



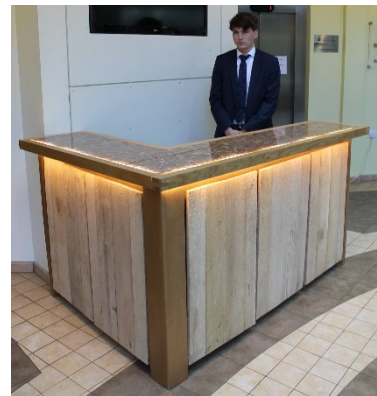
Bloxham School

A-level





D&T: Product Design



Why choose this subject?



Product Design should be chosen if you **studied** and **enjoyed** Design Technology at GCSE, are **good at practical** problem-solving and if you are **interested** in design or want to follow a **career** in any form of design or engineering. The specifications at both GCSE and A Level favour an iterative design process. The traditional boundaries have been removed allowing greater freedom of movement with students able to work in different materials and with different technologies far more easily



The nature of the course



Examination board: : **Edexcel**: Advanced GCE in Design and Technology (Product Design) (9DT0)

The Course:

Aims to equip students with the ability to **recognise design needs** and to develop an understanding of how current **global issues**, including integrating technology, impact on today's world. They will also need to consider the impact on the **environment** of their designing and making activity and to work towards more **sustainable** solutions to the problems they are solving.

Encourages creativity and innovation

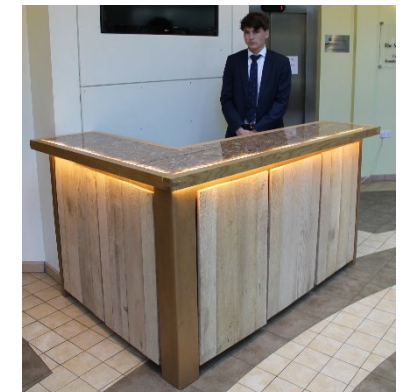
Has design challenges in the **Lower Sixth** which will give students the **freedom** to take design **risks** and innovate in a situation where it is safe to test and refine ideas. This will give them the confidence at A Level to further develop these skills in their own design brief with a client or user group



Examination structure



Component	Overview of A Level	Assessment
Component 1 50% of qualification	Principles of Design and Technology	<ul style="list-style-type: none">• Written Exam: 2hrs 30 mins, 120 marks• The paper includes calculations, short open and open response questions, as well as extended writing questions.
Component 2 50% of qualification	Independent Design and Make Project	<ul style="list-style-type: none">• Non-examined assessment 120 marks• The Design and Make project, is internally assessed and externally moderated





What do we expect from candidates?

Students should preferably have **studied a design-based** course before. The Design Technology GCSE is an ideal starting point. Those choosing to do this subject must be prepared to **work hard** on the coursework units that start in the first term and which incorporate a significant amount of ICT including CAD/CAM. Students must apply their understanding and knowledge from other subject areas, with a particular focus on **Mathematics, which has 15% content**. An open mind, creativity and flexibility in approach is essential.



With which subjects can it be combined?



The majority of students combine Design and Technology with any of the following subjects: **Maths, Physics, Art, Computer Science, Theatre Studies or Business Studies**. Other successful combinations have included **Geography, PE and Biology**. It is a multidisciplinary subject which lends itself to many combinations.



Higher Education and Careers?



D&T: Product Design, is suitable and recommended in combination with the subjects mentioned on the previous slide, for courses and careers in **Design** and **Engineering**. It also suits **Architecture**, **Agriculture**, **Surveying**, **Business**, **Theatre** and **Media**. These are just some of the more obvious broad areas that give a hint of the range of opportunities available. It is also a suitable qualification for many other careers.



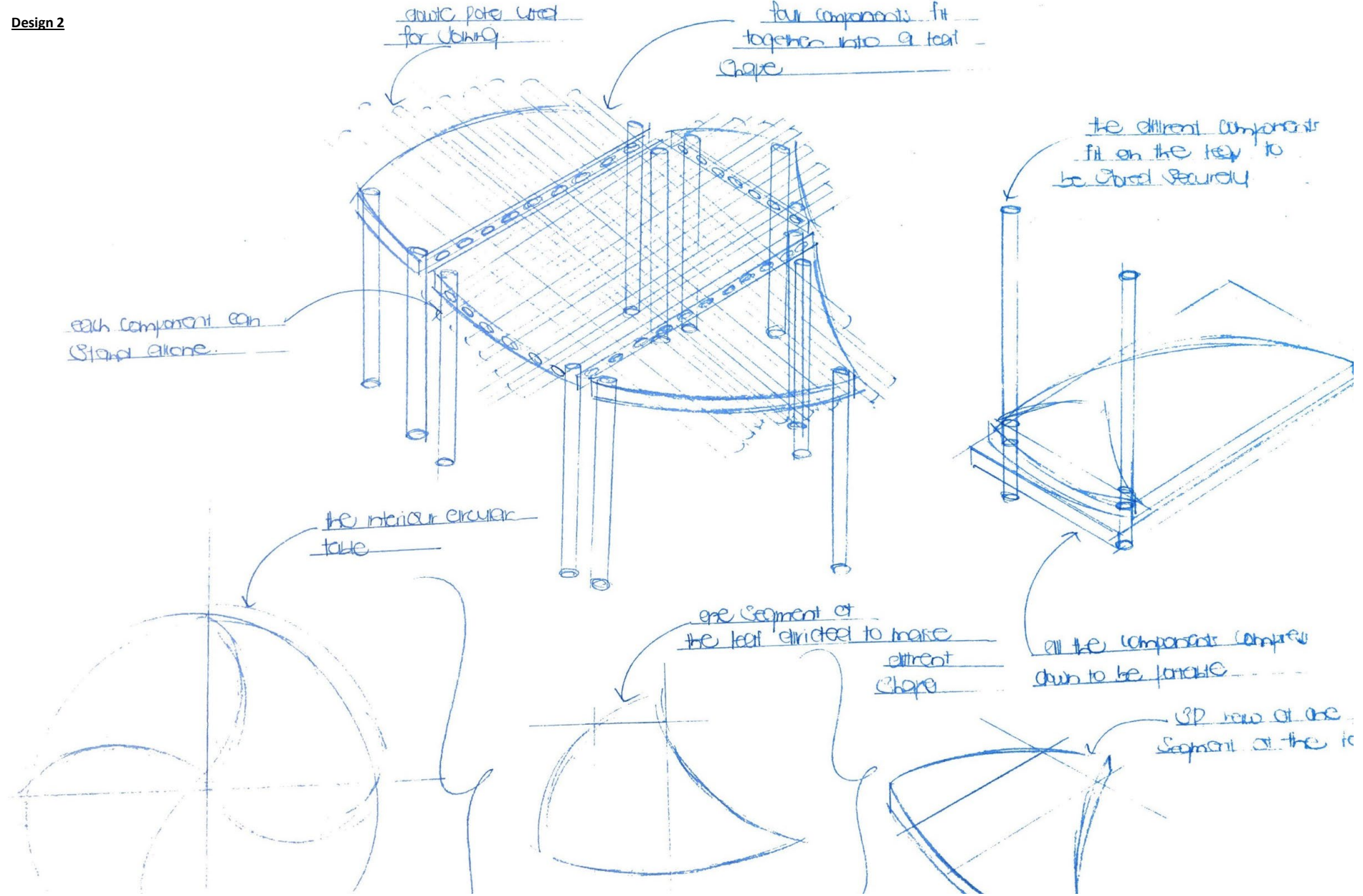
D&T: Product Design



FAQs:

