



Candidates must complete this page and then give this cover and their final version of the extended essay to their supervisor.

Candidate session number			
Candidate name			
School number	0		
School name			
Examination session (May or November)	May	Year	2015

Diploma Programme subject in which this extended essay is registered: Design Technology

(For an extended essay in the area of languages, state the language and whether it is group 1 or group 2.)

Title of the extended essay: How does the use of spatial design affect the atmosphere of a classroom?

Candidate's declaration

This declaration must be signed by the candidate; otherwise a grade may not be issued.

The extended essay I am submitting is my own work (apart from guidance allowed by the International Baccalaureate).

I have acknowledged each use of the words, graphics or ideas of another person, whether written, oral or visual.

I am aware that the word limit for all extended essays is 4000 words and that examiners are not required to read beyond this limit.

This is the final version of my extended essay.

Candidate's signature: _____ Date: 28/10/2014

Supervisor's report and declaration

The supervisor must complete this report, sign the declaration and then give the final version of the extended essay, with this cover attached, to the Diploma Programme coordinator.

Name of supervisor (CAPITAL letters) _____

Please comment, as appropriate, on the candidate's performance, the context in which the candidate undertook the research for the extended essay, any difficulties encountered and how these were overcome (see page 13 of the extended essay guide). The concluding interview (viva voce) may provide useful information. These comments can help the examiner award a level for criterion K (holistic judgment). Do not comment on any adverse personal circumstances that may have affected the candidate. If the amount of time spent with the candidate was zero, you must explain this, in particular how it was then possible to authenticate the essay as the candidate's own work. You may attach an additional sheet if there is insufficient space here.

INITIAL DISCUSSIONS FOCUSED ON THE TYPE OF ARCHITECTURAL SPACE TO BE INVESTIGATED.

This declaration must be signed by the supervisor; otherwise a grade may not be issued.

I have read the final version of the extended essay that will be submitted to the examiner.

To the best of my knowledge, the extended essay is the authentic work of the candidate.

I spent hours with the candidate discussing the progress of the extended essay.

Supervisor's signature: _____ Date: 29/1/15

Assessment form (for examiner use only)

Candidate session number	0		0	
--------------------------	---	--	---	--

Achievement level

Criteria	Examiner 1	maximum	Examiner 2	maximum	Examiner 3
A research question	1	2	<input type="text"/>	2	<input type="text"/>
B introduction	2	2	<input type="text"/>	2	<input type="text"/>
C investigation	2	4	<input type="text"/>	4	<input type="text"/>
D knowledge and understanding	2	4	<input type="text"/>	4	<input type="text"/>
E reasoned argument	<input type="text"/>	4	<input type="text"/>	4	<input type="text"/>
F analysis and evaluation	1	4	<input type="text"/>	4	<input type="text"/>
G use of subject language	2	4	<input type="text"/>	4	<input type="text"/>
H conclusion	1	2	<input type="text"/>	2	<input type="text"/>
I formal presentation	2	4	<input type="text"/>	4	<input type="text"/>
J abstract	2	2	<input type="text"/>	2	<input type="text"/>
K holistic judgment	1	4	<input type="text"/>	4	<input type="text"/>
Total out of 36	17		<input type="text"/>		<input type="text"/>

Name of examiner 1: _____ Examiner number: _____
(CAPITAL letters)

Name of examiner 2: _____ Examiner number: _____
(CAPITAL letters)

Name of examiner 3: _____ Examiner number: _____
(CAPITAL letters)

IB Assessment Centre use only: B: _____

IB Assessment Centre use only: A: _____

Design Technology Extended Essay:

How does the use of spatial design affect the atmosphere of a classroom?

Examination session: May 2015

Word Count: 3466

Contents

Abstract	.....	3
Introduction	.....	4
Research	.....	5
Sociological Needs	.....	5
Aesthetics	.....	6
Light	.....	6
Shape	.....	7
Investigation	.....	8
Conclusion	.....	14
Bibliography	.....	16
Appendices	.....	17

Abstract

This essay examines the question ‘How does the use of spatial design affect the atmosphere of a classroom?’ The essay begins with looking at how different aspects of spatial design can affect the environment of the area such as light and shape. It then moves on to investigating how different aspects of spatial design affect the atmosphere in a workspace, specifically a classroom. It then continues with looking at an existing classroom that was able to be part of the primary research. Another two classrooms were found to compare so it was easier to identify which classroom had the better learning environment. To prevent bias in this investigation, interviews with students ranged from year 10-12 were conducted. They were asked which classroom they preferred and why. From the results, it was found that rooms with different purposes have different needs, therefore need different environments.

