LITTLE FREE LIBRARY

EPortfolio 2023

Contents

Introduction Page

Throughout this ePortfolio these general questions below will be developed and answered by the students.

Factual:

- What is globalisation?
- What is social sustainability?
- What methods do we use to connect and collaborate with one another?

Conceptual:

- Why are global interactions important?
- How can design improve communication?

Debatable:

- Is the increase of global interaction a risk?

Criteria A: Inquiring and Analysing

Explain and Justify the Need for a Solution

Many international schools have limited access to reading material because of the price and difficulty of acquiring books in multiple languages. A Little Free Library is beneficial to the community because it allows for better access to reading materials and works to combat illiteracy. A Little Free Library has a diverse amount of literature materials to choose from, encourages people to give back to the community, and teaches kindness to bring back the books taken. Reading has shown to boost brain activity, improve communication skills, enhance creativity, and reduce stress, (University of the People, 2022). To improve our world, we ought to improve the literacy rate for all. According to TheirWorld, 750 million adults are illiterate, 2 thirds being women, and more than 393 million children. A Little Free Library will give students the opportunity to combat illiteracy and enhance their education by providing them with a diverse amount of resources and giving them an opportunity to give back to their community.

International schools have students from around the world. A Little Free Library will allow students to have access to books written in different languages and provide access for books in their own native language that may be difficult to acquire. Building a Little Free Library will create a closer connection between students and staff and increase students' feeling of belonging.

Identify and Prioritise the Research

Show Evidence of Primary and Secondary Resources

Primary Questions:

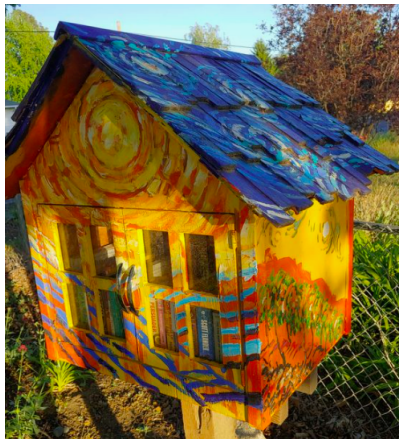
- Is a more colourful outside decoration better to attract students?
- Should a window be included for a better view of the books inside of the library?
- What is the best size so that the little free library is big enough to fit an appropriate amount of books?
- Would a door or detachable roof have better access?
- Where is the best place to put the little free library for better access?

Secondary Questions:

- How have others constructed little free libraries?
- Which colours go best together for the best look?
- What designs attract a passers eye?

Analyse a Range of Existing Products that Inspire a Solution to the Problem.

My research has revealed that most little free libraries have a house-like shape and colourful exterior to attract the attention of students and fit the storytelling aesthetic. Below are examples of little free libraries, most will have a theme that remains constant throughout the house. My target audience for this project is between the ages of 5-14 and so therefore I will create a theme that coincides with the idea of imagination. I will also include an opening and closing door for the best access to the books inside and a window in the door so that a passerby may observe the books inside throughout differing seasons in the year. This will benefit the design because previous structures have shown that this increases students' curiosity to the content inside and increases their chance to grab a book from the library.



For my product I will have a library that is tall rather than wide, like the first image, so that I may include two levels for more books, with the second level having more vertical space so that hardcovers may fit. This design has shown to be most popular because it fits a larger number of books and books of different sizes. I will also follow a coherent theme throughout the library to attract viewers with the different colours in the house. Themes have been shown to be very appealing to the user's eye and have been shown in previous models. Lastly I plan on including a see-through door, using perspex so that we do not have to worry about glass breaking, and so that others may see the books inside. I would change the slanted roof in the third photo for a more homely looking one like the first two images, because this is more appealing to the eye and offers more room. These design specifications will allow for a visibly attractive little library and a working design for the easiest use.

Connection to Global Context and Statement of Inquiry

Research has concluded that there is a need for increased access to reading materials, and to combat this I plan to create an aesthetically appealing and efficient little free library. I will create my library with the global context, “Globalisation and Sustainability,” and the statement of inquiry, “Effective collaboration can be enhanced through design in a highly interconnected world” statement of inquiry,” in mind. By using recycled materials, such as nails, wood, etc. and creating a space for sharing learning materials, a little free library allows for the opportunity for recycled books to be shared and enjoyed by others, decreasing the amount of trees cut down to print new books. Thus by creating a more sustainable environment and encouraging globalisation, the process by which businesses or other organisations develop international influence or start operating on an international scale (Oxford Dictionary) a little free library encourages the sharing of ideas and recycling books so that others may enjoy them. Therefore a little free library encourages the sharing of new and old ideas, increasing one's curiosity and pursuit of education, and saving money and resources.

Criteria B: Developing Ideas
Develop Design Ideas

Design Specifications which Clearly State the Success Criteria for the Design of a Solution.

Function:

- My little free library will store various reading materials.
- My little free library will be placed around neighbourhoods and schools to improve access to literature materials and encourage reading.

Size:

- The little free library will be 0.7 metres in length, 0.92 metres in height, and 0.3 metres in depth.

Aesthetics:

- My little free library will take the shape of an enlarged bird house with opening/closing doors, a window to see the materials inside, a roof, and four sides. The library will have two shelves on the inside and will stand on a wooden beam.
- My little free library will be centred around the design of a tree. The main theme for my library is the pursuit and "growth" of knowledge represented by the tree.

Cost:

- My project targets communities so the cost should not be too expensive but the product ought to be made from recyclable materials and have a sturdy design.

Customer:

- My product appeals to the younger generation but is supposed to be bought by communities. This allows for a more stable and efficient product to be built which requires a higher price point.
- My little free library is meant to be shared in a small community.

Materials:

- My product will need wood planks, nails, perspex, paint (several different colours), and varnish.

Safety:

- My product is targeted towards children so I will have properly sanded down my project (to prevent splinters), have no sharp edges, loose nails, or glass.

Environment:

- My product will live in a shared space (a lobby of a school, in a neighbourhood, or hospital).
- The little free library will be placed so everyone has access.

Product Specifications

Average Book dimensions:

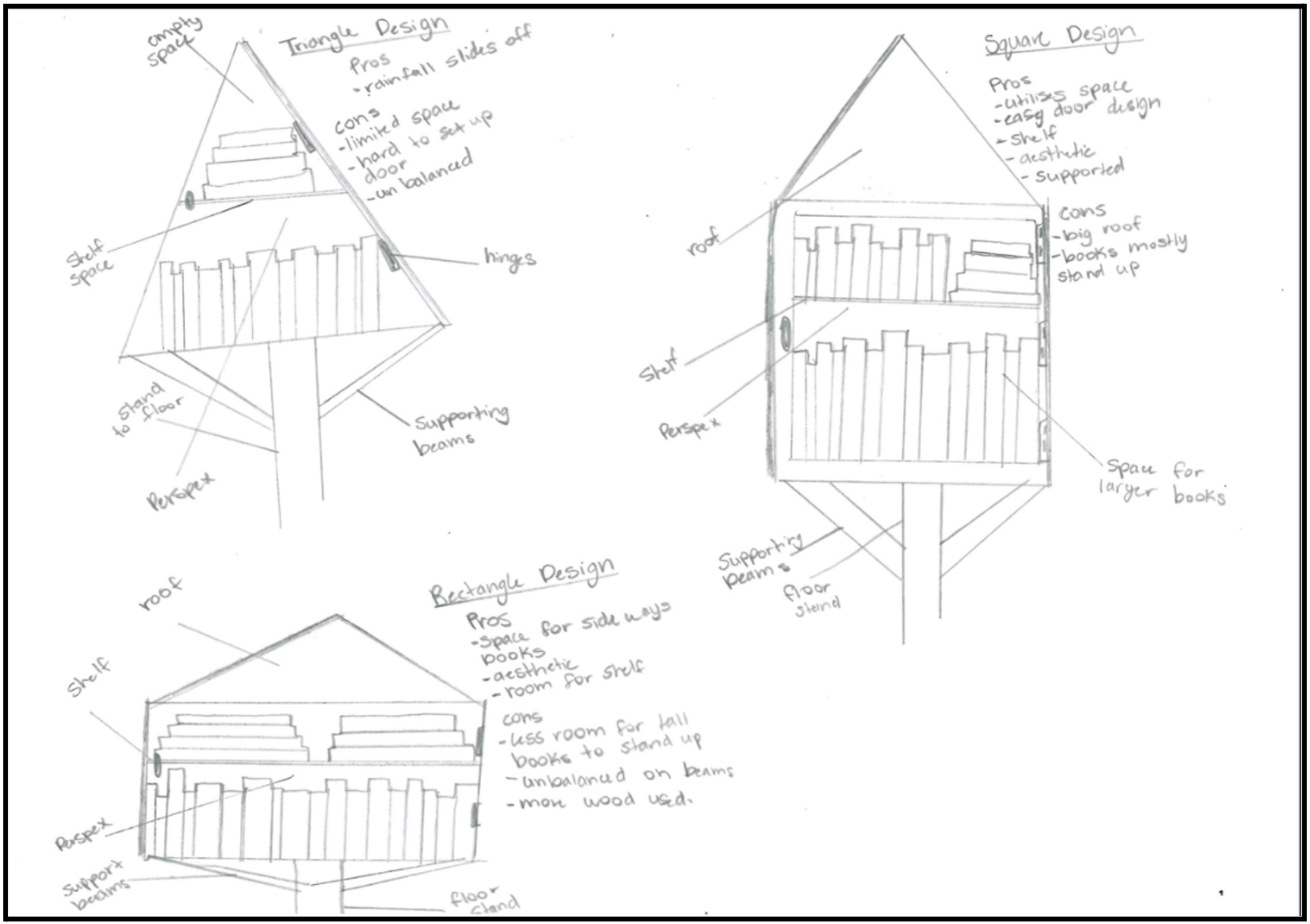
- Hard Cover: 24.77cm x 20.96cm
- Softcover: 24.10cm x 20.32cm