1. When does the Design and Make Project start?
 - a) March of the L6th year.
2. Is there a contextual challenge for the project similar to GCSE?
 - a) No, there is a free choice of the challenge to be taken on.
3. How much more work is there compared to GCSE?
 - a) Its proportionate, rather than being a tenth of the work load, as D&T is for GCSE, it's a third of your time commitment, as there are now only three subjects to commit to.
4. How many products do you get to make as an A level student?
 - a) Generally it is two, a light in the L6th and the solution to your Design and Make task, in the U6th.

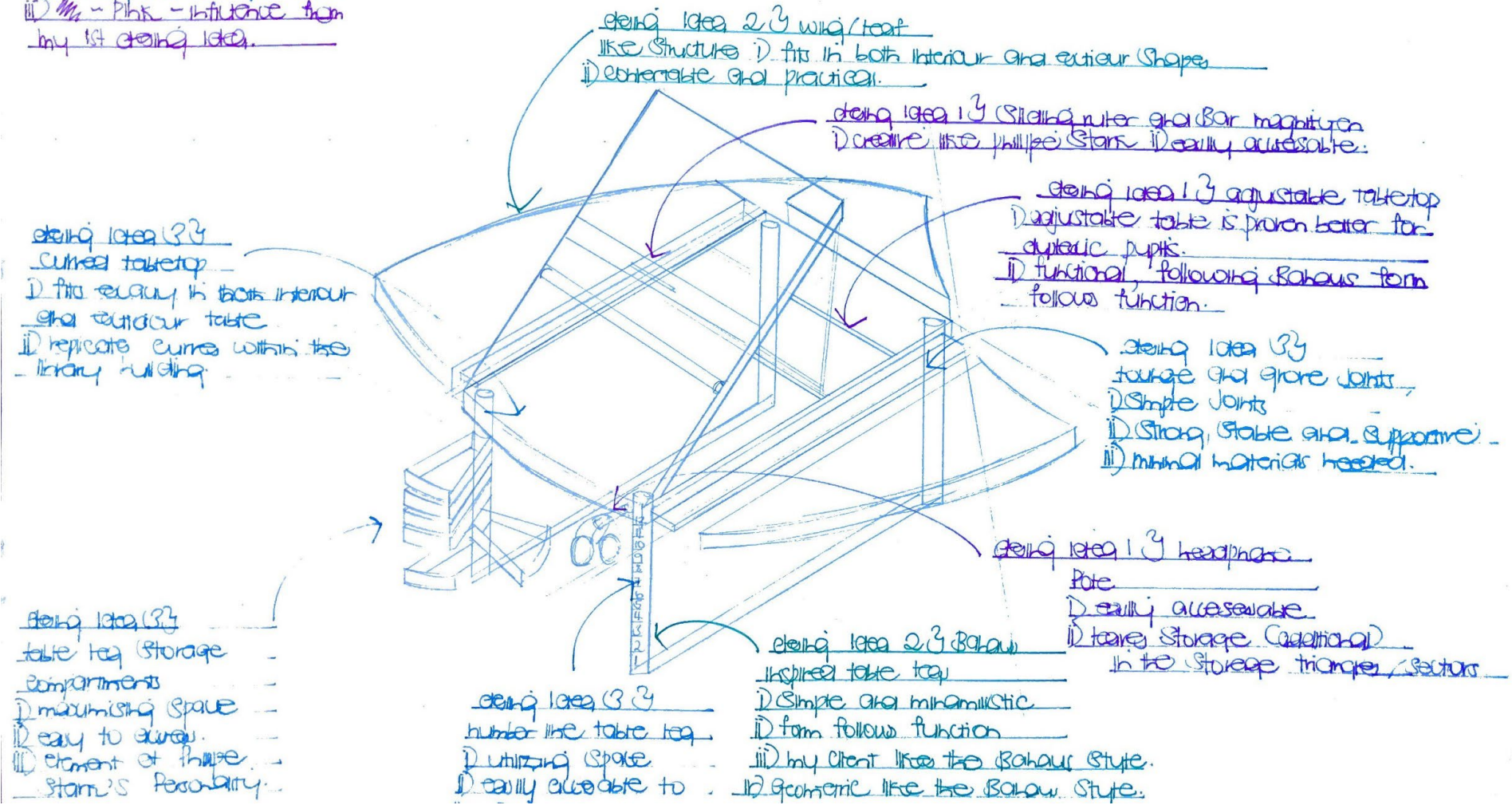


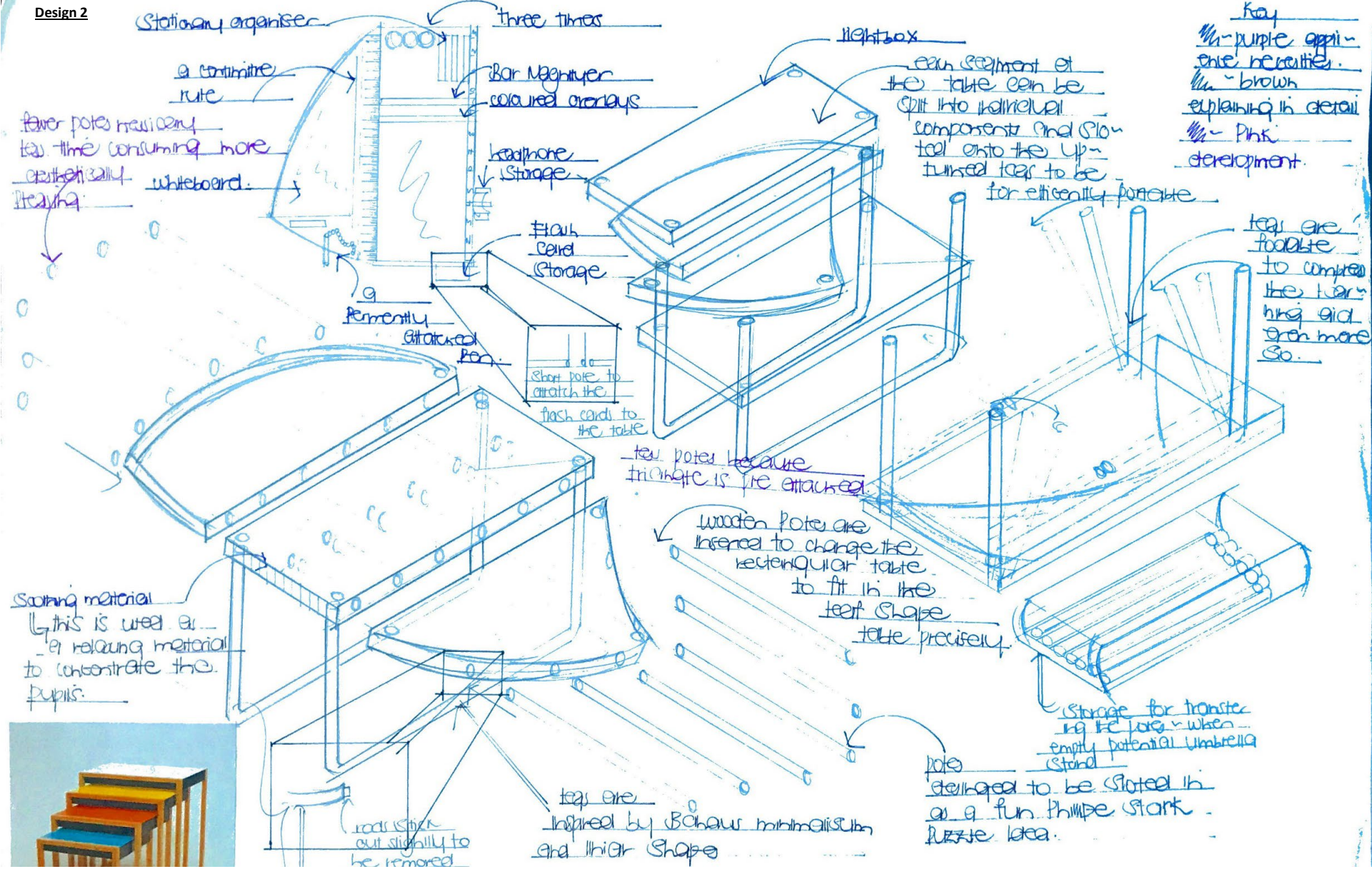


Key:

- i) green - influence from my 2nd design idea
- ii) blue - influence from my 2nd design idea
- iii) pink - influence from my 1st design idea

combining four details together! as an experiment.





Analysis of design 2, yellow: if it meets the specification

Key specification points

1. To provide aid to three main types of leaning difference, Dyslexia, Dyspraxia and ASD
2. Be useful to 150 plus users in the Learning Support.
3. Be supportive to 16 pupils with severe learning Differences.
4. My learning aid should aid pupils with SpLD (Specific Learning Differences)
5. Literacy and numeracy are the two key factors my learning aid will need to provide for, as these are the key pastoral bases.
6. To provide a learning area which makes the pupils feel calm in the classroom environment, (the use of colour will support this).
7. Incorporate the post modernism style, like that of the centre Pompidou, replicating elements of the learning support department building, (the library)
8. Follow the style "Form follows function".
9. Replicate the Bauhaus style, in particular the curvaceous shapes used, and with the simplicity.
10. Incorporate elements of Philippe Starck's use of colour, and "personality".
11. Be durable.
12. Be sustainable.
13. Be timeless.
14. Must have elements of post modernism of the library building presented in it.
15. Have calming colours to maintain the pupil's concentration.
16. Must accommodate for these classroom appliances:
 - I. A lighting appliance
 - II. A time management system
 - III. Three timers
 - IV. Bar magnifier (large)
 - V. A centimetre ruler
 - VI. A light box for handwriting
 - VII. Colour overlays
 - VIII. Ear defenders
 - IX. A organiser for stationary
 - X. Soothing material
