Lighting Student’s Well-being

Social lighting, social sustainability, subjective well-being
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Abstract

This thesis is an exploration of how artificial lights are used to create atmospheres in a space, and how they enhance an individual's well-being. The focus here is placed on students in Sweden, specifically those who live in one-room apartments. Students typically do not invest much in their lights yet being in Scandinavia, artificial lighting is used to compensate for the lack of daylight hours. As such, the lights they have will impact how they go about their day.

A light is designed using product design methods to respond to the research question: “to what extent can a versatile light source alter the atmosphere of a student's space to enhance their well-being?” As the research is situated in Sweden, aspects of the Scandinavian lighting culture will be examined and implemented in the design. The student's well-being will be assessed through the theory of subjective well-being, specifically how it can be enhanced through perceived control. The light design also aims to be socially sustainable, focusing on how individuals' well-being can be improved through lighting. The design also attempts to tackle inequalities by showing it can be made of cheap and accessible materials, as well as being professionally manufactured. The cheaper version is to ensure students with lower incomes can access the same quality of light as others, where the light will create a similar atmosphere. Finally, the concept of social lighting is defined in the context of this thesis. It concentrates on designing the light based on interviews with students and emphasising the relationship between a student and their apartment.

Through interviews and photos, a design brief was formed to understand what type of light students use in their apartment and what they were looking for. After a series of iterations, a final design was obtained and created. One version was made professionally in metal by Belid Lighting. Another was made out of thick card and paper clips, materials easily accessible to students. The models were tested by students in their home for two nights, after which an interview took place to obtain impressions and feedback on the design.

It was concluded that a versatile light source altered the atmosphere of a student space to enhance their well-being to a certain extent. This was due to people's existing relationship with lights, where they don't generally interact beyond switching them on and off. Nonetheless, participants enjoyed making their own lamp, and found the lamp design quite unique. This helped maintain their subjective well-being.

Keywords
Versatile lighting, subjective well-being, social sustainability, Scandinavian lighting culture, social sustainability
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From the conference I met my supervisor, Martin Hellberg, who helped me push my design further and test out different iterations. Thank you for your dedicated time and shared knowledge.

A very big thank you goes to Belid Lighting, especially Björn Szajbel and Joakim Fihn for bringing my prototype to life and creating a high-quality product that best exemplifies what I had in mind. They fully understood my design, and knew what elements to add to make it better than I would ever be able to.

Lastly, merci beaucoup to friends and family, who were constantly supportive of my fascination for lighting and didn't question it. The project would not be what it is without the feedback and encouragement provided.
Introduction

“The very essence of working with lights is the relationship with people, with what they feel” said Roger Narboni (Bille, 56), a pioneer lighting designer from France. Lights are constantly around us, illuminating our way home or keeping us awake late at night. They are also a way to reflect moods and send un-spoken messages to others, showing how much influence they can have.

Being such a vital part of our everyday surrounding, artificial lighting should accurately reflect individual’s feelings by creating atmospheres. This type of lighting should be accessible to all, in particular to students. They typically live in small apartments with lights provided just for the kitchen and entryway. The students interviewed for this project had to furnish their own one-room apartments in Sweden. These students choose their luminaires but are frequently limited by how expensive lights can be. They are also in a country where daylight is limited in winter, so the lights used during the dark hours should enhance their well-being as much as possible. Students spend many hours in their apartments, hence why their environment should be the atmosphere they choose.

To investigate this topic, this thesis aims to answer the question “to what extent can a versatile light source alter the atmosphere of a student's space to enhance their well-being?” As such a lamp will be designed using the methods of product design to determine the impact of a versatile light. It will be manufactured by lighting professionals, Belid Lighting. The same lamp will also be made in a DIY manner, with materials accessible to students. This will ensure the versatile light can be accessed by students of all incomes.

The thesis will discuss how lighting works within social sustainability, as artificial lighting can help or hinder individuals within a society. The term social lighting is explained, as the aim of this thesis goes beyond creating a lamp. It aims to see how the exchange between artificial light and student, thereby having a social dimension. It will also discuss how to measure the impact of the light on a person's well-being, according to the theory of subjective well-being.
“Light is one of the important factors that reveals space, time, activity and focus” (118) writes Volf. This represents why lights are so integral to our everyday life. With the invention of electric lighting, many aspects of our lives have changed such as building deeper-depth rooms (Volf, 110) as the lack of daylight is compensated by electric lights. It has also had “an enormous impact on our productivity” as it has “[created] longer working hours” (Volf, 109). We flood cities with light, for safety and aesthetic purposes. However, this has in turn affected wildlife nearby, as it is “more difficult for animals that depend on keen night vision for both food and safety to see” (Brox, 276).

Because of this impact on individual’s personal and outer environment, the effect a light creates on humans must be thought through. The aim should not be “adding quantities of light” but rather “adding qualities of light to the atmosphere” (Volf, 107). By answering the research question, this paper will investigate how artificial light is used to create different atmospheres to enhance well-being.

The topic of lighting was chosen because of the author’s personal interest in lighting and its relation to people. The works of Julio Le Parc and Olafur Eliasson started this fascination for how lights can change a space, and how in turn the museum visitors respond to them. As these are of the art world, the author decided to focus on the everyday lighting of homes and how these spaces affect their inhabitants.

