

**An Investigation into Creating Vibrant Social Spaces Through Games and Activities in
the New Student Union Building**

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An Investigation into Creating Vibrant Social Spaces Through Games and Activities in the New Student Union Building

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ABSTRACT

The University of British Columbia feels that there is a need for student interaction on campus, the absence of which can lead to deteriorating mental and emotional health. To combat this, the Alma Mater Society (AMS) have designated a vibrant social space to be constructed in the new Student Union Building. The objective of this report is to give recommendations on how to create this vibrant social space. Using examples of vibrant social spaces implemented in other universities, we determined that this social space needs to be dynamic so it can serve multiple purposes, while mainly serving as a game room. Research demonstrated that a DLP projector is the most suitable for a multimedia projector, which will mainly be used for watching sports but can also be used to convert the social space into a lecture hall or a movie theatre. Our analysis of lighting demonstrated that LED lighting is much superior to its alternatives in all three aspects of the triple bottom line assessment, and certain colours can also be used as “mood lighting”. All of this ties into our main objective, which we have achieved by recommending a variety of games for students that encourage interaction and can also be a good source of stress relief. The use of the triple bottom line assessment has allowed us to create a social space which is socially, economically, and environmentally feasible. The recommendations made in this report ensure that the social space will be a dynamic environment where students can feel welcome and where new relationships can be fostered.

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GLOSSARY

Blackbody	An idealized physical body that absorbs all electromagnetic radiation.
Incandescent	A bulb with a tungsten filament that glows brightly as current passes through it.
Kelvin	The Kelvin is a unit of temperature based on absolute zero. 273.15 Kelvin is equal to 0 degrees Celsius.
Luminescence	Light emission which is not a result of heat.
Phosphor	A substance that exhibits luminescence
Placemaking	A dynamic approach to creating a public environment that is built around local resources, community inspiration and potential.
Semiconducting	A substance that exhibits the property of a semiconductor.

1.0 INTRODUCTION

Our group was tasked with designing a vibrant social space in the new student union building through the use of games and activities. This challenge involved looking at many different aspects of an interior space and choosing between a large number of options with which to promote a social environment for students. We looked at existing examples of social spaces across North America and Europe to determine which elements maximized social interaction. Using the concept placemaking to visualise the social space, we will focus on three key elements; a video projection system, vibrant lighting and games/activities.

We feel that the video projection system is key because its multiple uses contribute to the dynamic nature of the room. It could be used for presentations or guest speakers, and also as a media tool for viewing movies and sporting events. To analyse this element, we will conduct a triple bottom line assessment of two popular projection technologies, and make recommendations accordingly.

To focus on the vibrant directive of the project, we will investigate two leading technologies in environmentally sustainable lighting. The triple bottom line assessment of these technologies will include the social impact of coloured lighting, a life cycle assessment and an economic comparison for two common applications of the lighting.

Finally, the element which we feel is most important for the space is the games and activities we hope to see realized. As this subject is incredibly diverse and open to our interpretation, we choose to make our recommendations based on aspects which we feel the games should share.

2.0 MULTIMEDIA PROJECTOR

One of the most important dimensions of a vibrant social space is the ability to present and demonstrate a wide variety of media and information. The most effective way to accomplish this is with the use of a video projection system, which allows this social space to become very dynamic. This projector could be used to transform the room from a video game room, to a lecture hall with a change of the input hardware. However, as this projector would be used for such a wide variety of purposes, it is very imperative to look at the many different technologies using the TBL assessment. For this report, we will be discussing the 3 dominant projector types (LCD, DLP) and then giving a specific projector recommendation.

2.1 SOCIAL ASSESSMENT

The video projector installed in the vibrant social space will be the hub of the room, often times with most of the attention focused towards its screen. The main uses for this projection screen will be for viewing sports events or movies, for playing video games, and for presenting lecture slides and PowerPoint presentations. Keeping the main uses in mind, we can decide which of the three technologies is best suited towards serving the social spaces needs.

