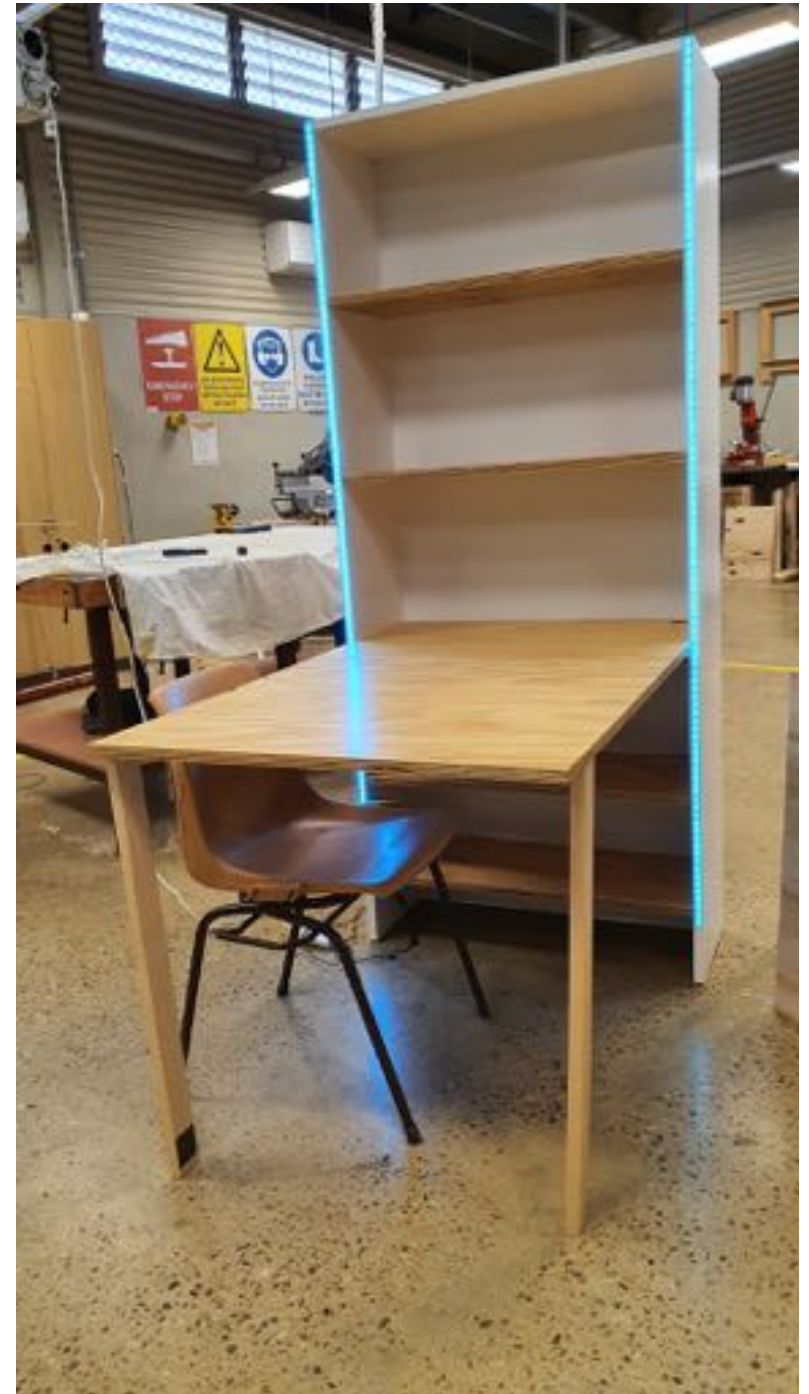


# Compact Study Desk

Design & Technology

By student: 33594658



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Ongoing Evaluation

# **Project Proposal & Project Management**

# Identification and Exploration of the Need

## . Design Situation

A study area is one of the most important needs a student has. There are students who may share a desk with siblings, studying on their bed, couch, floor, or any areas at home that is not quite appropriate to study. Currently I have a small room with a small desk that doesn't have organisational storage space to organise my school stuff. My desk can get messy easily because it doesn't have any space to put things in its place. My desk is so cluttered when I'm doing my homeworks and other school work. This issue lessens productivity, which can impact on my study routine. So, I need to design a compact desk that would fit in my room. I am keen to design and develop a place of multi function furniture to improve my room and a study space.

## . The Identified Need

The problem that I face is a need for a study desk that can fit in my small room, be able to have space to put my school stuff and make my room more tidy. The desk I design needs to look as compact as possible and be able to fit in my room. Since my current desk is small and it makes my room look messy when I have too many things overflowing on my desk, I need to design something that prevents it from looking messy and can fit in my room. The other challenge is I live in a rented home so it must be easy to move as well as I can not attach anything on the wall.

## . Exploration Of The Need

For this project I had to explore how high school or university students manage being productive, because having a cluttered room or a cluttered desk can impact students on their study habits. So I will be designing a desk that is both functional and aesthetic, as well as being durable. Below are some ideas from what I've researched on the internet and on the market.



# Identification and Exploration of the Need

## . The Design Brief

To design and construct a study desk suitable for a compact space, and to improve productivity. It is to design and construct an aesthetic modern desk.

## . Motivation & Purpose

My motivation and purpose for this project is to create a desk that is compact and aesthetic, which can fit in my small room and be able to have a space to put my stuff. Currently I do have a desk to help me study but it is so small that I can't organise all my school stuff. This desk not only benefits me individually, it can also benefit other students in need of a desk to increase productivity and comfort.

Another motivation comes from the trend on social media platforms which they have natural timber looks, as well as looking modern.

## . Target market

Generally the target market of this project is me. However the target market could be anyone, but it is primarily aimed for high school students and university students in compact accommodations.



### ONGOING EVALUATION - Identification & Exploration of the Need

So far, I have identified and explored my problem and my need. This whole project will be about designing a solution for my problem. To complete my project successfully I will be further researching about the existing products available for my problem that are already existed in real life. My motivation to successfully complete this project will be the satisfying end results of my product which I will be working hard towards it.

## Areas of Investigation

	Parameters/Limitation	What is to be investigated?	How will it be investigated?
Functional Qualities	. It should be functional.	. What makes it a better ergonomics?	. Researching online . Store Catalogues . Surveying/physically asking about the best functional study desks for students
Size	. It should fit in my room. . Should be compact. . It should have space for organising books and other school stuff.	. What are the dimensions of the design? . What is the best size that can fit in my room and (how wide or tall should it be ?)	. By finding the spot that the desk is going to be placed at and measuring what is the best dimensions.
Cost	. Some materials are over the cost. . The materials should fit my budget.	. The price of the materials/resources used in the MDP.	. Researching the prices of the materials that are going to be used in the MDP.
Aesthetic Qualities	. Should be appealing and eye-catching. . The cost of the paint is limited to the budget. . It must match to my room decor (existing colours)	. How is it going to be made pleasing? . What type of paint is needed? . How to paint it? . What type of styles are more out in the market for student desks?	. Researching online for learning the tips about how to make a desk appeal and be aesthetic. . Researching online how to use the paint and how to paint a desk. (only if it is going to be painted)
Safety	. It must be safe to function well and not harm anyone.	. Does standing desk harm your back or have any problems with the body?	. Researching online . Asking students if they rather study standing or sitting.
Weight	. It should not be too heavy, because we might move houses.	. How much does the normal study desks weigh?	. Researching online . Store catalogues
Materials for Construction	. The cost of the materials is limited to the budget, however most of the cost will be covered by school. . The materials must be durable for long enough time.	. What materials do I need to make this design? . What are the pros and the cons of those materials?	. Teachers' help . Researching online . Samples of other designers' processes

## Criteria to Evaluate Success

There are many requirements that needs to be met to achieve a successful, functioning and aesthetic design solution. My project should be to a high standard. To achieve this I need to analyse what criterias I have to meet before moving into designing a solution for my problem. To achieve this I have to analyse functional criteria, and the aesthetic criteria.

These are the criteria requirement needs of my project:

Criteria - Function	Analysis(why this is essential to be achieved)	Impact on MDP if NOT Achieved (What would be the impact on your MDP if you were unsuccessful in achieving this criteria)
<b>Size - It must fit in my room.</b>	. The main reason this is important it is because it must fit in my small room, or it would be pointless.	. If this is not achieved, it will not be used in my room unless to move houses.
<b>Need - It must have organisational storage spaces.</b>	. The need of the desk is to be attractive and functional. The function of the desk is to easily move the desk, easily slide the shelf, and big enough to fit my school stuff, as wells as suitable size to fit in my room.	. If this is not achieved then I will be disadvantaged to have my own study desk.
<b>Compact - It must be compact.</b>	. The desk must be compact. . Multifunctional to improve the efficiency of my room.	. If this is not achieved then, I will be disadvantaged, because the desk can take too much space of my room.
<b>Cost - The materials must be in the budget.</b>	. The cost of the material used in the process must be able to not go above the budget limit, however most of the costs will be covered by school.	. If this is not achieved, I will be struggling to get the materials I need. This will result in not being unique and not being in the good quality I wanted to be.
<b>Strength - The shelves must be strong to not fall.</b>	. This is important because it needs to be a strong desk to stay still and not be shaky.	. If the desk is not strong enough to hold still and shake it would break, and this may be caused by the construction of the desk during the process.

## Criteria to Evaluate Success

Criteria - Aesthetic	Analysis(why this is essential to be achieved)	Impact on MDP if NOT Achieved (What would be the impact on your MDP if you were unsuccessful in achieving this criteria)
<b>Style Design - It must be scandinavian design, which is matching the style with another product.</b>	. The style type needs to be in a way to attract customers. The style is going to be matching the existing colours in my room, basically matching my room decor.	. The aesthetic style is one of the important parts of the design, because it gives a style to the room and a contrast in colour.
<b>Colour Appropriate - The colour must be matching my room style.</b>	. The aesthetic style is one of the important parts of the design, because it gives a style to the room and a contrast in colour.	. If this is not addressed, then it might not be appealing to consumers.
<b>Quality - It must be to a high standard quality.</b>	The quality of the product must be to a high standard, to ensure longevity.	If this is not achieved, then it will not last long due to its quality.
<b>Time - It must be completed before the due date.</b>	The time this MDP is due is important to keep in mind, because I must finish earlier than the actual due date to ensure I can fix my mistakes and submit a successful MDP.	If the MDP is not completed before the due date or is submitted after the due date I will not be able to receive a mark.

## Criteria to Evaluate Success



### ONGOING EVALUATION - Areas of Investigation

So far I have done enough investigations on the areas that is necessary. Throughout working on this project I will be definitely continuing to research and investigate the areas I need help with.