Average Hinge dimensions:

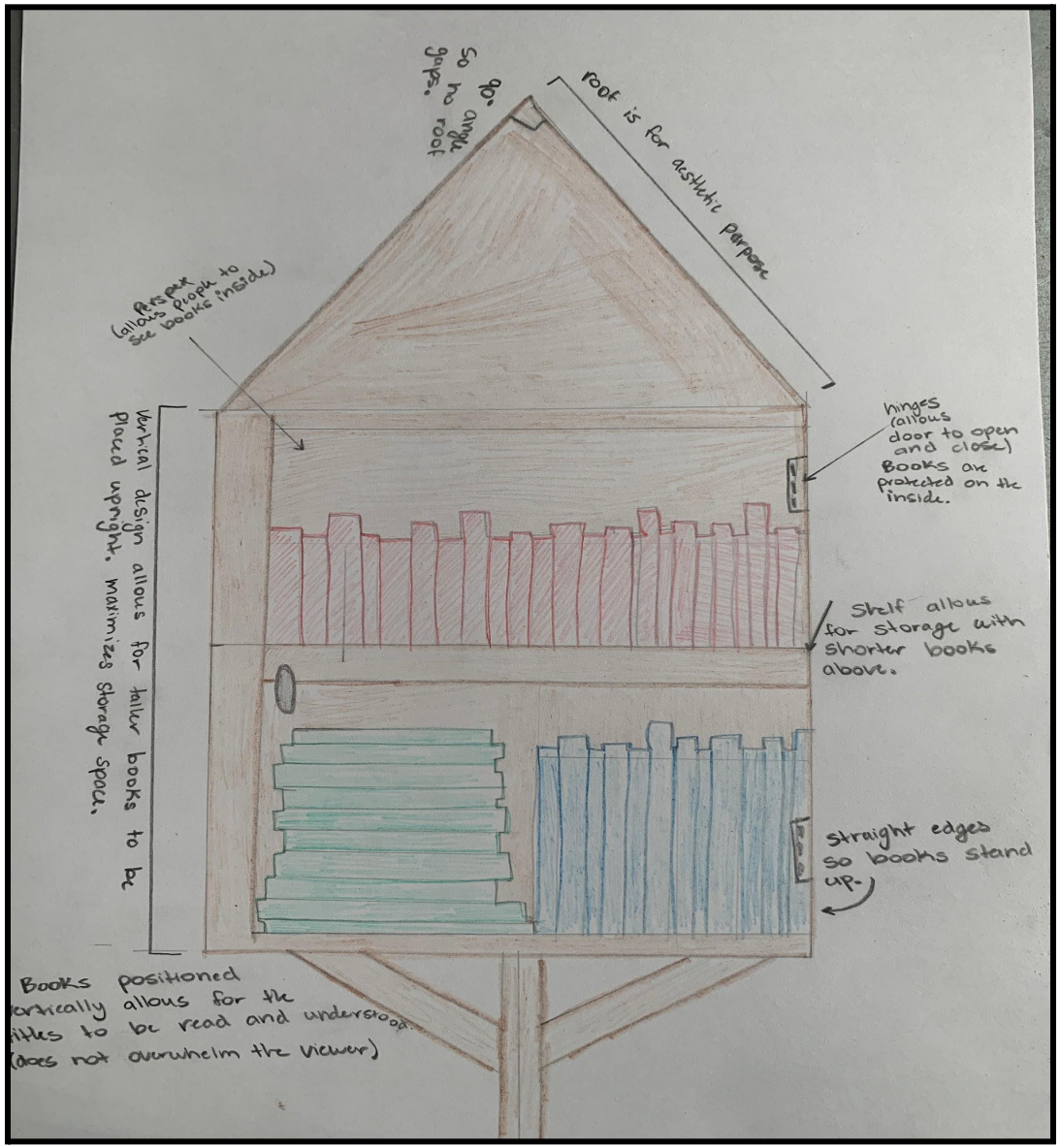
- 45mm, 48mm, and 52mm

Develop a Design Specification

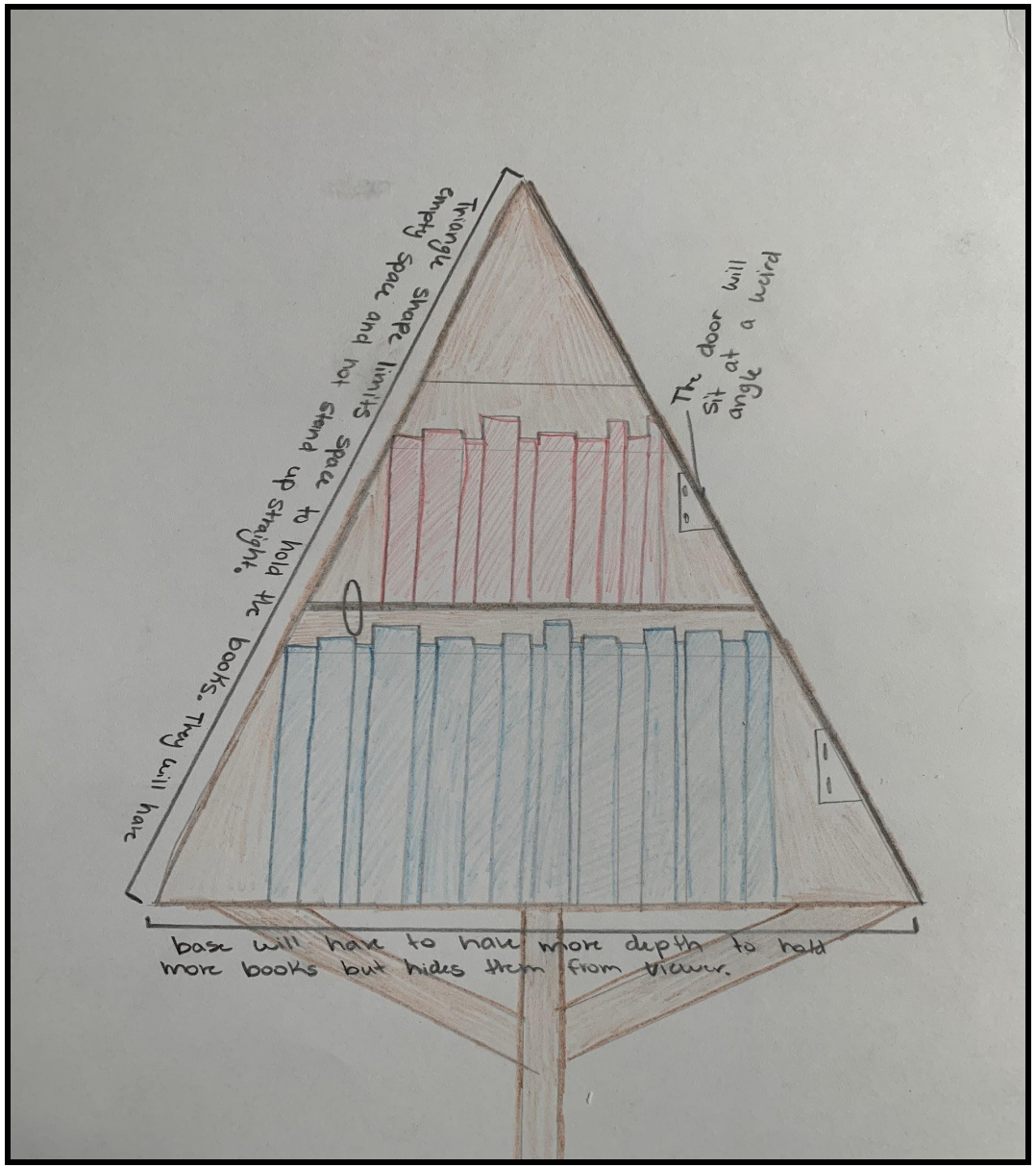
Initial Ideas



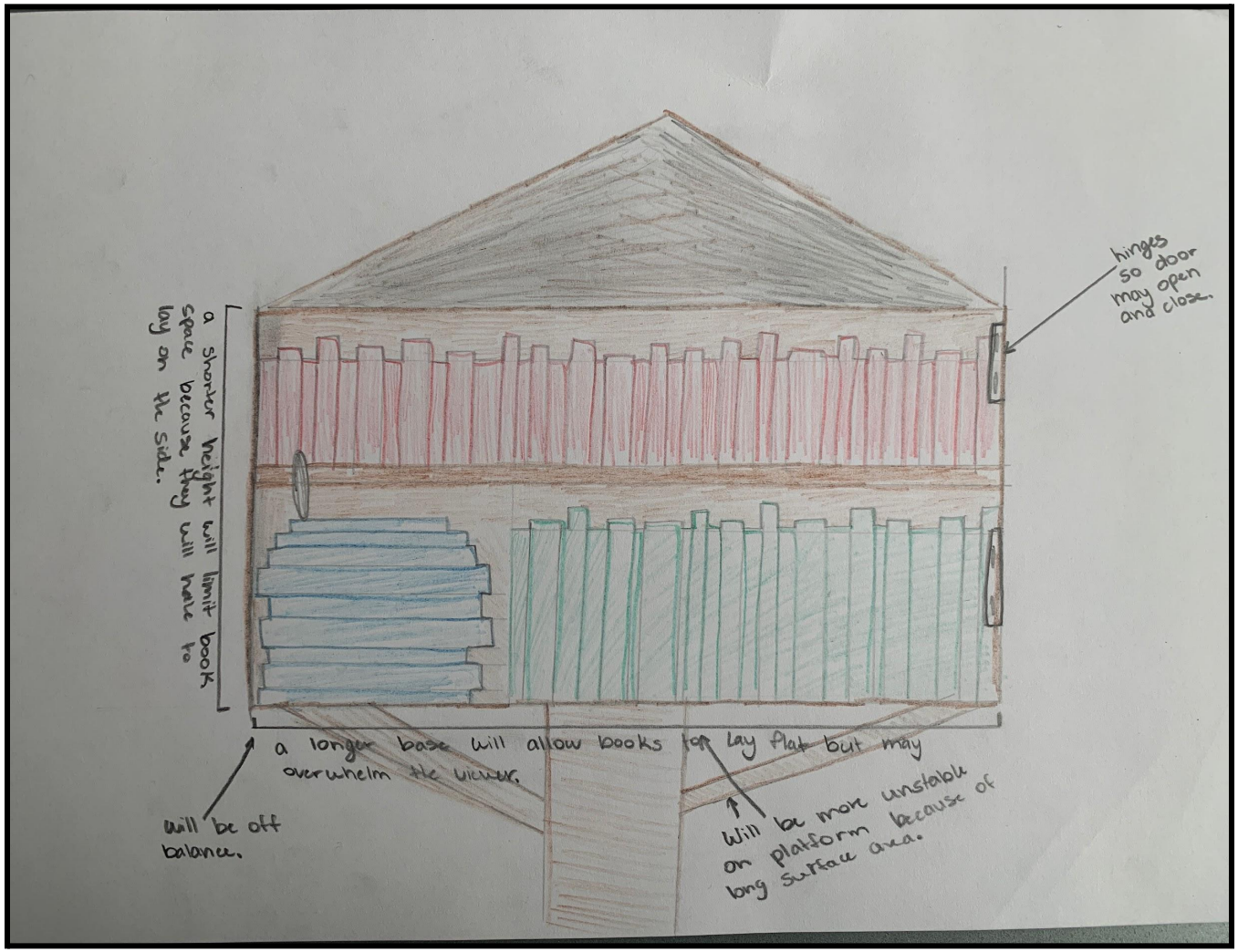
Developed Idea 1



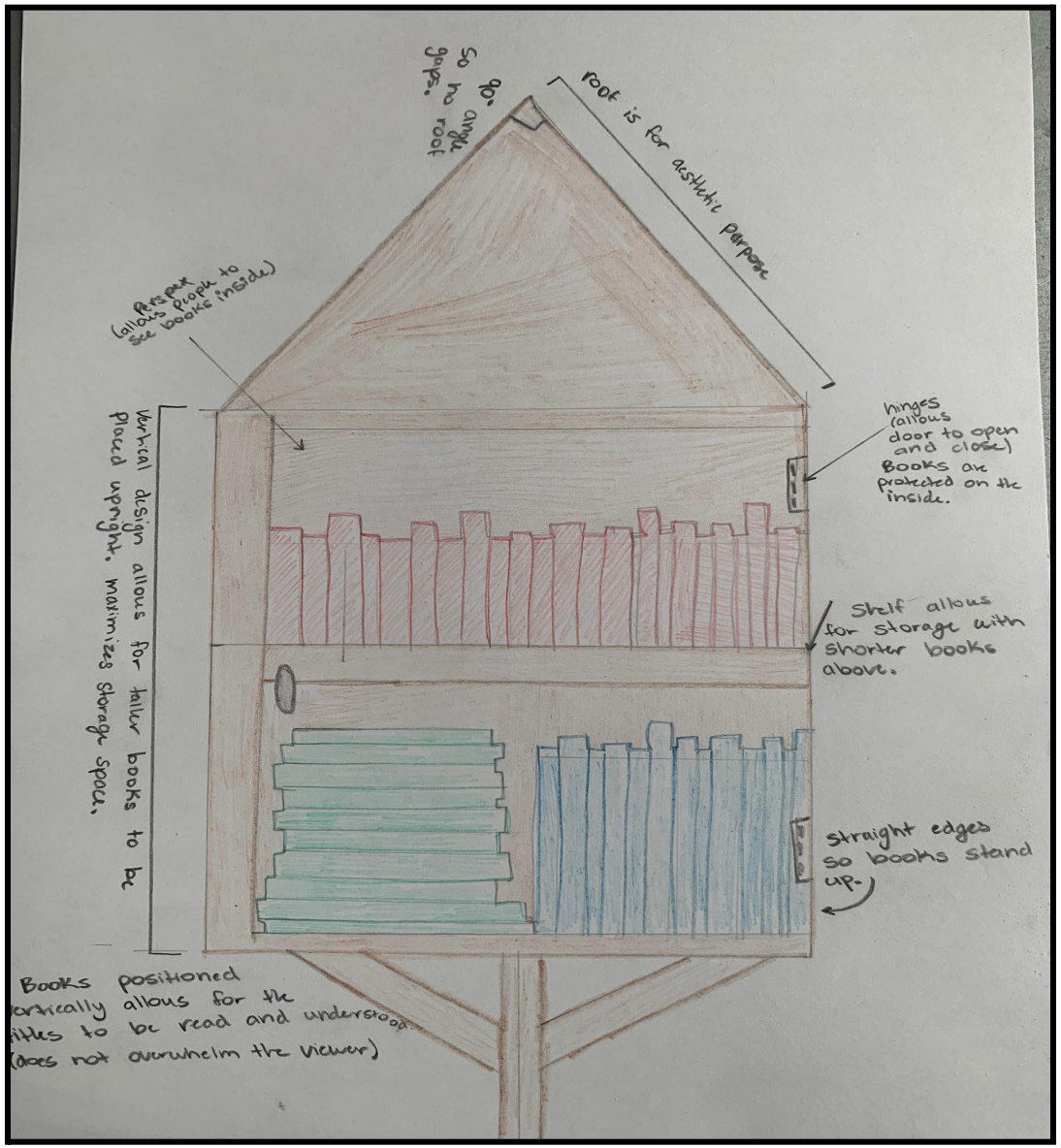
Developed Idea 2



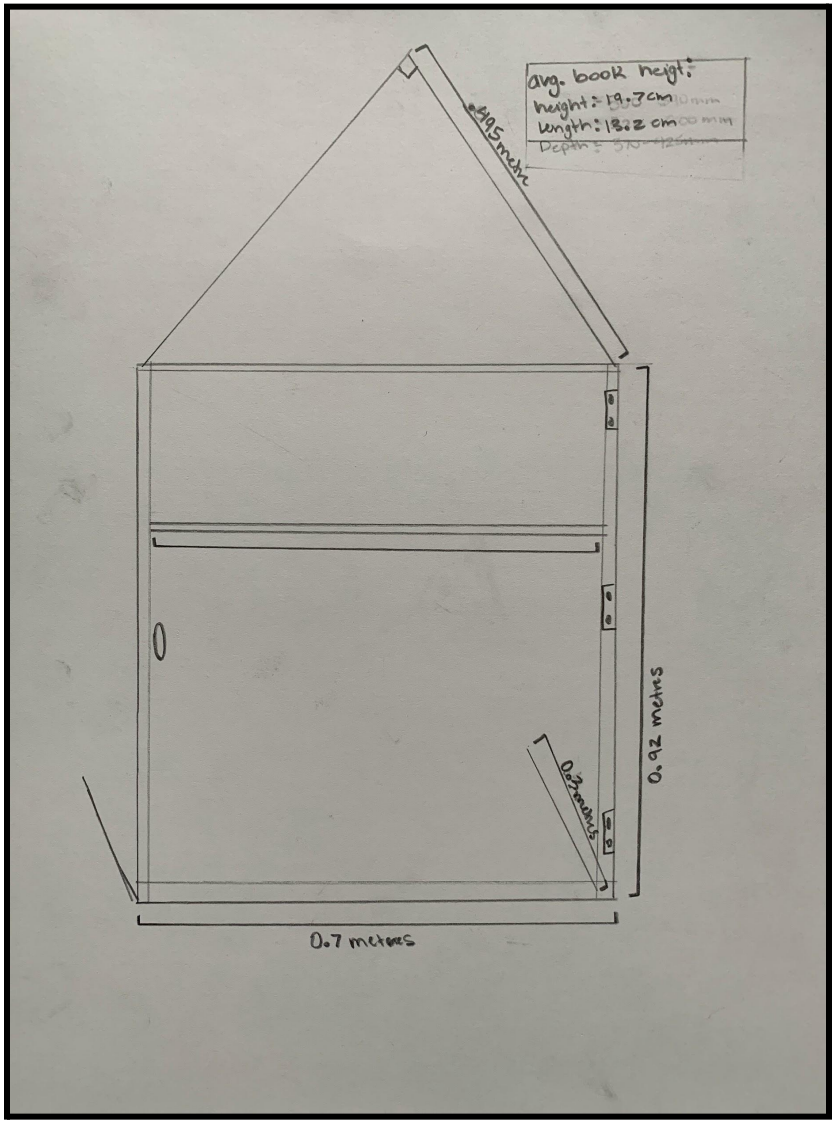
Developed Idea 3

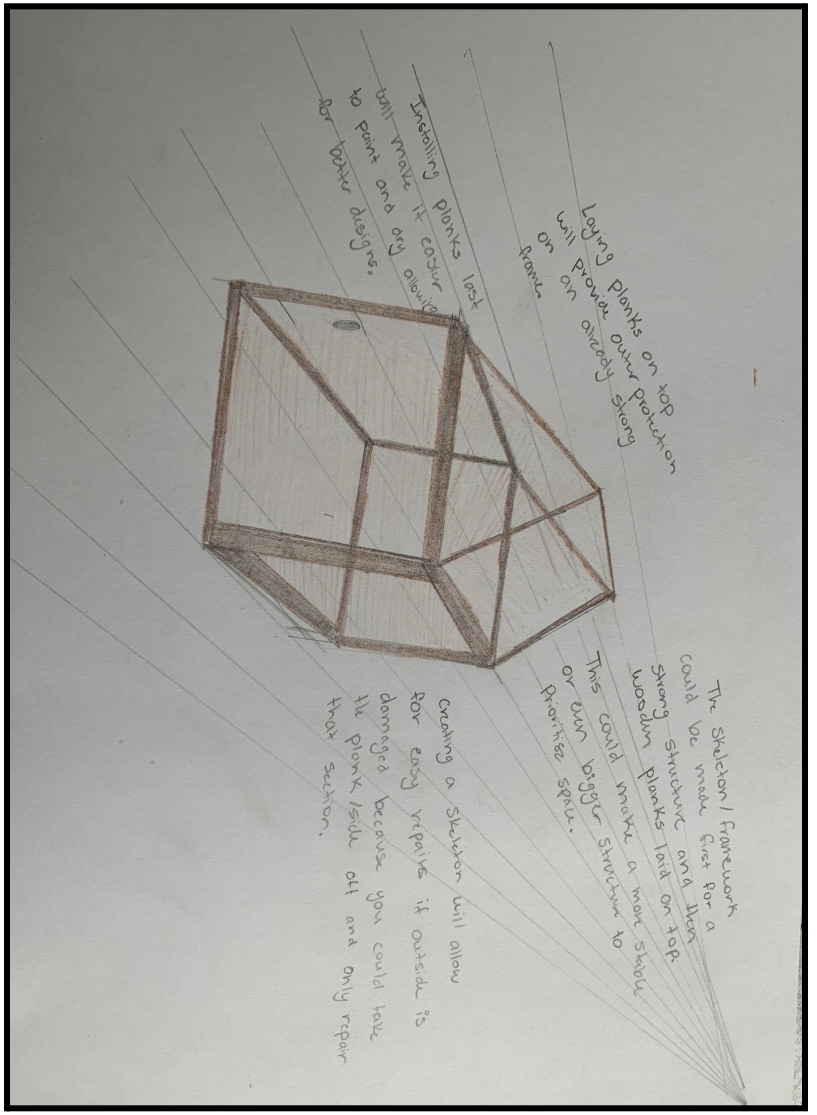


Present the Chosen Design



The chosen design has a square-like shape with a shelf on the inside. This design has a perspex door (so one may see the books inside), room for hardcovers to stand up horizontally, and is balanced on the support beams. This design uses the least materials for the highest amount of space while being aesthetically pleasing.