Digital Light Processing (or DLP) technology is quickly becoming the most implemented in video projectors. This technology uses small mirrors displayed on a semiconductor chip, where each mirror represents a pixel that is displayed on the screen. These projectors are very dominant in the film industry, as they provide a much smoother video due to its higher contrast. These pictures also do not have visible pixels on the screen, which is highly recommended for viewing sporting events. However, this technology does not provide sharp reds and yellows at higher brightness. Another setback of this technology is the “rainbow effect”, where the speed at which colours are displayed and changed may cause viewers to see the colours blended together, often causing headaches (Powell, 2002).

From Computer Desktop Encyclopedia
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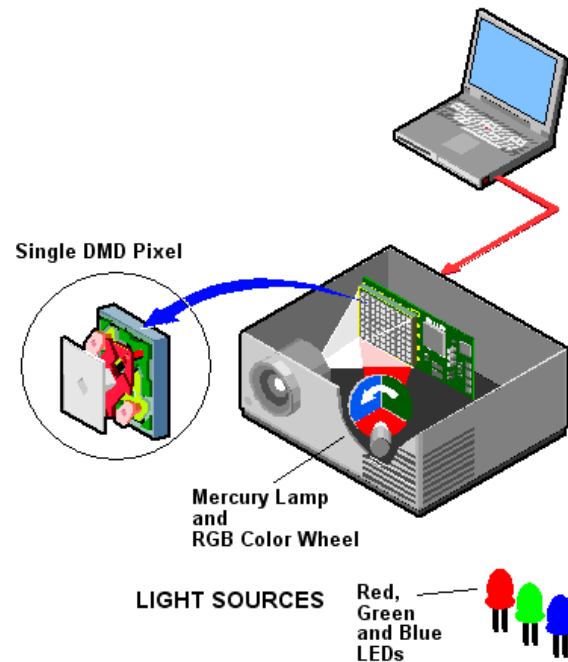


Figure 1: DLP technology

Source: <http://img.tfd.com/cde/DLP1.GIF>

The Liquid Crystal Display (LCD) projectors use a lamp that is split into three beams which then pass through an LCD panel. The projector determines which of the pixels in the LCD panel the light should pass through, thus creating a picture on the screen. This technology relies on having a larger number of pixels to deliver a higher resolution picture, with the lower end models lacking in pixel quantity. Due to the bulb being in more direct use, the LCD projector produces a much brighter and vivid picture than its competitors with a bulb of the same brightness. The main issue with LCD projectors is that you can distinguish the pixels from one another, providing a less fluid video quality (Powell, 2002).

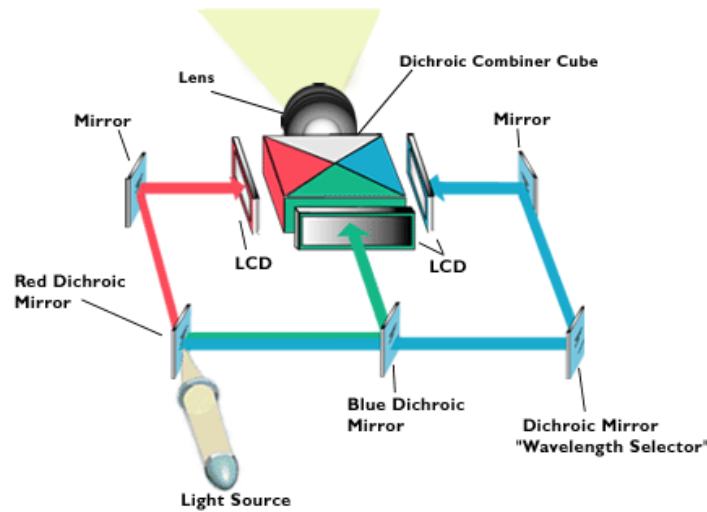


Figure 2: LCD Projector

Source: http://www.ustudy.in/imagebrowser/view/image/4908/_original

This projector will see most of its use with students watching movies, sports or playing video games. The DLP projector would prove to be the better option under the social aspect of the TBL assessment, as it is the better choice for movies and sports events, as compared to the LCD projector being favoured for presentations and use in dimly lit environments.

2.2 ECONOMIC ASSESSMENT

Economic sustainability is a very important aspect in the purchase of the video projector. This assessment is not only based on the initial purchase, but which projector will be more economically viable over continued use. The DLP projectors are available in two different models, with both a three-chip and a one-chip model. However, since the three-chip DLP projectors start at a price range of over \$20,000, we will only be considering the one-chip projector in our assessment.