### ONGOING EVALUATION - Criteria to Evaluate Success

The criteria to evaluate success is a great way to reflect back during the working process to ensure that I am meeting the function and aesthetic criteria and as well as to meet the need of this project. To achieve a successful design solution, it must be functional and aesthetic, to do this I need to refer back to these criteria factors. Throughout experimenting and developing a design solution, I must test all these factors, to create my MDP to the highest standard.

# Action, Time and Finance Plans and their Application

Initial

Actual

. Initial Time/Action Plan

Term	Term 4 - 2020										Term 1 - 2021										Term 2 - 2021										Term 3 - 2021							
Week	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8
Need Identification																																						
Areas of Investigation																																						
Criteria to Evaluate Success																																						
Time/Action Plan																																						
Finance Plan																																						
Project Developement & Realisation																																						
Research																																						
Sketches																																						
Experimentation Prototyping																																						
Purchase of Material																																						
Cutting the parts + the legs																																						
Routing the LED strips line + routing the sides for joining the shelves																																						
Plaster coating + Sanding																																						
Routing a whole for laptop cord																																						
Painting + Oil finish																																						
Joining sides and the shelves																																						
Joining the desk shelf + adding the legs																																						
Attaching thin plywood at back of bookshelf																																						
Installing LED Strip Lights on the sides																																						
Evaluate Functional Properties																																						
Evaluate Impact on Society																																						
Evaluation Impact on Individual																																						
Evaluate Impact on Environment																																						
Final Evaluation																																						

# Action, Time and Finance Plans and their Application

. Actual Time/Action Plan

Term	Term 4 - 2020										Term 1 - 2021										Term 2 - 2021										Term 3 - 2021							
Week	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8
Need Identification																																						
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Final Evaluation																																						

# Action, Time and Finance Plans and their Application

. Finance plan

For this project most of the cost will be covered by school supplies.

Item	Quantity	Supplier	Unit Cost	Projected Cost	Actual Cost	Projected VS Actual Evaluation
Desk & Attached Bookshelf						
19mm ply sheets 24000 × 1200	2 sheets	BIgRiver Group/ School	\$40	\$40	NIL	Actual Cost
Hoops Pine - 150 × 25	1	BigRiver Group/ School	\$40	\$40	NIL	Actual Cost
Continuous Hinge	1 915mm	Bunnings	\$14.75	\$14.75	\$14.75	Projected Cost
White Melamine Backing	2 3mm 1200 x 900mm	Bunnings	\$12	\$24	\$24	Projected Cost
Paintings & Accessories						
Enamels Water- Based	1 4L	Bunnings	\$79.90	\$79.90	\$80.00	Expensive
Foam Paint Roller 100mm size	1 2 pieces	Bunnings	\$4.65	\$4.65	\$4.65	Projected Cost
Screw Caps White	1 pack	School	\$3.50	\$3.50	NIL	Actual Cost
Plaster	1 15kg	School/Bunning	\$48.12	\$48.12	NIL	Actual Cost
LED Strips Light	1 5m	Kmart	\$22	\$22	\$22	Actual Cost
Tung Oil	1	School	---	---	NIL	Actual Cost
Total:				\$276.83	\$145.31	Actual Cost
Budget: \$300						

## Action, Time and Finance Plans and their Application

. Guesstimate

I think the guesstimate time that I would finish my MDP is by the end of week 4 while the due date is week 6.

! Due to Covid-19, we got an extension on our MDP due date. I was then able to develop my skills to produce a higher quality product.



### ONGOING EVALUATION - Action, Time & Finance Plan

The light blue is the initial time I was planning to do my MDP, and the dark blue is the actual time I did work on my MDP. As well as the yellow highlighted part is the time where I will be working on the construction of the desk. In the initial time plan I decided to start my design brief from the start of the term 4 2020, but it didn't go as planned. I started doing my design brief after week 5, this is because I was unmotivated and figuring out the problems I could design a solution for it.

For my finance plan, most of the cost will be covered by school except some of the materials.

Due to Covid-19, we got an extension on the due date



# **Project Development & Realisation**

# Evidence of Creativity

## . Generation of Ideas - Initial Idea



This was the first existing idea that I saw on the internet. It is compact and aesthetic, and it has organising little shelves to hold stuff. The organising part does not hold small things and it isn't really helpful for me because I need more organising space to organise my school stuff.

### Parts I don't like:

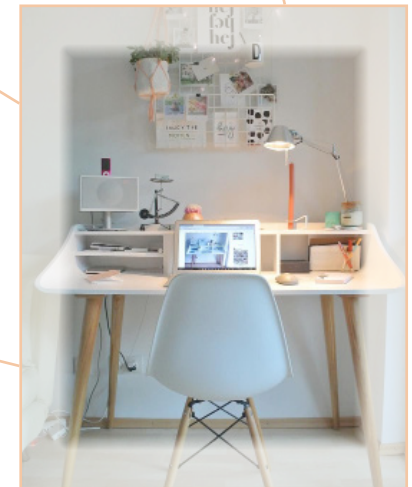
- I don't like how it doesn't have more storage for putting things (such as; extra shelves for folders and textbooks)

### Ideas I can gain from this existing product:

- A storage to put your laptop in
- The storage shelf ideas
- Being simple is more modern and aesthetically pleasing

### Interesting factors:

- The curved sides (to prevent small things from rolling down)
- Aesthetically simple



# Evidence of Creativity

. Generation of Ideas - Design Developement

I started to change my idea into a better design idea.



Second Ideas:

I only liked the lights and how compact it is.

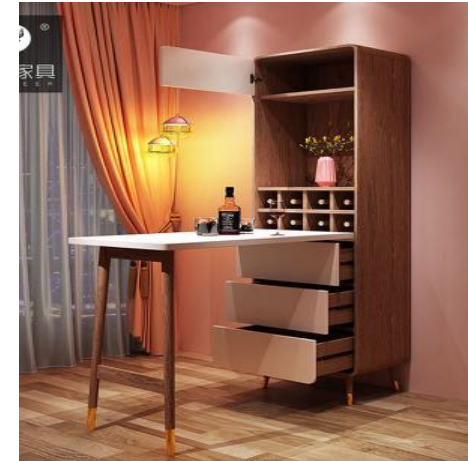
However, the fact that it has no organising spaces is not going to help me. Another part I don't like is that it is stuck on the wall.

From this design, what I will be taking away is the lights and how compact it is.



Third Idea:

This was the third idea that I liked the shelves. It has enough shelves to store anything you need and the desk can fold to hide the shelves at the bottom. However I dislike how the sides are open, and because of that it looks messy.



Fourth Idea:

This was the last design that my own idea grew from it. I like the idea of how organised this is. It looks neat and organised. I definitely do not like the drawers at the bottom, because they are not really accessible.

# Evidence of Creativity

## . Generation of Ideas - Initial Design Sketches

I did these different design sketches on Adobe Illustrator.

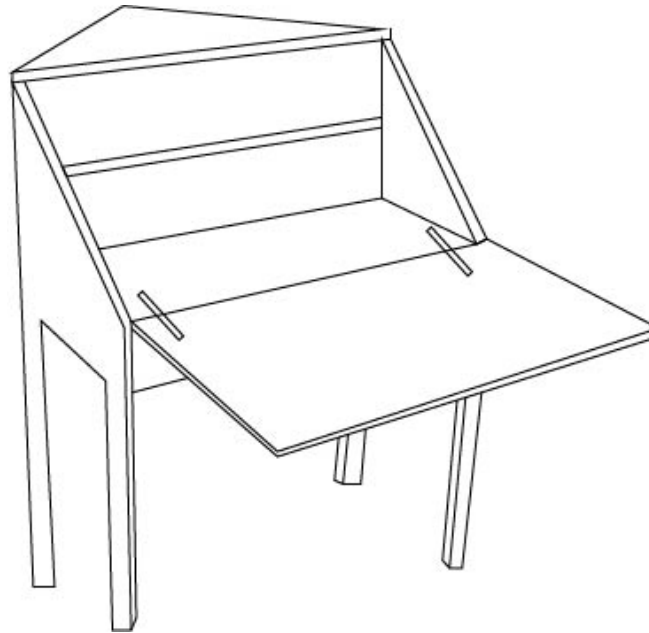


This is the first sketch I did on Adobe Illustrator.

P: I like the leg idea and how the bottom shelves are going to be fully covered.

M: The top shelf looks messy and I don't like the sides.

I: There is lots of storage spaces specially you can put things you don't like at the bottom shelves.

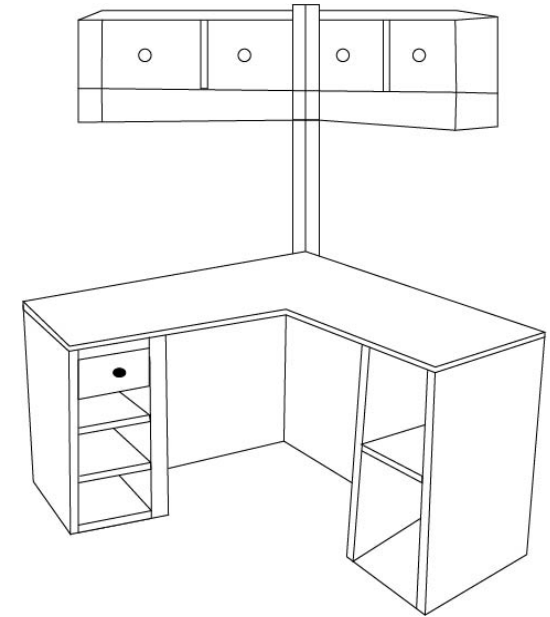


I did this sketch in Illustrator, the inspiration from this design comes from pianos. I think it's a pretty cool design.

P: Greate for small rooms as it is in the corner it can cover the working environment.

M: It looks very unprofessional and there is not much storage space.

I: Cool shape and the fact that it fits in the corner of a room.



I did this drawing on Illustrator. While thinking about ideas I though of something compact but has lots of storage space.

P: It has lots of storage space and they are placed at the top so it does not take so much space on the ground.

M: Looks messy and it looks like kitchen cabinets which I dislike.

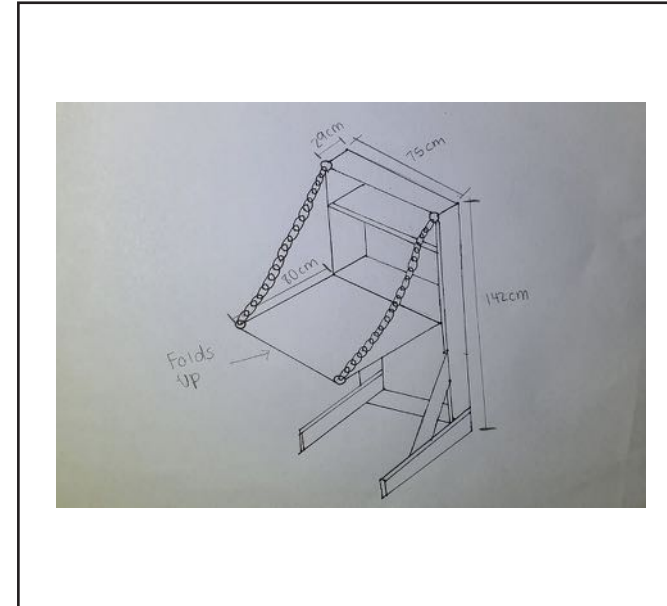
I: The fact that placing the storage space at the top is a genius idea to save space.

