Critical Paper

ABD616

Comparing the Impact of Lighting on Student Performance:

Contrasting University and Home Study Settings

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Q14554411

Word Count - 4148

Table Of Figures:

Contents:

1. Aims & Objectives

The aim of this critical paper is to analyse how different types of lighting affect the productivity of students when studying at home, compared to when studying at university.

The secondary research will expand the existing knowledge on the various factors influencing a student's productivity levels in a space, including those relating to lighting design. This will be completed by:

- Investigating how the colour of lighting can impact a student's focus.
- How the types of lighting vary in public spaces compared to at home.
- The types of environments which improve student grades.
- Lighting design within other academic locations, such as offices and libraries.
- Investigating how the direction of lighting can impact productivity.
- The types of lighting emitted from various light sources.
- Other factors which may also impact focus levels in a space i.e. temperature.

Following this, the primary research will then be conducted through the methods of a field experiment, an online questionnaire and a focus group which should offer insight into:

- Comparing how natural and artificial light sources can affect the cognitive functions of students.
- Analysing how light intensity can affect student's productivity.
- Exploring the different types of lighting students tend to surround themselves with when studying at home.

2. Introduction

Interior designers of today create environments that are not only visually appealing but also address the functional needs of a space. Establishments such as offices and educational facilities share similar functional requirements, as they are both places where people need to maintain focus and productivity. Lighting, colours and a range of other factors all play a significant role in influencing human psychology, emotion, behaviour and performance therefore impacting cognitive functions like productivity levels (Gad, Kamer and Nour September 24, 2022). Lighting is especially important as it has a direct impact on energy levels, mood and concentration, making it a key element when designing a productive space.

So why is it important to pay close attention to the interior design of productive environments? One of the most expansive studies on this topic, conducted in 1984, found that *"more than 10,000 workers over a period of four years revealed that aesthetics, noise level, lighting, privacy and comfort all contribute to the level of job satisfaction and*

performance" (Brill, M 1984). This highlights the importance of lighting design in various interior spaces in order to fulfil the intended purpose of an environment. For instance, while homes are usually designed for relaxation, office spaces call for a more productive working environment, requiring different approaches to lighting design in order to achieve the desired psychological response.

This study will focus on investigating the productivity levels of university students when studying at home, compared to at university, analysing how different approaches to lighting design can affect productivity in these environments. University students are an important demographic to include in this research, as their productivity directly influences their academic success, and they often split their time between home and campus environments. The variables which will be compared in this paper are lighting intensity, the colour of lighting and natural vs artificial light sources. The research on this topic aims to further understand how lighting impacts not only the design of a space but also influences people's emotions and behaviour in response to it. After the research has been conducted, a better understanding of the impact and significance of lighting will be achieved and as such increase the collective knowledge of interior design.

3. **Chapter One-** Natural vs Artificial Light Sources

An article discussing lighting design and human psychology suggests that lighting is one of the most important services in every building, particularly commercial spaces. The article states that without adequate lighting design, people cannot carry out their intended tasks efficiently and comfortably (So, A.T.P, 1998). This source suggests that lighting dramatically affects the psychological response someone has to various lighting designs. Natural lighting is often portrayed as psychologically beneficial, meaning that productivity will theoretically be improved. For example, Karlen explains that "The integration of daylight with electric lighting plays a major role in achieving both productive and personally satisfying work environments." (Karlen et al. 2012). This study indicates that combining both natural and artificial lighting will create the most productive environments.

Similarly, a study by Feilding (2006) suggests that lighting requirements vary based on the type of task being completed within a space. For example, this article suggests that artificial lighting within a gymnasium can enhance performance as artificial lighting is easier to control than natural light, allowing distracting glares to be minimised. In contrast, within classroom settings, the same study also suggests that studying near a window is psychologically beneficial due to the fact that it is a natural human reflex to frequently look up from a task and refocus on an element in the distance as this is proven to act as a form of stretching for our eyes by changing the focal length of what we are looking at. People tend to look up and out of a window over any other subject subconsciously because we are

naturally drawn to the light and colour visible through a window (So and Leung 1998). This indicates that natural lighting is paramount when studying as it is mentally beneficial which boosts productivity levels.
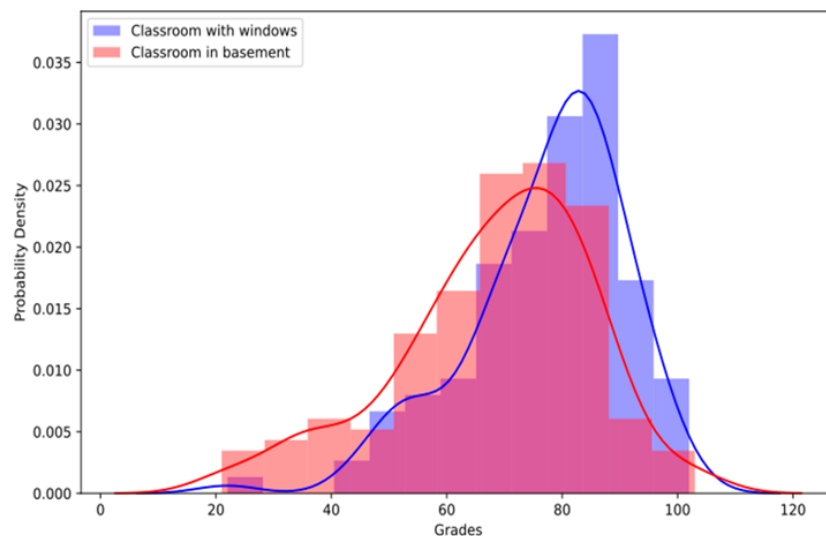
Figure 1: Graph showing the correlation between student grades and the amount of natural lighting within a classroom (Porras Álvarez 2020)

Another study supporting the theory that natural lighting leads to improved productivity within an educational establishment is this experiment involving 278 architecture students being taught a theoretical course running six times a week, over six years. Three of these years were taught in an underground classroom, relying solely on artificial lighting. Whereas, the other three years were taught in classrooms with plenty of natural lighting (Porras Álvarez 2020). Figure 1 indicates that the exam results of students working in a room with plenty of natural lighting were considerably higher than the results of those students working in the basement classroom relying only on artificial lighting. These results align with research stating that sunlight improves a person's physical and psychological health, through factors like the regulation of serotonin, melatonin and vitamin D levels, which improve mood and cognitive functions, contributing to productivity (Kent et al. 2009). Another study analysing the sleep quality and overall well-being of 27 office workers also suggests that "Office workers with more light exposure at the workplace tended to have longer sleep duration, better sleep quality, more physical activity and better quality of life compared to office workers with less light exposure" (Boubekri et al. 2014).

Collectively, these sources suggest there is a common theory that increased daylight exposure leads to enhanced psychological well-being, which in turn will boost productivity levels. This highlights the importance of including ample daylight sources in the design of office and educational establishments in order to enhance productivity and performance within the space.

4. **Chapter Two**- Lighting Intensity

There is a common perception that higher lighting intensities lead to enhanced productivity within a space. Recent research analysing the correlation between illuminance and emotional response has suggested that higher illumination levels are generally associated with more intense emotional responses, whereas lower illumination levels tend to provoke a calmer emotional state. Highlighting that higher illumination can lead to heightened alertness and improved performance (Mostafavi, Xu and Kalantari 2024).