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1 Volf holds a PhD in lighting, architecture and health.
2 Brox published a book on the history of artificial lighting.
Theory

Social sustainability

As lighting influences people’s behaviour, it will affect the society they are in. Because of this relationship, it was deemed suitable to work with how an artificial light can be socially sustainable. The definition of this term varies between writers as there is no official one. As such, Rogers et al.’s definition is chosen to frame the research due to their work in the fields of equality and environmental change.

Rogers et al. write that “social sustainability emphasizes living in ways that can be sustained because they are healthy and satisfying for people and communities” (3). This definition was chosen because it places well-being at the forefront of a sustainable society, where factors such as equity, identity and social relations are dependent on the individual’s well-being. Rogers et al. also argue that “healthy, happy individuals […] are more likely to make protection of their environment a priority” (3). With this definition, this paper will focus in what ways an artificial light can improve a student’s well-being.

To define well-being further, this thesis will use the social researcher Rob Bilj’s paper on social sustainable development. Bilj explains that many aspects of people’s well-being need to be measured, such as “the way in which they spend their time; their paid and unpaid activities; their health and educational status; their relationships with other people” (160) to name a few. He goes on to say: “all kinds of inequality also need to be considered, such as inequality in income, wealth, health status, educational level and political voice.” (160). This definition shows more facets of well-being, such as inequality which need to be accounted for in the designing of a luminaire. It must be understood how a design impacts different areas.

For an artificial light to be socially sustainable, it must therefore enhance the student’s well-being. This is why the theory of subjective well-being is also implemented in the project and will be explained later. The light should also be accessible for all and not reserved for those who can afford it. Based on interviews, furnishing an empty apartment can quickly become expensive, and an element as important as lighting should not come at a high cost. The lights will be used every day and should therefore be of good quality for the student. Because of this, it was decided to have the light professionally manufactured but also show how it can be made with cheap materials easily accessible to students. By offering a cheaper alternative, students will be less stressed by the high costs of lighting and their well-being can improve.

By giving the option to the students to make their own light, it increases the chance of creating user-product attachment. Ceschin argues that user-product relationship can “lengthen product lifetime” (123) and this can be achieved by “enabling product personalisation” (123). The student could then personalise their lamp as it would depend on the materials they have available to them. Ideally it would lengthen the product lifetime because of the emotional attachment to it, but this cannot be guaranteed. This means the design looks beyond environmental sustainability, which frequently “disregards social dimensions of sustainability” (Ceschin, 122). The DIY lamp attempts to create a connection with the student, who can be proud of their handwork. This may enhance their well-being even further.

Bilj also writes “the social aspect of sustainability is […] layered (it pertains to both an

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3 Ceschin is a senior lecturer in Design for Sustainability, and researches design for sustainability and circular economy, as well as co-design.
individual and a collective level)” (p.162). In the case of this project, the light designed focuses far more on the individual level, as it is intended for a one-room apartment for students. By starting with the individual’s well-being, the collective well-being can grow. As students will spend much of their time in their apartment, this must be a focus. The light must also be fitting for when students have friends over and want to create a certain atmosphere using the artificial light.

The versatile light will be trying to sustain student's well-being through its impact on their daily activities indoors and creating atmospheres in their apartments. It will also try to reduce economic inequalities, by providing a similar service for students of different incomes.

**Social lighting**

The topic of social lighting is also implemented in this project, because it aims to study the relationship of lighting and people. This term is not well defined either, and its approach varies if the project is in urban lighting or interior lighting. A clarification is needed for how social lighting is achieved in the scope of this project.

Social lighting relates to social design. The authors Janzer & Weinstein⁴ write about how “social design study, practice and practitioners must consider […] the macro and micro political, economic and cultural systems that contribute to the issues and ills that social design seeks to change” (329). The quotation implies that to create social lighting, the political, economic, and cultural systems must be understood to explain why the social problem of low-quality lighting for students has arisen. To do so, Janzer & Weinstein urge that “design work applied within the social realm must be collaborative, culturally relevant, socially applicable, and empowering” (329). This means the stakeholders must be part of the development and implementation of lighting design. This will be demonstrated in the methods. There must also be an understanding of the space in which the light will be used, from the student’s perspective. As the sociologist Don Slater⁵ wrote: “Any space is 'social', because it is made up of many different understandings, actors, materials and interactions” (14).

Based on the previous section of social sustainability and well-being, the light designed must demonstrate how it changes a social situation even for an individual. It emphasises the relationship of a student with their apartment, and how that space will influence their well-being according to their use of the light. The student’s well-being may also increase by having the option of making their own versatile light with cheap, accessible materials. Other students will also have the option of buying the more sturdy, durable light.

Janzer & Weinstein spoke of the design being culturally relevant. Because the project has focused on students in Sweden, the lighting culture that exists here must be respected and implemented within the design. The way people use their lights reflect the society they are making themselves part of.

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⁴ Janzer & Weinstein's backgrounds are in systems and process design.
⁵ He is a co-founder of the Configuring Light/Staging the Social research programme on social research within lighting design.
Scandinavian lighting culture

The project being in Sweden impacts design decisions of the light. This is primarily due to the few hours of daylight in winter, and how historically this has influenced people to use their lights. Specific to artificial light, Bladh's investigations in Sweden claimed to be “typical for the Nordic lighting culture [where there] is an effort to create a cosy atmosphere through the use of several small luminaires and low lumen lamps with a warm glow” (238). Though it may seem like a generalisation of this culture, he also says “it is perfectly possible to have individual variation and deviation within a culture, because some people in Nordic countries do not live up to the Nordic lighting culture” (237). This means that designing a light that has a low lumen with a warm glow will not please everyone in Scandinavia, though it should be important to be mindful of this culture.