# Evidence of Creativity

. Generation of Ideas - Initial Design Sketches  
I did these different design sketches on a paper.



This was one of the design that I liked at the early stages of my generation of ideas. I was thinking of designing a desk that has the bookshelf attached to it and it is on wheel so it can move to the other side of the desk. But refering back to my criteria of evaluation, I was not solving my problem.

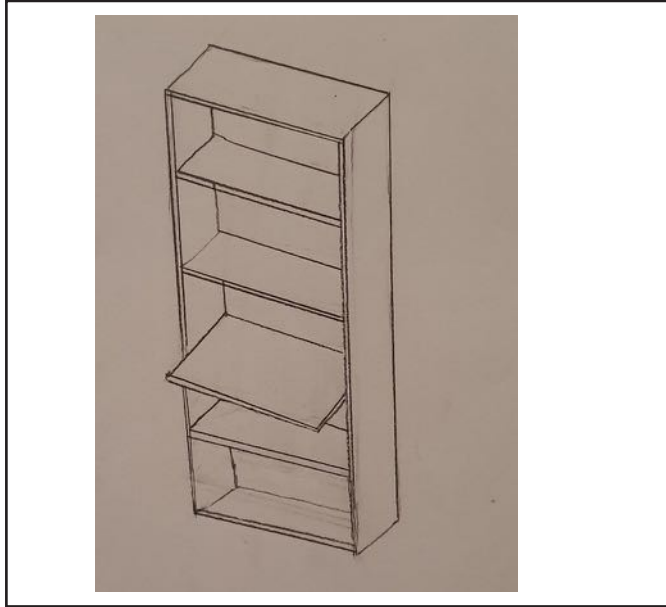


Then I had this idea where there was a bookshelf standing to the wall and the desk drops down uncovering the top shelves. However I did not like the pines at the bottom where it would prevent the desk from falling. I thought if I have this in my small room, I may trip because of the pines standing out.

# Evidence of Creativity

## . Generation of Ideas - Initial Design Sketch

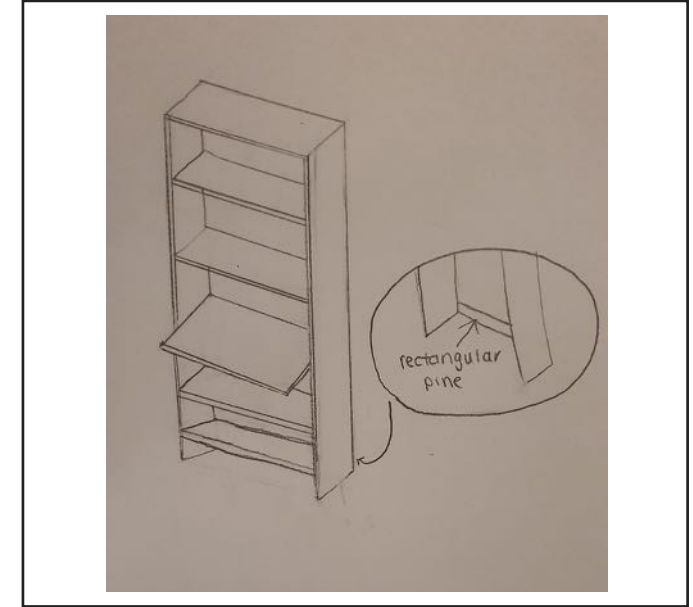
These design sketches are some of my design for the bottom sides, and it has been hand drawn on a paper.



This was how I wanted the bottoms to look like at early stages of my generation of ideas. I liked it because it looks very neat and organised. But I did not like how the last bottom shelf is sticking to the ground.



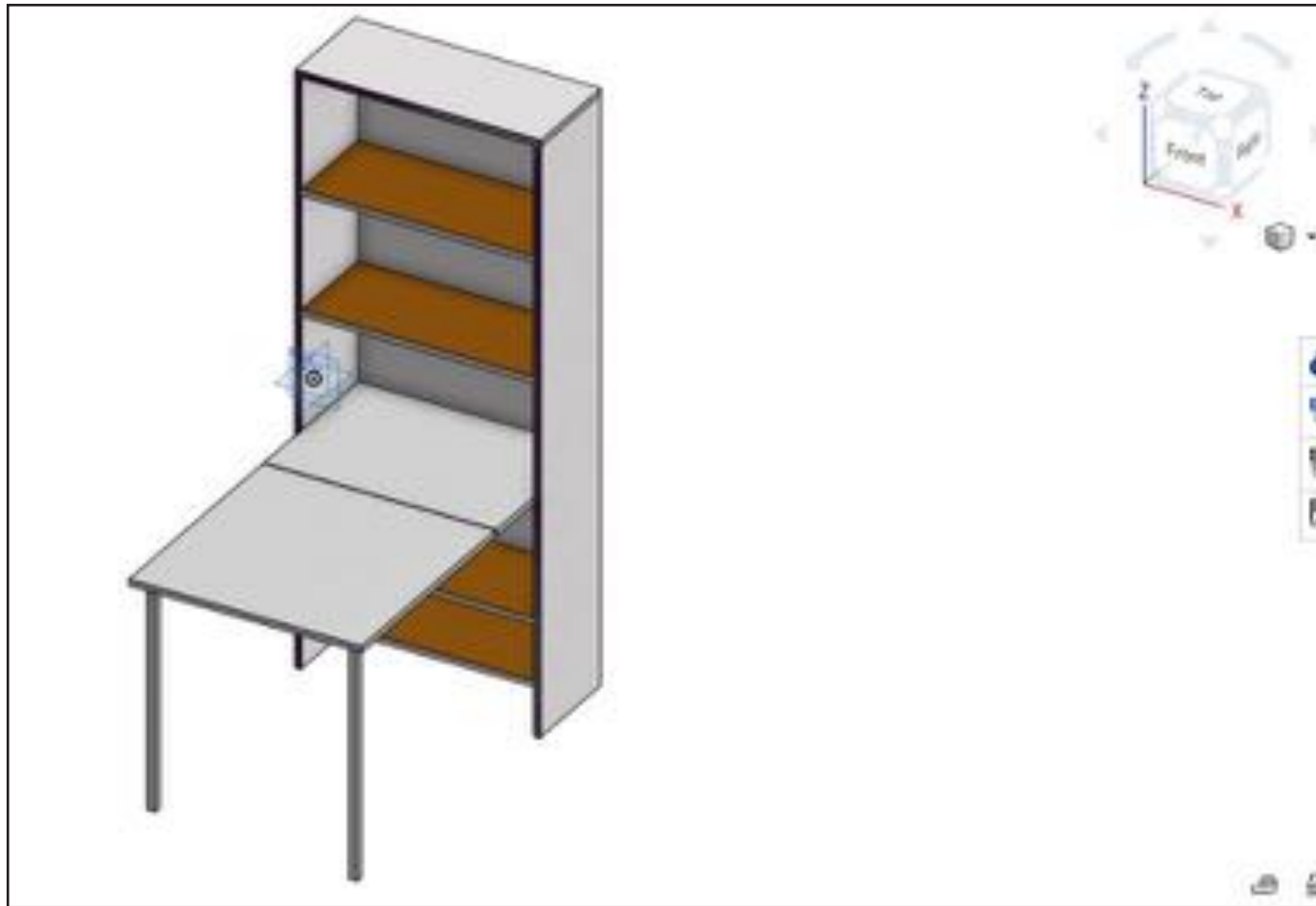
I decided to move the last bottom shelf upper so there is nothing at the bottom. Then I thought if the bottom sides a shape they would be able to give the sides a little bit of uniqueness. But then after sometime I wanted to change it because it looked so weird and not neat.



The I changed it to leave the last bottom shelf up, and leave the sides as simple as that and then put a rectangular pine at the back under the last bottom shelf to give the back cover some support. This is what I came up with at the end for the bottom of the bookshelf.

# Evidence of Creativity

. Generation of Ideas - Final Design Sketch





This is the final sketch I did in OnShape.  
And I am very happy with the final design look and the final measurements.

# Evidence of Creativity


## . Exploration of Existing Ideas


I explored the existing ideas mainly from the internet, because there's always more resources for ideas.

	Plus	Minus	Interesting
	<ul style="list-style-type: none"> <li>. compact and aesthetic</li> <li>. has a small shelf to organise books and other small items</li> </ul>	<ul style="list-style-type: none"> <li>. hanging on the wall</li> <li>. not much space for my folders</li> </ul>	<ul style="list-style-type: none"> <li>. the shelf has no legs, but it is hang on the wall and it will not fall</li> <li>. not sure if the desk is strong enough to put more weights on</li> </ul>


	Plus	Minus	Interesting
	<ul style="list-style-type: none"> <li>. it's aesthetic and simple</li> <li>. has shelves to put some stuff</li> </ul>	<ul style="list-style-type: none"> <li>. too simple</li> <li>. not enough storage for putting my stuff in</li> </ul>	<ul style="list-style-type: none"> <li>. it's interesting how its so simple and has enough storage for minimal organising</li> </ul>

## Evidence of Creativity

	Plus	Minus	Interesting
	<ul style="list-style-type: none"> <li>. it's a very modern style</li> <li>. it is compact</li> <li>. The LED lights make it more functional because I might not have a study lamp, then I can use the lights inside of it.</li> </ul>	<ul style="list-style-type: none"> <li>. it is hanging on the wall</li> <li>. not enough storage for putting my stuff in</li> </ul>	<ul style="list-style-type: none"> <li>. it's interesting how they used the LED lights in them</li> </ul>

	Plus	Minus	Interesting
	<ul style="list-style-type: none"> <li>. it has a little shelf to store you laptop under</li> <li>. it also has shelf storages to store papers and stationary</li> <li>. the legs are aesthetic and modern</li> </ul>	<ul style="list-style-type: none"> <li>. it is a bit big to fit in my room</li> <li>. not enough storage to store my folders</li> </ul>	<ul style="list-style-type: none"> <li>. the curved sides are functional, because it's to prevent pens and small things rolling down</li> </ul>

## Evidence of Creativity

	Plus	Minus	Interesting
	<p>. it has enough storage to put my school stuff as well as some decoration on the top shelf</p> <p>. as well as the drawer kind of storage can be used to store my laptop</p>	<p>. I don't like how it has used metal for the legs and the shelf</p>	<p>. I like how the desk can be folded</p> <p>. it's an old style and not very stylish</p>

### . Degree of Difference

My product is likely functioning similar to these existing products. However, I will be making a different style with more modern features included and different functioning features. The similarity of my product and the existing products will be the desk and a shelf beside the desk. The rest of the features will be different, which are the style, additional functioning, and how the desk will be folded to the shelf.

