shown, which Youssef will talk about later, that natural elements are conducive to wellness, the room only incorporated two wilting plants and a green wallpaper.

Therefore, through communication with the client, it was clear that the revamp should make the room an inviting calm space. The room should serve as a sanctuary where individuals can recharge and find wellness.To solve these issues the team worked for the past 3 months to create a design to optimize the space and resources within the room, by integrating specific elements that foster an environment that promotes human wellbeing.

Recommended Design

6. Floor Plan and Description of Design → **Youssef**

1- Immersion in natural environment

- Leaves along windows block external light
- Ceiling lamps provide illumination

2- Mimics nature with:

- Strong presence of green
- Artificial grass flooring
- Bonsai tree

3- Focus on relaxation and well-being:

- Egg pod chairs, hammocks, yoga mats
- Aromatherapy diffuser, SAD lights for freshness

4- Peaceful atmosphere features:

- Fountain
- Bulletin board for community sharing

5- Well-being learning:

- Tablet on bookshelf

5. Description of Design → Youssef

To address these problems we recommend the design “Nature’s Haven”.

****Floor Plan shows****

****Overhead View Shows****

Here, you can see the general layout where we merged the past wellness room and the study room into one single room.

****Play Video****

The following walkthrough will demonstrate how the design immerses users in a natural environment. To recreate this natural atmosphere, we have **leaves** placed along the windows to block external light. This design mimics nature with a strong presence of green, using artificial grass covering half of the floor and the presence of a bonsai tree. Its main objective is to ensure the relaxation and well-being of users, with the presence of egg pod chairs, a sofa, and yoga mats. Users can also experience the freshness of nature through an aromatherapy diffuser and SAD lights. A fountain helps create a peaceful atmosphere in the room, while a bulletin board allows users to share kind words, fostering a sense of community.

6. Reasoning for a biophilic design

In order to address the problem we recommend a design titled *Nature's Haven*. What distinguishes this design from others is its focus on a nature-theme. It has been shown by research conducted by professor Weijie Zhong from Eindhoven University of Technology that Biophilic designs have a positive impact on mental health and well-being. These benefits include increased stress reduction, improved mood, enhanced cognitive function, increased productivity and creativity, and Creates a Sense of Connection with nature .Biophilic design is also used in offices . A study by commercial flooring manufacturer, Interface, The Global Impact of Biophilic Design in the Workplace, found that workers in offices that contained natural elements such as greenery and sunshine are six per cent more likely to be productive and report a 15 per cent higher level of wellbeing. They are also 15 per cent more creative than other workplace and office workers. We are thus confident that this design will improve the mental health of its users since it respects biophilic principles . By incorporating elements such as plants, water features, natural light, and even nature-inspired materials, biophilic design creates a harmonious environment in our wellness room that nurtures the users well-being.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8125471/> ← impacts of exposure to nature

7. Justifying how client's needs are fulfilled → **Ethan**

Through *Nature's Haven*, we addressed the client's needs by improving the lighting and sound system.

Firstly, our design uses smart LEDs programmed with a daily lighting schedule modeled after the Human Centric Lighting System, which optimizes human vision, concentration, and performance. This system begins and ends each day with warm, dim lighting, reaching peak brightness and coolness at noon.

Also, as seen on several egg pod chairs and throughout the room, SAD lights are accessible to all users. These bright lights are able to provide a therapeutic dose of light to improve mood for those with Seasonal Affective Disorder.

Next, Absorber CS, a sound-absorbing textile with a high sound-absorbing coefficient, is installed within each egg pod chair to block out any disruptive external noises.

Lastly, while the speakers are not in use, they constantly play white noise to help mask the buzzing noise that you heard earlier.

8. Trade offs → **Warrick**

Community Event Hosting

To meet these goals however, we had to trade off the room's ability to host clubs or community events. The egg pod chairs are less efficient in accommodating than commercial tables and chairs since only one person can sit on it at a time. With less seating, the space isn't ideal for users seeking wellness through large social settings like U of T Student Life's wellness workshops. One additional trade-off is the design's maintenance. Components like the synthetic grass carpet and yoga mat require additional cleaning or replacement due to wear and tear and hygiene concerns. In return however, as Youssef and Ethan already discussed, using the egg pod chairs instead met the client's needs and provided additional biophilic benefits.

9. Credibility of MoS → **Ethan**

Now moving on to our measures of success! Given that our design emphasizes biophilic aspects, we decided to evaluate its success in this area.

Since existing industries often use simulation-based models to evaluate their designs, we began by creating our own 3D model of the current wellness room using Blender and incorporating components from *Nature's Haven*.

Then, as you saw, we added textures and colours since enhancing these minute details create a more realistic environment, helping us gather more accurate data.