The one-chip DLP projectors start at approximately \$1,000 and cost up to \$10,000. The bulbs in these projectors need to be replaced every 2000 hours, with the replacement bulb costing more than \$300. An average DLP projector consumes approximately 265 W of electricity while operating, while consuming 10W while in standby mode ("Best buy: home," 2012).

Comparatively, the LCD projectors start at \$300 and can cost up to \$5000, depending on the resolution. The LCD projectors have the same bulb life, but are slightly cheaper in bulb replacement. They also typically use between 220-240 W while in use, with a 10W usage during standby ("Best buy: home," 2012). Due to the simplicity of LCD technology relative to the newer DLP technology, it is also cheaper to repair. Due to having a much lower initial cost and cheaper upkeep, the LCD model is much more economically viable and thus the recommended model for purchase under the economic assessment.

2.3 ENVIRONMENTAL ASSESSMENT

There are two main factors to consider when completing an environmental assessment on video projectors, the first being disposal and the second energy consumption. Despite having very different technologies, both DLP and LCD projectors are disposed the same way and both cause very little environmental damage. The main difference between DLP and LCD projectors is the power consumption that is discussed above, which is also very insignificant. Therefore, both DLP and LCD video projectors are both equally viable options for the social space from an environmental standpoint.

2.4 RECOMMENDATION

After conducting the TBL assessment on both DLP and LCD video projectors, we have decided that the DLP video projector is the more suitable choice for the vibrant social space in the new Student Union Building. This is mainly because the DLP projector provides a much clearer and more fluid picture, while still being economically viable.

3.0 ILLUMINATING THE SOCIAL SPACE

One of the key elements which we hope to see incorporated into our social space is a source of vibrant, energy efficient lighting. We are also investigating the possibility of making our social space more distinct from the other rooms in the new SUB building through the use of coloured lighting. Two promising new technologies have revolutionized energy efficient lighting far beyond traditional incandescent bulbs: Light Emitting Diodes and Compact Florescent Lights.

3.0.1 LEDs

LEDs are solid and composed of a semiconducting substance. A diode is an electrical component with two terminals which conduct the electricity only in one direction. Connecting a diode to an electrical current excites the electrons within the diode, making them release photons, which we see as light. The die is a small cube of semiconducting material. The composition of the die determines the colour of the light given off. The distance from the die to the domed end of the lens determines how tightly focused is the resulting beam of light. Some LEDs have flat, opaque, or even concave ends to help disperse the light into a wide beam (Holzer).