## Consideration of Design Factors Relevant to the Major Design Project

Factors	Justification	Implication
Need	This factor must be clearly considered in the MDP. It is important to ensure if the design solution is meeting the need.	If the need is not met, then it is unsuccessful. The impact of not being successful in meeting the need is that I won't be able to have a compact study desk and a productive mindset.
Function	Function is absolutely an important factor which is to ensure if it functions how it can solve the problem and how it can be sustainable.	For example if the desk that is attached to the shelf does not have strong legs. Then the shelf would fall on the desk.
Aesthetic	The aesthetic factor is also affecting the design solution. I want the aesthetic to match my room and at least look modern so it is appealing.	If it is not appealing to me, then it is not appealing to anyone else. It shouldn't be too fancy nor too simple. It must be a scandy design, which is matching the style to another product.
Ergonomic	The desk must be 710 mm tall from the ground. This is because my chair has arm rests and I usually like my arm rests to be under the desk so it's more comfortable to focus. Which means that if the arm rest is under the desk, then the desk must be 710mm high from the ground.	If the height of the desk from the ground is too high or too low it can result in ruining your back posture. I can not push my chair a bit forward so it's under the desk.
Quality	The quality of the desk must be considered as another important factor. One of the reasons it should be high quality is that whenever I have a cup of coffee/any other drinks, I get some drops on my desk and it ruins it and leaves a stain. So the paint I will be using should cover this issue and be in a high quality to be durable.	If this factor is not achieved, then the implication it has on my design project is that it will not be durable for example if the paint or gloss does not prevent this issue, I may spill some drops of a drink and it will leave a stain, as this will result in a design with no high quality finished touched.

# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 1. Research

### . The Internet

I used the internet to search and gain some ideas of modern aesthetic styles of furniture. Using the internet was a big impact on getting new styles and fashions. This is because if I was to research ideas from a book it would have old trends and styles, because by the time the book gets published the style is probably out of date.

Basically there was a lot of inspirations that came to me from researching on the internet, as I used different sites to gain ideas of styles and trends that were all up to date.

### . Journal & Professional Magazines

Using journals is another great way to get some ideas, especially since most journals include uptodate trends and styles. As well as they are a more professional way to gain clever ideas.

# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 1. Research

. The sheets of ply

For my major I was not sure what materials I need. So I researched and I found out that wood is going to be the best option. Wooden furniture gives my room a sense of comfort and an organic feel. It also has strength and durability.



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 1. Research

### . Finishing look

For finishing my desk with a high quality appearance I had to decide whether to use paint, spray paint, timber oil (tung oil), lacquer or self-adhesive woodgrain wallpaper. After deciding what finishing look I wanted for my desk I chose to apply a water-proof paint for both the bookshelf sides and the top shelf. For the rest which were the shelves, the desk shelf and the legs I chose to apply timber oil to get a finished shining look and for it to be water-proof.

The water-proof paint: I had to research what type of paint is suitable for my desk. I decided to go with enamel white. Some of advantages include that it is the water based version which means it is waterproof, it also has no fumes, it is great for protecting timber from getting ruined by liquids.

The timber oil (tung oil): One of the types of timber oil is tung oil. It is drying oil made from a tung tree. Features include hardens upon air exposure, water resistance, enhances the colour of the wood, excellent protection, and most importantly it is an eco-friendly product.



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

----> Tools

Aim:

In here I aimed to cut the hinge shorter.

Materials:

The material used here is metal.

Methods:

Firstly I measured how much it needs to be cut. Then I cut it based on that measurement with bench shear.

Result:

The result was fine. It was a very easy process and it was safe.

Conclusion:

After experimenting this, I decided to do the same for my actual major. Since it worked great.



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

### ----> Tools

#### Aim:

The aim of this tool was to put the screws in.

#### Materials:

It was used on a steel hinge and wood.

#### Methods:

I used the electric screwdriver first, because it was quick. However, it made the screws a little bit stripped. Then I decided to go with the manual screwdriver because I didn't want to make them strip again.

#### Result:

I ended up using the manual screwdriver

#### Conclusion:

I will be using both these tools in creating my final product.



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

----> Tools

Aim:

The aim of these saw machines was to cut the wood sheets into the pieces I needed.

I used the band-saw to cut small size pieces out for the shelf which were going to be joined to the sides.

I got the teacher to use the table-saw to cut all the big pieces I need which were the sides, shelves, and the desk.

I used the drop-saw to cut small sized pieces into half, including the legs.

Materials:

The material used was ply sheets.

Methods:

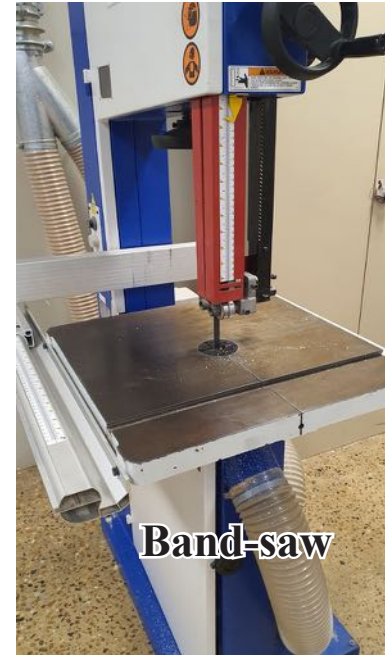
First I had to measure how much I needed to cut the piece from the sheets. Then I marked the measurements, and cut it.

Result:

The result was that it perfectly cut the piece I needed.

Conclusion:

At the end of the process I had a perfect cut wood.



Band-saw



Table-saw



Drop-saw

# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

----> Tools

Aim:

The aim of this router was to cut the parts where the joint are going to be, as well as trenching the sides to install LED strip lights inside.

Materials:

The materials used were the ply and the router.

Methods:

I had to first measure where I need the grooving to be and then picking the right sized cutter. After this I had to make sure there is a protection to prevent it from not going straight.

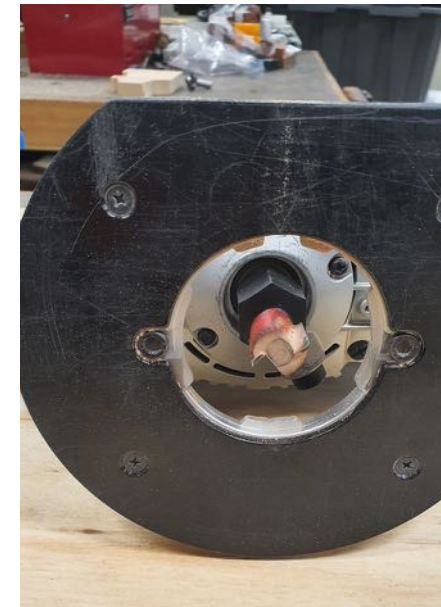
Result:

The result was great, it left some messiness and then I sand it to get rid of those small sharp pieces of wood.

Conclusion:

I will be using this router for trenching the joints and the sides for LED strip lights.

5mm



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

### ----> Techniques

#### Aim:

I was hoping to achieve comfort and easy to put the screws in, and to make the process run smoother.

#### Materials:

The materials used are; electric screwdriver, continuous hinge, ply sheet and the workbench.

#### Methods:

I only had to put the sheet in between the vice and adjust it into a suitable position.

#### Result:

This technique made it so much easier to put the screws on.

#### Conclusion:

This was a great woodwork technique to hold the sheet and give more comfort in being able to work easier.



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

### ----> Techniques

#### Aim:

The aim here was also to make it easier to put the screws on.

#### Materials:

Wood, and clamps.

#### Methods:

I had to cut the supporting pieces to hold those two shelves.

#### Result:

It helped me to put the screws easier and make the process run smoother.

#### Conclusion:

Doing this technique made the two shelves to stick together closely.



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

### ----> Techniques

#### Aim:

The aim here is to make sure the two sides are well close together. This is a routing guide.

#### Materials:

The materials used was the router, ply sheets, and the long clamps.

#### Methods:

I just had to adjust it to tighten it up.

#### Result:

It made the process run smoother and ensure me that the top and bottom is equally adjusted.

#### Conclusion:

It made it so much easier to groove in a straight line.



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

### ----> Techniques

#### Aim:

My aim was to make the trenching smoother.

#### Materials:

I used sanding paper to do this.

#### Methods:

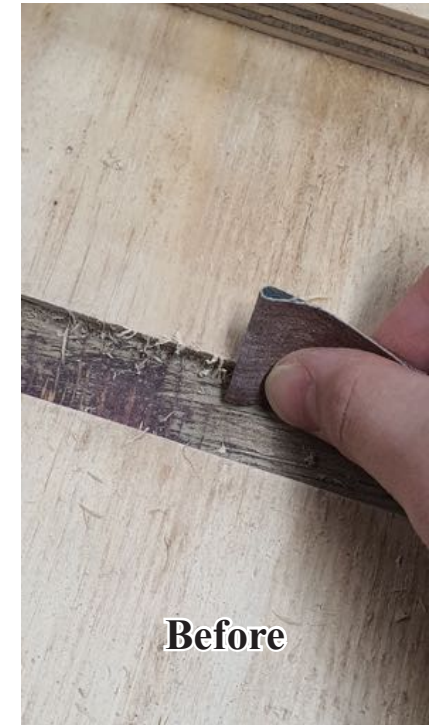
To do this I had to rub the paper a couple of times on the surface.

#### Result:

The results after this process was that the surface was smoother now.

#### Conclusion:

After grooving, it made it look so messy because of those small wood particles. I will be doing this to my final product as well.



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

### ----> Technique

#### Aim:

My aim was to make sure the sides are tightened as well as both bottom and top are equally placed.

#### Material & Methods:

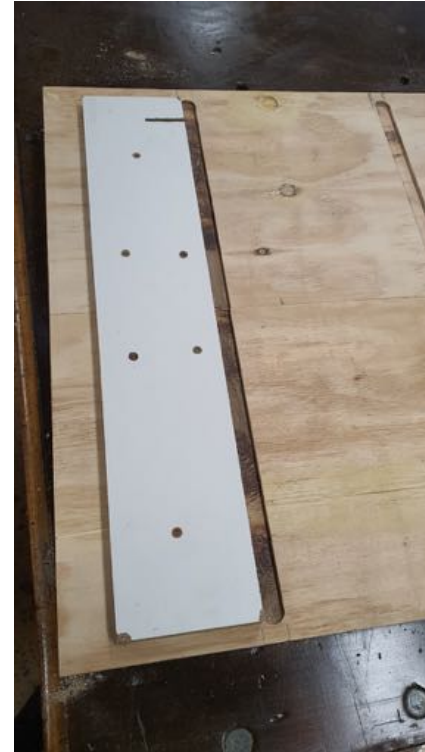
I screwed a ply sheet to the bottom of the sides.