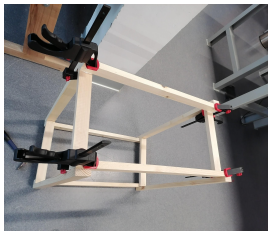

avg. book height:
height: 19.7cm
length: 13.2 cm
0.695 metres
0.92 metres
0.7 metres


The skeleton/ framework could be made first for a strong structure and then wooden planks laid on top.
This could make a more stable or even bigger structure to prioritise span.
Creating a skeleton will allow for easy repairs if outside is damaged because you could take the plank inside at and only repair that section.
Laying planks on top will provide outer protection on already strong frame.
Installing planks last will make it easier to paint and dry allowing for better designs.

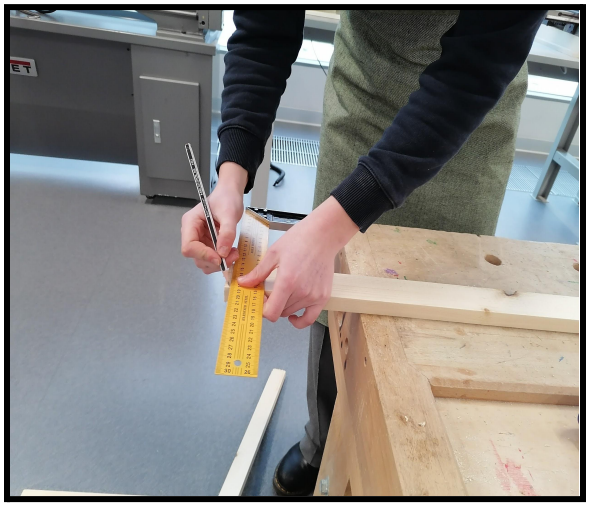
Criteria C: Product Analysis, Design, and Manufacture

Construct a Logical Plan

Timeline

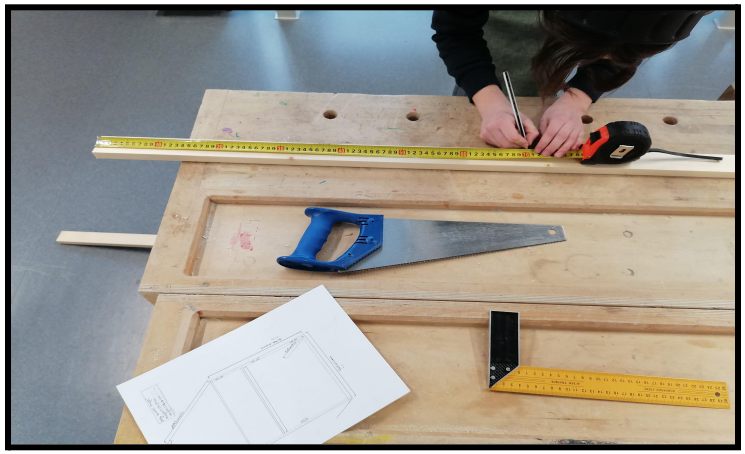