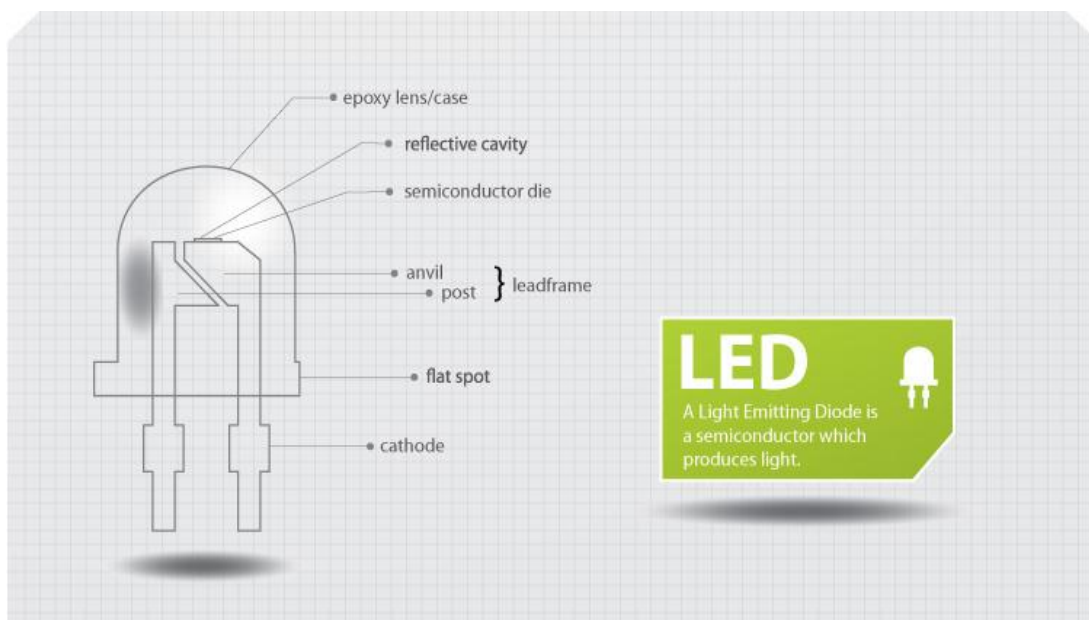


Figure 3: Components of an LED

Source: <http://www.elightspot.com/images/diagrams/LED-light-bulb-components.jpg>

3.0.2 CFLs

CFLs are simply miniature versions of full-sized fluorescents. Electricity is used to excite mercury vapour. The excited mercury atoms produce short-wave ultraviolet light that then causes a substance known as a phosphor to exhibit the phenomenon of luminescence, producing visible light (Harris, 2001). They screw into standard lamp sockets, and give off light that looks similar to the common incandescent bulbs.

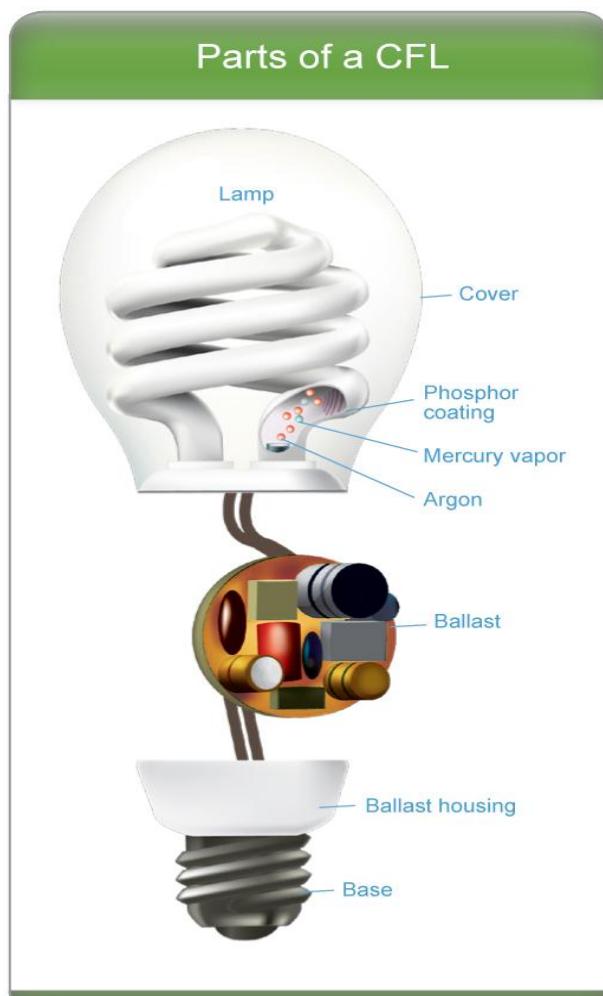


Figure 4: Components of a CFL

Source: http://stoppingatthegreenlight.files.wordpress.com/2010/01/parts_of_cfl_large1.jpg

In this section of our report we will compare the two technologies in terms of their social, environmental, and economic impacts, and make a recommendation of which energy efficient light source we believe is best suited for our purpose.

3.1 SOCIAL ASSESSMENT

One aspect that we will consider when choosing the lighting for our space is whether or not it is possible to improve the mood and comfort of the room through the use of colour. Before we are able to compare the benefits of different colours of LEDs and CFLs, it is necessary to have an understanding of what 'coloured light' really means. As it turns out, to describe the colour of a particular light source is actually more complicated than describing its perceived colour or even its wavelength on the visible spectrum of light.

3.1.1 Correlated Colour Temperature

The colour of a light source is specified using the term Correlated Colour Temperature (CCTs), which is the temperature of a blackbody, in Kelvin, that has a colour closest to the colour of the source. A candle, for example, has a CCT of about 1800K. A small incandescent desk lamp has a CCT of about 2800K. The sun has a CCT of about 5800K, and a clear blue sky has a CCT of about 6500K (Lowel). This will be important information when comparing our two options for light sources. Also, it is worthwhile to note that as the Correlated Colour Temperature increases, the colour of the light source moves from reddish to bluish.