 - XI. Flash card storage
 - XII. A number line
 - XIII. A permanently attached pen
 - XIV. Additional learning words for multiple subjects
1. Be convertible to different shapes within the classroom.
2. Have an adjustable angular setting on the desk.
3. To be light enough to be carried by the teacher, no more than 30kg
4. To be able to stand spontaneously.
5. Have whiteboard table surface.
6. My learning aid needs to fit in the space of which is maximum of 600 mm wide, with a depth of 600 mm and 962 mm deep when it is situated outside the classroom, though when it is in the classroom it needs to fit exactly into the space which is, 700 mm of the ground, (this would only be an issue when regarding weight) it should be of a width which is 830 mm wide, and it should have a depth of 830 mm. The learning aid needs to be transferable between the two situations.
7. The learning aid needs to fit through the door with measurements of 1024 mm wide, 2163 mm high.

Aesthetic

1. The leaning aid is designed to maximise every element of the components, for instance the table leg being used as a storage container, certifies that the pupils can get as much use out of the leaning aid as possible. And making sure the space allocated for the learning aid can be used to its full potential.
2. The leaning aid does not waste any material, it is a self-standing structure which fits identically into the indoor circular table, I want to reflect this using resourceable materials which I intend to waste very little of, thus ensuring my product is sustainable.
3. The style of the leaning aid evidently is influenced by the Bauhaus style, the use of minimalist materials and limited components makes the product simple and easy to use, this is not only aesthetically pleasing though the product should be self-explanatory to the pupils.
4. The leaning aid organised all of the student's appliances necessary, they can be easily stored out of sight due to the original storage system, therefore the organisation when the pupils are working should be reflected in their higher standard of work.
5. Although often originality becomes dated, I don't believe this to be the case within my learning aid for instance this puzzle like appeal is complex in terms of the idea though the implicit when the components are put together, therefore the product should blend in in future years it should not become outdated due to its simple originality.