Part of the Structure	Skeleton	Shelves	Walls	Roof	Aesthetics
Picture					
Description	Begin by building the skeleton/frame of the library. By building a frame, the structure will be more secure and easier to build upon.	Next, build upon the skeleton/frame to add three shelves, two shelves for books, and one for blankets (this shelf is under the roof)	After building the shelfs, add medium density fibre wood to the sides (except the front)	Build upon the structure to add the roof above the third shelf.	Add the finishing touches, sanding, paint, struts, and wood stain.)
Date	Jan. 9-20	Jan. 23-Feb. 10	Feb. 13-24	Feb. 27-Mar. 10	Mar. 10-20

Demonstrating Technical Skills



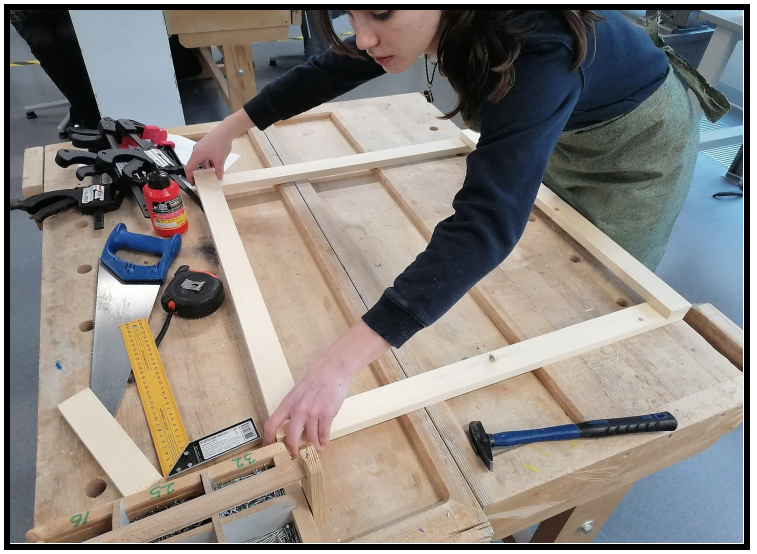
Step 1: Cutting the Wood for the Base Frame/Skeleton