Most LEDs have a very high CCTs, often above 5000K, producing “cold” bluish light. However, warm white LEDs (2600K to 3500K) have improved significantly and are currently available for commercial use. Similarly, CFLs are made with CCTs ranging from 2700K (like an incandescent lamp) to 6000K, bluer than the sun. While the CCT can be the same as that of the sun, they do not recreate the benefits of natural sunlight. For the purpose of our space, both lighting technologies would be able to deliver a warm yellow light which is well suited to areas that need low light intensity, like a lounge for example. The lower scale of the CCT scale is described as friendly, warm, inviting, intimate and relaxing. In addition to these benefits, yellow light is also best for accentuating skin tones and the colour of wooden objects (MyLEDLightingGuide). While this does not provide a way to clearly distinguish between the lights, it is valuable when choosing a specific lighting element, whether it be LED or CFL.

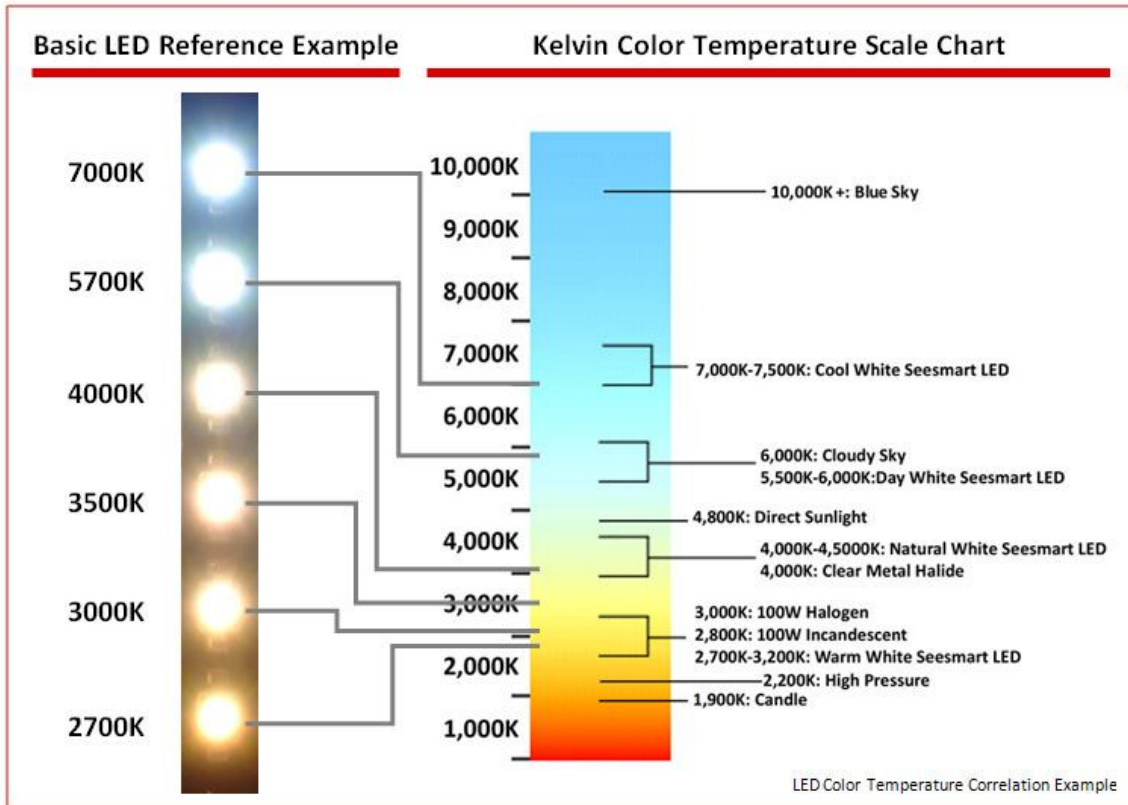


Figure 5: Contrast of lighting colours with the associated kelvin colour temperatures