Some studies also suggest that there is an optimal lux level range which creates the most productive studying conditions. For instance, a 2017 study investigating the ideal lighting conditions within an office space concluded that the optimal lux levels for an office environment were between 300-500 lux. Additionally, it was also indicated that 30 minutes of exposure to bright daylight near a window between 1000- 4000 lux is "almost as effective as a short nap in reducing normal post-lunchtime drowsiness in healthy subjects" (Vieira Dias et al. 2017).
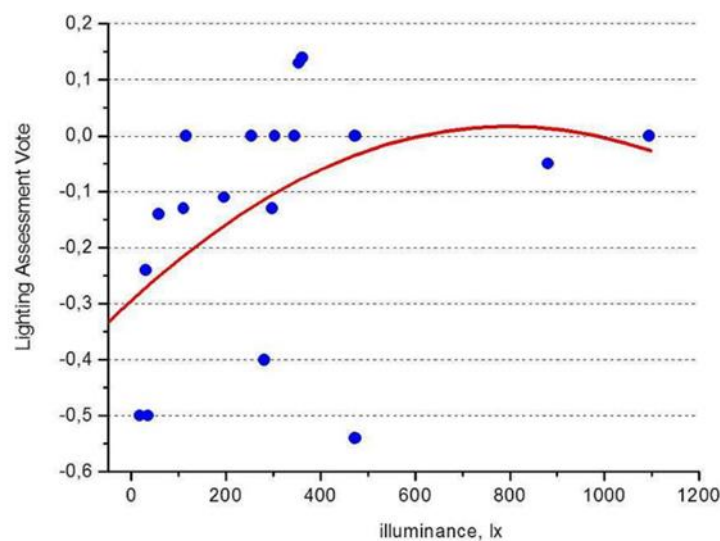
Figure 2: Graph presenting the correlation between illuminance and lighting assessment votes (Krawczyk and Dębska 2022)

Another study carried out within 18 teaching rooms in Poland, involving over two hundred volunteers reported that 74% of participants felt that their productivity levels were normal in the rooms where the lighting conditions stayed the same. However, figure 2 shows that the participants favoured working in rooms where lighting intensity was over 200 lux with the majority of people being most satisfied when the lighting conditions were between 200- 400 lux. The experiment also discovered that "participants of the study in rooms below 200 lux did not feel satisfied" (Krawczyk and Dębska 2022). This study supports the theory that higher lighting intensities do tend to create more comfortable working conditions, therefore

suggesting that people will work more productively in the space. However, the article also indicates that there is an optimal range, as it found that fewer individuals perceive working in conditions above 400 lux to be ideal.

Overall, these findings indicate that lighting intensity plays a crucial role in supporting productivity within study environments. While increased lighting intensities generally promote improved alertness and performance, there seems to be an optimal range which creates the most effective studying conditions which some sources have said to be between 200-400 lux whereas other studies indicated that this range is between 300-500 lux. This information suggests that designing spaces with adjustable lighting within this ideal intensity range is essential for maximising productivity within educational and office environments.

5. **Chapter Three**- Coloured Lighting

Many studies indicate that colours can have a substantial impact on a person's mood and emotions, triggering different psychological responses. Calm and relaxed emotions are suggested to lead to enhanced productivity levels, whereas emotions like nervousness and irritation are likely to make an individual less productive. For instance, a psychological journal found that participants who received a red participant number, rather than green or black numbers, performed 20% worse on tests (Cameron Chapman 2022).
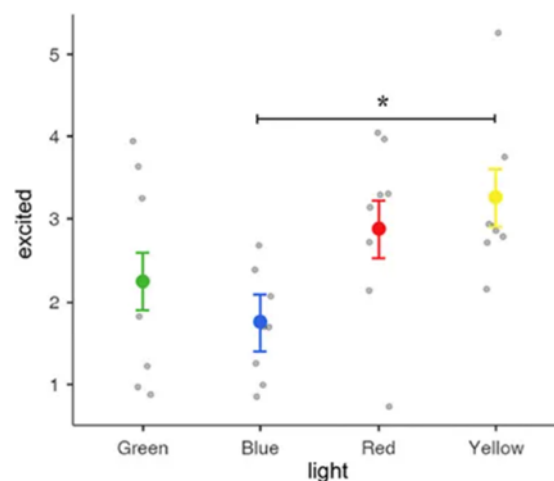
Figure 3: Graph presenting the correlation between excitement levels and various coloured lighting (Xing, Jun and Hai Fang 2022)

Another source states that blue is the ultimate calming colour, perfect for a space that requires focused work like offices and educational establishments and that yellow is known to spark creativity, perfect for design-focused work (Mahon 2023). A supporting study measured the influence of colour on college students in different settings and determined

that red excited and aroused the students, while cool colours like blues and green relaxed them, supporting Mahon's theory (Sevinc and Kelechi Kingsley 2014). Another recent study compares individual's responses to observing objects in a coloured, illuminated space, compared to white and natural light sources. The study discovered that red light elevated feelings of irritation and nervousness while blue light led to calm and relaxed responses. Green light on the other hand, was found to reduce the feeling of pleasure and yellow light reduced irritated feelings (Xing, Jun and Hai Fang 2022). The study concluded that coloured light may contribute to changes in cognitive responses, supporting the theory that cooler tones create a calming atmosphere, as you can see in figure 3, where blue and green tones provoke less excitement than red and yellow. These results also support Mahon's theory that blue tones are best suited to academic study environments whereas yellow sparks excitement and creativity.

However, a contrasting article analysing the preference between different coloured office spaces argues that colour has little influence over how someone feels in a space. This study is looking to investigate the effects of blue and red coloured rooms by examining which space participants prefer. Out of 100 participants, 17 people stated that they preferred the blue room, whereas 12 people stated they preferred the red space, with a further 55 people stating that they felt like the colour had no impact, as shown in figure 4. This conflicts with previous findings which argue blue should be the preferred colour in an academic working environment.

Colour	Favourite colour (%)	General colour meeting room preference (%)
Blue	39	8
Red	15	14
White	0	36
Various colours	23	17
Doesn't matter	21	23
Missing	2	2
Total	100	100

	Preferred test room (%)
Blue room	17
Red room	12
Reference room	16
Does not matter	55
Total	100

Figure 4: Table analysing participants' preferred colour compared to the colour of preferred test rooms (Sevinc and Kelechi Kingsley 2014)

To conclude, this research suggests that natural lighting is paramount when studying as it is proven psychologically beneficial. At the same time, some researchers believe that creating an atmosphere with both natural and artificial lighting creates the most productive studying environment. This finding will be challenged throughout this paper through various research

methods. Another finding of this research is that, in general, higher lighting intensities tend to encourage a more productive environment, with some sources suggesting a range between 200-400 lux is optimal and others suggesting a range of 300-500 lux will create the most productive environment. This paper will expand this research by experimenting to find a more specific lighting intensity range. It is also suggested through this research that coloured lighting conditions may also have an impact on student psychology. This paper will explore this theory through a research method which will highlight the link between coloured lighting and human psychological responses.