This lighting culture is also believed to exist because of Bille's interviews with homes in Copenhagen, who strongly acknowledge the concept of 'hygge', roughly translates to cosy. “Informants often expressed how objects and light were pivotal to the creation of cosiness” and “in Denmark [hygge] implies dimmer, ’warm’ lighting dispersed across the room to carve out smaller spaces within spaces” (“Lighting up Cosy Atmospheres in Denmark”, 59). It is important to say these statements are not trying to limit such lighting practices just to Scandinavian countries, as many other countries receive the same daylight hours. They are demonstrating a penchant for these lighting preferences in this region.

Because of the author's interest in exploring this lighting culture, and to create a social light, it was decided the light must be designed to blend in with other small, warm light sources Scandinavians seem to prefer.

Subjective well-being

The versatile light designed has the aim to enhance a student's subjective well-being. The theory of subjective well-being in this paper will be define by Jalilzadehazhari’s analysis, who wrote her licentiate thesis on the topic. SWB (subjective well-being) has two elements, which are core affect and satisfaction. “Core affect refers to generation of pleasant and unpleasant feelings and satisfaction refers to ability of individuals to perform cognitive interpretation, including memorising, concentrating, reasoning, planning and solving tasks” (2). Jalilzadehazhari also explains that SWB can either be maintained or enhanced. The maintenance of SWB has to do with life domain factors impacting the cognitive interpretations and generation of feelings, and a person's ability to exploit homeostasis or adopt coping systems (3). However, this project wishes to focus on how to enhance SWB.

Jalilzadehazhari argues using a theory of Fishman's that “enhanced SWB is associated with a higher level of perceived control” and it “can improve individuals' ability to perform cognitive interpretations and generates pleasant feelings” (4). To go further, perceived control has two elements, which are: “individuals' internal locus of control, and their awareness regarding outcomes of their own behaviour” (4). A summary of this is shown in the following diagram:

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6 Please note, the author has found no proper evidence as to why other regions of the world with similar daylight hours, such as Scotland and Canada, don't have a similar lighting culture. It can be presumed there is just a greater interest in researching the lighting culture within Scandinavia, especially due to the Danish concept of ‘hygge’.

7 Bladh researched statistics of lights per households to support this claim.
As a result, the light made for students was chosen to be versatile to give the individual a higher level of perceived control. It should make the user reflect on how the light can change the atmosphere of a room. A framework for assessing how effectively the light did this will be formed and implemented later on.
Method

Product design
At its core this paper aims to see how a product can enhance a student’s subjective well-being. As such, the development of this product will be carried out using the methods from the field of product design. The professor of design Rodgers writes that “product design [...] has a wider meaning that includes the generation of ideas, the development of concepts, product testing, and manufacturing” (6). These are the common steps taken to bring a product a life, where manufacturing is generally for large scale production, which is not the case here.

More specifically, Rodgers also says “a product designer observes people, listens and asks questions” (14), which is why students are interviewed before generating ideas. This helps form the design brief which then leads to sketching and a final design (14). This process is explained in detail throughout this chapter with less emphasis on the manufacturing of the product. This paper’s aim is primarily the relationship of student and light, which is explored through a versatile light source.

Qualitative research
The process began by interviewing students who live in one-room apartments. Before meeting them, they were asked to take pictures of their rooms over a 24-hour period, to show how they changed what lights were on and at what time during the day. This was to have pictures to refer to during the interview itself, and help the author understand the student’s use of lights visually. As the professor Merriam writes, this qualitative research was to “[understand] how people interpret their experiences, how they construct their worlds and what meaning they attribute to their experiences” (6). The interview format was chosen to see how students express themselves through language in regards to their lights. It outlines what meaning is attributed to lights from which an in depth knowledge of student’s relationship to them can be made.

Here are a few pictures from the interviews, and the interview questions are in Appendix A:

Interview photos
The participants gave their express permission for the author to use these photos.
The photos and the interviews showed students vary greatly in their use of lighting and a few are discussed in depth.

One student emphasised how important they find fairy lights/string lights to create an atmosphere in their home. When they turn on their lights in the evening, they aim to create a cosy atmosphere through warm lights and candlelight. These small spots of light are also used because they don’t want to be enveloped by a bright light source, like a ceiling light. For studying they will use a spotlight so they can see the task well. Their parent told them “light keeps you company”, which was affirmed when they moved to Sweden. Here it was noticed they use their lights for creating moods rather than the practical purpose of seeing their surroundings.

Another student rescued their lamps because they would be moving out soon and didn’t want new ones. They don’t like their lamps so hide them in corners to create light spots. Their home is arranged to be as cosy as possible, which means dimmed, warm yellow lights to them.

For another student, they moved apartments because of the lack of daylight and their heavy reliance on artificial light. In the new space, they aim for cosy lighting in the evening by having a variety of second hand lights that give off a warm glow. They believe this came from their family’s habits. Like their family, they put in place a light by the window for passersby and observed several other students on campus do this as well. Like the previous student, they didn’t want to invest in lights as the space is so small and chose to favour functional lights. This also means they rarely use the ceiling light as it illuminates too much of an already small space. They see lights as a sort of meditation, which they believe all students need.