Source: http://www.seesmartled.com/kb/choosing_color_temperature.php

3.2 ENVIRONMENTAL ASSESSMENT

When considering the environmental impact of these two lights, namely CFLs and LEDs, we examined the life cycle assessments of these competing technologies (Navigant Consulting Inc, 2012). The life cycle assessment considered three major phases of the life cycles of these two technologies when examining energy used; manufacturing, transportation and use. The results of these assessments were as follows:

- 1 The average life-cycle energy of LED lamps and CFLs are similar, about one quarter of incandescent lamp energy consumption.
- 2 The “use” phase of these lighting technologies represented the most energy intensive life-cycle phase, i.e. accounting for 90 percent of the total energy use.

These findings are visually represented in the graph below.

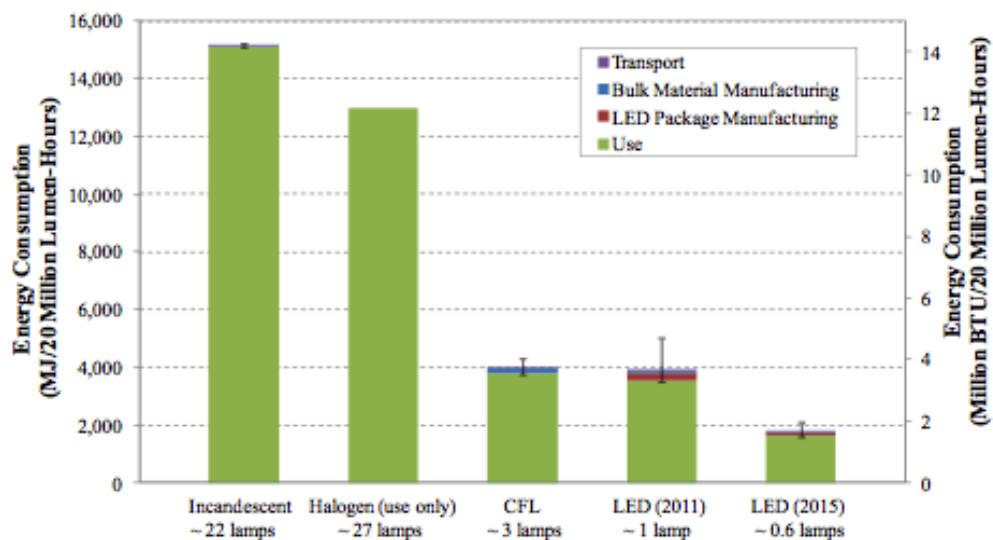


Figure 6: The energy consumed during the life cycles of various lighting technologies.

Source: http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/2012_LED_Lifecycle_Report.pdf

The result of the life cycle assessment shows that LEDs and CFLs have roughly the same energy consumption throughout their life cycles. However, one advantage that LEDs have over CFLs is that they do not contain mercury and other heavy metals which are classified as hazardous

material by the US Environmental Protection Agency. (Johnson et al., 2008). Also, LEDs are more durable than CFLs and their components less environmentally toxic. This makes LED lighting environmentally preferable for the space (BC Hydro, 2012).

3.3 ECONOMIC ASSESSMENT

For this comparison, we reviewed the data on both a CFL and an LED lamp that fit into a standard home light-socket at home to decide which is the most efficient, and thus will be more economical in terms of power consumption (Precision-Paragon [P2], 2011). The initial cost of the lamps will also be taken into consideration. The two lamps whose data was reviewed are: the Philips Ambient LED 12.5W A19 indoor and the GE Energy Smart 13 Watt bulb, which is a compact fluorescent light bulb.