6. Questionnaire Analysis

As part of this critical paper, primary research was conducted to investigate whether new findings will align with or challenge existing theories relating to the impact of lighting applications on student productivity. The first method carried out was an online questionnaire, completed by current and former university students from a range of courses and institutions. This questionnaire received a total of 67 responses, with 88% of participants stating that the interior design of a space does influence their productivity when studying. Following this, participants were asked to identify which design factor they felt affected the productivity of a space the most. The most common response, mentioned 28 times, was lighting application, followed by an open-plan and tidy working environment. These findings suggest that the majority of people consider lighting design a main factor influencing productivity, highlighting the importance of adequate lighting design to designers of productive environments.
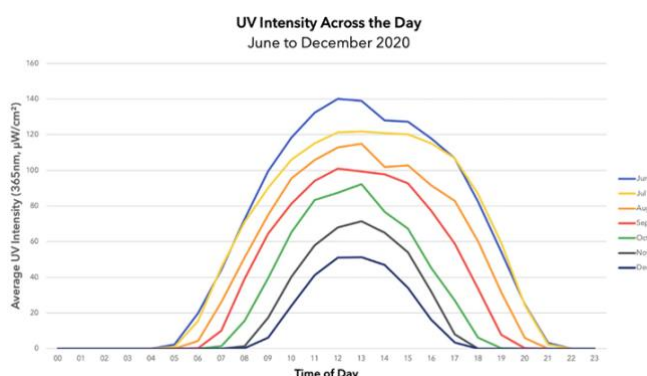
A. Natural Lighting

Figure 6: Graph indicating the average UV intensity at different times of day (Ian Leake 2020)
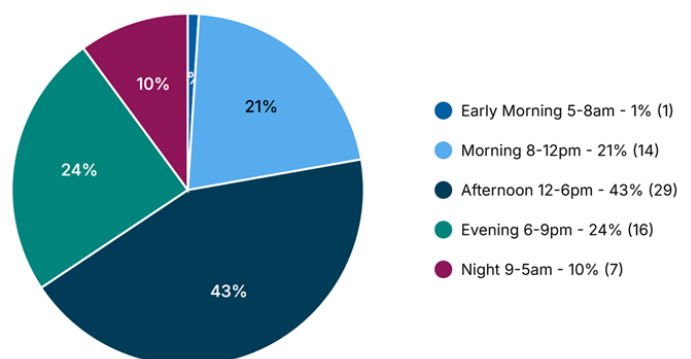
Figure 5: Graph presenting participants preferred time of day to study. Questionnaire analysis

When asked what time of day participants felt most productive, 43% of respondents reported feeling most productive between the hours of 12-6 pm, while 21% stated that they are most productive between 8-12 pm, as seen in figure 5. UV intensity is highest between the hours of 9 am- 6 pm, as shown in figure 6. Altogether, 64% of participants reported feeling most productive within this timeframe where the UV intensity is at its highest. This suggests that natural lighting positively impacts the cognitive functions of university students, as natural light appears to boost productivity results. This aligns with previous studies reviewed in this paper.

Figure 7: Imagery presented to participants, identifying various lighting applications. Questionnaire analysis.
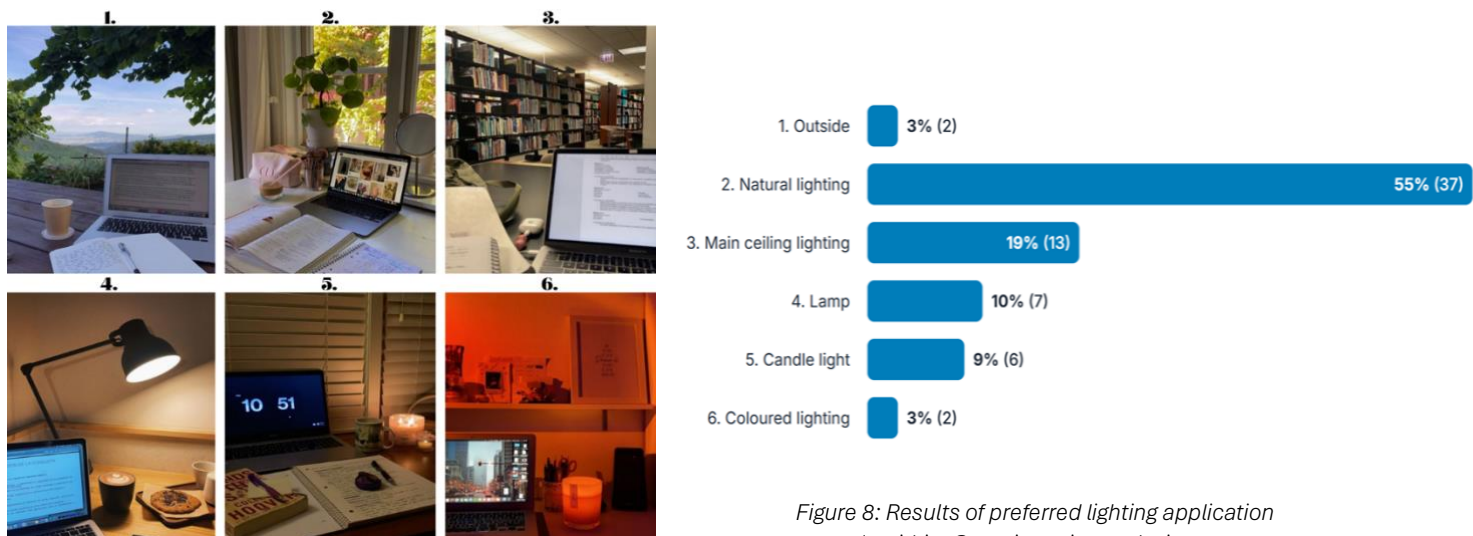
Figure 8: Results of preferred lighting application to study within. Questionnaire analysis.

Throughout this questionnaire, participants were presented with images of study environments featuring varied lighting applications and were asked to select which location they believed they would study most productively, as seen in figure 7. Option two, natural lighting, was the most preferred environment with 37 respondents selecting this. However, the least favoured environments were tied between coloured lighting and studying outdoors, with only two respondents selecting each option, as shown in figure 8. The result of only two students favouring studying outdoors is intriguing, considering that both options one and two rely solely on natural lighting. This indicates that while 55% of students recorded favouring studying in natural lighting, additional factors such as temperature and weather conditions may also influence how productively students study in an environment. These are aspects which are not often considered in studies investigating the correlation between lighting design and cognitive functions. Overall, these findings suggest that natural lighting creates the preferred study environment for the majority of students. Although, they also suggest that other factors need to be considered when designing a productive space.
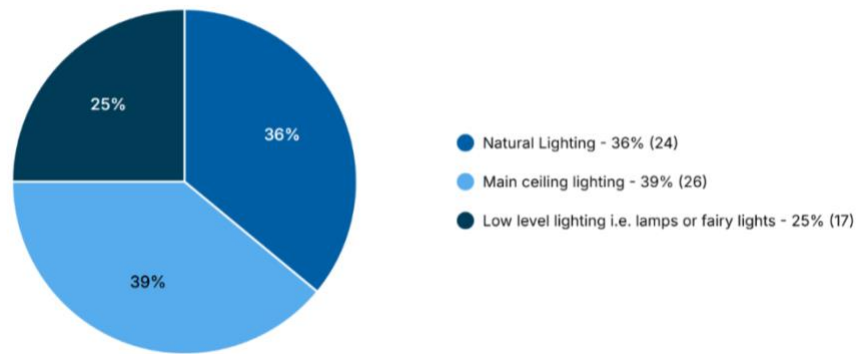
Figure 9: Graph presenting participants preferred lighting application to study within. Questionnaire analysis.