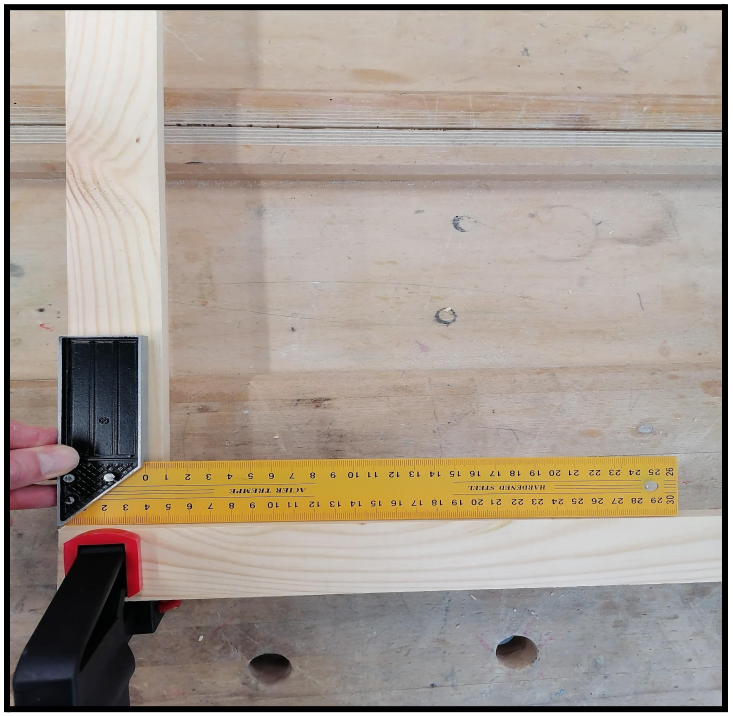
In this first step I measured out the dimensions of the frame. I would work to build two sides in this step, both with the same measurements. I began with measuring the front side with a height of 0.72 metres and a width of 0.7 metres after marking less than half a centimetre from the end so I may sand down both sides (see photo directly to the right.) To measure the length and width of the wood, I used a measuring tape, try-square, and pencil. You may observe this in the second photo with me marking the line where I would have to cut the access wood off. Instead of beginning from the direct end of the wood I began from the line I marked in the beginning (to ensure both sides may be sanded down properly) so that the length was properly measured. Next, I used a handsaw to cut off the excess wood. It was crucial that I cut not exactly on the pencil line but half a centimetre away. This is important because in the next step I sanded down the wood so that the edges were straight, the length was even for all planks used, and for safety to prevent potential splinters. After sanding I measured all the planks to guarantee they were uniform before I began to nail them together. I did this for four planks in total, two with the length of 7.2 metres and two the length of 7 metres.



Step 2: Fixing the Dimensions of the Skeleton/Frame

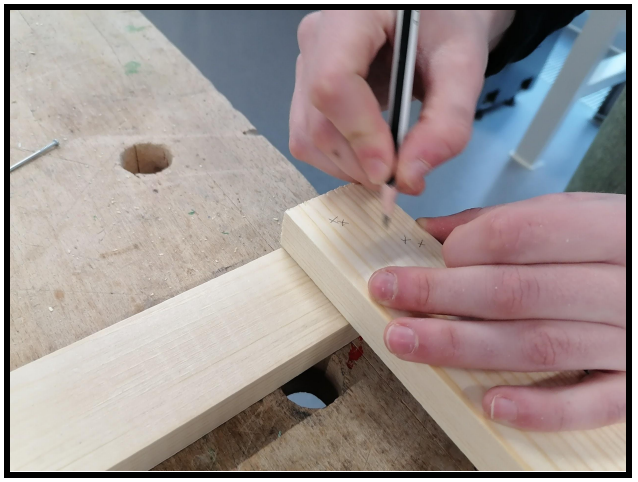
I began by setting the wood in the position I would hammer it in to guarantee the length of the wood was correct, all angles were 90 degrees, and there would be no mistakes in the structural integrity when I begin to hammer the wood together. When putting the planks together, I noticed that the square was not equal on all sides so I had to remeasure the planks and sand them down again. After fixing my mistake, I used a tape measure to remeasure the planks to guarantee they were all equal. Next, using a trisquare, I checked that each plank lined up at a perfect 90 degree angle. This is an important step because it guarantees a stable structure.

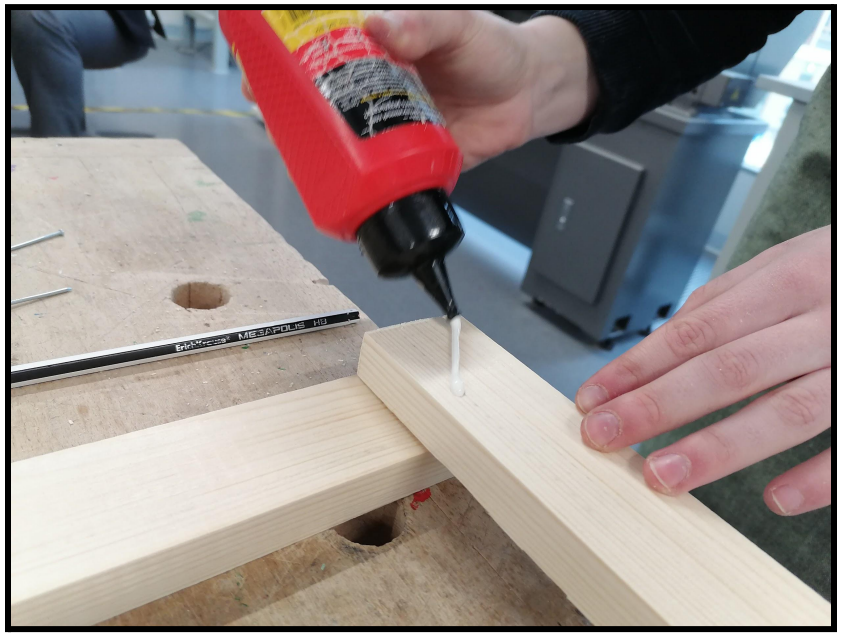




Step 3: Nailing the Frame/Skeleton Together:

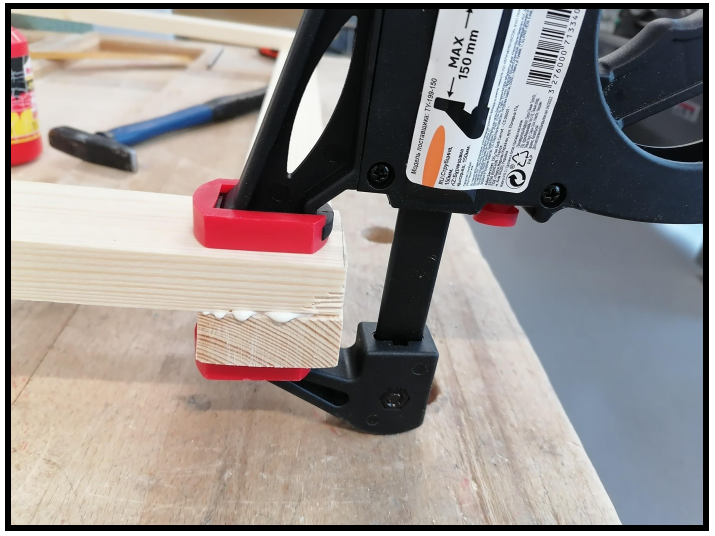
To join the wood together, I used two 32 mm nails on each end of the planks, on each edge, therefore using 8 nails in all and wood glue. I began this process by marking the placement of each nail with an x, allowing me to guarantee each nail was centred and would not splinter the wood when hammered in. On the backside (where the x was not labelled) I put a minimal line of wood glue to better join the planks together when I hammered them in. Then I placed the 0.72 metre plank at a right angle to the 0.7 metre plank and carefully began to hammer the nails in. When hammering the nails it is important to hammer with one hand supporting the nail so that it is hit firmly on the top and not at a weird angle. By hitting the nail at the wrong angle it can prevent you from hammering it in securely, damaging the nail, and the nail's effectiveness. After hammering in both nails, using a damp paper towel, wipe off the excess glue.