Specification consideration analysis

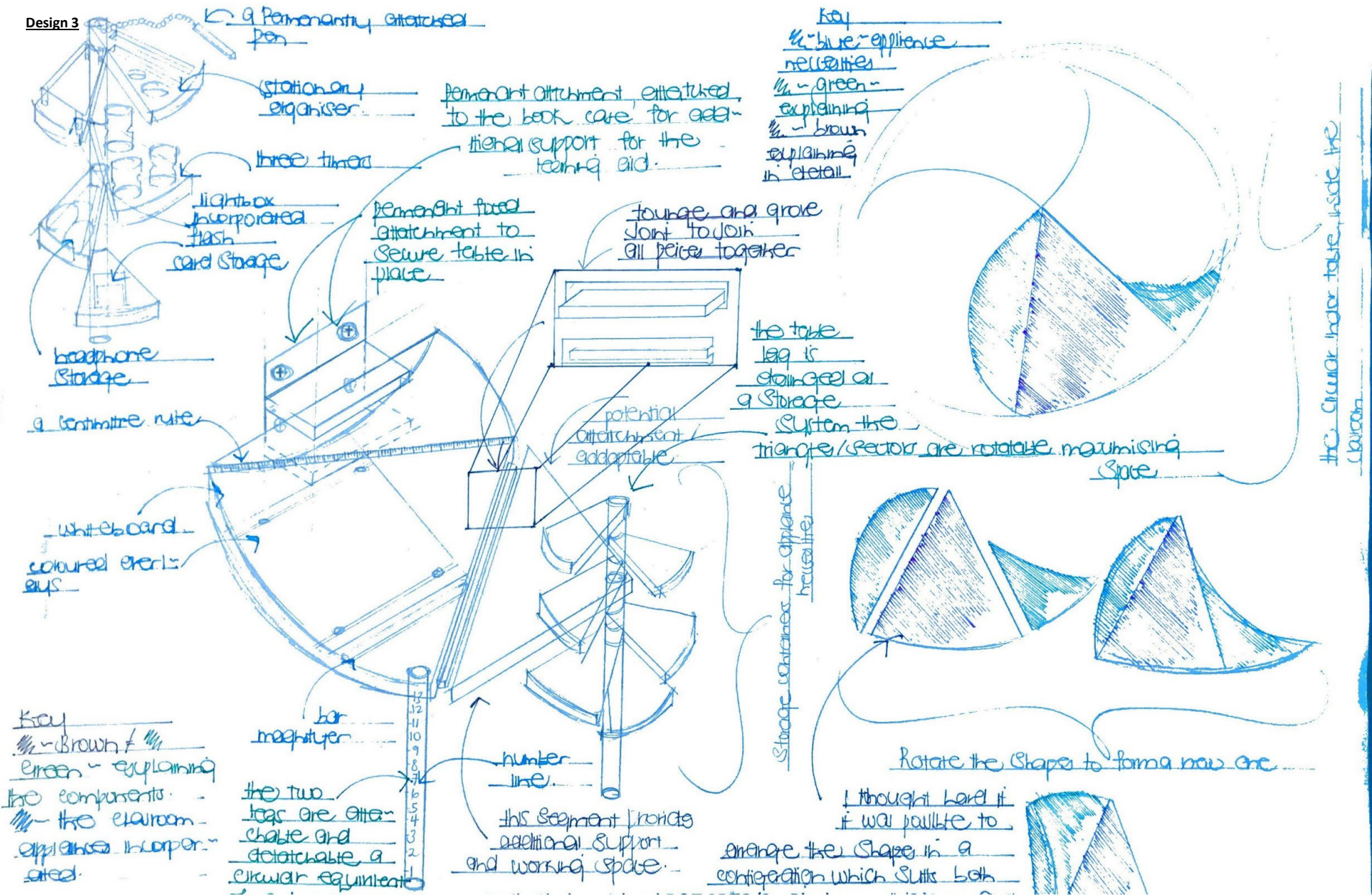
1. The learning aid is certain to include all of the classroom appliances necessary, though it goes beyond this is maximises the pupils leaning surface by having the appliances stored in the leg of the table, making sure the pupils has access to them though also has the option to have a clear leaning aid surface to maximise their freedom to use the space of the leaning aid.
2. The leaning aid compresses into a flat packable shape, though it cannot be simple carried as one shape it can be carried individually and then put together in one play, I will consider other option to combine all the pieces to be portable together, though it does ensure that the leaning aid fits through the doorway.
3. Philippe Stark's originality is evident within the learning aids design, I have considered multiple options of how the same shape can be maximised to its full use, by rotating the shapes I have had to think creatively when disengaging his idea.
4. Not only is the product particularly practical though this is combined with the use of aesthetics to create a function product, the use of the linear shapes reflects the Bauhaus style which my client specifically required, the angular shapes are also complimentary the library building making it both aesthetically and functionally pleasing.

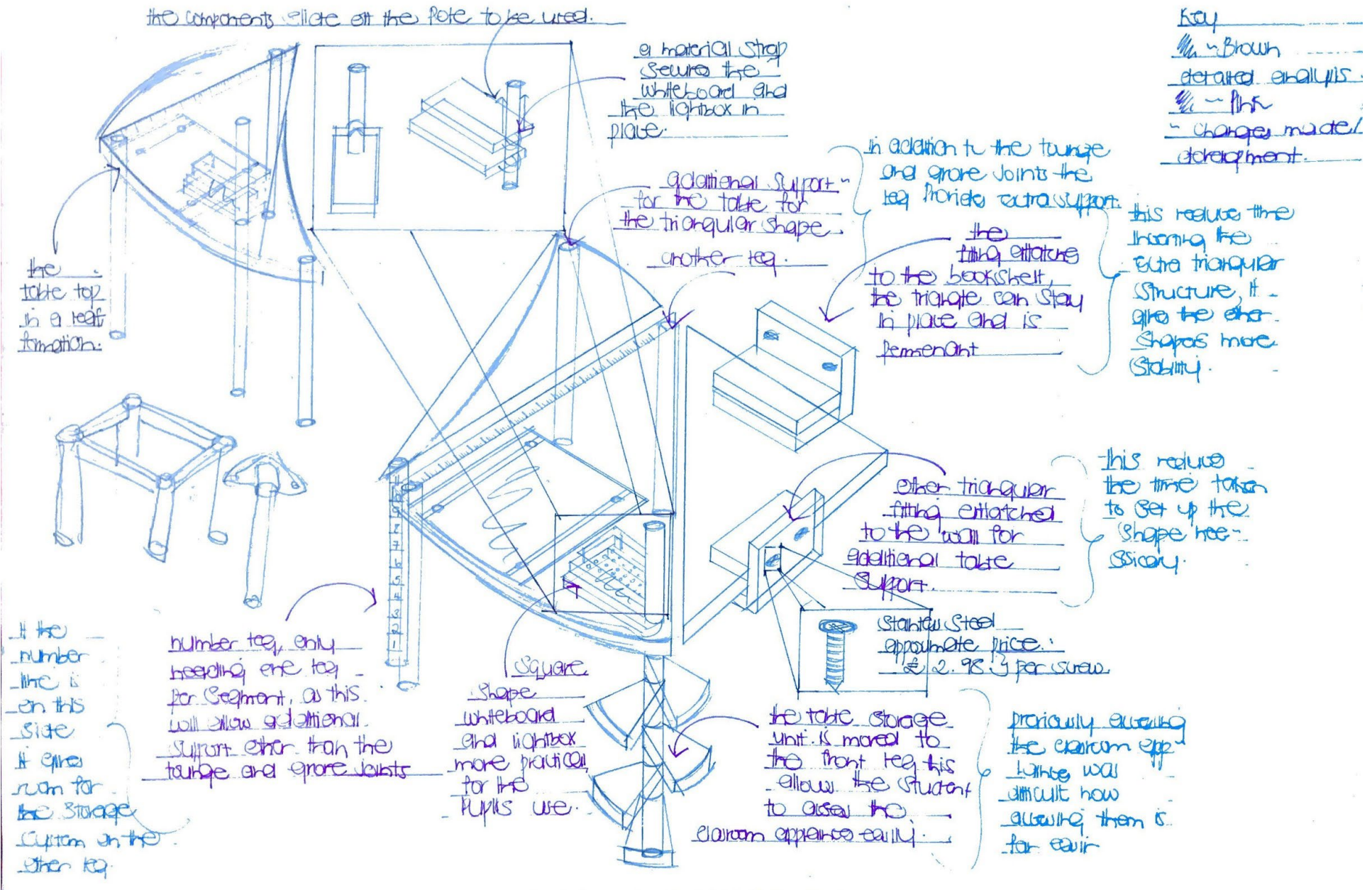
Materials

1. For both the table top and the table legs I hope to use hardwood, as this is proven to last longer if weight is to be applied, the chosen wood is oak, although wood is expensive it is strong, hard and tough, oak provides both aesthetic and durability necessary for my product, oak is not easily damaged, the prominent grain is an example of oak aesthetic. The reasoning for both the table legs and the table top being oak they blend nicely and complement the product.
2. For the multiple storage systems which are attached to the table leg I would like these to be acrylic, I would like the acrylic to be a light blue this reflects the colour of the circular table therefore complement the table rather than oppose it, colour is prominent in both Philippe Starks work and the Bauhaus style, both of these use colour to enhance a product the Bauhaus style in particular subtle use of colour is affective I believe having a subtle use of acrylic colour will not bewilder the pupil and complement the learning aid, the acrylic I hope to be recycled to make my product more sustainable.