B. Lighting Intensity

A previous study by Karlen suggests that the most satisfying work environments are created by combining natural and artificial lighting applications. This theory is supported by the results shown in figure 8 where the two most favoured studying conditions were natural lighting, followed by main ceiling lighting. Similar results were also recorded when participants were asked which form of lighting they studied within their home environments. As you can see from figure 9, 39% of students stated that they studied using main ceiling lighting, 36% studied in natural light, while only 25% of students reported studying in low-level lighting. Natural lighting and main ceiling lighting typically produce the highest lux readings out of the options provided. A total of 75% of students reported studying in these conditions within their home environments. This suggests that higher-intensity lighting design leads to an improved psychological response, therefore benefiting student productivity. This aligns with previous study findings referenced throughout this paper.

C. Coloured lighting

Figure 10: Chart presenting the number of participants who had previously studied in coloured lighting conditions. Questionnaire analysis.

When asked if participants had previously studied in coloured lighting conditions, only 15% of students reported that they had, as seen in figure 10. These participants were then asked to describe the colour of light they studied in and how this affected their productivity. The students who had previously studied in blue light noted that this negatively affected their productivity, with one stating that the blue tones gave them a headache. Another expressed that blue light made them feel distracted and less productive than usual.

Other students reported studying in warmer-toned coloured light, like red and pink tones. The participants who had studied in red lighting found that this made them feel more alert and productive. This challenges an existing theory by Mahon which states that red lighting increases feelings of excitement and nervousness, previously discussed throughout this paper. Whereas, one student reported that pink lighting made the space feel cosy, allowing them to close off from distractions and focus solely on their studies. The results of this suggest that warm-toned lighting had the effect of increasing productivity levels for most participants, while cool-toned lighting negatively affected student productivity.

7. Focus Group Analysis

A focus group has been conducted as part of this study. During this, a group of design students were first asked which environment they typically choose to study in. Two of the participants stated that they feel most productive studying at home throughout the day next to a window with plenty of natural light, while the other participant stated that they typically study within the university library, mostly relying on main ceiling lighting. Following this, the participants were then exposed to different coloured lighting conditions and asked how each form of lighting made them feel.
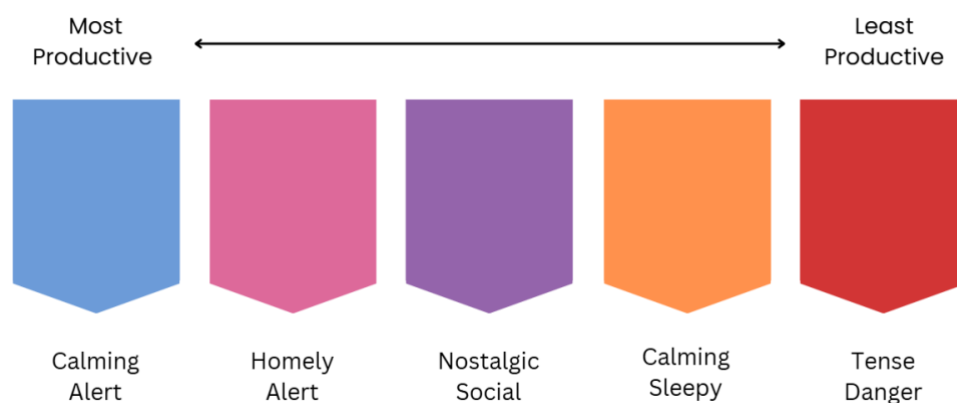
Figure 11: Focus group results. Participants identified the scale of how productive various coloured lighting applications are

Figure 11 shows how the participants ranked each coloured environment and the words they used to describe how the atmosphere made them feel. From this, it can be seen that red was agreed to create the least productive environment for the participants. The red lighting was described as being intense by the participants, provoking a sense of anxiousness, suggesting that red lighting creates a less productive environment for students to study in. On the other hand, blue lighting was agreed by the participants to create a calming atmosphere and provoke a feeling of alertness. One participant suggested that they preferred blue lighting compared to the other colours presented to them as blue is a colour which can be seen in nature through the sky, reminding them of looking out of a window, which provokes a sense of calmness. All participants agreed that this is the atmosphere in which they would feel most comfortable within, leading to improved productivity overall.

8. Case Study Analysis

A case study has been conducted throughout this research to identify which conditions students feel most productive in. This case study focuses on analysing the effects of natural lighting and lighting intensity variables, comparing home and university settings. During this, the students studied in each condition for a one-hour period and then recorded how productive they felt studying in that environment on a scale of one to five, one being the least productive and five being the most productive.

Home Study Environments	University Environment	Participant List-
Condition 1-	**Condition 3-**	**Participant A-**
• Research conducted between 1-2 pm. Lots of natural light. • Participants studying at a desk next to a window.	• Research conducted between 1-2 pm. Lots of natural light. • Participants studying at a table in a room with large windows.	Third year Interior Design and Decoration student at Solent University.
Condition 2-	**Condition 4-**	**Participant B-** Third year Interior Design and Decoration student at Solent University.
• Research conducted between 5-6 pm. No natural light. • Participants studying at a desk using main ceiling lighting.	• Research conducted between 1-2 pm with blinds shut. Minimal natural light. • Participants studying at a table using main ceiling lighting.	**Participant C-** Third year Makeup and Hair Design student at Solent University.

Figure 12: Table identifying the various conditions in which the participants studied and the participant list. Case study analysis.

	Condition 1		Condition 2		Condition 3		Condition 4	
	Average Reading (Lux)	Score (1-5)	Average Reading (Lux)	Score (1-5)	Average Reading (Lux)	Score (1-5)	Average Reading (Lux)	Score (1-5)
Participant A	485	4	278	4	390	4	100	2
Participant B	345	5	330	3	390	4	100	2
Participant C	370	5	250	3	390	5	100	3
Average	318	4.6	286	3.3	390	4.3	100	2.3

Figure 13: Table identifying the results of the case study- presenting the lighting intensity readings and participant scores

A. Natural Lighting

Throughout this case study, there was one condition with high exposure to natural light and one with limited exposure in both University and at home study environments. Condition 1 was conducted within a home environment where the students were studying at a desk next to a window with high exposure to natural light. The students studied between 1-2 pm, where daylighting is optimal. As shown in figure 13, two out of the three students felt most productive in this setting and recorded a score of 5, while the other student recorded a score of 4, resulting in an average score of 4.6. This was the highest ranking out of the four conditions analysed throughout this study. The second highest ranking condition recorded was condition three which received an average score of 4.3. This condition was performed within a university study environment, also with high exposure to natural lighting. Conditions two and four had minimal- no exposure to natural lighting and received the two lowest average scores out of the four conditions. This suggests that natural lighting has a dramatic impact on how productive a student studies within an environment, aligning with previous studies by Porras which also indicated that the integration of natural lighting within educational establishments leads to improved student productivity.