#### Result:

After doing this technique both bottom and the top were equally placed and were ready to be trenched for shelf joining.

#### Conclusion:

I will definitely use this technique in the future to construct my product.



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

### ----> Techniques

#### Aim:

My aim was to paint the sides and I didn't want the paint to get everywhere, so I had to make something that makes the sides to be standing high from the ground.

#### Material & Methos:

I just put screws in on a wood pine, and I made about 6 of them to help during the process.

#### Result:

This technique was great because of protecting everywhere else and that it is much easier to paint this way.

#### Conclusion:

There was no prototype needed for this process of painting so this will be my main one.



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

----> Design Solutions

### Aim:

My aim was to groove the side to join them. But for the grooving to be easy I had to make a jig, that made the machine move straight and easily.

### Materials:

The materials used were wood and router.

### Methods:

I had to make the jig perfectly sized to fit the router inside.

### Result:

It was very hard to make the squares but it was beneficial.

### Conclusion:

Now that I have already made this guide jig, it will help me when I am constructing the main one.



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

----> Design Solutions

### Aim:

My plan was to make sure if I want the LED Light Strips to be all along the sides including the top shelf or I had to change it.

### Materials:

The materials used were wood, router, LED Strips, and measuring tools.

### Methods:

To ensure if this idea was suitable I had to make model for the corner of the bookshelf to see how the strip is going to turn to the side.

### Result:

After this I realized that it does not look neat if I bend the strip to turn to the side.

### Conclusion:

Now that I have already tested this I am able to make another solution to this design idea.



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

----> Design Solutions

Aim:

My plan was to install LED light strips along the sides and top shelf. However, it looked so unprofessional in my first idea which was bending it. Then after talking to my teacher I was able to decide on installing it only along the sides and not top shelf, which means that both side's strips will connect to each other at the bottom.

Materials:

The materials used were router to trench to place the strips and the LED Light Strips itself.

Methods:

I tested to see if my ideas works for how I want to install the LED strips.

Result:

It was better to go with the second option because it looks more professional and to a high standard.

Conclusion:

Now that I have already made this decision I only have to construct my product and install it like the second idea.



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

### ----> Design Solutions

#### Aim:

My aim was to ensure that the shelves are joined to the sides securely.

#### Materials:

The tools used were router, screw-driver, band-saw and wood.

#### Methods:

For my first completed prototype I joined the shelves to the sides with only screws. But this time I trenched the sides where the shelves are going to join and cut a little bit of the end of shelf to join them to the sides.

#### Result:

It was a time consuming process. However, at the end it was the best option because now the shelves are more securely joined to the sides.

#### Conclusion:

This will be used as my actual shelves and sides.



A prototype I did before trenching the actual sides.

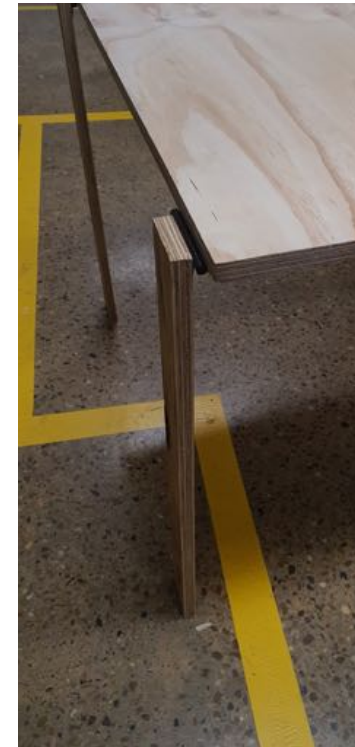
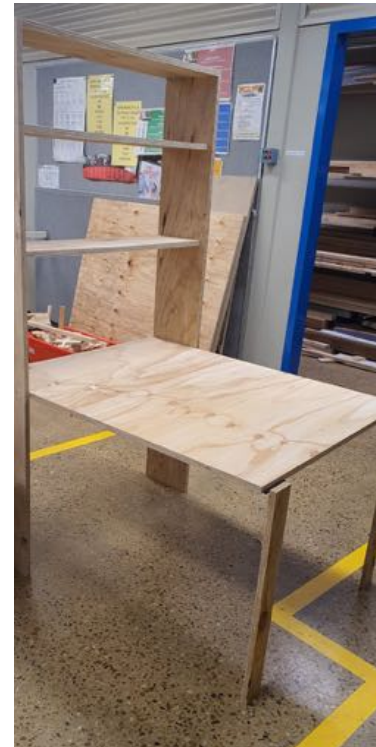


# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

----> Design Solutions

When I was constructing the legs for the desk, I found a problem. I didn't like how the hinge was standing out and showing. If I extended the desk it would have not been able to fold back down because of the height. So I had to figure out where to put the legs that it is visible and can function easily.

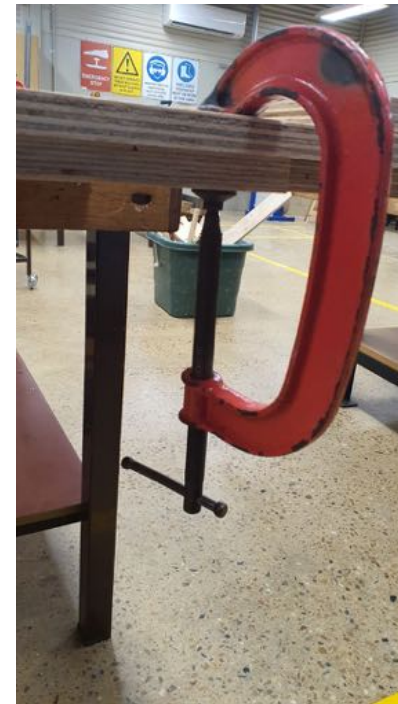


# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

----> Design Solutions

When I was trenching I found out that the jig slides is moving so I used this clamp to hold it tight so it doesn't move.



# Appropriate Research & Experimentation of Materials, Tools & Techniques & Testing of Design Solutions

## 2. Testing/Experimentations

----> Design Solutions

Aim:

My aim was to fill in the gaps.

Materials:

The materials used were plasterboard and plaster spatula.

Methods:

I had to smooth the plaster to make sure there is no bubbles in it when I am applying it to the wood. Then I had to smooth it on the wood as well so there is nothing standing out with the plaster spatula.

Result:

It was easy to do but it took so long to dry. I also had to apply it two times because it went deep so I had to make sure that it is on the surface. However, the results were great, it filled the gaps perfectly.

Conclusion:

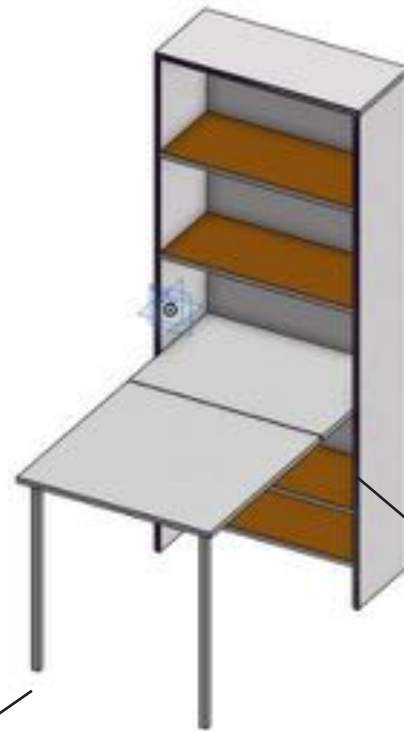
This will be used as my actual sides because there was no prototype needed for this solution.



### ONGOING EVALUATION - Experimentation

I think I have made a steady progress towards experimenting and making prototypes. I believe this prototype will help me to build the actual product. This means that if I encountered any issues during the prototyping stage I will be able to fix it and use it for the actual product. I also will be more confident to build the actual product and I would be able to develop design ideas.

## Application of Conclusion



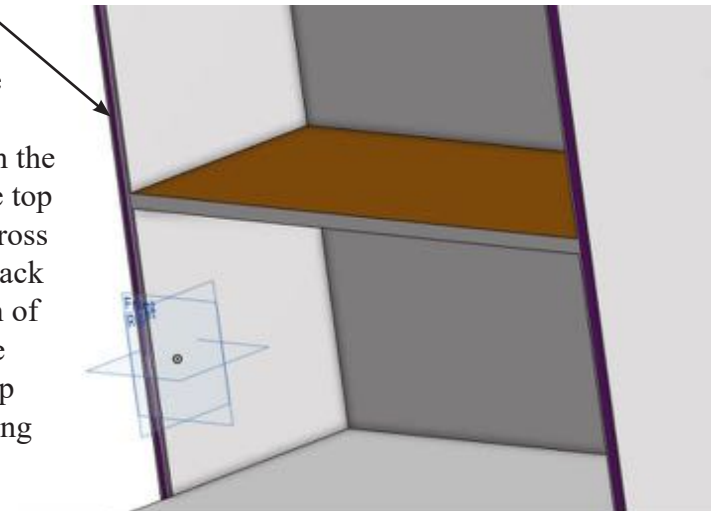
This is the front side view of the design. I decided to timber paint the shelves, the back and the legs. I will be painting the sides, and the desk with the shelf it is attached to.



This the bottom view of the desk, which is showing the legs.