Process

1. To begin with the exact measurements will be drawn only the oak to create the table top, using pencil, these will then be cut using the ban saw, which is precise and exact.
2. These shapes used to create the table top will then be sanded to ensure there is no risk of splinters and ensures the product looks aesthetically pleasing to satisfy my client.
3. Before the table top is complete the tongue and groove joints need to be created, a slot cutter is used to create the groove on one wooden component, a slot cutter can also be used to cut away from the other component to create the tongue. Once this is done the table top can be inserted together to ensure the pieces fit together.
4. The circular legs will be made using a wood turner, chisels are used as the leg rotate to create the rounded shape, they can be sanded on this to give the oak a pristine finish.
5. The oak legs will then be inserted using a hole saw to make an insert into the table the use of the hole saw will ensure that the legs are stable and maintain in place.
6. Once all the oak components have been cut and inserted into the correct places, I shall use the measurement of the classroom appliances to work out how big the storage triangles need to be which are stored around the table leg, these acrylic shapes will be drawn on 2D design, which is a laser cutting program designed to make the material cut precisely and accurately, these shapes will later be put together using acrylic glue.
7. Finally the wall appliance is created using a combination of the laser cutter and a ban saw, this is inserted on the bookshelf parallel to the learning aid using screw fittings.





Analysis of design 3, yellow: if it meets the specification

Key specification points

1. To provide aid to three main types of leaning difference, Dyslexia, Dyspraxia and ASD
2. Be useful to 150 plus users in the Learning Support.
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4. My learning aid should aid pupils with SpLD (Specific Learning Differences)
5. Literacy and numeracy are the two key factors my learning aid will need to provide for, as these are the key pastoral bases.
6. To provide a learning area which makes the pupils feel calm in the classroom environment, (the use of colour will support this).
7. Incorporate the post modernism style, like that of the centre Pompidou, replicating elements of the learning support department building, (the library)
8. Follow the style "Form follows function".
9. Replicate the Bauhaus style, in particular the curvaceous shapes used, and with the simplicity.
10. Incorporate elements of Philippe Starck's use of colour, and "personality".
11. Be durable.
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13. Be timeless.
14. Must have elements of post modernism of the library building presented in it.
15. Have calming colours to maintain the pupil's concentration.
16. Must accommodate for these classroom appliances:
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 - XII. A number line
 - XIII. A permanently attached pen
 - XIV. Additional learning words for multiple subjects
1. Be convertible to different shapes within the classroom.
2. Have an adjustable angular setting on the desk.
3. To be light enough to be carried by the teacher, no more than 30kg
4. To be able to stand spontaneously.
5. Have whiteboard table surface.
6. My learning aid needs to fit in the space of which is maximum of 600 mm wide, with a depth of 600 mm and 962 mm deep when it is situated outside the classroom, though when it is in the classroom it needs to fit exactly into the space which is, 700 mm of the ground, (this would only be an issue when regarding weight) it should be of a width which is 830 mm wide, and it should have a depth of 830 mm. The learning aid needs to be transferable between the two situations.
7. The learning aid needs to fit through the door with measurements of 1024 mm wide, 2163 mm high.

Specification considerations analysis

1. The learning aid is compactable into a smaller shape making transportation easier, it can be easily carried as each of the components can be stacked and held in a compactable shape.
2. The learning aid does contain elements of Philippe Starck's "personality" style to it, due to the puzzle like appearance which can be put together by the pupils allowing them to feel as if they have contributed to the making of their learning aid.
3. The Bauhaus style table legs are not only minimalist and simple, though they also prove durable thus making the learning aid long lasting, they are additionally practical for stacking the layers of the learning aid.
4. The learning aid can be convertible to different shapes it can suit many different environments as there is flexibility if there is to be one wing attached of three, thus ensuring the learning aid suits the given environment.
5. Due to the practicality of the learning aid revolving around the compactable shape, the learning aid incorporated all the necessary appliances to suit the pupils with learning differences therefore following the style "Form Follows Function".

Aesthetics

1. The puzzle like shapes are childlike and friendly, they fit together to form a necessary shape which is practical in terms of it being suitable to the two classroom areas which it needs to be situated, though it is also highly creative and child friendly, making learning fun.
2. The product is simple and minimalist and is very much so like the Bauhaus style, this is designed specifically to not distract the pupils from their work due to the aesthetics of the product, though to ensure they are productive, and the learning aid supports this productivity.
3. The legs are designed to be stainless steel to reflect the aesthetic style of the library building, they reflect the large steel structural poles represented within the interiors of the library building, the learning aid will complement the style of the library building rather than contradict it.
4. The learning aid ensures that all the necessary classroom appliances are within reach of the pupils, this will ensure that they are clam within the classroom environment as they have all the support necessary close by.
5. Finally the product is multipurpose for instance, the storage containers which are used to store the poles to fit the learning aid together can additionally be used for instance as an umbrella stand or a storage system for anything the pupil needs storing during the lesson.