From this, we measured and calculated three distinct things for our measures of success:

1. The ratio of greenery in the room
2. The light intensity and
3. The colour temperature

We optimized the precision of our data by writing scripts to analyze tens of thousands of pixels to measure these quantities throughout the entire room.

We then compared these measurements with established recommendations from scientists at the University of Singapore and the University of Manchester, which now brings us to the following results.

10. MoS Results and Analysis: Green Ratio → **Ken**

These recommendations indicate that the natural green coverage ratio should fall between 5% and 20%, with an optimum ratio of 12%. To calculate the green coverage ratio, we took six different shots of our design and calculated the total amount of green area in each projection as shaded in the red, and divided it by the entire area to get the result. The result of our design is 12.3%, close to the 12% that indicates optimizing psychological relaxation.

11. MoS Results and Analysis: Light Distribution and Intensity → **Ken**

As for the lighting conditions, we tested our lighting schedule by inserting light probes into the simulated room. Then, we measured the light intensity and color temperature with the outcome being shown on these graphs. Using a mathematical approach, we then converted this data to an M-EDI value, which is a direct indication of how much a light source affects the non-visual system of humans, including our circadian rhythm [x].

As seen in our data, our design fulfills the recommendation in our research: during the day, the M-EDI is greater than 250 Lux, and at night, the M-EDI is smaller than 10 Lux.

The success of our testing indicates our room succeeds in the majority of daytimes to be biophilic

12. Possible Limitations → Aileen

- Although we were as thorough and detailed as possible, we still advise to take out data with a grain of salt. This is for two reasons
- Firstly, our lighting probes cannot capture values as high as direct sunlight, which means the histogram we get has a sudden spike beyond 1500 Lux, which is a scale limitation of our program
- Secondly, a study on the accuracy of lighting programs modeling real-life has an error of up to 13%, with most situations having errors between 2-3%, which is a necessary flaw of programmable simulations, thus our data values should be taken with some caution
 - we still cannot eliminate the error even though we made all the data from scientific based and physical based research

13. Next Steps → Akshaya

While our simulation demonstrated that we achieved the most important objective of being biophilic, the design requires further testing for sound insulation of the egg pod chairs & ergonomic principles as they are important objectives as well. It's also useful to test the Measures of Success on the current room by either simulating the existing room conditions with the same software or making physical measurements, which likely requires consultations with professionals in optics and construction. This will further confirm that aspects like the green coverage ratio, color temperature and light intensity are improved from the current design before implementing as it would give comparable values.

14. Synthesis/Therefore Statement → Youssef

Therefore our recommended design meets our clients needs by having a lighting system, a theoretical sound insulation system and a more welcoming ambience that conveys wellness by using a biophilic design. Although more testing is required before implementation, our design showed successful results during our measure of success making it very promising .

When we showed those statistics at the start of the presentation, we knew we needed many initiatives brought on to reduce them. Having a sufficient place to recover and relax is something

we should all have access to, so to renovate this wellness room, is therefore going to be an impactful and long-lasting change.

Being a part of the UofT community, we can all relate to living in a high-stress environment.

To have a place to recover, when that stress becomes overwhelming, can be a minor, or vital improvement to our living.

Having a place to go to recover and relax, when the world might be overwhelming for various reasons, can go a long way in improving mental health. Being part of the UofT community, we can all relate to living in a high-stress environment, and projects expanding spaces designed for well-being such as the wellness room will really help towards

When we showed those statistics at the start of the presentation, we knew there were many initiatives brought on to reduce them. To renovate a wellness room is one such change, and it's an impactful and long-lasting one. Having a place to recover and relax is something we should all have access to, and can really make the difference when stress begins to feel overwhelming.

...We all saw those statistics at the beginning.

We're glad to see our university strive to improve...

We hope that the next time you feel overwhelmed, you'll have to rest, whether that be a refurbished room up on the 28th floor or somewhere else...

We hope that a refurbished wellness room with the elements we've presented....

- Design attempting to tackle the underutilization of wellness room
 - Lighting, sound, biophilic design
- Tested to meet top objective
 - Not yet ready to be implemented
- Added insight to what the room needs

Questions

Research about Biophilic Design (Circadian Rhythm?)

- Youssef
- Ethan

Measures of Success Procedure and Calculations

- Ethan
- Ken

Project Next Steps

- Akshaya
- Youssef/Ethan/Ken will build on

Project Scope and Trade-offs

- Warrick
 - On U of T Student Life's official website, until further notice, all wellness workshops from the Student Life Health and Wellness department are done virtually, accommodating at least 12 students on a zoom call
 - If these opportunities do open again for in-person events, then the room is unable to allow for that.
 - It was discussed with the client in the first meeting that it's a great addition to have, but not a dealbreaker as it's not the primary purpose of the room.

If they ask about the statistic

- Aileen

CDS Sections

- Whoever did which part of the CDS

Client Meeting related stuff

- Aileen
- Akshaya