RQ

The interviews showed that different students wanted specific aspects of the room to be altered such as table arrangement or lighting, because they wanted a different mood and atmosphere to work in.

Through the process of the investigation, it was therefore concluded that shape, light and arrangement of objects and furniture do affect the atmosphere of the room in a classroom.

Introduction

Interior design plays a big part in our lives. We spend most of our time indoors, whether if it's at school, work, home or in shops and museums. The environment we spend most of our time says a lot about ourselves, these environments can also affect our emotions and wellbeing. Interior design is about more than designing for the aesthetic appeal and what a room looks like. Interior designers have to consider the spatial design of the room. Spatial design focuses on the flow of space between interior and exterior environments. Designers need to consider many factors including comfort, communication and most importantly the user experience. One of the main aims that interior designers try to achieve is to create a space in which users will find it easiest to move and interact with objects or people through their daily lives. The use of spatial design when designing a space can even make the area more sustainable for the future.

The spatial can affect the overall environment and mood of the room. One alteration such as changing the light intensity and colour, the materials of the furniture and walls, even the pattern of the flooring can set the room's mood. Each room requires a different type of atmosphere. For example the interior design of a hospital should be different from the interior design of library because both these areas have completely different purposes, therefore need different environments. The people who work or live there should also alter the atmosphere of a room. Different people move around the room in different ways. The way they move around can be defined by their occupation (such as a student or any particular profession) and the personality (personal space, privacy, how social they are).

As a student in a secondary school, I feel that it is vital to have a stimulating learning atmosphere in order for students to work at their highest potential. Therefore, an investigation will be carried out to find out whether the use of spatial design can affect the atmosphere of a room.

Research

Sociological Needs

Every space is created to fit each user's sociological needs, psychological state, and individual differences. From the book "Human Behaviour and the Interior Environment", the sociological human needs are based on four concepts: privacy, personal interaction levels, territoriality and crowding. These four factors determine what type of space they can actually work and feel comfortable in. Privacy is one of the most important aspects people look for in a space, the result of more or less privacy in a room can make the person feel comfortable or not. Privacy can be manipulated by using partitions, for example an office plan. A person's interaction level is the level of privacy that is the most desirable to achieve. Other than needing enough space for the user to move around, the space needs to meet the users' social needs and in some cases health related (such as anxiety).

The purpose of the area defines the amount of space and distance needed between the users. There are four distinct distances: intimate space, personal space, social space and public space. Intimate space is the area that is just surrounding the individual; it is the most private and only allows the individual to move around by him/her self. Personal space is the area that only contains the individual and people that person feels comfortable with since personal conversation will be expected in this type of space. The more intimate the relationship, the more comfortable the person feels in a restricted and tight space. People have two space factors that need to be considered when establishing the different personal space and privacy requirements. These space factors are crowding and territoriality.

Aesthetics

The reason why interior designers consider spatial design is to design a room that gives the user as much space as possible. According to Peter Zumthor's *Atmospheres*, the space that occupies the room is also called the architectural atmosphere. The term atmosphere refers to the sensorial qualities one space consists of. This can be from the physical perception or emotional sensibility of the user. Each aspect can be changed depending on the purpose and 'expected' mood of the room. There are many aspects that contribute with the architectural atmosphere:

Light

Light is essential to interior design, from the colour and type of light to the position of where the light source is can make a room look bigger or smaller. The light level sets the character and mood of the space and affects how we move within the space. Light distribution affects the relationship between the dark and bright corners of the room. The distribution of light can vary from having the light stretched evenly across the room creating a monotony mood to having strong contrasts between brightness and darkness such as the effect spotlights give. The perception of the room is dependent on light distribution. The choice of using natural light from the sun or from light bulbs can have a big effect on the mood of the room. Light and the architecture of the room play hand in hand. The amount of light shining on to a particular corner of a room can change the way a person looks at the space. The light plays with the scale of the room and can be used to highlight certain elements of the space. (Zumthor)

When light from one direction hits an object, it creates shadows. The shape that the shadows form contributes to the architectural surroundings. The shadows add to the complexity of the space, creating a livelier atmosphere. Other than shadows, light can also create reflections when it hits a glossy and smooth surface such as marble or glass. Although reflections are not as noticeable as shadows, it definitely enhances our experience of the space. Like shadows, reflections can be used to bring more life to the space.