B. Lighting Intensity
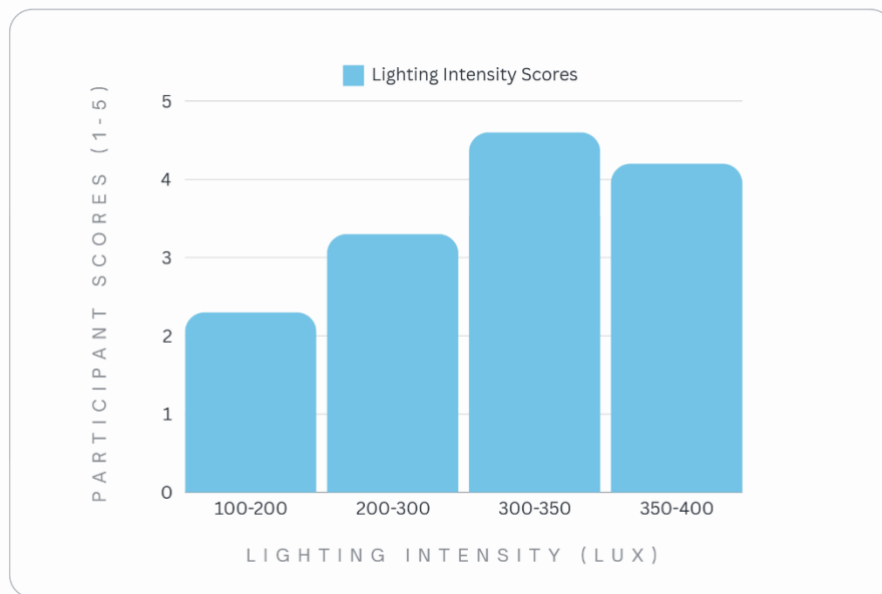
Figure 14: Chart analysing the preferred lighting intensity range based on participant scores. Case study analysis.

The purpose of this section of the case study is to identify what the optimal lighting intensity range is to enhance student performance. A photometer has been used to record an average lux level within each condition. As shown in figure 14, the results reveal that the least favoured intensity range is 100-200 lux, with an average score of 2.3. This was followed by the 200-300 range with an average score of 3.3.

The most favoured range was 300-350 lux with a score of 4.6 out of 5. This finding aligns with a previous study by Krawczyk and Dębska which suggests that the ideal range for enhancing student performance is between 200-400 lux. However, figure 14 indicates that there is a slight dip in satisfaction for the 350-400 lux range, with an average score of 4.3. These results suggest that the specific optimal lighting intensity range for enhancing student performance lies within the 300-350 lux range.

9. Conclusion

One of the main considerations when designing a productive environment is lighting application. This paper has explored the connection between student productivity and lighting design through a range of research methods. The primary and secondary research conducted throughout this paper suggests that there is clear evidence highlighting the link between lighting design and productivity levels within educational establishments. This suggests that the designer's role in creating a space which enhances cognitive functions, leading to a heightened productive response, is paramount to achieving a successfully productive space, which in turn leads to improved overall performance of that establishment.

The first subject this paper has researched is the effect natural lighting has on human psychology and the cognitive response this triggers. Many previous studies have indicated a correlation between natural lighting a performance. The findings of this paper align with previous research. The questionnaire results indicated that the majority of students choose to study in a naturally illuminated environment, next to a window at a time of day when the UV intensity is at its highest, in order to achieve a productive environment. Whereas the case study experiment concluded that the environments with the most natural lighting received the highest average scores among the participants, suggesting that increased natural lighting and accessible windows with a view lead to enhanced student productivity.

Another factor analysed throughout this study is how lighting intensity affects how productive students study within a space. Previous studies have suggested that a range of 200-500 lux is key to obtaining a productive environment. This study has conducted further research on this topic to find a more specific range in which students feel most productive when studying. The results of this research concluded that the optimal range to create the most productive study environment is between 300-350 lux. This suggests that educational establishments should introduce flexible lighting systems which allow the lighting intensity to be adjusted depending on the student's preferences. This change would positively affect student performance and result in improved results overall.

While coloured lighting application is not typically utilised within educational establishments, many previous studies have indicated that coloured light can trigger a positive psychological response which could improve student productivity. During this research, a focus group experiment has been conducted to establish what psychological response is triggered by each coloured lighting application and whether or not this creates a productive environment. Overall, the results of this experiment indicated that blue and pink lighting creates a calming and alert atmosphere which the participants felt would create the most productive studying environment. While red lighting created a tense atmosphere participants noted that they would not feel comfortable studying within. This

research suggests that the integration of coloured lighting applications may be beneficial for some students within educational establishments. Introducing adjustable coloured lighting design within study pods would allow students to select the exact atmosphere they feel most comfortable within which would in turn improve productivity and results. These results may also indicate a rebrand for some universities as a red-toned atmosphere created a tense and unproductive environment. This suggests that more universities should introduce blue colours within their interiors, instead of red, in order to promote a positive psychological response, which in turn boosts student productivity.

Overall, the results from this study suggest that universities across the country need to adapt their lighting applications in order to create and sustain a productive environment. This research suggests that integrating flexible lighting design within universities would allow students to tailor lighting to create an atmosphere in which they feel most productive. The integration of study pods with flexible lighting would be particularly beneficial within universities as this allows students to study in a space adjusted to their personal preference which they study best in. It is clear that the lighting application of a space does in fact have an impact on a students psychological response, affecting their mood and productivity. This in turn affects how well students study and how successful they are with their studies, highlighting the importance of carefully considered lighting design within productive environments as this is paramount to achieving academic success amongst university students.

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11.   Appendix

Primary Methodologies:

Case Study-

- Conducted with three third-year design students
- Four conditions were analysed
- Participants studied for a one-hour period in each condition
- Participants were all conducting laptop written work within this timeframe
- Light measured with a photometer
- Readings taken before, during and after the one-hour period analysed in each condition. An average reading was then calculated for each condition.
- Following the one-hour period participants scored how productive they felt while studying in each condition.
- An average participant score was then calculated, allowing the results from each condition to be compared.

Focus Group-

- Carried out with a group of five third-year university students.
- Participants were first asked which environment they typically choose to study in to understand how coloured lighting may affect this.
- A range of five different coloured lighting conditions were created within a room.
- Participants were asked how the colour made them feel and if they felt as if they could work productively in each condition.
- An order was then created collectively, placing each coloured lighting on a scale from least to most productive environments.

Questionnaire-

- Created using Jisc
- Distributed to a range of past and present university students throughout England.
- Students were from a range of universities and courses.
- Background questions were asked first to determine how different forms of study may affect how students study.

- A range of questions were then asked regarding various lighting applications and atmospheres to gauge where and how students tend to study
- Participants were then shown a range of different lighting conditions and asked which environment they would feel most productive studying within.
- The questionnaire received a total of 67 responses.
- Responses were then categorised and analysed in order to find which lighting applications and environments were favoured by participants.

Ethical clearance for research and innovation projects

Project status

Status

⬤⬤🟢 Approved

Actions

Date	Who	Action	Comments
09:19:00 22 March 2024	Alan Manley	Supervisor approved	
15:15:00 21 March 2024	Maia Rogers	Principal investigator submitted	

Get Help

Ethics release checklist (ERC)

Project details

Project name: Focus group- Comparing the Impact of Lighting on Student Performance: Contrasting University and Home Study Settings

Principal investigator: Maia Rogers

Faculty: Department of Art and Music

Level: Undergraduate

Course: Interior Design and Decoration

Unit code: ADB508

Supervisor name: Alan Manley

Other investigators:

Ethical clearance for research and innovation projects

Project status

Status
⚪⚪🟢 Approved

Actions

Date	Who	Action	Comments
09:19:00 22 March 2024	Alan Manley	Supervisor approved	
15:17:00 21 March 2024	Maia Rogers	Principal investigator submitted	

Get Help

Ethics release checklist (ERC)

Project details

Project name: Online questionnaire- Comparing the Impact of Lighting on Student Performance: Contrasting University and Home Study Settings

Principal investigator: Maia Rogers

Faculty: Department of Art and Music

Level: Undergraduate

Course: Interior Design and Decoration

Unit code: ADB508

Supervisor name: Alan Manley

Other investigators:

Ethical clearance for research and innovation projects

Project status

Status

● ● 🟢 Approved

Actions

Date	Who	Action	Comments
09:18:00 22 March 2024	Alan Manley	Supervisor approved	
15:13:00 21 March 2024	Maia Rogers	Principal investigator submitted	

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Project name: Field experiment- Comparing the Impact of Lighting on Student Performance: Contrasting University and Home Study Settings

Principal investigator: Maia Rogers

Faculty: Department of Art and Music ▼

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Course: Interior Design and Decoration

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Supervisor name: Alan Manley

Other investigators:

Comparing the Impact of Lighting on Student Performance: Contrasting University and Home Study Settings

1. What is your gender?   Responses: 67

Male	22% (15)
Female	75% (50)
Other	3% (2)

2. What year did you start University?   Responses: 67

2022

2022

2022

2022

2022

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2015

2024

2022

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2020

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1992

2022

1996

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2019

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2023

2022

3. What stage of University are you in?   Responses: 67

Year 1	12% (8)
Year 2	30% (20)
Year 3	42% (28)
Graduate	16% (11)

4. What course are you studying?   Responses: 67

Interior design decoration

Interior Design Decoration

Interior design

Interior Design Decoration

Makeup and hair design

Makeup and Hair Design

IDD

MSC Digital Marketing

Digital marketing

Primary Education

Psychology

Primary teaching with QTS

Primary Teaching with QTS

Primary Teaching

PE Teaching

Fashion Design

Interior design and decoration

Fashion Design

Medicine

Medicine

Accountancy

Law

Media Foundation

Primary education

Communications and media

History

Business management with marketing

BEDHons

PGCE

Business management

PE and sports coaching

Interior design decoration

Fashion Marketing

Law

Sociology

law

Media and communications

criminology

Criminology

Criminology

Fine art

Fine art

Fine Art

Fine art

Fashion Design

interior design

Interior design

Football studies

Business managment

Business management with marketing

Counselling and mental health

Business management with marketing

Education

Education

Education

Biomedical Science

Football studies

Business management with marketing

Marine Biology

BA Fine Art

Sport and exercise science

BA Fine Arts

Film and Tv

Interior Design Decoration

Sport and exercise science

Psychology with Counselling and Mental Health

Football Studies

5. Where do you live during term time at University?

Responses: 67

At Home	28% (19)
Student Halls	9% (6)
Student Housing	57% (38)
Private Accommodation	6% (4)

6. On a scale of 1- 5 how happy are you with your current working environment?

Responses: 67

1- Very Happy	12% (8)
2- Happy	69% (46)
3- Neither happy or unhappy	13% (9)

4- Unhappy	3% (2)
5- Very unhappy	3% (2)

7. Please briefly describe where you study

Responses: 67

My desk in my room

Desk in my bedroom

Classroom with 30+students and at home.

My bedroom or sofa in lounge

Lounge or my bed

In a six bed house

I mostly work in the lounge as there is more light from windows and I can move around more / look at different things (tv, friend, food)

Generally at the library or SOLEN

Solent university

University library

in my room at my desk

I usually study at the university library but may sometimes study at home at my desk.

University library or cafe

library or at home

Chichester

In the library

Solent university, the library, at home and in cafes

studio spaces

At my desk in my room or in the library on campus.

Hospital library, occasionally at my desk in my room.

Accounts

Winchester University

Mainly at my desk at home

Brighton uni

Bournemouth university

Bedroom

Solent

Students halls - desk in room

In my bedroom at home with dim lighting on. Or at the university library study rooms

At home at my desk

I am now teaching following the conclusion of my studies

Normally at a desk near natural lighting

At home or in library

library/desk at home/cafe

Library study space

.

I tend to study in my own space, I get distracted if I go to the library at uni

i study in my room

In my bedroom, at my desk

In my bedroom

Art studio

Art studios

In the studio area

In the building next to the library

library and classrooms

At home at my desk

At university

Library

At uni

At solent uni and at home

I normally study in the library

In the library

Either at home or in the library

In the spark, at home or the library

At uni

at home in my room or at the uni library

In lesson, Library, and at home

At university, primarily the library or at home

At home and at the library

Studio space

In the library, at home and in coffee shops

Wherever I feel like it

At home in the front room. someone aways has the tv on. Icant do it in my room because it is too small and i dont have a desk

Library

At the university

the librar/ in my kitchen (never in my room as i get distracted)

Library and home

8. Where do you usually choose to study?   Responses: 67

At Home	46% (31)
University	49% (33)
Other	4% (3)

9. If other, please specify where you choose to study.   Responses: 6

or a coffee shop

Student room in halls in own bedroom

Bit of both

In my room or living room. Do study at Uni too though

The library in the basement

Both

10. On a scale of 1-5 how much do you agree that the interior design of a space affects how productive you are when studying?   Responses: 67

1- Definitely	52% (35)
2- A little bit	36% (24)
3- Not sure	6% (4)
4- Slightly	6% (4)

5- Not at all	0% (0)

11. If yes, please briefly explain what design factors affect how well you study.   Responses: 53

The size of the desk and where it is positioned in the room (if it's near the window)

Hugely impacts mood and physical responses

The lighting and furniture pieces

Cozy lighting and comfy seating

I think if you make your environment more interesting or better colours that connect with emotions (colour psychology) then it makes you feel more motivated

Fresh air (windows), noise (quiet), comfort (sofa, chair)

Table height

if it's too dark i'll get too tired

I feel if the space is cluttered and full of different colours it becomes distracting and almost overstimulating

desk space, charging ports

light and colours play a big part on how focused I am during studying. e.g: if there is too much/ too little light/colour it makes it hard to focus.

The room needs to be bright and have good air conditioning - there's nothing worse than when studying I get a headache because the environment is wrong - sometimes when in solent library they have big red walls that I personally hate

spacing of tables

Lighting- if it is too light/dark it's hard to focus. Access to windows and natural lights help me study effectively. Nice modern design with neutral colours creates a nice environment to study in.

open space with lots of windows, bright lighting, large workspace

Somewhere with good lighting, spaced out room, so I don't feel enclosed.

The rooms were modern and not too bright or too dull to distract me. Lots of natural light.

distraction from being to noisy / bright, sensory overload

Effects how distracted you get

The lighting of the room and how large the space is

Layout, tidiness and organisation of the room makes me feel more relaxed.

Lighting, seating, brightness of surroundings

In student halls or university, if the desk is too high or the board is in a weird place or the lighting is too bright and in your face it can make it uncomfortable to study

The layout of the environment- strength of lights and things that can easily distract me are ways in which design factors affect my focus. A cluttered space or something that looks and feels stuffy and tight will reduce my levels of work.

Natural lighting defiantly helps me to focus I tend to struggle as it gets darker in the colder months

Not a busy design, very minimal so less distraction

needs to be cosy and comfortable

Somewhere with lots of space, clean and bright

it is very bright, which is good as it keeps me awake for longer

If there's a lot going on in a space I get distracted, so when I'm home I'll sit at my desk which is quite minimal

i need a clean room and a cosy space to work properly

lighting, busy decoration on walls can be distracting, comfortable seating

Tidy space, I find mess distracting

Personal studio space

Bright rooms help to see work better and to concentrate

Amount if noise and separate rooms

Big space to put my stuff up

seating and lighting

lighting, noise level, comfort of materials

A nice design can make me feel more relaxed

No distractions like TV and bright light

Maybe how cosy it feels and how many resources are available. Need lots of computers. It should feel a little cosy so I don't mind spending majority of my day there studying

I like a clear and organised study space.