Table 1: Comparison of LED bulb vs. CFL bulb

	LED	CFL
Watts	12.5	13
Delivered Lumens	800	825
Lumens Per Watt	64	63.5
Bulb Cost	\$45	\$0.86
Expected Lifespan	25,000 hours	8,000 hours

Source: <http://www.p-2.com/helpful-information/blog/370-is-led-the-most-efficient-lighting-technology/>

As can be seen in the table above, both lamps operate at nearly identical efficiency; within half a lumen per watt. However, it is clear that an equivalent LED lamp is much more expensive than its CFL counterpart. This difference in price is worthwhile if the fixture you're mounting the bulb in is in a location where it's difficult to change, i.e. ceiling lighting. In this case the expense might be worth not having to deal with maintenance for the expected 25 plus year lifespan of an LED (BC Hydro, 2012)

4.0 INTERACTIVE ACTIVITIES

In order to make the room entertaining and vibrant, we suggest for the room to contain board games, life-sized games and drawing boards. By adding these games and activities, the room will contain a culture and personality as well as lots of open space. These games are easy to maintain, install and move. Therefore, it will guarantee that the room can be used for other social events like movie nights, game nights or any UBC club social events. There are many great board games and the board games inventory is something that can grow bigger with time. The following board games are very social and entertaining: Taboo, Settlers of Catan, Cranium, Uno, Scategories and Apples to Apples. These games are a great way to begin a board collection and we suggest that they are purchased for the room entertainment. Real size games are the games that require participants to be standing and engaged. We recommend that few life-size jengas (Figure 7) are built from 2x4's. Jenga will be about 3 feet tall and 12x12 inches on the floor, which means it doesn't require a lot of room and can easily be observed by spectators in the room. This will help to build an environment that promotes social interaction within the vibrant space.



Figure 7: Life-Sized Jenga

Source: http://i3.squidoo.com/resize/squidoo_images/-1/lens19993472_1353031203a-a.jpg

Lastly, for the drawing boards, we suggest using multiple Buddha Boards (Figure 8). They simply require water in order to create a drawing and the paint fades between 5 to 10 minutes, which means it can be used by someone else. In order to ensure longevity of Buddha Board, it needs to be daily maintenance.

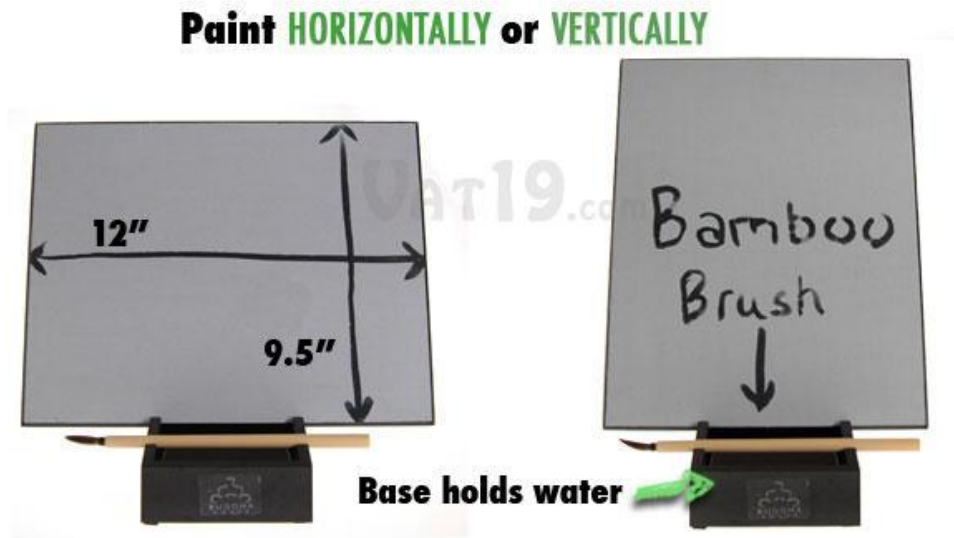


Figure 8: Buddha Board

Source: <http://images1.vat19.com/buddha-board/buddha-board-cutout.jpg>

The rest of this section will cover triple bottom line assessment of the interactive activities that were recommended above.

4.1 ECONOMIC ASSESSMENT

The price break down of individual games is seen in Table 2. All the pricing can be found on the www.amazon.com website, with the exception of life-sized jenga. The price quoted is an approximation to purchasing the material and labour to create a single life-size jenga. From that Table 2, it's an accurate estimate that having a total budget between \$500-\$750 will be sufficient to contain enough games in the entertainment room. Since the board games require certain level of supervision, there should be a person working in the room. One of the ways to tackle the problem is to have a small snack bar in the room. This way the board games can be rented out with a UBC card and the environment of the room can also be supervised. Ideally, profits from the snack bar will be able to pay the staff member to work there full time, which will make the room financially self-sustaining.