Shape

Shape is another aspect of interior design that can be looked at. The shape can include the furniture, walls and other parts of the interior architecture. Shape can be used as an aesthetic element to make the room more livelier. However, the use of shape can also improve the mood of the room, whether if it is to produce a calmer atmosphere or a more active ambience.

In the journal article “Impact of contour on aesthetic judgments and approach-avoidance decisions in architecture”, a recent study done by psychologist Oshin Vartanian, where 200 images of different rooms were shown to the participants and they were to label them whether each room was ‘beautiful’ or ‘not beautiful’. Results show that participants preferred rooms that consisted of curves than rooms that had mostly straight lines. This experiment proved that the liking of curves is not related to personal taste, the pleasure was universal. Through brain imaging, Harvard Medical students found out one of the reasons people tend to choose roundness over sharp corners. They found that when shown a photo of an object that has a sharp edge or pointy furniture, it activates the amygdala, the part of the brain that activates fear. From this, it shows that curves give people the element of safety and less of a threat.

The use of curves can contribute to spatial design. Curves might not be useful in some cases, such as when a space needs to be designed to increase functionality rather than beauty. However, areas such as workspaces need the beauty in order to increase the efficiency of the room, because beauty ultimately increases comfort.

It is found that the spatial design of a room with the contribution of light, colour, sound and shape, can affect the mood of the room and how people move in the room. The spatial design of the room can also define the purpose of the room. Workspaces are a great example of how altering different aspects of spatial design can affect the purpose of a space. Aspects such as light and shape can make a space bigger or smaller; the amount of space needed in a room is determined by the purpose. For example, a workspace (such as an office or school) needs more space between people compared to a house or flat.

Investigation

Studies show that the layout characteristics and spatial design effect job satisfaction and performance of the workers or in this case students (Wineman 1). Education facilities use the spatial structure to maximise its efficiency. For a school to perform efficiently, it needs a high level of social engagement of the students, can allow frequent student communication and still allow the students to work efficiently in an area that still maintains their own personal space.

Classrooms will be investigated. Although workspaces such as offices seem to serve a similar purpose as a classroom does, classrooms vary depending on their function. Classrooms were chosen over workspaces because there is something more complicated about the design of them. There are many aspects from the research conducted earlier that can contribute to the design of a everyday classroom.

Primary and secondary research will be conducted. Through primary research, photos will be taken of different schools, especially classrooms. Surveys will also be sent out to teachers and students of the existing schools to ask them for their opinion on their current working conditions. Through secondary research, other classrooms will be analysed and compared with the rooms that were analysed in primary research.

The photos below show the standardised classrooms belonging to an international secondary school in Hong Kong. These classrooms are mainly reserved for lessons when students don't need to do as much practical work. Food Technology, textiles and design technology classrooms have a different function; therefore, they are designed differently.

However, the main use of these classrooms is used as form rooms. During form periods and registration in the morning, students will go to their form rooms. This period is the lesson that requires the most social interaction between the students and the interaction between teacher and student. This is a great type of classroom to focus on as an investigation. Although it requires the most social interaction, there is a lack of spatial awareness. With the cramped table arrangement and the lack of colour, the space seems to be made smaller.

The classroom includes everything a standard educational facility needs: air conditioning, daylight (windows), desks and chairs, and other learning materials such as a whiteboard. Furniture consists of rectangular tables and plastic standard chairs. The rooms' colour scheme consists of grey scale and some greyish blue colours. All classrooms use the standard 'white lights', however teachers sometimes rely on natural light from the wide windows. This is sometimes a big problem because the lighting in the room very dim most of the time creating a non-stimulating working environment.



This image doesn't show entire classroom

Fig. 4 Standard Classroom

From the arrangement to colour, they are all aspects that contribute to spatial design. With the alteration of one factor, it can change the mood and environment of the area. And if the environment changes, the people will move differently.