One student will often have their kitchen lights on to create a small spot of light to compensate for the lack of daylight. They acknowledge this as a habit obtained from their mother, who used lamps at home to create environments and space. Despite having a ceiling light, they don’t use it because it reaches objects “in the wrong way”. Lights to them create an ambiance and often provides inspiration, finding the lampshades give the soft dimmed glow they want and like. They say their lighting would be very different if they were living in the apartment for longer as they are too aware of the fact they will live soon.

The consensus from the interviews was to design a small light where the user can change the way the light is dispersed. It should be cheap, so students were more likely to buy this “quality light” and be more socially sustainable by having a light that enhances their well-being. It was also decided to create a single luminaire, despite three being observed as an ideal number to create a proper atmosphere. This was influenced by the time frame of the project and the author’s first time designing a light.

**Design brief**

A design brief was formed from the research to outline the parameters of the design, such as objective, materials, user, etc. This helps product designers understand their possibilities and limitations. The full design brief is in Appendix B.

The main design criteria was that it should not be bigger than 30x30x30cm so it would be easy to pack up. The light had to have an interactive element, where the user’s involvement with the product would change a feature. It was decided the feature would be the direction of the light, which also impacted the brightness and what area of the room is lit up. The light is also a way for the author to explore the Scandinavian lighting culture, and implement aspects of it in the design of the light. This design brief directed the ideation process.
Ideation

Considering the personal decisions made in the design phase of the project, the first person will now be used for the remainder of this chapter.

The aim of the qualitative research was to gain a strong understanding of the student I was designing for. Because of this, I decided not to co-design with users in the ideation phase. The information I obtained was sufficient to start my design process and also felt it would be better to test in-depth a “final” design, rather than designing several lights with a group of students. This was also done because of the manufacturing restrictions I had, which limited what type of light could be designed in the first place. And as it was my first time designing a light, I was new to the constraints that can present themselves in manufacturing a light, such as lightbulbs and temperature control. I wanted to design the light myself, because it was an exciting project to take on for the first time and explore the possibilities.

Before sketching, several versatile light examples were researched for inspiration. Two stood out most, of which the first is the Mondo Lighting by Antonio Facco for Oblure (Williamson). This light has four striped shades around the central piece, which can be moved around and overlap. The shades allow the user to customise their light, as well as inviting them to interact. A person can easily change the light dispersion to how they wish, making the light their own. Here the versatility is achieved in the aesthetics of the light, as the pattern changes the user’s perception.

![Mondo Lighting by Antonio Facco for Oblure](image)
The second inspiration was Rolo by Smallgran (“Smallgran”). This appealed because of the way the light direction is changed with what surrounds the bulb. The user rolls down the steel petals and changes the levels of illumination within the room, giving more light to one area of a space. It’s a playful concept and the user is invited to manually adjust the brightness, making them think beyond just switching a light on or off. Controlling the illumination was a primary inspiration when designing my own light, as it involves the user more than most light designs. This related to the theory of enhancing SWB, as perceived control is the primary contributor. The perceived control is achieved in the Rolo lamp so would maybe also enhance an individual’s subjective well-being.

These inspirations led me to sketching ideas, while creating prototypes to test the most promising concepts. Three are briefly discussed before coming to the final design, to show their strengths and also why they were not chosen as the final design.

Design 1

Though the sketch and prototype differ, the concept is the same as layers cover the bulb to dim it, and the user chooses the degree of brightness. It’s quite interactive and the versatility shown in Mondo and Rolo was well reflected. My main concern was the exposed bulb which is too harsh to look at directly so would need some shading as well. It responds well to the design brief, as it’s a simple design that isn’t too big.
Design 2

This light operates by having to rotate the bulb up or down and light up only half of the sphere. The top half is dimmed with a mesh-like material to create an atmosphere in the room, while the lower half is brighter. This is for a more focused and intense light, which could be for studying. The bulb would be rotated at the back, yet I didn't know how the lamp could be stable enough with such a thin base holding up the larger component. I believe this design would work well in a large scale, as it's quite unique. Being small, the same effect wouldn't be achieved. Though this idea had potential, it wasn't deemed easy enough to construct and set up for a student.

Design 3

Here, the main component would be on a larger frame on which it would rest and direct the light. The cylinder is cut at an angle to allow light to spread out, and would either be directed upwards or downwards. Like with the previous light, upwards would be for creating an ambience, and downwards to direct light for tasks. The main difficulty with this design was that to use an E27 bulb, the cylinder had to be quite large, which would make the lamp as a whole too big for practical purposes. In this prototype a Pringles can was used, which while being very accessible, helped determine the design was too bulky. I would try this again with a smaller bulb, but it would still be too much for a student to make with easily accessible materials, as the base must be sturdy.
Final design

The final lamp design is made of two pieces, a base and a shade with a joint for the two, upon which the shade rotates around the base piece. It was chosen based on the design brief, as it respected the important criteria of being no bigger than 30x30x30cm, and is easy to set up and take apart. The light is dimmed through interaction with the user and thereby versatile.

The design itself stands out against most lights students would buy, making it quite unique. I designed it based on the simple action of tilting the shade, and found the straight lines very sleek especially when the shade is rotated upwards. It spreads the light very uniformly in this position, and creates a cosy corner of light in the room. When the shade is flat, the lamp is symmetrical, offering light on both sides and an appropriate level for desk use. The Mondo and Rolo lights discussed earlier influenced this design by their interactiveness, and manually changing the illumination level provided by the bulb.