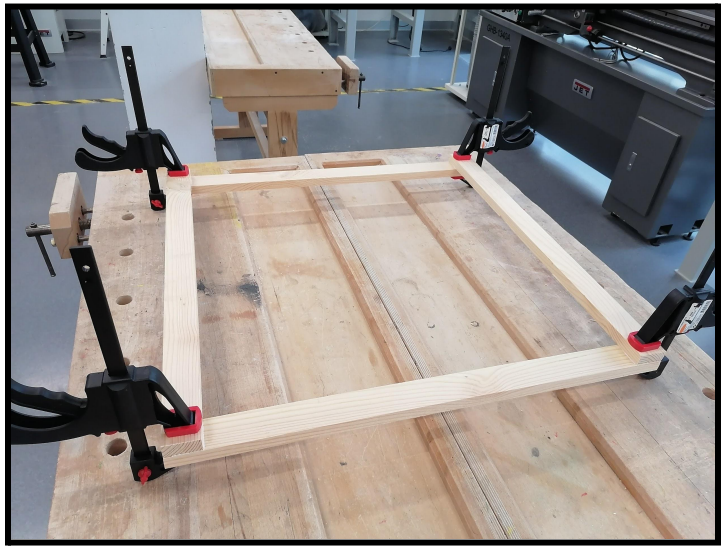




Step 4: Ensuring the Frame's Structural Integrity

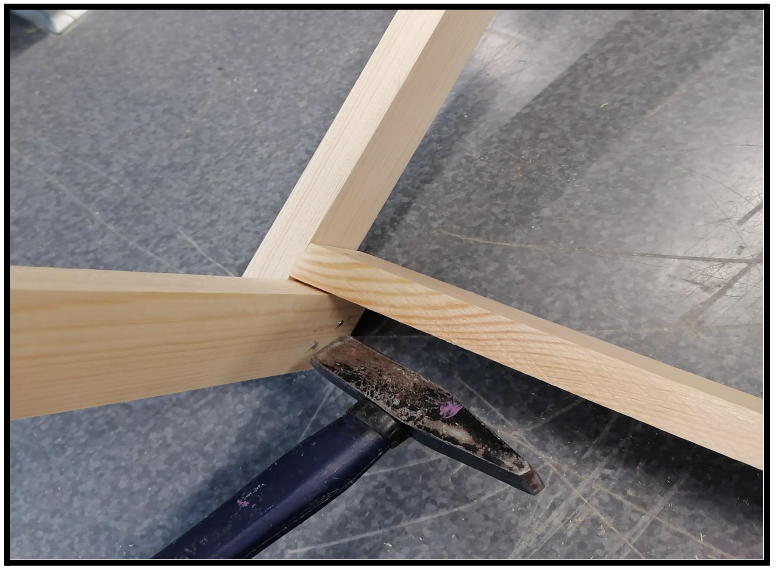
In this step we ensure the frame is properly put together and secured by using clamps. I attached the clamps at every edge of the square and tightened them until the excess glue spilled around the edges. Next, I used a paper towel to wipe off the excess glue and let the square frame rest overnight. I repeated steps 1-4 for two frames.





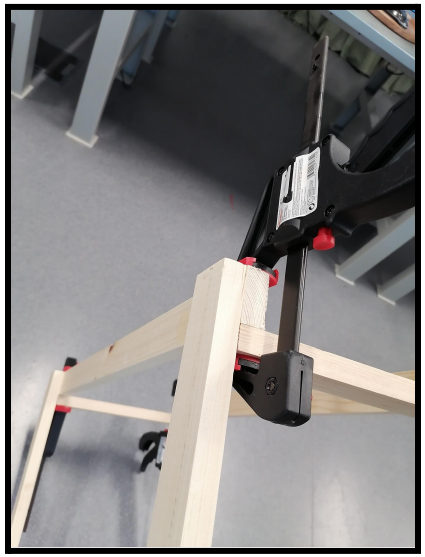
Step 5: Adding Sides to the Frames

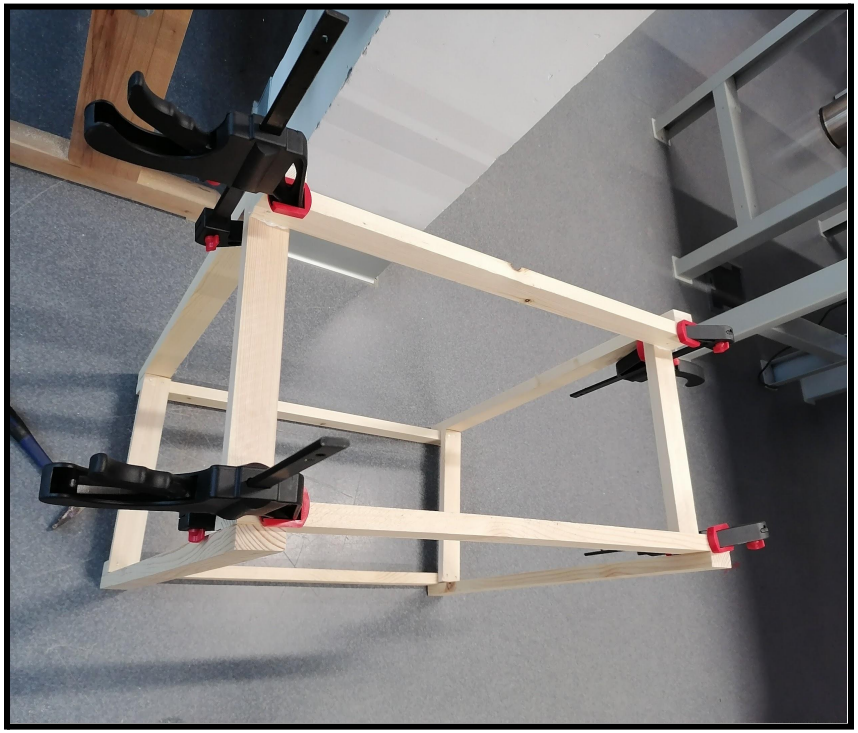
In this step I worked on joining the two frames together to create a rectangular frame/skeleton for my little free library by adding a piece of wood at each edge to create the width of the library. I began by measuring the length of the plank that will join the frame together. I repeated my process of marking half a centimetre from one side of the plank and measuring from this line so that I may sand down both sides of the plank and ensure the edges are straight. I measured the length of the plank to be 0.4 metres and used a handsaw to cut off the excess wood. To ensure the edges are straight, the planks are the proper length, and there are no safety risks (splinters, sharp edges, etc.), I sanded down both ends.. Next I remeasure the length of the plank to ensure it is the proper length and begin the process to nail it to one of the frames. To do this I marked each place the nails would be hammered in with pencil, applied glue on the backside and nailed the wood on the opposite plank connecting the wood to one frame. I repeated this process for every corner on one frame.

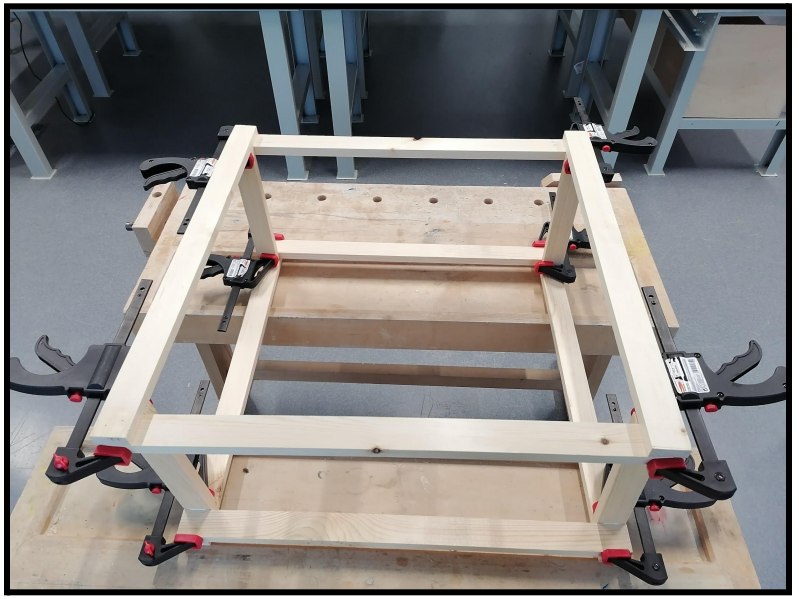


Step 6: Joining the Frames Together

In this step I joined the two frames together by hammering the “connecting” planks to the other frame. I repeated my process of nailing the wood together, beginning with the marks for each nail, glueing the underside of the wood, hammering the nails in, and wiping the excess glue off. Once I joined each corner of the frames together, I used clamps to ensure the structural integrity of the frame. I then let the frame rest overnight so the structure would remain sound and secure.