Good lighting, some noise but not too much. Airy space - the right temperature.

The lighting. Temperature, comfort, colour/aesthetic (too bright a colour may be overwhelming)

if i'm working in a messy environment i can't focus as well. lighting also affects my productivity as if the lighting is more moody and not fluorescent lights that hurt my eyes after a while i can focus much better :)

It's the feeling gained from being in a specific area. At home I feel and am less productive than I am at university due to the fact I am in a productive environment

Tiny Studios with little to no resources

An open area with enough lighting.

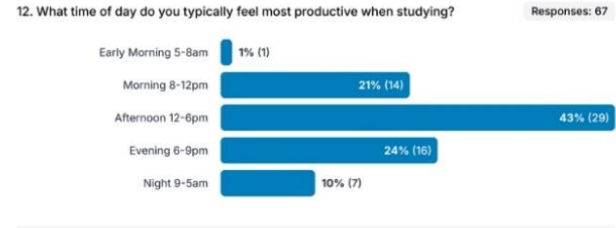When there are plants around I feel calmer. It has to be a real plant though

Consistent lighting that doesnt buzz and flicker. Same for any sounds. Its ok if the air con or the pipes are audible but they should be consistent. Also there should be alot of plug sockets. And corners/ nooks to hide in

I work better in a space that has less distractions and cosy interior

If there's too distracting can put me off

12. What time of day do you typically feel most productive when studying?   Responses: 67

- Early Morning 5-8am — 1% (1)
- Morning 8-12pm — 21% (14)
- Afternoon 12-6pm — 43% (29)
- Evening 6-9pm — 24% (16)
- Night 9-5am — 10% (7)

13. Which type of lighting from the options below do you feel most productive studying in?   Responses: 67

- 1. Outside — 3% (2)
- 2. Natural lighting — 55% (37)
- 3. Main ceiling lighting — 19% (13)
- 4. Lamp — 10% (7)
- 5. Candle light — 9% (6)
- 6. Coloured lighting — 3% (2)

14. Have you ever studied in coloured lighting conditions? i.e. blue/green/red lights   Responses: 67

- Yes — 15% (10)
- No — 82% (55)
- Unsure — 3% (2)
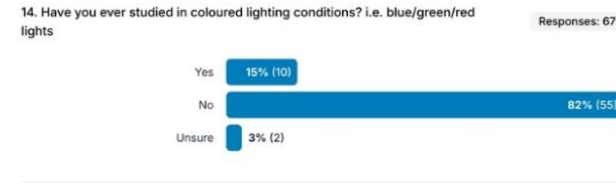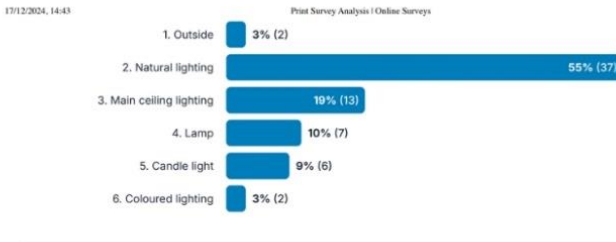
15. If yes, please specify which colour of lighting you studied in and how this affected your productivity levels.   Responses: 9

Blue lighting, made me feel less productive as it was too dark and so didn't help me concentrate. It's quite distracting have a coloured light

Blue, better

Mixed/rainbow colours and it made my room feel more comfortable with it being darker and more relaxing
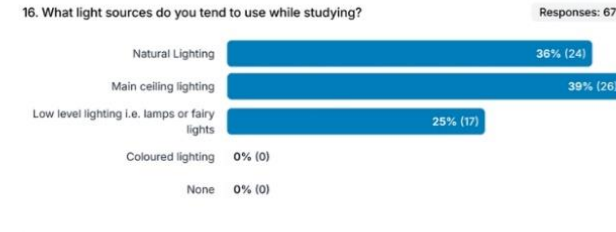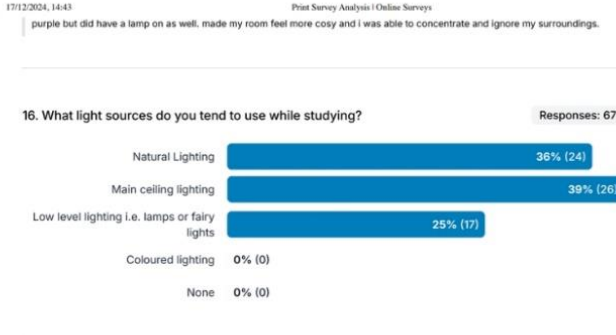
Red and blue

blue, does give me a headache

During my first year of uni I'd use my multi light lamp and turn it to the pink setting, I felt that it made my room more cosy and I could shut other things out and focus on my work

sunset lamp feels more homely, can work harder

Red and very

purple but did have a lamp on as well. made my room feel more cosy and i was able to concentrate and ignore my surroundings.

16. What light sources do you tend to use while studying?   Responses: 67

- Natural Lighting — 36% (24)
- Main ceiling lighting — 39% (26)
- Low level lighting i.e. lamps or fairy lights — 25% (17)
- Coloured lighting — 0% (0)
- None — 0% (0)

17. What other factors do you feel affect your productivity levels while studying?   Responses: 67

- Noise — 67% (45)
- Temperature — 12% (8)
- Weather — 3% (2)
- Company — 18% (12)
- Other — 0% (0)
- None — 0% (0)

18. Please specify which factor(s) affects your productivity and briefly explain how they influence your productivity levels while studying.   Responses: 67

Noise because when I'm trying to really concentrate on something and company as I get easily distracted

Noise makes me distracted and I can't work

Noise- struggle to concentrate unless it is quiet.

If there is too much noise it is distracting

Being with a friend makes me more productive

All of the above to be honest, most of them act as a distraction and can throw you off when trying to concentrate

Noise - i get distracted easily Lighting - it needs to be bright but not clinical Confort - i can work for longer if i am confortable

Dunno

I feel the most motivated when surrounded by other people who are studying

Noise, movement around me. Distractions that all interrupt my flow

if it's too loud then i struggle to concentrate on what i'm reading and loose focus quickly

If I'm with other people it can affect my productivity levels as I collaborate with people rather than working by myself

noise - if it is too noisy i can't focus. I am more productive when i am with my friends even if we are not talking.

get distracted when people talking to me

Noise levels. Need silence when I'm studying

If there is too much noise I tend to lose focus.

Company - if I'm studying with freinds that won't stop talking, I don't get anything done. Temperature- if I'm too hot or cold I'm thinking about that wether than my work. Noise - I can work well with any noise around me (unless it's talking at me)

too much or too little noise is distracting

Noise- if it is too loud I cannot focus. If it is too cold/hot I also cannot focus.

being around other people, or with friends when we're both working makes me more productive. Low level noise also allows me to be more productive over being in silence.

Noise = Distractions

Noise - studying in peace is usually good or sometimes the background noise of music, but it has to be on my terms. Temperature is the same as I don't want to be freeezing cold whilst studying.

when it's too hot

If an environment is too noisy I struggle to concentrate, where as if it is quiet I can focus

Who I'm with - their concentration levels

Noise distracting

Too hot in a room badly affects it

Noise, mess, feeling comfortable

Temperature - if I'm too hot I don't focus and if I'm too cold I can't focus. The weather can fully distract and change my mood when studying

Noise and tempurature can make studying too distracting and uncomfortable to study

Noise and company are the main 2 factors as I struggle to retain attention on tasks. Lights also affect my productivity if the light is too bright or too direct I find it throws me off task and can even cause headaches that affect my focus.