These sketches were the basis for the design, seeing if it should be more circular for a softer look, or have straight edges. In the sketches the bulb is at the top of the base, but when prototyping I realised the bulb should be in the base, as the light was dispersed effectively.

To make prototypes, I used an E27 socket from Clas Ohlson with a flat round base, allowing me to place different materials around the bulb and observe the changes in light dispersion and illumination. The bulb itself was an LED, with 2700K and 5.5W, which resulted in a warm glow. This was kept as it corresponded well to the Scandinavian lighting culture theory of warm lights, making it suitable for the context. It was observed the bulb itself did not get hot enough to damage materials, which allowed me to design closer to the bulb than expected. The first iteration for this was very similar to the result, as the shade is off-center, as shown below.
I first tried with paper, which gave a soft glow overall, but I wanted the base to block off the light. So the next model was made of thick dark card, which blocked the light more efficiently. While making these, I realised how easy they are to create, as it is straight edges and the joint is achieved with a paperclip. This was a significant reason for pursuing this design.

After a discussion with my supervisor, the symmetrical aesthetic was achieved. It was preferred because of how pleasing the symmetry was, and the user can rotate the shade to whichever side they need. From this I made a few with different materials.

Made from cardboard and mesh, this was made to test how it will look. The problem of having the bulb exposed is slightly subdued with the mesh and creates a very striking look. However I doubted students would want this aesthetic, or could even get hold of this mesh.
I tried with a thick white cardboard to see how well the light would be blocked out. As shown the light was blocked but it reflected the orange pattern inside giving off an orange glow. This wasn’t the aim, but it showed how much the material will change the lighting, which some students may want, but should be aware of. It allows for a great deal of personalisation. This prototype was also made to be sure my measurements were accurate so they could be communicated to students.

This was the final prototype, made with thick black card. I really liked the contrast of black and white, similar to the Mondo and Rolo lights. The straight edges offered a nice contrast to soft intangible light. I thought it was sleek so it could blend in with most homes.

From these prototypes, a template was made for students who want to make the same frame. It has the measurements and steps on how to put it together, as well as the possibility of printing out the template so it just has to be cut out. It only requires three pieces, as one is repeated to create the base. To be completely made, a similar bulb socket I used for my prototypes should be used. It was bought for 50SEK, and an E27 LED bulb can be purchased for around 50SEK. This makes it already cheaper than many lamps as the frame piece can be made of thick card and paper clips. It also means the shade can be remade should it get damaged, and more importantly the card used can be recycled at the end of its use.
DIRECTIONS

STEP 1
Cut the two base pieces and fold them along the dots, then join the two.

STEP 2
Cut the shade piece and fold along the dotted lines.

STEP 3
Join the base and shade with a small joining mechanism, such as a paper clip, by lining up the dots. The shade can then rotate around the base.

STEP 4
Place the lamp on the lamp base. NOTE: an LED light must be used as it doesn’t heat up and damage the structure around it. An E27 lamp will work, but anything smaller can fit as well. A similar version of the bulb socket can be found at DIY stores or lighting shops.

STEP 5
Switch the light on, and rotate the shade as you please.

Template and directions of DIY guide of lamp, where the template can be printed and cut-out

BASE PIECE

Print and cut out in A3
Scale 1:1

SHADE PIECE

Print and cut out in A3
Scale 1:1

Thought is recommended for the project, as the light can be blocked out. Of course, a lot of freedom is provided depending on what you wish the end result to be. The template can be printed or replicated on other materials by the provided measurements.
A model of this lamp was also created by Belid Lighting, a lighting manufacturer located in Varberf, Sweden, since 1969. To be made, I supplied measurements and a video of the prototype to help understand the design. I went to visit the company to see how they manufacture their lights and the steps required to create the prototype.

The light is made of metal sheets coated in black, which were folded using an industrial machine for bending metal sheets. The designers at Belid agreed to make this product due to its simplicity and having the right tools. They were able to paint the inside of the shade white, as they also understood black would not reflect the light appropriately. The lamp was given a weight at the bottom to make it more sturdy and give it a better quality feel for the user. Lastly they changed the bulb to a spotlight, as otherwise the light emitted gets wasted downwards.

Overall I was incredibly thrilled with the model they created, as it felt very sturdy and like a high-quality product that could be sold. The product manager of Belid said a lamp like this would cost around 800-1200kr, showing how this could be out of a student’s price range for lamps, hence the need for the DIY version. However this version would last for a long time, and is not too inconvenient to pack away.
This design was chosen because it best embodied the theories explored. For the product to be socially sustainable, it must aim to create healthy and happy individuals as Rogers et al. discussed (3). This will be assessed through user testing. Through lighting that enhances well-being, factors such as equity, identity and social relations can develop positively. This light attempts to do so, as a part of the larger surrounding in which students live. The social problem of low-quality lighting is explored and this design challenges it.

Showing that this light can be made easily out of basic materials responds to social inequalities of income and health explained by Bilj (160). It bridges the gap between students of different incomes, as those on tighter budgets can still access this social light. The main difference is the more expensive model would be more durable, and they wouldn't have to build it. As argued earlier, the DIY version attempts to enhance the user-product relationship which may enhance their well-being, as they can be proud of their work. They may also keep a product they made themselves for longer.