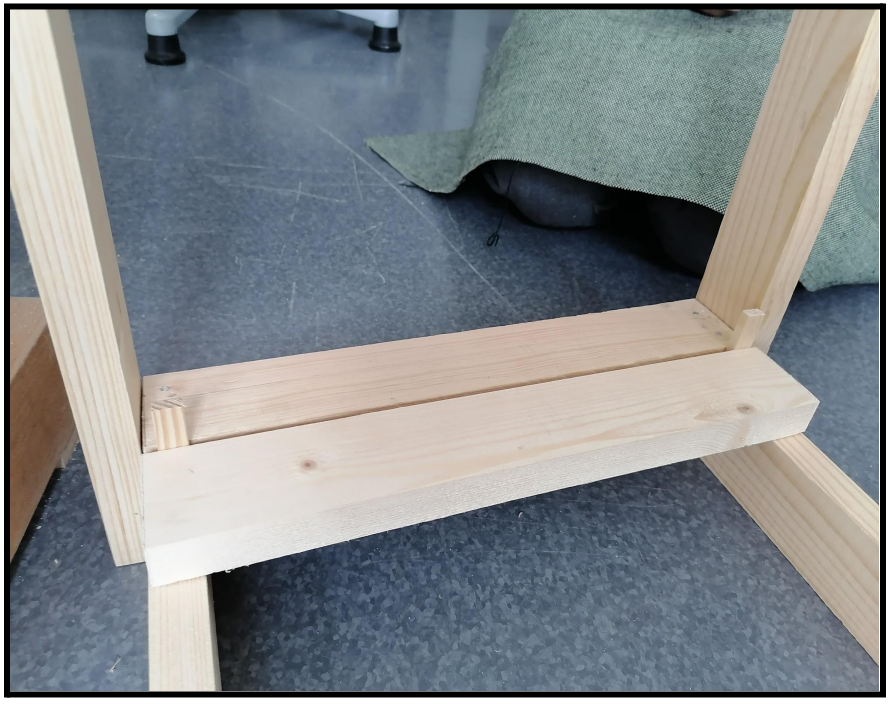






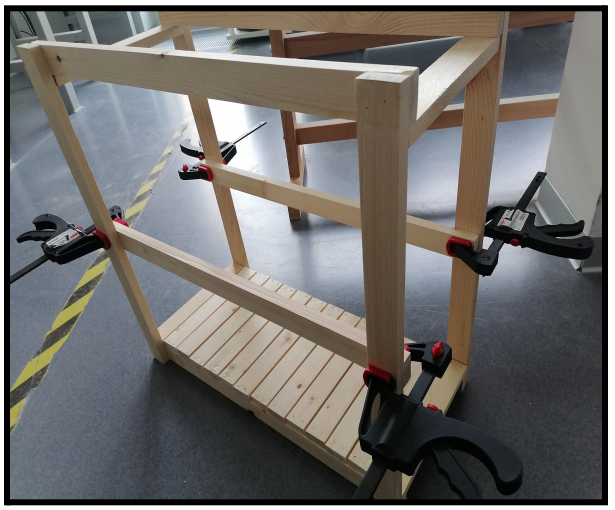
Step 7: Shelf One

For this step I worked on the bottom shelf of the little free library. I began by measuring 12 planks at the length of 0.4 metres each, using the same process as before when cutting and sanding the wood. Following this I cut two small pieces of wood the length of one centimetre to space out the planks. After researching, I discovered that if you leave space for the wood to "breathe" it would prolong the length it would last before rotting. Therefore when nailing the planks I used the two one centimetre wood pieces to separate and space the planks out. Finally I finished the bottom shelf by marking the place where I would hammer the nails in, at both ends of the plank, put glue on the backside of the plank, hammered the nails in (beginning with the opposite side and then alternating so that the wood planks would remain straight), and wiped the glue off.



Step 8: Building the Second Shelf

I began by cutting two planks, 0.7 metres, to be attached at half the height of the frame. To attach the planks you lay them on the inside of the frame and hammer the nails in on the top face of the wood (see picture to the right). To nail the planks together I marked the place where the nails would rest with an x, glued the bottom side, and hammered the nails in. Immediately after I used a clamp to ensure that the two planks would be secured firmly and rest it overnight. To finish the second shelf I repeated Step 7 but with 14 planks instead of 12 because the bottom shelf already had two planks as the connection between the two original frames.

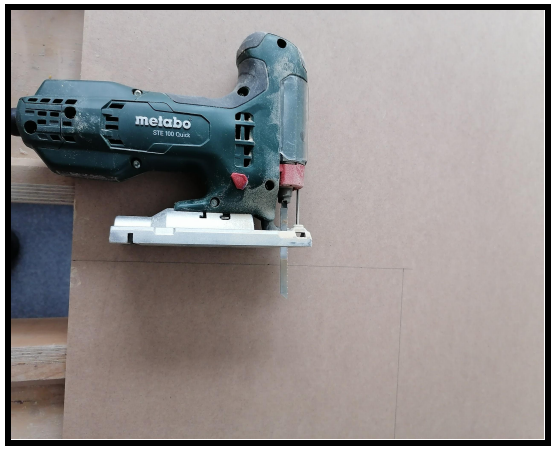


Step 9: Building the Third Shelf

Building the third shelf takes the same process as the second shelf but remember to place the beginning and last planks on the very top, and not on the inside of the wood. This shelf is used for blankets and other materials.

Step 10: Measuring and Cutting the Sideboards

In this step I measured the height and width of each face of the little free library, the sides are 34 by 72 centimetres and the front and backside are 70 by 72 centimetres. Then using the measurements I sketched the outline of a proportional rectangle onto medium density fibre wood (MDF) for each face besides the top and bottom. Following this I used a jigsaw to cut each side of the wood out. Next, I hammered the sides into the frame (following the same routine, marking the nails, putting glue on the sides, hammering the nails, and wiping the glue off.)

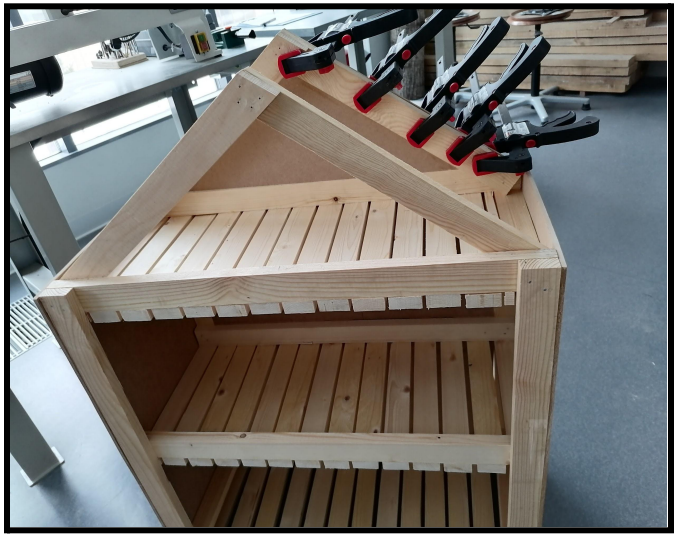


Step 11: Constructing the Roof

I began by cutting four planks a length of 64 cm and placed them together to guarantee they formed a perfect 90 degree angle by measuring them with a try-square. I nailed them, first together at the pinnacle to form a right angle triangle, then to the top corner. To secure them tightly I used clamps to force the glue together and seal the planks. I then repeated this step for the backside of the little free library.

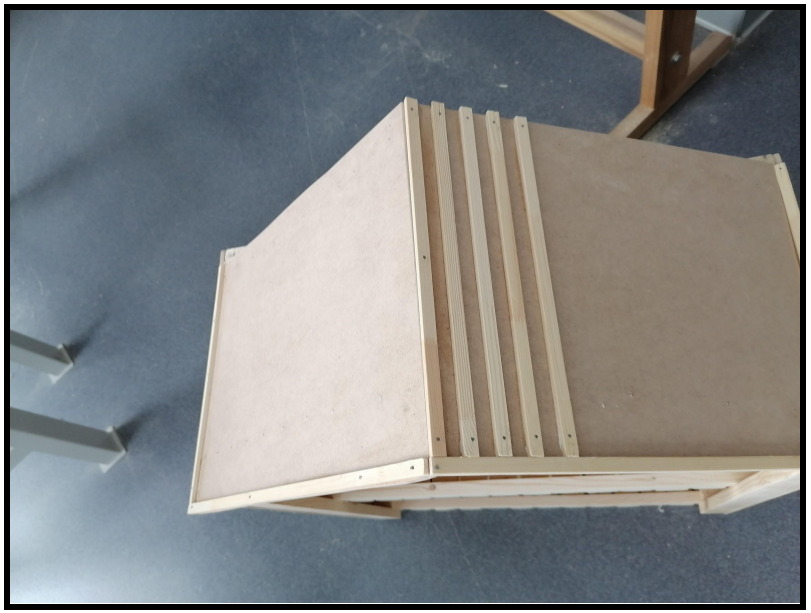
Step 12: Finishing the Roof

For this step, I work to attach the medium density fibre wood to the frame skeleton to create the roof. To begin I used the measurements of the length (44 cm) of the wood planks I cut previously and the distance between the two “triangles” (32 ½ cm) as the width of the MDF board, and traced my measurements on the board (repeat twice for two boards). Next I measured the outline of the triangle (bottom length 71 cm and two identical opposite sides 32 ½ cm) made by the wooden planks in the roof skeleton (use the highest side as the measurement since the board will completely cover the wooden skeleton), and transcribed the measurements onto a MDF board. Next, using a jigsaw I cut out the wooden boards, and proceeded to hammer the triangle piece to the backside on the front of the skeleton (see picture for clarification). To do this I glued the outer edges of the triangle and hammered the board using a total of 10 nails, 5 nails on each plank. Finally, I attached the rectangle pieces to the wooden frame at a 90 degree angle (begin by glueing and then hammering the boards to the skeleton. Make sure the nails are hammered into the planks that form the roof of the skeleton and do not splinter to the outside).



Step 13: Adding Wooden Struts for Aesthetics on the Roof

Wooden struts (long thin pieces of wood) are added to the project to give the little free library a treehouse aesthetic, but is not necessary for the build or structural integrity. To add the wooden struts onto the little free library, I measured the length of the roof from the front side to the back side, so the struts would lay horizontally across the structure. The struts for the roof were 32 ½ centimetres long. To nail them to the wooden board on the roof, you begin by marking the spot where the nails should be hammered in (one perfectly in the centre and the other two one centimetre from the edge) then partially hammer the nails into the strut (make sure they do not poke through the other side of the strut) and finally put glue on the bottom and place it at the bottom of the roof and hammer the nail all the way in. Make sure to wipe off the excess glue, repeat the past steps for each strut until you cover the entire roof, and separate each strut by ½ a centimetre.