If i am in a noisy environment and I'm doing something that I need to get done or need to focus better I get very distracted by loud noises

Areas that are too loud I find are hard to concentrate in

i can't get anything done with other people cos i just chat ahaha

Noise is a big factor as I choose to study in more communal libraries that don't require silence as I like background noise

company can help as it means i have a break and do not go on my phone as much. my phone does not help me so i try to leave it away. the time of day affects as in the day i am more productive but i tend to study at night as it brings urgency to my work

If there's a lot of loud noise going on I'm distracted, if there's more than one person in my space while I study I get distracted- I need minimal distractions to actually get work done

too much noise will stop me from working

company, if they're too noisy it can be difficult to concentrate

Can't study in loud or busy areas or anywhere with people because I get distracted

Company distracts me

Hotter rooms can make you feel more stressed and overwhelmed and make you tired

Noise makes it hard to concentrate

When it's noisey with people who aren't studying

if it's too loud

noise levels if high are distracting and lighting if too harsh can cause me headaches

Low lighting, noise

Having people around me can distract me but also motivate me

The day

Loud talking or no music means I can't work productively

I cannot focus at all it's really loud so I normally use quiet spaces in the library

I struggle to concentrate in loud environments

Noise does effect my distraction of how i study

I like some low level noise so that the environment isn't intense but not too loud at the same time so it causes a distraction

If you're cold or too hot that takes away your main focus as you're not comfortable.

noise - i usually put my music on so i cant hear my surroundings. Company - i can only focus if the person in with isn't bothering me every second.

If it's too cold or too hot I find it hard

I want to be fully in on my work, so listening to music allowing me to have something to drown out any exterior noise helps. Company also influences my work, if I am in company that is productive, then it is good, however it can work the opposite way and be counterproductive

All of the above, more productive in cold temperatures than warm, prefer my own music to other noise

general vibe of space, and resources most of all!!!

I like to have a little noise but not too much it's overwhelming. I also study better with company because I feel a better sense of accountability if I'm with others.

If there is a high pitch noise or many people talking at the same time I can't seem to focus

Ideally the noises would be consistent

Noise distractions are huge for me and can not allow me to focus on anything.

Noise as it distracts me

noise, temperature, company - the only noise i can have is my headphones

All affect as can be distracting

19. Please tick this box if you consent to the information provided being used anonymously as part of this study   Responses: 60

I consent   100% (60)

Audio file

New Recording 2.m4a

Transcript

OK.

So First off, can I ask you for everyone give their consent for this information being used anonymously so the party study. Thank you. My nose are on there. So First off, what sort of environment you typically choose to study? And why?

Yeah. OK. Normally at UNI or in my room, just I preferably in the day like. Natural life. That's less stressful than that universe. What they call flux.

I mean, I usually end up studying in the basement of the library and obviously that is like not, it's a fluorescent lights, but then at home it will.

Be.

During the day, but actually mostly at night. So probably my big lights. Made lighting. Yeah. Yeah. Because it's night time. It's dark.

At home, in front of a window. So we got natural lighting, but also lots of light warm light to make sure the space is still bright, but never the big light, OK.

All right. So now I'm going to put on a few different colors, colored lighting to make an atmosphere, and I just want you to sort of say how it makes you feel and if you think you could concentrate well and be productive in this sort of cup of lighting.

OK.

So how does this color make you feel being?

Be a little. In a way tense. Yeah, I know. If I see a big red light, I might think or like red lighting, I might think danger. I.

Think red is dangerous.

Yeah.

Like it reminds me of city in the car. Traffic lights.

Yeah. And like kind of, yeah, yeah.

Yeah. Yeah, it's not. It's not very calming.

It's not like, yeah, easy to concentrate.

It's.

No, I also wouldn't. I wouldn't choose to sit in a red room anyway. While going off. I wouldn't put this color on. I was chilling. Definitely wouldn't put it on to do work.

OK.

Yeah.

So no, I.

Do.

No, no.

Studying okay.

Right.

So this ones blue.

I like this one more.

Yeah, yeah, yeah.

It sounds a bit, yeah.

Do you know what I feel like? I could work in blue light.

Yeah, yeah.

You should try it.

Well, I know.

Bye. OK. See what keeps you up from a screen? Feel like actually having blue light? I feel like my eyes are wider looking at this. Anyway, I feel like you could focus on a typing module, but this is classical music I think like so many.

Yeah, yeah, that sounds.

Yeah, so better than the red.

Yeah, yeah.

Not to get my case second trimester.

OK.

So this ones orange.

In a minute.

Once it turns on. Step. You know.

I.

Now this one's orange. How does this one make you feel?

Yeah. Yeah, it feels like, obviously, I guess you associate like an orange light with like, fire and like candlelight.

It's like sunrise like. I need to do work.

'Cause right is really harsh, but orange just.

Yeah.

Yeah, but I don't know if I could do work, and I think it would just make me sleepy.

Yeah.

Yeah, it kind of makes more like tough up. Better gasps. You're like.

OK, so based on like the other two colours that you've seen, what you think this would?

So if you were thinking of trying to get work done, like productivity, yeah.

Which one would you do you think you would feel most productive working?

Very fast, then orange, then red.

But it was the most productive. OK.

Yeah, I think I think I'd agree with that. Yeah, yeah.

Yes, all blue, orange, red.

Orange is calming. You don't. You need to have some kind of alertness to actually do be productive.

Maybe.

You would just sit in front of your work and not get. Done, yeah.

So maybe Orange is too far.

Yeah, yeah.

I.

So this one's purple. How to suspect you fell?

I'm praying for a party.

Yeah.

I like purple lighting like. Yeah. And like a drinking session. Yeah. Yeah, like social party. I I will do work to it. 'cause. I I just feel like it's.

Like a social.

Yeah. Yeah.

OK.

Yeah, it's too exciting.

It was kind of like.

Yeah.

I mean, I think. Like right now, I. The blue, but I think purple would. Be a close second for me.

So what was your? Order B blue.

Blue, purple, orange, red, right now.

OK.

Yeah, I think so. 'cause. It's like the blue, but it's like warmer turn this.

Yeah. It's like, yeah, it's like a study which shows, yeah.

It's kind of just. Nice in between the blue and the.

Maybe it's a sort of similar response to your info. It makes you feel calmer because it's a more subtle so.

Yeah, yeah.

I used to have this color on my LEDs called. Usually it reminds me of when I had LEDs in my bedroom, which is why. Me think of. Yeah. Yeah, but. Yeah, it's a nice color.

Yeah.

But it doesn't.

Doesn't scream for duct tape, OK?

Make. Other way, no.

Right. I'm just going to put one last one on. Because it's here. So this ones pink. Similar to the purple or just make you feel any different.

It's. Much more fibrous.

So more productive than the purple, OK.

Yeah, yeah, yeah, yeah.

Is it as productive as blue?

I think. No, I think blue is like.

Is darker, so it's a bit more.

I think it. More of a natural color that you have a blue sky outside and obviously where I like working in front of a window with natural light. The blue is more. I associated more with outside but pink, you know you don't see pink anywhere so.

Yeah.

It's still more alerting, but I just feel like it's a bit more distracting than the blue.

Baby, so there's everyone in agreement that it was the blue first.

OK.

Yeah.

Yeah. And then.

Signal first.

What was the bottom one?

I've read that estimate.

Red.

OK. Well, I think that's everything I need. You very much for taking part.