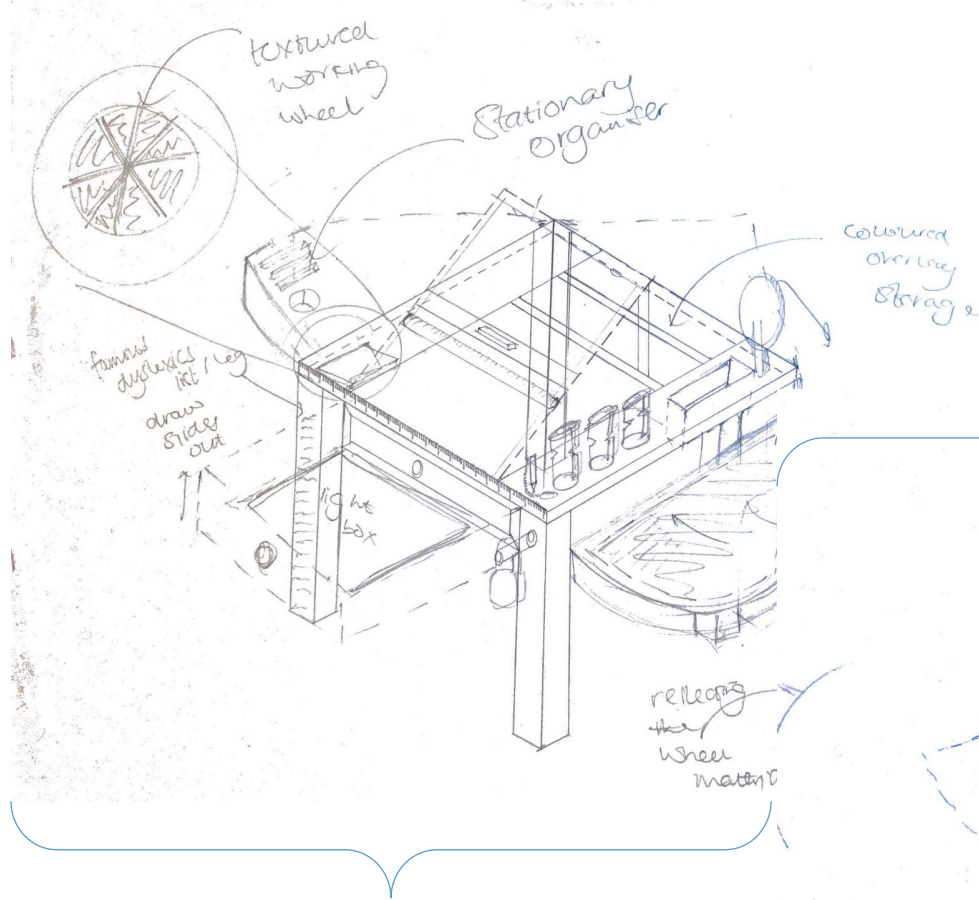
Materials

1. Unlike the other two designs, I wanted to use materials which are features through the library building to ensure that my Learning aid complements its style, hence my reasoning for the stainless steel legs, this has a subtle appeal which is replication in the Bauhaus style steel was often used, in particular I want to use this for the legs as the legs appear linear which is what the Bauhaus style strive for.
2. For the main body of the table I intend to use plywood, plywood is a cost effective and strong due to the multiple veneers, the attractive grain of the plywood makes my product aesthetically, the combination of this and the stainless steel provided both a natural and industrial appeal satisfy a wide variety of tastes, the plywood is strong enough to support the stainless-steel wings.
3. The table I was to use minimalist material to reflect on the minimalist style, I would use ply dowel for the rods to secure the table together, as this blends nicely and will appear to look aesthetically pleasing, meanwhile the ply dowels are strong enough to support the table.

Process

1. The ply table top will be measured out to ensure that this fits within the circular structure, once this is measured out this can then be cut using the ban saw, which is both accurate and creates smooth edges to the wood.
2. The wood will then be filed using both the electric sander and sand mapper to ensure there is no risk of the wood splintering, this also adds to the high-quality finish for the product.
3. Once this is complete the ply dowel piece, will then be measured to fit the table, and large holes will be drilled through the table top this will allow the dowel joints to be inserted, the dowel will be set and sanded to create a smooth edge once inserted.
4. Once the table top is secure, I shall bend the stainless-steel rods which will have been sourced previously I could potentially use lever benders to enable this, or I could use the oxyacetylene torch and heat to bend the steel rods.
5. There will also be a bend in the steel half way up to make the legs as compactable as possible, I shall cut the steel and insert a stainless-steel hinge to ensure this bend is achievable.
6. I will insert the table legs by using a hole saw, this will intend the base of the table and allow the table legs to be firmly in place supporting the table top, the hole saw will also be used to cut holes in the other wooden table tops which will be cut slightly more to the circumference of the table leg to ensure they slide off efficiently for transportation purposes.

Design 2 development

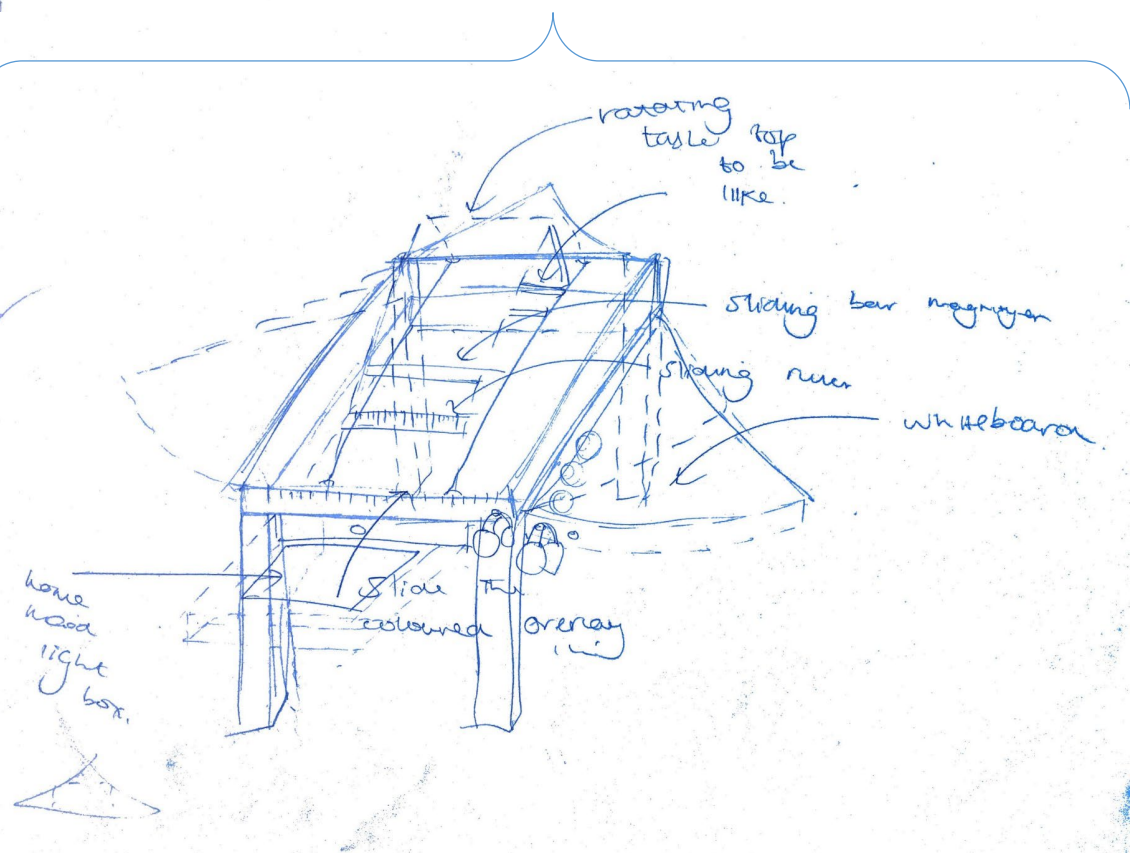


A initial sketch with alterations based of design two

Why is this my chosen desing:

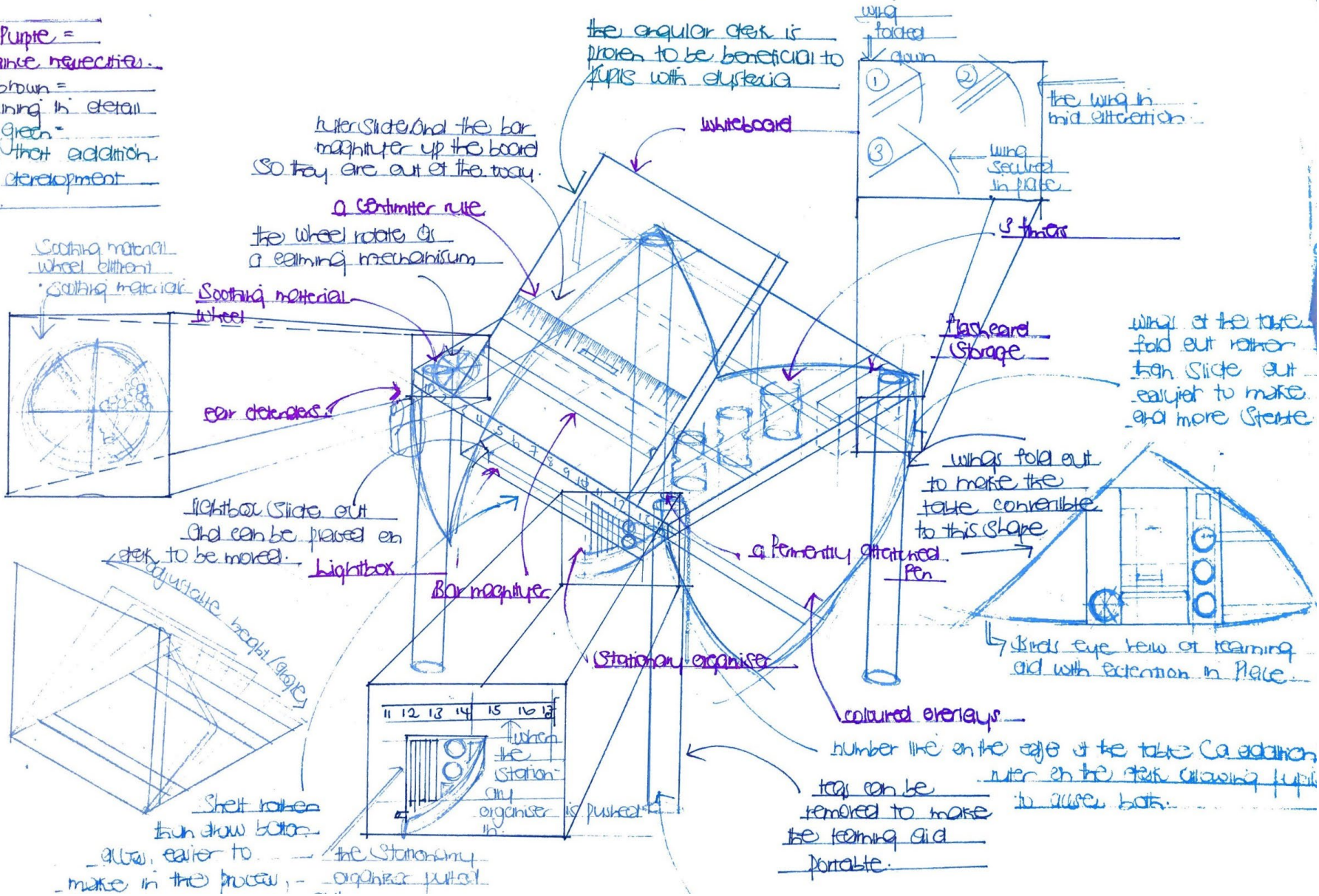
My reasoning for choosing design two was most in keeping with my clients spesificiaition, it needed developing to ensure that it did justice to all of my clients spesificiaition points. This design would also have the correct balance between being complex enough to satisfy my clients needs wants and valued, listed in her spesificiaition though also being doable within the time resistant and the facilities I have within the classroom.

A initial sketch with alterations based of design two

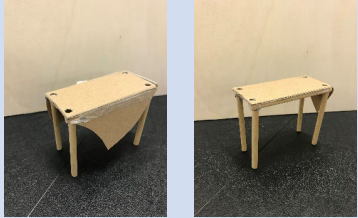
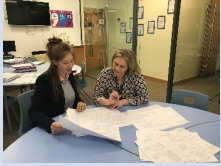
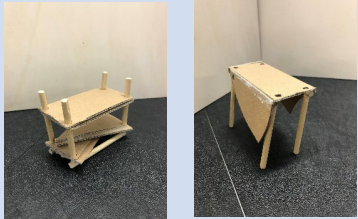
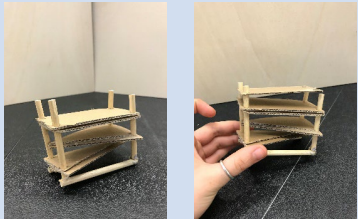
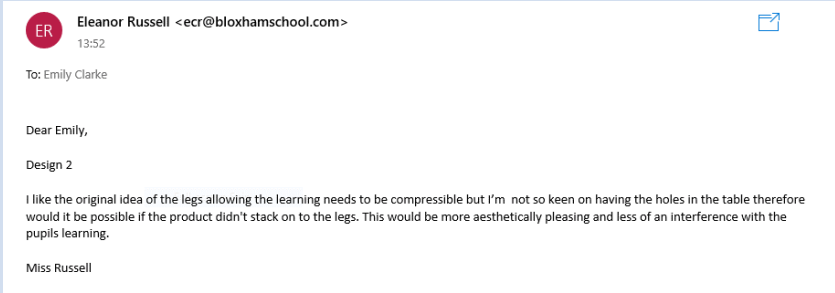
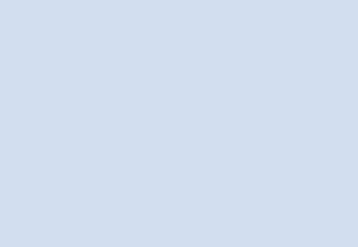