Looking at the arrangement and choice of furniture, it is clear that the interior design was mainly designed for functionality and arranging the furniture so that the maximum chairs can fit in the room. Throughout the school, there are ranges of different arrangements of the desks and chairs found in each room. The classroom is arranged differently, normally according to the teacher's style of teaching. Such as if those particular teachers who like the students working together as a group more or they should be working individually.

In some classrooms desks are arranged in a U shape facing the whiteboard. Inside the U shape, there are desks placed horizontally with one side attached to the U shape. To some extent, this design can increase frequent communication between students and allows them to work efficiently. Students can easily can into groups/teams when having to do group work activities without moving around. However, some of the angles, especially sitting along the U shape, can make students uncomfortable.

Other arrangements includes, the desks go in pairs and make 'squares' and 'rectangles'. The desks can also be placed individually, allowing only two students sitting at each desk facing the teacher or there are desks that are simply arranged in to rows facing the whiteboard.

A few students varying from year 10-12 who study in the same school were interviewed about the current working environment of the standard classrooms. (See Appendix 1)

These results collected from students mostly agreed what was said before. The comments are mostly about the colour and furniture used.

After analysing these classrooms and asking existing what they think, areas that have been successfully designed as a suitable learning environment so a comparison can be made.

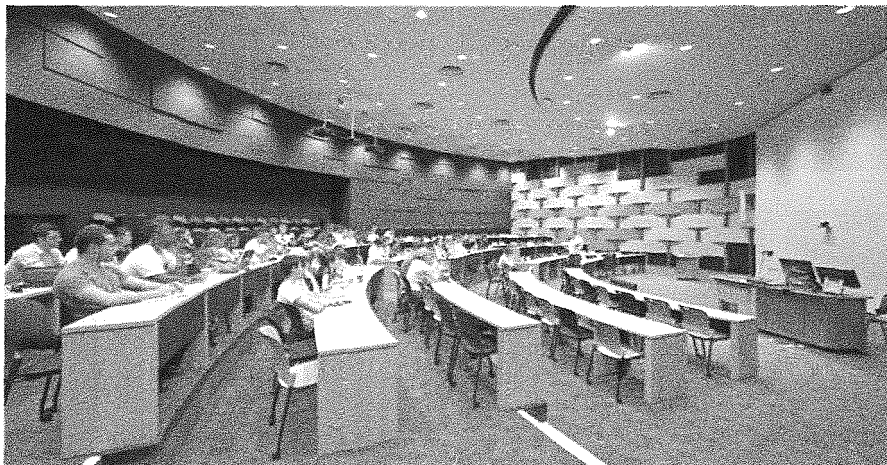


Fig. 2 Classroom

The photo (photography from) above shows a classroom belonging to in Northern Queensland.

Although this lecture room belongs to a university, the design and furniture arrangement can be used for a smaller classroom. Unlike the classroom analysed before, this area has a lot of different design features that help create a more stimulating environment. The room has an earth tone because of the use of wooden materials and the coal black colour on the walls. The earthy tone gives a warmer mood, where the classrooms in the Hong Kong school consisted more of colder colours.

Lighting is positioned evenly making all corners of the room lit up. The colour of the light is not completely white but more ambient. The colours and lighting that is used makes the classroom more comfortable. The colour of the wood, different tones of brown with the coal black gives contrast to the room, creating more depth in the design.

The furniture also contributes to the spatial design of the room. From previous research, the use of curves create comfort and sense of safety, it also makes the room aesthetically pleasing. The arrangement of the desks consists of six rows, two long desks in each row. The desks are curved, giving the room shape. The table and seating arrangement is suitable for a school because it is very open to a certain extent, allowing more social interaction between students. The curved shape of the desks also allow students to sit any seat and still able to have a good angle facing the front.

All the shapes and patterns that the room consists of make the design more interesting. The designer tries to avoid dullness by adding a pattern wherever there is a flat surface (including the carpet and ceiling); the chairs are even in two shades of grey.

The photo below is the second area that will be analysed.