Table 2: Game prices

Name of the game	Price per game(\$)	Total (\$)
Buddha Board	35	
Taboo	35	
Settlers of Catan	34	
Uno	7	
Cranium	27	
Scattegories	24	
Apples to Apples	22	
Life-sized Jenga	50	
		234

Source: www.amazon.com

4.2 ENVIRONMENTAL ASSESSMENT

The life-sized Jenga can easily be made by someone in the forestry department, which means it can be used from recycled wood or from a tree that was re-planted. Buddha Board is a local company who advertises their merchandise as environmentally friendly because it's made out of wood/paper material and doesn't contain any chemicals or toxins.

Overall, the ecological footprint from purchasing board games is very low because it requires simple materials to be created and doesn't consume any energy once it has been made.

4.3 SOCIAL ASSESSMENT

There are many social benefits to having the chosen games and activities. Unlike watching TV or playing computer games, board games promote interaction between participants. This leads to bonding and competition between friends. Board games introduce certain level of challenges. First one is the challenge of playing the game and winning. Second challenge is the social interaction between the participants to overcome difficult game situations. The skills that are learnt playing board games can also be used during in real life circumstances, which is ultimately a social benefit. During the time that the participants are playing the board game, their mind is heavily concentrating on the challenges, which creates a mental break away from studying and school grades. Due to the entertainment level and human interaction, the board games will create a stress free environment for student.

The life-size games like jenga don't require a lot of room and they are great games for people to observe, which will further add to the social and vibrant environment of the room. The Buddha Board will give the students an outlet to be creative. It's a great activity to do if you don't have a lot of time to spare. Also, it will give the students a reason to drop into the room and sketch something really quickly. We believe that Buddha Board will add to the social environment by creating student traffic and possible conversations that could spark due to temporary art on the wall.

5.0 CONCLUSION AND RECOMMENDATION

We believe that in order to make the room vibrant and entertaining, it has to be dynamic and many factors need to be considered. The room has to be easily modifiable for variety of different events throughout the day. In the afternoon it can be a games room with board games and other interactive activities. In the evening, it should be able to host movie nights, presentations, talks, or any UBC club events. We suggest that the furniture in the room is something that can be easily moved. The lighting is environmentally friendly and efficient as well as adaptable, meaning it can change depending on the event. Instead of purchasing flat screen televisions, we suggest buying a projector. It will be able to satisfy all the entertaining needs, save money and space in the room. In order to create social vibrant space in the SUB, we recommend using board games, life-sized games, drawing boards similar to Buddha Board and a snack bar. We believe that these four things will create a stress free environment in which students can socialize and have fun.

In our economic analysis, we found that LCD projectors are cheaper than DLP projectors which cause us to recommend purchasing LCD projector. Also, we found that CFL light bulbs are much cheaper than LED light bulbs but the trade-off is in the lifespan of the bulb. If light bulbs will be costly to change, then it will be a better investment to purchase LED light bulbs as oppose to CFL light bulbs. The cost breakdown of board games, life-sized game and the painting board showed that it will be a very cost effective solution to creating entertaining and vibrant social space.

In our environmental analysis, we found no significant difference between LCD and DLP projectors, so the projector recommendations won't be based on environmental analysis. After the research that was done on light bulbs, we concluded that LED light bulbs are more environmentally friendly than the CFL light bulbs. Therefore from environmental standpoint, we recommend LED light bulbs. Lastly, we noted that interactive activities we are recommending will not leave any significant ecological footprint, which further supports the implementation of the recommended games.

In our social analysis, we found DLP projector to be more viable due to the improved image quality in movies and sporting event. The light bulb research told us that both LED and CFL light bulbs are viable solutions to create warm environment in the social vibrant space. Due to the benefits like social interaction, stress free environment and easily movable, the recommended interaction activities has a lot of potential in creating a unique social vibrant space.

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LIST OF ABBREVIATIONS

DLP	Digital Light Processing - a brand of projector technology
CFL	Compact Fluorescent Lamp
LCA	Life Cycle Assessment
LCD	Liquid Crystal Display
LED	Light Emitting Diode
TBL	Triple Bottom Line