The lamp designed attempts to enhance the student’s subjective well-being by increasing their awareness and control of the product. Rotating the shade changes the way the light is dispersed, for which the user will have to make a conscious decision of what that change will have on their environment. This changes their perception of how to control lights, which should in theory enhance their subjective well-being.

Though this is defined as the “final design”, there are still improvements to be made with the light. When testing the product with users, changes will be noted to push the design further. More iterations would have been done but to keep to the timeframe of the project, it was favoured that one design be created and then tested in a qualitative manner.

The paper will now return to third person to consolidate the positioning of the project in the various fields presented.
Results

Using the lamp
To determine to what extent this versatile light enhanced student’s well-being, it was tested in a qualitative manner. This was done because well-being is highly subjective and experiences like this cannot be quantified. Participants were given the lamp prototype for two nights and instructed to use it however they liked. After this they were interviewed (questions in Appendix C) on their experience and first impressions of the lamp. Other participants test-made the lamp to determine how feasible it is to build and how their relationship changes towards it. These were separate so the participants could each focus on these different experiences, as well as seeing how people relate to it when they receive it already made.

A majority of the participants said they really appreciated the light’s aesthetic and playful nature. They liked the simplicity and its modern look. One participant said they enjoyed “actively influencing” the light thanks to the shade, as it made them think of the light distribution on either side. They moved the light around their space to test it, as well as seeing how it looked in relation to their belongings such as their plants. After some testing, another participant decided they liked the lamp shining on a mirror so the light would be reflected, to create an ambiance. One placed it by the window to use as a “nightlight”, again for atmosphere. Meanwhile others found it made for a good reading light on their bedside table, as it was bright enough and could be dimmed if it became too bright. Unfortunately no participants mentioned how it changed the overall atmosphere of their room.

For improvements, users suggested adding colours, either to the structure itself or colour filters for mood lighting. One participant suggested having perforations on the shade piece so as to have patterns shining on the ceiling.

Overall, all participants used the lamp in one common way. They would test the moveable shade and look for what position they prefer it in. Once this was done, they did not change the shade’s position again. They attributed this to their existing relationship with lights, wherein all they do is switch them on and off, and don’t interact beyond that.

Photos taken by participants.
Express permission was given for the author to use these photos.
These results showed participants did not use the lamp as it was expected when designing it. Therefore it didn't enhance their subjective well-being to a great extent, as the control they had on their environment wasn't obvious to them. To improve this, participants could be given more specific instructions, such as using the light as a table lamp. Placing it there might encourage them to interact with it, as they might be closer to it.

The feedback was nonetheless positive, which indicates they had a positive experience. This would in turn generate positive feelings which is part of maintaining subjective well-being, showing it did improve a student's happiness but not in the intended form. The participants who used the light in a more atmospheric manner fell more in line with the Scandinavian lighting culture, simply because the theory urges for mood lighting rather than practical lighting. This however was not directly stated by the participants, perhaps because they did not realise the extent of their choices. It may also be because the testing period was in April, at which point there is more daylight than in winter time, so people use artificial light less frequently.

**Making the lamp**

When it came to making the lamp, participants were given the template shown in the previous chapter with directions and measurements. It was decided the designer would be present to ask questions during the process. Assistance was not given during the building process, as realistically the template is all students would be given. This testing was to make sure the directions and measurements were comprehensible enough to build the same frame.

The participants found the frame easy enough to build because of the few pieces required. They said it was sturdier and had a smoother motion than initially anticipated. When testing out the motion they said they liked the versatility it offered. They also said they saw themselves using it as a reading lamp and maybe for mood lighting. All participants said they appreciated the product more after having spent time creating it.

In terms of improvement, they suggested having smaller pieces so that smaller cardboard boxes could be used, instead of having to find somewhat large ones which limits their choice of material. As such they would also more strongly consider what the cardboard on the outside would look like while constructing the frame.

This was a successful test, as participants wanted to keep their creation afterwards with some refinements needed. It can thus be said the user-product relationship was strengthened because this product enabled user personalisation, as was discussed in the Theory chapter. It therefore shows how designing the lamp so it can be easily constructed makes it socially sustainable because it accounts for the social relationship users will have with their products. The suggestions offered also showed how freely the product can be personalised. Because of these results, it can be said this design appropriately tackles income inequalities. All a student needs to build this lamp is the time, materials and drive to do so. Otherwise the professional version is a suitable alternative, as it offers the same quality of lighting but with a higher quality of crafting, making it sturdier.

The use of accessible materials also implies re-purposing these instead of discarding them which may help environmentally, but this action could help the student's well-being by knowing they are making an effort to waste less. This act shows how socially sustainable building a lamp can be, as “healthy, happy individuals [...] are more likely to make protection of their environment a priority” (3, Rogers et al.).
Contribution

In this project, the author showed how a light can be designed in correlation with social sustainability, subjective well-being and the concept of social lighting, thereby contributing to these fields. The definition of social sustainability has been consolidated as the term is still vague within design. To do so, the theory of subjective well-being was integrated to deepen the definition as well as offer a way to measure how socially sustainable a design is. It was also to show that well-being can be maintained or enhanced, but this depends on the project at hand. The design also demonstrated how a product can consider options for all incomes. The lamp was simple so that a prototype could be manufactured by professionals, but also for students who enjoy crafting. Though it may seem challenging at first, this design is easy to make and has an interactive element, setting it apart from other lamps. As such, this project is contributing to product design by showing a versatile light can be built by both professionals and students. From this a series of lamps could be designed for all incomes, that are easy to build. This could develop into using other common materials aside from cardboard to create a lamp such as plastics. It would extend the material’s life by giving it a new purpose, as well as opening up an exploration of the light’s reaction to these different textures.