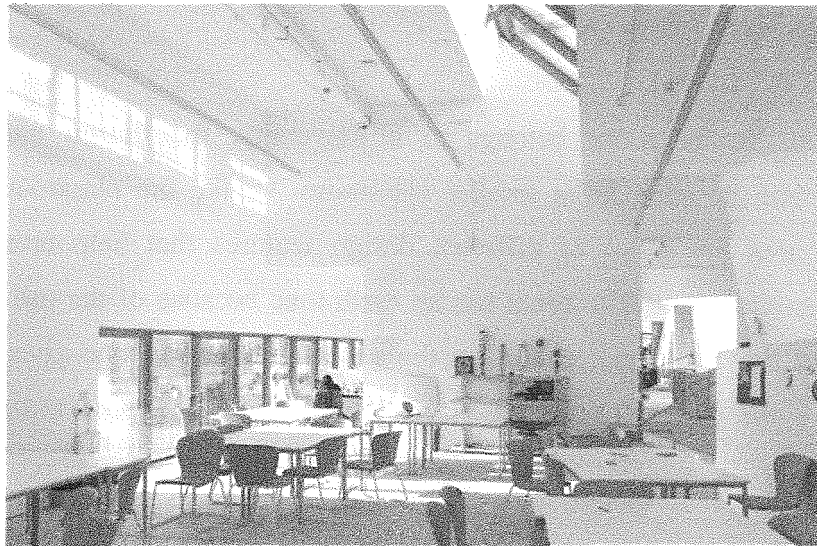


Fig 3 Classroom

(Photography from _____, _____ Architects)

This classroom belongs to a newly designed building part of the _____ School of Art. The architect _____ Architects) wanted to design to a building that can represent the school's activity in an urban environment.

Compared to the other buildings in the same area, it is a 21st century modern building on the exterior and interior. One of the main aspects that the architect focuses on is natural light. This photo was taken during the day, and is providing enough light without turning on electrical lights. The position of the windows and using the colour white for the walls allows natural light to cover most of the space in the room.

The use of natural light is only one of the aspects of spatial design used in the building. All the rooms in the building are not just standard cuboid rooms; there is vertical circulation through the whole building. This way light can travel from one room to another and also gets rid of the need to switch on the air conditioner in every room. This circulation route also increases the interaction between different departments.

The whole classroom from the walls, flooring and furniture are coloured white with the exception of the chairs, which are orange. This gives a splash of colour to a white

Lighter colours can reflect the light, eliminating the over use of electrical lights. The use of the colour also makes the room look much bigger. This will make the students feel more comfortable and less cramped when dealing with a small room.

Compared to the lecture hall analysed previously, there are not that many curves and shapes. Although both education facilities provide two completely different atmospheres, both classrooms have reasons as to why they are excellent stimulating learning environments. From this comparison we can tell that the two rooms might have different functions that need achieving. The first example might be for more lectured styled lessons where, students don't need to communicate as much as the other example. The other example might be for more practical work where students need to face each other in order to complete their work.

Another interview have been conducted, asking different students which classroom would they prefer. The lecture hall in Institute was labelled as picture one and the classroom from the School of Art was labelled as picture two. In the interview, questions were asked how they feel about the atmospheres that are provided with the two different classrooms.

Overall, the results (see Appendix 2) that were collected varied. There wasn't a classroom that a majority preferred, the students provided reasons why they liked one and not the other one. To add to that, a further question was asked at the end of each interview with the student, whether or not these two classrooms are a huge improvement from the existing classrooms we have now. All of the students agreed that both picture one and two have a more stimulating work environment then the first one that was analysed.

Conclusion

Through the research that was conducted, it was found that there are different aspects contributing to spatial design of an area or space: Light, colour and shape. If each of the aspects is altered, this can change the size and atmosphere of the room. The research was narrowed down to investigating workspaces, especially educational facilities. As a student, it is very important for students to have a stimulating working environment and a good social environment. Both of these types of environment depend on the atmosphere and mood of the room.

After collecting the research, a standard classroom from an international school in Hong Kong was analysed. Through analysing the classroom, looking at the different aspects of spatial design, it was found out the room didn't have the best working and social environment a classroom should have. Other views were collected through an interview, asking students what they think about the existing classrooms. The students that were interviewed all thought the classrooms need to be more 'livelier' and the rooms need to have more shapes such as curves and patterns.