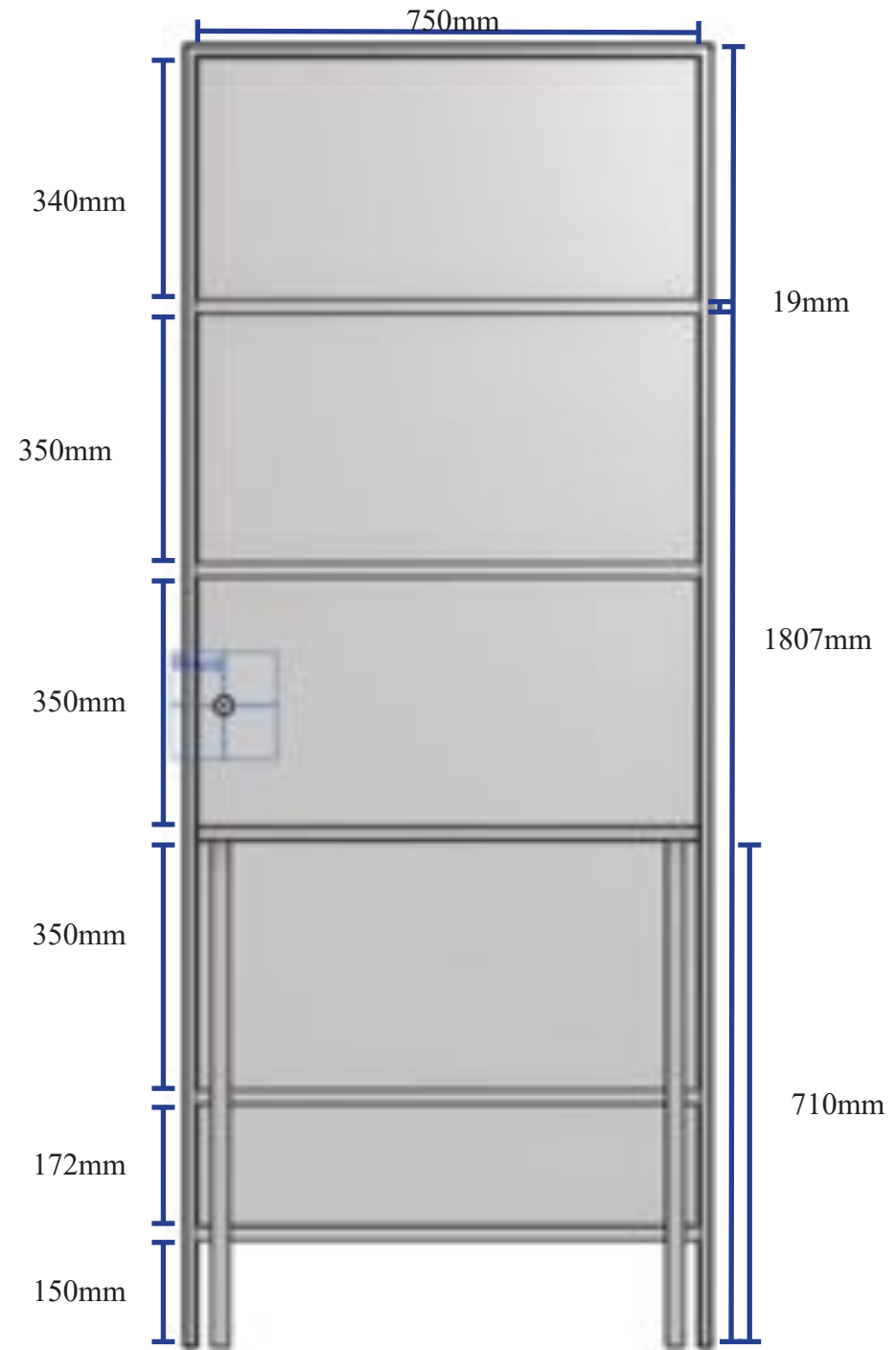


The sides are going to be grooved from the bottom to the top and going across the top and back to the bottom of the other side and LED strip lights are going to be placed there.



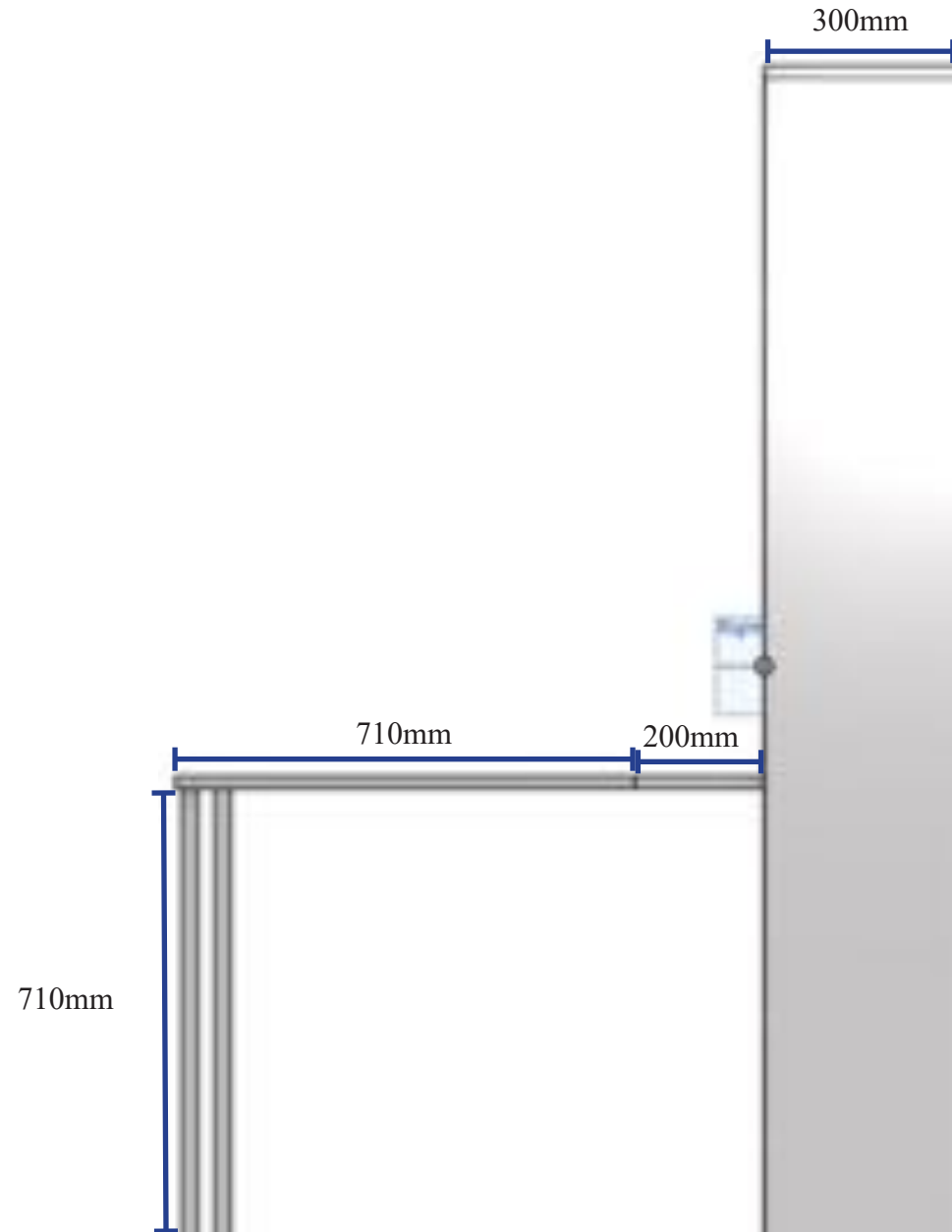
# Application of Conclusion

Full Sketch with Measurement - Front View



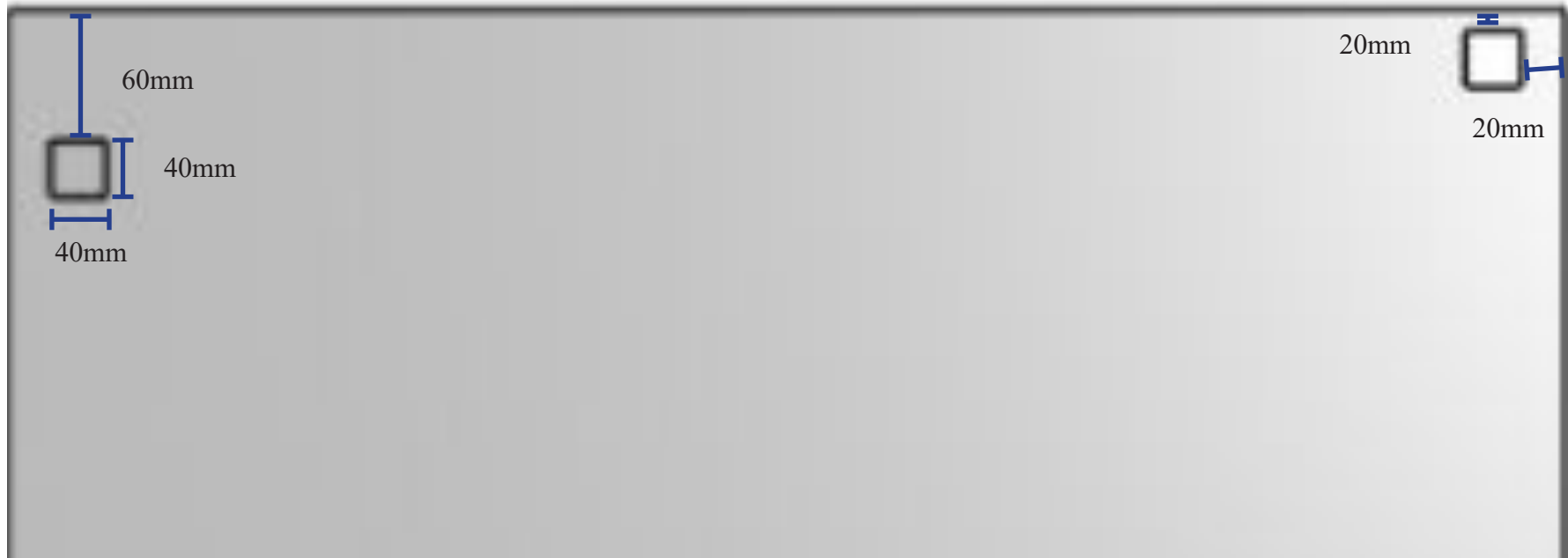
# Application of Conclusion

Full Sketch with Measurement - Right Side View



# Application of Conclusion

Full Sketch with Measurement - Bottom View of The Legs



# Application of Conclusion

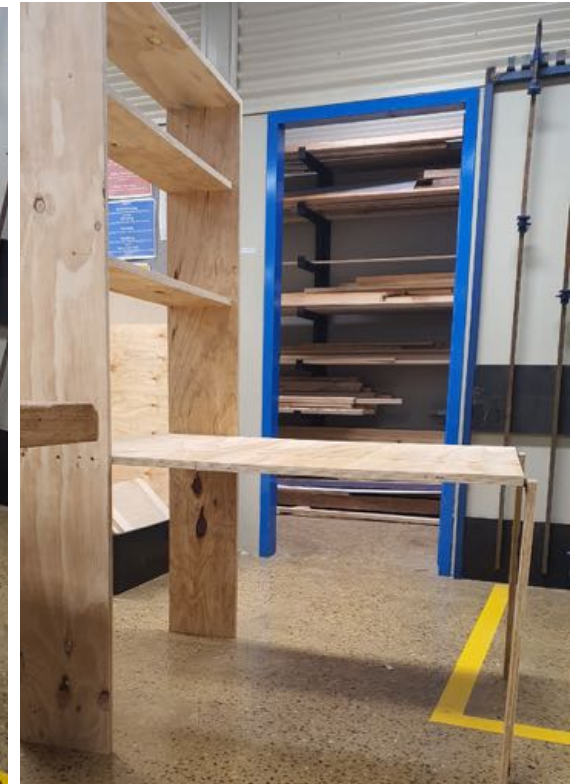
## Final prototype

This was a prototype which I first made and the legs were at the end of the desk. This made it look so not professional and I had to change the position.

So I had think about it and find solutions that could help me with the problem.

I considered so many solutions but all were unsuccessful.