This project has shown how a designer can integrate the theory of subjective well-being, despite it being in the field of psychology. It is important to note only an aspect of this theory has been implemented, as measuring subjective well-being involves many more aspects of a person’s life (OECD, 21). Nonetheless, this thesis showed one way to measure it is through qualitative research, whereby the product was given to see how a person experienced it and how it changed their surroundings. As the theory of enhancing subjective well-being was about awareness of control, the design became versatile so the student could observe how having this control affects the atmosphere of their space. Giving this control was well achieved, because the light dispersion changed greatly depending on the shade’s position. However, students did not feel the control given to them impacted them to a great extent. Perhaps new technologies like app-controlled bulbs could be integrated, and this would cause students to feel more involved in their choices.

With social lighting, the author was trying to put the user first by learning how students use their lights within the home. This was done by interviewing participants, as well as using photographs they provided. The information gathered was specific to those on a Swedish campus, but the method itself was found to be very effective. Some students felt a strong link to lighting, in which case they brought up interesting points, while others used it very pragmatically. It was generally noticed that in a one-room apartment, at least three light sources were needed to create an ambiance. This lamp also showed how to design for its cultural context when researching the Scandinavian lighting culture, thereby attempting to sustain this lighting culture by upholding its characteristics. This was why the lamp was kept small, and a warmer bulb was favoured. The outcome could then change depending on the culture, if prominent preferences become apparent during the research phase which impact the design.
Conclusion

Electric lighting has advanced incredibly since its commercialisation, and alongside the impact it's had on people's daily lives. No home or office is ever dark after nightfall, thanks to light bulbs that are activated by a simple flick of a switch. As they surround us and enable us to be active during the dark, lights affect our environment and well-being. Because of this, artificial lights should be designed more thoughtfully, by understanding the user and the systems surrounding them. Here students were selected as they live in temporary spaces that are often one-room apartments. The time spent in these spaces should benefit the individual's well-being in the best way possible, with a particular focus on lighting here. Hence, this project was to study lighting from a social perspective and its relationship with students.

Social sustainability was the focus of this thesis, which allowed an exploration of its practical application to a lighting project. Understanding how a group of people use their lights throughout the day was a first step to gaining an insight in what lighting they wish for their well-being. Along with this was understanding the social systems that surround their use of lights, such as which they purchase and to what effect. In this case, the lamp was designed to best fit in with the economic and cultural systems of students living in Sweden.

The light designed served to respond the research question: “to what extent can a versatile light source alter the atmosphere of a student's space to enhance their well-being?” Based on user feedback, it was concluded the student's well-being was enhanced to a certain extent by the versatile light. As shown in the user testing phase, students largely attributed this to their existing relationship with lights, where interactions do not go beyond switching lights on and off. Even given the option, students played with the versatility at the beginning, but then left it in one position afterwards. Their use of the lamp was limited which didn't make them reflect sufficiently on how the light affected their atmosphere.

This exploration into creating a versatile light highlighted the many possibilities and creative directions lights can take. They are the perfect combination of art and technology, merging the intangible nature artists work on with the very practical side of manufacturing, all aimed at obtaining a certain atmosphere. Looking at the future of lighting, designers should be asking themselves “what kind of human are we creating with these new lighting technologies?” (Bille, “Towards a Social Lighting Design.”) Ideally designers can help humans consume less light without compromising their well-being, as well as being mindful of the systems surrounding their use of light.
References


Appendix A. Interview questions

1. Talk me through the day of your lights, using the photos you took
2. What is special about your lamps/luminaires? Why did you choose them and what do you like/dislike about them?
3. How does the daylight influence your lighting use?
4. What are the activities/occasions you change your lighting for, and in what ways?
5. In what situations would you not use a certain lamp?
6. If you have a preferred lighting, what is it? (Warm/cold, large/small…)
7. Have you noticed something different about the way this region uses lights in comparison to your own home country?
8. What do you consider good lighting/bad lighting?
9. What did you think of your student apartment’s lighting when you first arrived? How have you changed it?
10. What about candlelight?
11. And how many LEDs do you use? Conscious decision or not so much?
12. Any family traditions/habits you have in regard to lights?
Appendix B. Design Brief

- **Objective + goals:** To make a versatile light source the user interacts with to change the lighting. Made for a small apartment in mind, the light should suit the needs of the users, which have been define as creating a cozy atmosphere through small, warm light sources. This is to match the generally preferred type of lighting observed in Scandinavia. It is not to say all Scandinavians light their home like so, but to explore this cozy type of lighting. It will have to be multi-functional, to light the different tasks users do, such as relaxing, studying or having dinner.

- **Function:** The light will illuminate a part of a room, creating a nice glow of light. It will dim the lightbulb in a manual way. The light will be powered by electricity, using a standard plug. It should also be easy to pack up so users can put it away when they are moving homes.

- **Appearance:** The light should be simple in appearance, allowing it to blend in well to any space, and still stand out by itself. It will most likely be in simple black and white, depending on the materials of course.

- **Environment:** The product will be built for small apartments, so it can light up this space along with other lights. The product will also be built with sustainability in mind, both in terms of production, during its life use and in disposal.

- **Production cost:** This will ideally be kept to the lowest of costs.