After that, other classrooms were then analysed. For a comparison between the current classroom and the other ones, these two classrooms were specifically chosen because they provide more of a stimulating working atmosphere. To prove that the areas have a good learning atmosphere, every spatial design aspect was analysed from the table arrangement (shape) to the use of natural light in the room. Interviews were conducted again, asking students which area they preferred. From the results, it was found out that students chose their preferred classroom to fit a certain learning style and habit. This goes back to the research that was done earlier about a person's sociological needs, how some people prefer to have more personal space and some people prefer more social interaction.

To conclude, different aspects of spatial design can affect the mood and atmosphere of an area, in this case, a classroom. From the interviews, some students prefer certain atmospheres, for example people who preferred more privacy, personal space or don't like social interactions with other students, they would choose picture one because

they don't have to face their peers. Students who preferred an atmosphere with higher social interaction would most likely choose picture two.

From the results, it is shown that the use of lighting, shape, arrangement of objects and other aesthetics of space can affect the atmosphere of the room. From primary and secondary research, the different aspects can be contributed to produce the 'perfect' learning environment.

A perfect learning atmosphere in a standardised classroom needs a lot of space. Most of the aspects of spatial design are focused on making the space bigger. Therefore natural light and the use of lighter and more pastel colours can increase the space without having to physically increase the size of the room. Although the perfect learning environment is achievable, through the whole investigation, it is found out that not all students will agree with the same environment as everyone has different sociological needs.

Works cited

- "Human Behaviour and the Interior Environment." N.p., n.d., n.pag. (n.d.): Web. 06 June 2014. <<http://alaskaindigenous.files.wordpress.com/2012/07/human-behavior-and-the-interior-environment2.pdf>>
- Stevens, Philip. *designboom* |Designboom Architecture Design Magazine Steven Holl. N.p., 5 Mar. 2014. Web. 22 Sept. 2014.
- Stevens, Philip. *designboom* | Architecture & Design Magazine." Designboom Architecture Design Magazine Woods Bagot and RPA Architects N.p., 11 Nov. 2013. Web. 22 Sept. 2014.
- Vartanian, Oshin et al. "Impact of Contour on Aesthetic Judgments and Approach-avoidance Decisions in Architecture." PNAS. Volume 110 (2013): 10446-10453. Web. 13 Aug. 2014. <doi:10.1073/pnas.1301227110.>.
- Wineman, Adhya. "Predicting the Influence of Spatial and Psychosocial Factors on Job Satisfaction." *Enhancing Workspace Performance* (2007): n. pag. University of Michigan. Web. 21 Aug. 2014.
- Zumthor, Peter. *Atmospheres: Architectural Environments, Surrounding Objects*. Basel: Birkhäuser, 2006. Print.

Appendices

Appendix 1

Interview 1.

“What do you think about the design of the current classrooms, any improvements that you think can be done?”

- I don't mind what the classrooms look like, all classrooms very wide windows so plenty of sunlight can get in and the area is very practical, enough to fulfil its purpose, which is to allow students to have a place to learn.
- I think that the classroom to me needs a bit more colour, because of the colour of the furniture and the light colour; it makes the room very dull. Adding sharp vibrant colours might make the room a bit more welcoming and lively.
- I like the arrangement of the desks being in rows all facing the front, this way; no one is sitting at a weird and uncomfortable angle.
- The colour blue that is one of the main colours used in the classroom is very calming; the choice is very suitable for the learning environment.

Appendix 2

Interview 2.

-I prefer picture one. The atmosphere feels warmer because of the material and colour that are used. I like it also because there is more going on with the different patterns and curves, whereas picture two is very plain and boring.

- I prefer picture two because I think environment's simplicity is what helps students concentrate. The atmosphere that is provided in the room looks calmer and quiet. For me, personal space and privacy is a big deal for me, so the seating arrangement of picture one looks very cramped. There seems to be more space to move around in the second picture.

- I prefer picture one because I like how everyone is faced to the front and the table curves with the shape of the room and patterns of the ceiling, this way no one is sitting at a weird angle. In picture two all the chairs were facing in different

directions. However the seating arrangement of that classroom does increase more chance of interaction between students during group work.

- I prefer picture two because it feels more 'healthier', the natural light and the use of the colour white makes the atmosphere of the room very refreshing. To me, I like working in this kind of environment. My suggestions for to make the room better is maybe add a bit of colour to the walls because some people might think the white is too bright.