At the end I decided to to change its position into a new place which was the below one.



## ONGOING EVALUATION - Application of Conclusion

After I was all done with prototyping, I developed so many techniques, skills and ideas. I now know what to do to make it so much better than the prototype and produce a high quality product at the end. By concluding all the research and experimentation, I know what my final product will look like. The final sketch of my design in OnShape is with all the correct and new measurements for my final product. I changed the measurements because the prototype one looked very weird and it was not neat at all. I think the final measurement is the best and suitable measurements for my final product.

## Identification & Justification of Ideas and Resources used

Resources Used		
Time	Material & Tools	Information
<p>Time mangement was very important in my major project. This is because most of the parts took long to do which was applying tung oil and letting it dry and later on I had to apply another coat again.</p> <p>I chose to not rush through the process and made time to do every bit during the class lesson.</p>	<p>While constructing my design I had to think of the best material option I can use to make the process easier and to create a high quality product at the same time.</p> <p>For some parts of the process I used manual materials if possible to reduce the risk of ruining anything.</p> <p>I had to research about the materials and tools to understand a basic concept of them.</p>	<p>Learning about what type of material is the best to solve my problem was an important moement to make decisions. After I found the appropriate option to go for, I had to find more information about it to see if there is more options about it.</p> <p>Out of all the types of woods available I chose to go with local company who sold ply sheets for a cheaper price than any other companies as well as being environmentally friendly.</p> <p>I also had to find more information about what I will be using to finish off my product. I chose to use enamel white paint for the sides and the top shelf. For the rest of the pieces I chose tung oil to make the wood a golden colour and to shine. '</p>

## Identification & Justification of Ideas and Resources used

Ideas Used		
Skills	Material	Tools
There was so many skills adpted in the construction of my major work. The skills I used included problem solving and time management. I used problem solving in most of the parts in prototyping and in the construction.	I used ideas to choose which material is the best option and why is that. I also used my knowledge about any material I used in my major project.	I used so many tools to slove my problems. AS well as understanding when to use the tools in the right moment was also important.  Tools such as saw machines were used by a teacher, to reduce the risks for a student.

### ONGOING EVALUATION - Resources & Ideas

I did not certainly use many resources in my MDP. The only great resource was my teacher, because I got all the help from him. As I did not know much about woodwork.



## Use of Communication & Presentation Techniques

Through this portfolio I have used many communication and presentation techniques such as sketches, tables, bubble diagrams, collages, and bullet points. I have shown sketches in pages of 17-19 and 44-47.

Tables can be seen through pages of 6-9, 20-23 and 49-50.

Bubbles diagram is done in page 15.

Collages are also presented through pages of 4, 16, 25-43, 48.

Bullet points are also seen in 20-22 in the tables where PMI is explained for each existing product.

### ONGOING EVALUATION - Communication

In my MDP folio used many techniques to present and communicate my ideas. These included tables, bubble diagrams, collages and dot points.

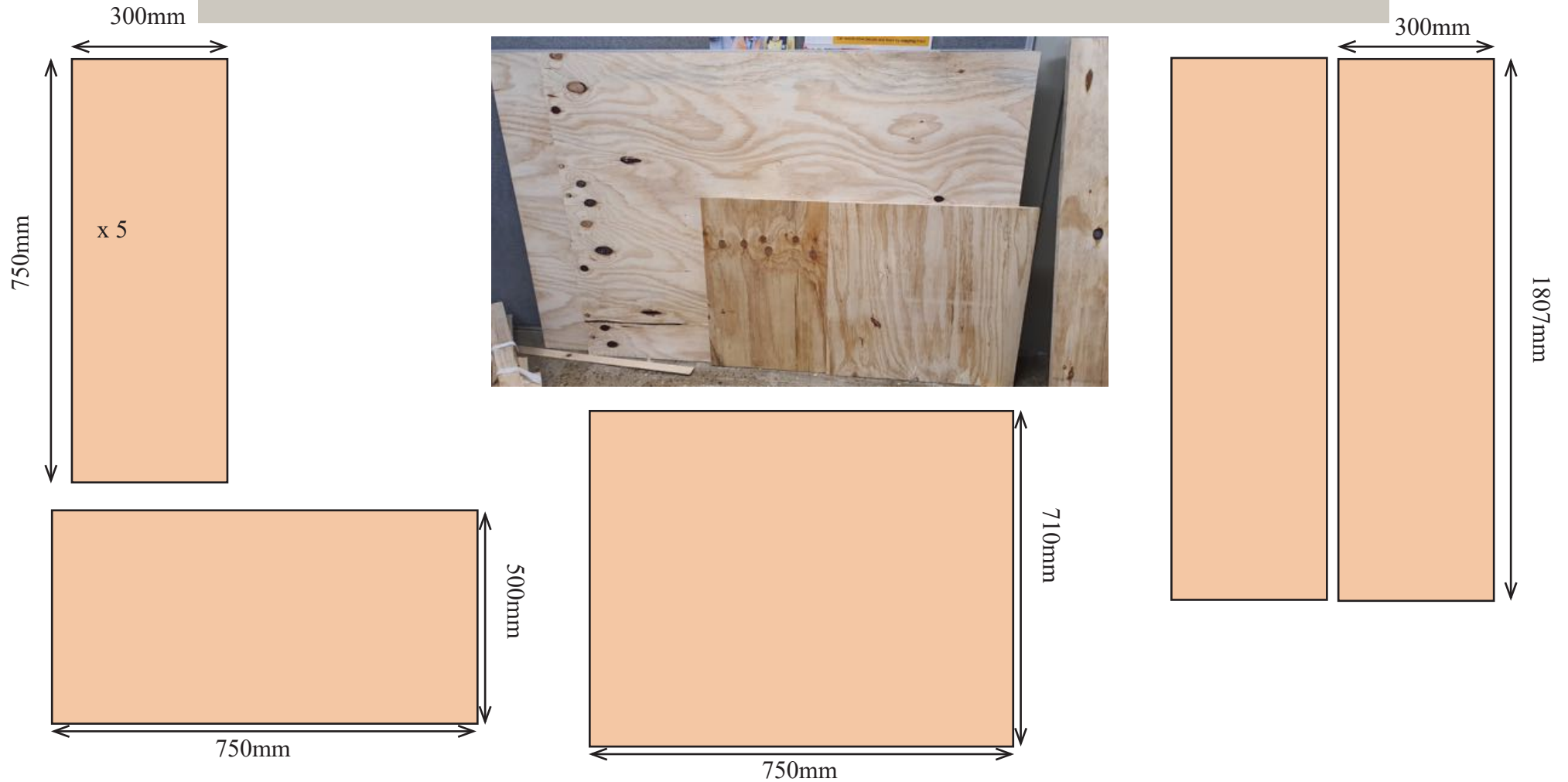


# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 1. Cut the pieces

I first drew the measurements on the ply sheet, then used the table-saw to cut them. For the shelves and the sides I only drew one on the ply sheet, then used that one as a model to cut the rest of them.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 2. Cut the joint part for shelves

From testing and prototyping, I learned that I can make the shelves more stronger if I use this technique. This is where the shelf is going to join the side.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 3. Trenching for the shelves

Here I used the guid that I made while prototyping to trench the sides where the shelves are going to be place. The trench size was less than 1cm. This was to ensure the shelves are secured tightly to the sides. After trenching I had to sand it to smooth it out and made a whole for where the screws were going to be placed.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 4. Trenching for the LED Strip Lights

After prototyping on how to install the strip, I had to trench where it was going to be place. I liked this idea, because it made my product to look neater and if the adhesive tape of the strip were not strong enough it would still be secured to not fall off.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 5. Plastering & Sanding

After having all the pieces it was time to fill in any wholes/gaps with the plasterboard to make a smooth surface. I had to wait for a 4-6 hours or even a day to let it dry and then apply again, because once it got dried it would sink in. After I was done plastering I had to use a sand paper to smooth the surface.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 6. Painting

After refining the top shelf and both the sides, it was time to paint them. I applied about 3-4 coats, because the paint was watery. The great thing is that while I was painting, it used to get dry faster than I expected, it took about 20-30 minutes.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 7. Oiling

I wanted the desk and the shelves to not be painted and instead be oiled to give a more natural look as well. I used a brush to apply the oil and I did about 3-6 coats for each of them, which it took a day to fully dry and 1-4 hours to be semi-dried.

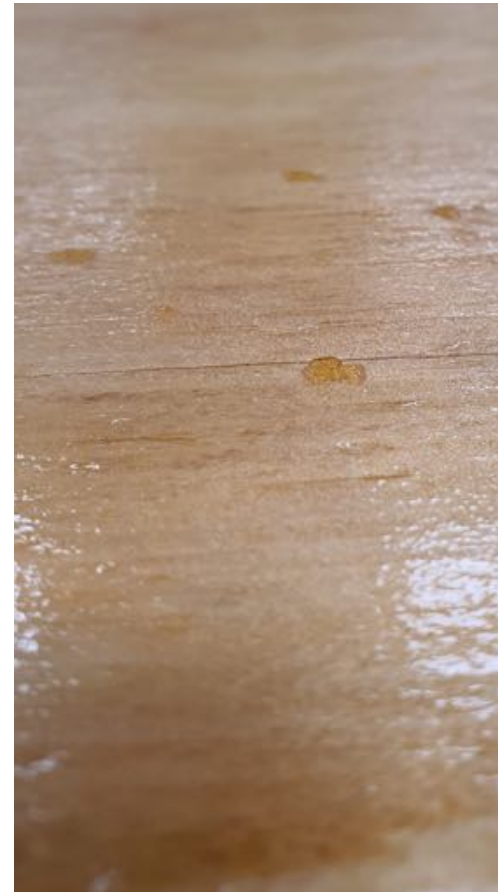


# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 8. Wetsand paper for the oiled pieces

Applying tung oil was a difficult process as it kept getting thicker and looking like gel, which left little clumps on the surface. To solve this problem and smooth the surface I used a wet sand paper.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 9. Cutting

I decided to add a board at the back of it. So I cut this part to give the back board some support which there wouldn't be only the shevles supporting the back. As well as this is not seenable.

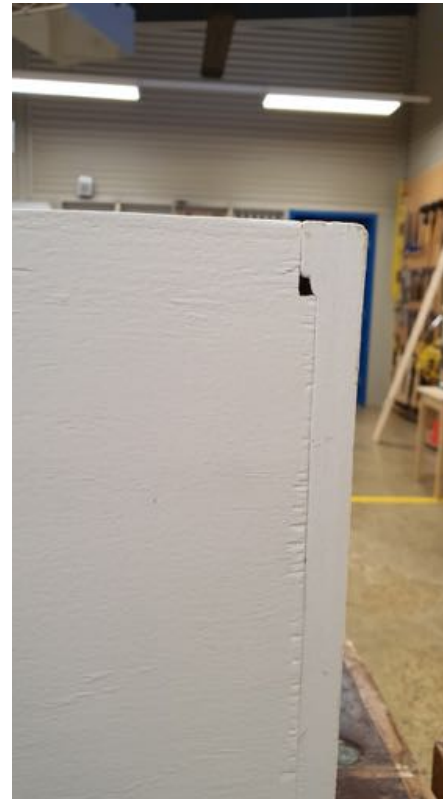


# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 10. Joining top shelf to the sides

After I had all the pieces, it was time to join everything together. First I did the top shelf. While doing this I had some problem with the heights which I had to make sure they are both equal. I had to adjust them so there is no bumps.