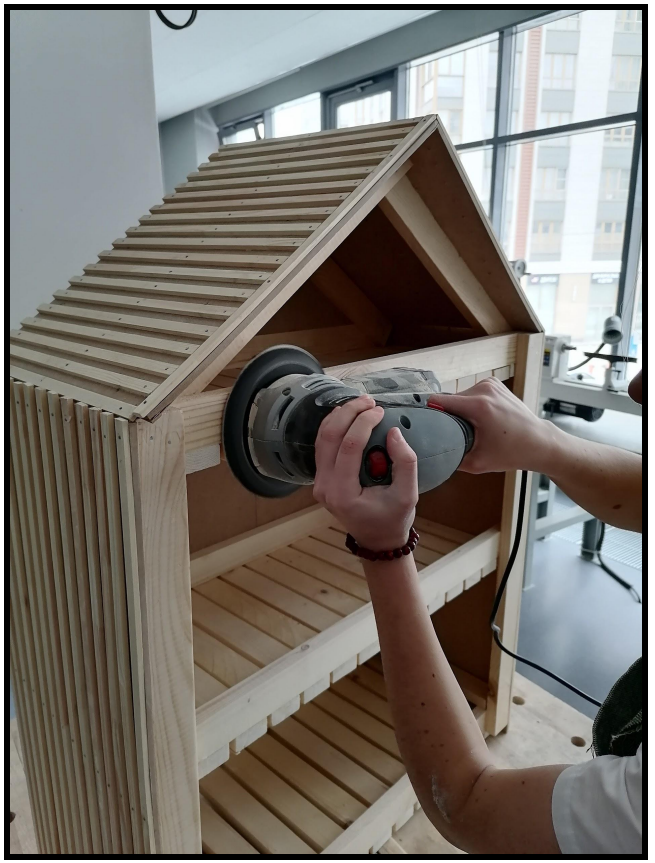


Step 14: Adding Wooden Struts for Aesthetics on the Sides

For this step, I repeated the steps to attach the wooden struts to the sides of the little free library that I did for the roof with adjustments to the length and the amount of struts used. I cut 28 (14 for each side) wooden struts with a length of 72 centimetres each. To attach the boards I repeated the process in the previous step.

Step 15: Sanding and Staining the Wood

In this final step, I sanded the outside wooden planks, using an orbital sander, to prevent splinters and prepare the wood to be stained. To operate the orbital sander, I wore protective glasses and placed the orbital sander on the structure before turning it on. By waiting to turn the orbital sander on until after it was firmly placed on the structure, I prevented ridges from forming. After sanding the outside planks, I used wood stain to darken the wood and protect the wood from water by closing up the pores. Before staining the wood I took the proper safety precautions by putting on safety glasses and a mask. This prevents me from inhaling dangerous fumes. To stain the wood I used a fabric cloth and paint brush. The fabric cloth was used to cover the outside boards and the paint brush was used to stain small places and crevices. I applied three coats of wood stain to the entire surface and let sit overnight.



Justify Changes Made to the Design:

Throughout the process I made several modifications to the little free library from removing the door idea, adding wooden struts, staining the wood, and adding a third shelf.

Adding a Third Shelf: After finishing my second shelf, I decided to add a third shelf, because it would increase the space for the little free library, and allow for storage for blankets and other materials. By adding this shelf, the construction of the roof became easier and therefore improved the quality of the little free library.
Removing the Door: During my production process, I decided to remove the door from my design because it inhibited the space available and obstructed the view of the books inside. It was decided that the little free library would be donated to my school, and reside inside the elementary school, therefore the door would not be needed to protect the books from weather.
Adding Wooden Struts: After practising my painting skills, I determined that if I was to paint the little free library the design would not be adequate and staining the wood would be more beneficial by creating healthier, more protected wood and a more pleasing look. I decided I would still like to give the little free library an imaginary aesthetic, so I transitioned the theme to be more like a childhood treehouse, like the book, “My Magic Treehouse.”



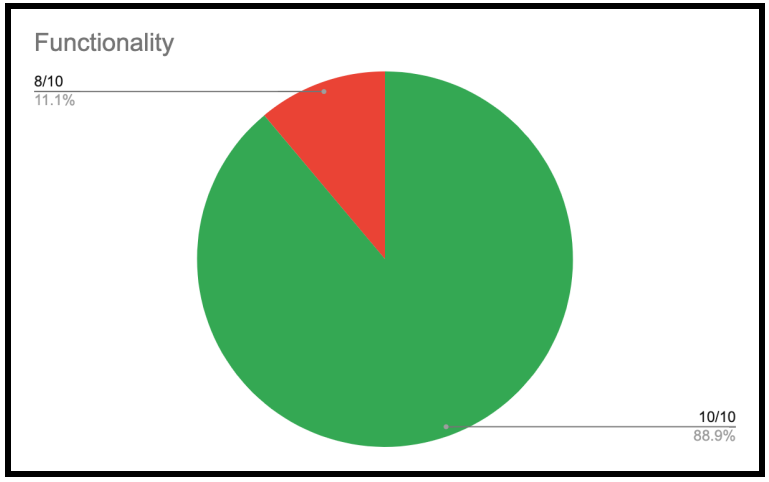

Criteria D: Evaluating the Final Product

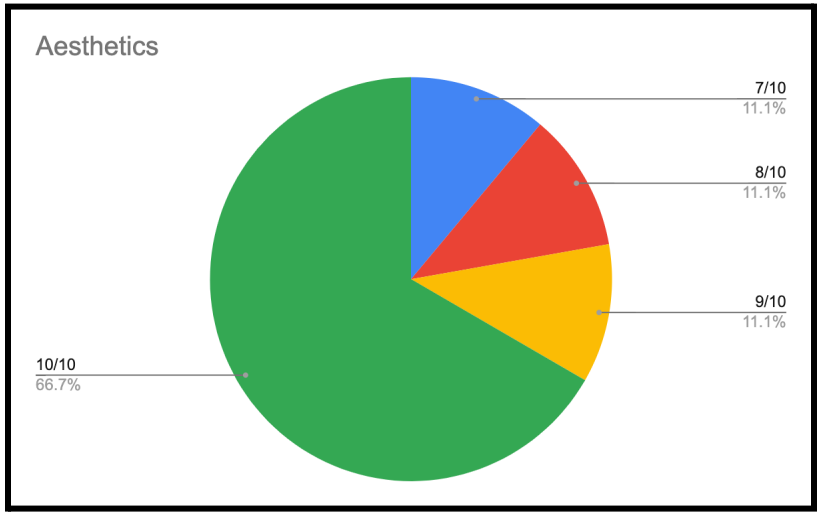
Testing Methods:

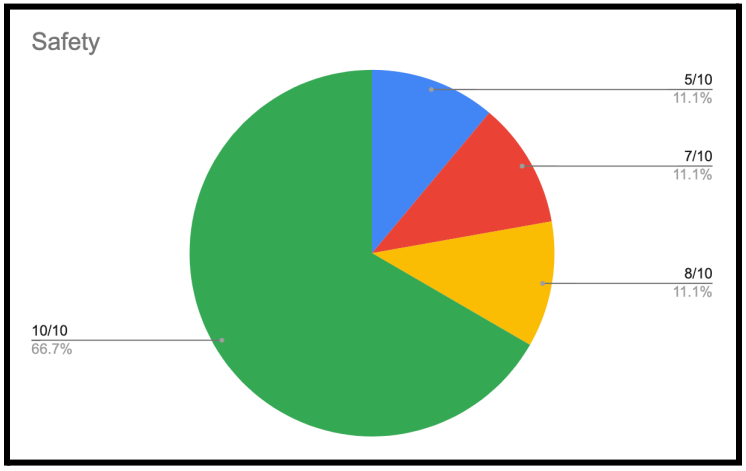
To test my final product, I stacked multiple different books, of different sizes and mass, in the little free library to guarantee the shelves structural integrity. The little free library was able to hold two full shelves of books and blankets in the top in the roof compartment. Originally I was going to continually stack books to see how much the library could hold, but this became futile because the little free library was able to hold books even when weights were put inside with them. To gain feedback I also asked the students using the little free library for what they thought. The feedback I received on my little free library was overwhelmingly positive, with one student stating, “I would love to have this in my classroom, the different books all look so interesting.”

Evaluating the Success of the Product:

To test my final product, I surveyed my peers and teachers to receive feedback on the failures and successes of my product. Overall results showed me that I ought to increase the safety of my product and that I had several sharp edges that I ought to fix so that the little free library would be safe when placed in a younger kids classroom. In all, I received overwhelmingly positive feedback, with 88.9% stating I had a high functional project, 77.8% stating I had enjoyable aesthetics, and 66.7% stated I had moderate safety. Multiple people commented that they enjoyed the traditional treehouse design of my little free library and the stability of the structure therefore I would consider my product a success.







How the Solution Could be Improved:

As stated above, feedback showed that I ought to improve the safety measures of my little free library by rectifying the sharp corners to prevent kids from getting hurt when running around the structure or leaning on the structure. During the building process, I worked to file down any and all protruding nails and sand down all the wood but I still had a few sharp edges and corners that ought to be sanded down before placed with children. To rectify this, I took a piece of sandpaper and sanded down the corners to rectify this issue. Therefore creating a safe little free library for young children, with little chance of accidents from protruding nails, splinters, or sharp edges.

The Impact of the Product:

The overall impact of my product was increasing the variety and access of literature to younger students. By placing my little free library in the area of my school that hosts younger students, and filling the library with books, the students were given more access to personalised reading materials that they chose and were recommended to them by their peers. After a week, the library had 7 more books added and about half the books priorly placed were gone. According to teachers, the amount of books students read each week went up and their enjoyment of silent reading time increased. Many would even treat the little free library as a secret library, like in a fairytale, during recess. Similarly, I had parents contact me about donating books to the classroom for the little free library and expressed their joy at their kids' increased interest in reading. Therefore the little free library had an overall positive impact in my school's community by increasing students' access to different types of literature and increased students' interest in reading.