- **Ergonomics:** The light should be easy to move around, easy to dim and position as the user chooses.

- **Materials:** These will be either metal or wood, as glass is too difficult to work with. Must be durable.

- **Assembly:** The product should be easy to assemble for the user, with a diagram if necessary.

- **Packaging:** Cardboard packaging to insure it can be recycled and the product is kept safe at the same time.

- **Quantity:** Only one will be made.

- **Installation:** Once again, should be very simple so the user can set it up by assembling parts together, and then just has to plug in the light.

- **Use:** The luminaire should be very easy to use and not require much effort from the user.

- **Maintenance:** The light must be easy to clean and easy to change the bulb.

- **Recycling/disposal:** The product should be as easy as possible to take apart to ensure the ease of recycling when the product needs to be disposed.

- **Safety:** Should conform to all safety standards, such as no sharp components or little parts that children could swallow.

- **Expected product size and weight:** Max 30x30x30cm. Maybe 500g

- **User:** Students who live in one-room apartments, where lights are already built in for the kitchen and bathroom. This leaves the student to light their main living area, for sleeping, eating and studying.

- **Time scale/deadline:** The product should be complete by the 13th of April
Appendix C. Interview on lamp design feedback

1. First impressions, what did you like/dislike?
2. How did you integrate it in your everyday context?
3. How did you use the versatile aspect of it? In what situations did you move the light shade?
4. What improvements would you make?
Appendix D. Reflection “Show & Possibilities”

When my thesis project started taking shape and a design for my lamp got more defined, I thought about how well it fits into student homes. My aim was for it to be simple enough so it could blend into most homes, while still being aesthetically pleasing by itself. My research had found most people use their lamps just for the light they give, without minding or considering the outside packaging. Because of this, I wanted to be sure my design could be pleasing to look at even when it isn't switched on. I also wanted to incorporate much of the theory I studied for the thesis, such as subjective well-being and social sustainability, but these don't come through when just looking at the lamp.

So when it came to the exhibition, I was glad to have tangible objects to exhibit for the audience. I felt I had two choices for how to best represent my project: create a makeshift student home in the gallery or let the pieces stand by themselves as they should be able to, and let the audience focus on just them. As much as I liked the idea of placing a desk/armchair/bed for my exhibit, it felt too ambitious in the context of an exhibition with 35 other students. This would mean my project would take up more room than others, which would be unfair to them considering my lamps are small. As well, capturing the essence of a student home is tricky as not much differentiates it from any other bedroom, except that it's everything in one room: kitchen/lounge/dining room, etc. One way around this would have been to set up a picture of rooms behind, maybe give the essence of it but if I was going to do it, I should do it properly. And so, I concluded my exhibit should be simple. The audience is given the chance to look at the two lamps in detail, interact with them and envision them in their own home.

My exhibit now consists of the two versions of my lamp, each on their own podiums. Placing one at a different height would insinuate one is less important than the other, whereas they are of equal value. The professional model shows how a nice, polished version of it looks while the DIY version is to demonstrate the way this lamp can be made at home and personalised by individuals. When playing around with the space I was given I had wanted to place them away from the wall, so as to create a “wall” in the exhibition. Doing this would mean the audience could look around the products, see them from all angles and appreciate them like so. However this was deemed too impractical as the audience would probably like to walk through the path I was blocking. I hadn't wanted my lamps by the wall because they didn't stand out well and felt they would be forgotten. To work with this new limitation, I
angled the podiums by 45° as a way of making them jut out of their space and get the audience to engage with them more than if they were parallel to the wall. I also hoped in doing this that the audience would feel invited to look at the products from all angles, as I had initially wished.

On the podiums themselves, I placed the lamps as well as their switches on the top, as an attempt to tell visitors they could switch them off and then move the shade which is a major component of my design. During the vernissage I was pleasantly surprised to see several people were switching the lights on and off, moving the shade and taking a closer look. It made me feel my exhibit was more successful than I had expected. The installation team had also placed me in this area as it was the darkest in the gallery, making it fitting for lamps. Of course the area was not really dark at all, but this was an advantage because the audience were able to look at the details of my lamp. They do miss out on seeing how the light dispersion changes with the rotating shade, but this would have required a much darker area. I had also initially expected our postcards to be beside our exhibit, thereby reducing the need for a poster explaining the project. This became evident very soon and I had to improvise with where they would go, placing them in the box itself. I can now hope the visitors will read the descriptions.

To improve my exhibit, I would add pictures on the wall of the lamp in different student homes, placed on desks, bedside tables or wherever they see fit. This would help the visitors to situate the lamp in its context, but once again it would be hard to convey this lamp was designed for one-room apartments. I hadn't expected my stand to look somewhat empty, but this happened too late to ask for a panel to be built for me. If I were to put posters up on the wall they wouldn't match with the rest of the exhibition, considering all students had a panel for their posters. Lastly, by adding posters I would show the template for the lamp to show it consists of two pieces that are easy to build and assemble. Though I could have had print outs of this template for the audience to take, many other materials are necessary to build the lamp, so I didn't want to promise audience members they could just make their lamp that very evening. My solution was to have a QR code but having no poster, there was nowhere logical to place it.

When starting this module, I think I got too caught up in exhibiting the lamps themselves and less with the theories and depth I had developed in the thesis module. I thought it would be too heavy for the audience to take it all in, but now I see I could have added some extra pieces to convey these concepts, for which I do regret keeping it so simple.