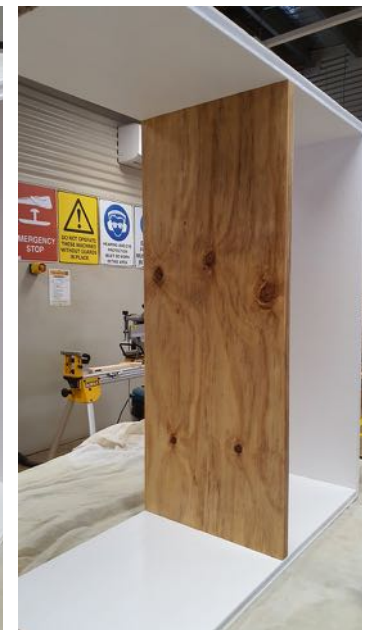


# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 11. Joining the shelves

After the top shelf was done, I continued joining the rest of the shelves plus putting the screws in. I had to ensure they are perfectly in. I faced a problem when I was placing one of the shelf which was that it couldn't fit in so I scraped that area to fit in easier.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 12. Back cover

After I was done with joining the shelves, I had to place the back cover. I did this with a stapler air gun around the back and on the places where there was a shelf to make it secure.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 13. Hinge for the desk

Here I was placing the hinge with a screw driver. During this process I had to make sure that there is no bump at the top and the bottom, so I had to adjust it perfectly.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 14. Making the legs

I had to choose which type of pine wood I wanted for the legs. I chose the rectangular shape pine because it is light weighted, fits the aesthetic and it is as strong as the other cubic pine. Then I had to make sure it is smooth using a hand plane.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 15. Hinge for the legs

I used the left over of the continuous hinge I used for the desk. Due to not having four holes I had to make a whole on the other end so that it can be secured.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 16. Magnet for the legs

The problem I had was that the legs were swinging and it was annoying. So to solve this I used a magnet to secure the legs to the desk so it does not move.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 17. The bottom stand

While folding the desk down, the desk was too low and it couldn't fold properly. To solve this I cut four pieces of this small wood to place it under the bottom instead of cutting the end of the desk to solve the solution. Another benefit of this was that placing this, it would lessen ruining the carpet.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 18. Covering the screws

To cover the screws, I used screws caps and a hammer. I had to use the hammer lightly so I don't damage anything. For some of the screws being too deep in, I used hot glue to stick it in.



# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 19. Fixing the trench

I changed the idea of the LED strips running along each side and doing a join at the bottom to going from the bottom to the top and again going all the way down. This was also a positive idea because the LED strips being at the top will give off a nice reflection to my ceiling.

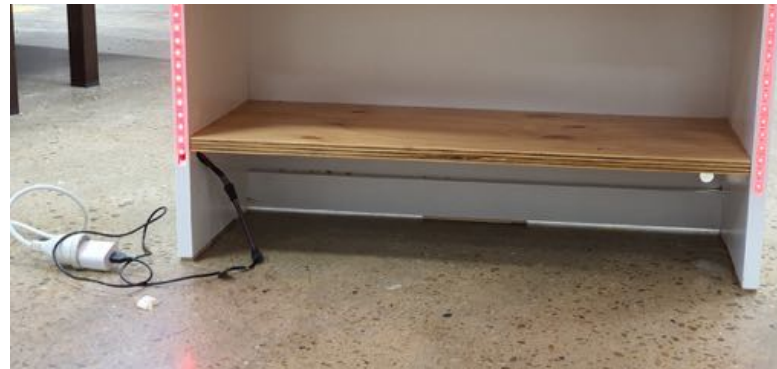


# Evidence & Application of Practical Skills to Produce a Quality Product

## Step-By-Step Process

### 20. Installing LED Light Strips

After I was completely done, I installed the LED strips. I also have a choice where to sit whether it is at the front or the side, which will preferably be the side.



## Comparison Look between The Prototype and The Final Product



### ONGOING EVALUATION - Comparison

I think I have made a high quality product at the end. The end product look so much better and stronger than the prototype one. This also includes the size and how neat it is.

# Evaluation

## Recording & Application of Evaluation Procedures throughout the Design Project

In my portfolio, I used so many techniques to communicate the process of my MDP. One of the things I did was to do ongoing evaluation after each part of the folio. The ongoing evaluations helped me to understand and summarise the whole point of the page/section.



### ONGOING EVALUATION - -----

I used this box to communicate the ongoing evaluation in my portfolio.

# Analysis & Evaluation of Functional & Aesthetic Aspects of Design

Through out my major work I kept evaluating my design solutions and everything in aspect of my design brief, criteria of evaluation to success and the need. It was certainly important to continue doing this technique.

## Criteria to Evaluate Success

### Functional:

**Size: It must fit in my room.** I believe that I have covered this criteria in my MDP. Before everything I made sure that I have measured my room and had a place in my mind of where I am going to place it in my room.

**Need: It must have organisational storage.** While designing my desk I had to think of a product that can fit in my room plus importantly it has spaces for storing all my books, folder and other extra things. This was the main need of my MDP and I have covered this parrrt as well.

**Compact: It must be compact.** I had to think of a design that is multifunctional and at the same time be compact and neat. My product is used as a study desk as well as a bookshelf. While you don't want to study you can fold the desk down and have a neat and organised room.

**Cost: The materials should be in the budget.** I made sure that the materials I was buying were in a cheaper price as well as being in high quality. This was a little bit hard as most of the materials should have been sustainable and in high quality to be able to produce a quality product. But I tried to stay as cheap as possible so I don't go above the budget.

**Strength: The shelves must be strong to not fall.** After the prototype I did at early stages I knew that I had to make some changes to how the shelves are joined to the sidse. I did a trench in for the joints and put screws in so it is 100% stronger than the prototype.

### Aesthetic:

**Style Design - It must be scandinavian design, which is matching the style with another product.** Before deciding to paint, oil and other extra finishing touches, I had to decide what colours I was going for to match my room decor and be unique to the market. I wanted to match it with my chair which was white. So I did not want to paint it all white as it would look so dry and not unique. So I decided to pain the sides and top shelf and oil the sheves and desk. This gave my product a very contrasting look about using white to match my chair and having the natural look of the shelves.

**Colour Appropriate - The colour must be matching my room style.** As I mntioned I chose two colours for my product, white and golden timber. I painted with the enamel white which gave no fumes and was not harming the environment. Then I used tung oil to make the shelves shine and have that nataural golden timber colour look. I beleive I have covered this criteria in my product because it certainly does match my room decor which is white and other colour. As well as putting the LED lights on my product has helped me to even change the theme of my room like if I wanted to give my room a cool trendy colour it would be red but if I wanted to make it look natural I can use green and blue.

**Quality - It must be to a high standard quality.** I believe that I have created a high quality product and it is durable. It is durable because I have made sure about the strength and I have resarched about the wood I used. Also my desk is water proof because of the paint I used and the tnug oil.

**Time - It must be completed before the due date.** I finished creating my desk as early as possible to start evaulating and see if there is anything else that needs to be fixed. This allowed me to have an opportunity to produce a high quality product.

## Evaluation - Impact on Individual, Society, & the Environment

### Impact of MDP on Individuals

My product has a huge impact specifically on the individuals. My product makes life tasks so much easier and efficient this includes increase in productivity, having a compact area for studying, not taking so much space of a room, and basically a space to use as organising your stuff, using it for studying and can be used as a decorative bookshelf. This desk allows the individual to organise their stuff how they like on the selves, such as putting stuff they don't like at the bottom shelves where it will be covered by the desk and putting things they like the most on the top shelves. Which means it impacts the aesthetic style of their rooms as well. I believe that my product will improve the quality of life to high extent for students, which will give them so much space to organise their stuff and the LED lights gives off a great trendy theme to their rooms which will motivate them to be more productive. My product is safe and easy to use as it will not harm anyone in particular. To use this study desk, users need to just unfold the desk and start working on whatever they want such as school works and other things.

By creating my MDP, I was able to learn so many new skills and techniques for finding solutions. The most common skill I learned in this project was that I should never stop thinking of ways to solve the problems I encountered. During creating my major work I faced so many problems with the design that I was going to make, and I had to think of a solution for each of them.

There was so many techniques used in the construction part, where I found techniques to make the process faster and run smoother. This ranged from measuring techniques to installing the LED strips techniques.

After successfully finishing my MDP, I was able to develop my knowledge about the new techniques and the skills I learned.

Overall I am very happy and proud of myself that I was able to finish my MDP successfully and meeting the need. I think I have innovatively solved my problem, because I have never seen a study desk like what I created.

## Evaluation - Impact on Individual, Society, & the Environment

### Impact of MDP on Society

- . One of the impacts my product has on the society is that my product will be an affordable desk for those students with small room but with lots of stuff that has no storage space.
- . The ply sheets I used to create my desk was bought from a local company. I was able to both use it for my MDP and help our local company by purchasing their goods.
- . I believe that my product will help people, in particular high school or university students. It helps students to have an organised study area and become motivated to study.
- . In a broader view, I think it would help the country as well. This is because if we have productive and hard working students in our country then they would be able to build and help our country. So my desk will be able to give students productivity and able to concentrate if their room is neat and organised.

### Impact of MDP on Environment

- . I can assure that my product has made a less than minimal impact on the environment
- . The paint I used to paint the sides and the top shelf was enamel white, which was a sustainable material in my major work. This paint is sustainable because it does not produce fumes nor it harms the environment.
- . The paint causes no damage to the environment, because it creates no fumes and it is not chemically harming anything.
- . The tung oil is the most natural oil to use for timber and it causes no harm to the environment.
- . As well as the timber used is as sustainable, recyclable and durable.
- . Overall, I believe that I have created a product that is recyclable and it does not harm the environment. I think that I also helped our local company that produces sustainable and environmentally friendly ply sheets.

The environment that my desk is going to be used in is bedrooms because it is to be used as a study space or it can be used anywhere in the house.

# Relationship of the Final Product, System or Environment to the Project Proposal

## Identification of the Need & Design Brief

For my MDP, I was hoping to be able to solve a problem which was the lack of space in my small room that makes me so unmotivated to study. I believe that I have made a product that is going to help me and help other students.

Overall, I am extremely happy and proud of my self with the final look and how multifunction it is.