Design 4 development

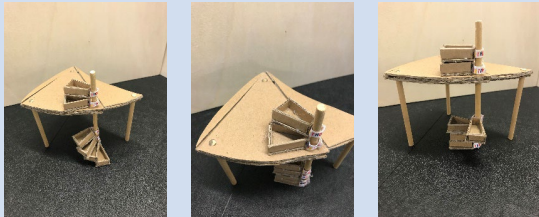


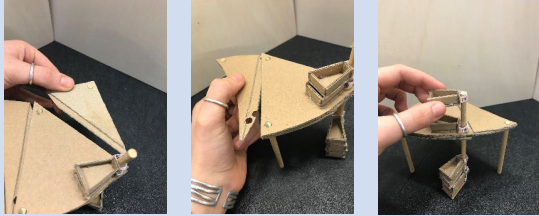
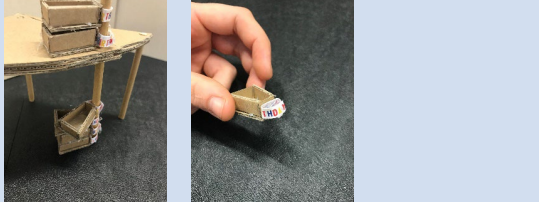
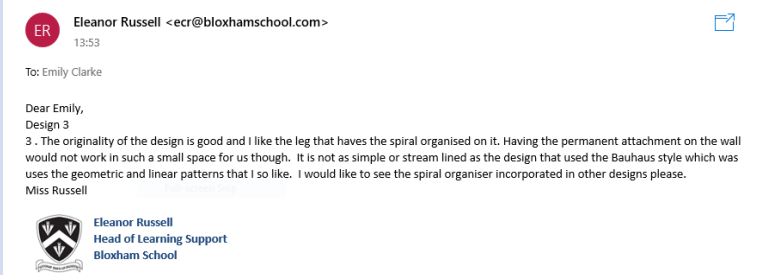
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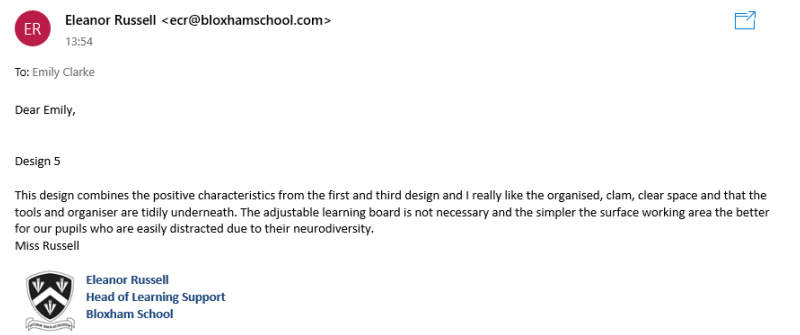
Making models to show to my client

Images of the model	Explanation of images (in order)	Summary of my clients feedback	Meeting with my client to discuss the model
	<p>1. The image of the model with the wing like structured folded down.</p>	<p>When meeting with my client, my client liked this design idea most out of all three designs, she expressed that she liked the original idea of using tongue and dowel joints, working like a puzzle to make the learning aid convertible. My clients only alteration was for the learning aid not to be compressible onto the upturned legs. Her reasoning for this was that if the different table top components were slotted onto the table, holes would have to be drilled into the table top to allow this to happen, my client believed that this would only affect the aesthetics of the learning aid, though it may also distract the pupils and my client was concerned that the pupils needed to have a totally flat and even work space for the pupils to work effectively, without distraction my clients feedback on this design is shown in the email to the right.</p>	
	<p>2. The model standing with the wing like structured removed apart from the front triangle.</p>	<p>Image of me and my client discussing my second proposed idea, since discussing this idea I wanted to make the 2D drawing into a 3D model so my client could get a visual idea of what this design of leaning aid would look like and how it would work. My client could then visually handle the model and discover what she likes and dislikes based on the 3D model, based on this feedback I could then justify that I could make my client something she would be satisfied with. The feedback which my client gave me based on my second design after seeing both my drawing and model, is shown in email form below:</p>	<p>I like the original idea of the legs allowing the learning needs to be compressible but I'm not so keen on having the holes in the table therefore would it be possible if the product didn't stack on to the legs. This would be more aesthetically pleasing and less of an interference with the pupils learning.</p>
	<p>3. A different angle of the model with the wing shapes folded downward.</p>	<p>How to develop my design further My client clearly liked the idea of he folding leaf tables, therefore I would need to research multiple ways in order to find a support mechanisms strong enough to support the leaf shaped wings. I would also need to consider I would combine the folding wings with other elements of my models, to discover the best possible way of benefitting the pupils learning whilst still considering my clients wishes to make a learning aid which is in keeping with the Bahaus style, which has a streamline and linear aesthetic.</p>	
	<p>4. The model with different components stacked on the table leg.</p>	<p>Images of me making a model based on my 2nd design.</p>	
	<p>5. The different components stacked on the upturned</p>	<p>The images to the left These images are of a stool I found with curved mild steel legs, they inspired the idea of stacking the leaf shaped components on the underside of the table legs. The mild steel legs are also intriguing as I analysed them and realised that the legs were bent using a pipe bender, they were</p>	

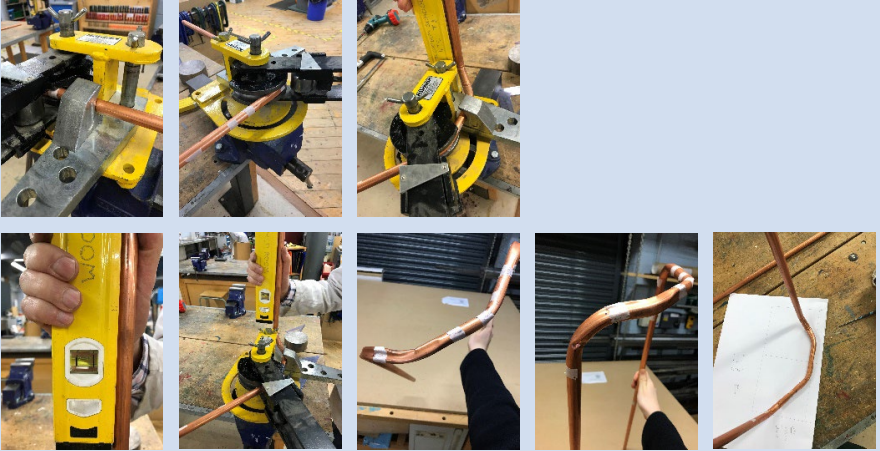
Making models to show to my client

Images of the model	Explanation of images (in order)	Summary of my clients feedback	Meeting with my client to discuss the model
	<ol style="list-style-type: none"> 1. The model standing in its leaf shaped structure. 2. A birds eye view of the model, in its leaf shape. 3. The front view of the learning aid model, in its leaf shape. 	<p>I discussed this model with my client and we agreed that the originality in the convertible shape was intriguing and she appreciated this side to the design, however she did believe this may be impractical as having a permanent wall attachment would be inconvenient due to the small proxemics of the classroom. She also felt the streamline Bahaas aspect of the design has been slightly neglected.</p>	 <p>Image of me and my client discussing my third proposed idea, since discussing this idea I wanted to make the 2D drawing into a 3D model so my client could get a visual idea of what this design of leaning aid would look like and how It would work. My client could then visually handle the model and discover what she likes and dislikes based of the 3D model, based of this feedback I could then justify that at I could make my client something she would be satisfied with. The feedback which my client gave me based on my second design after seeing both my drawing and model, is shown in email form below:</p>
	<ol style="list-style-type: none"> 4. The model in its altered shape, more square like. 5. The altered square shaped table of the leaning aid when situated outside the classroom. 6. A birds eye view of the altered table shape. 	<p>however my client thought the idea of the spiral organiser was both innovative and practical to maximising the leaning aid to its full extent.</p>	<p>Dear Emily, Design 3 3 - The originality of the design is good and I like the leg that haves the spiral organised on it. Having the permanent attachment on the wall would not work in such a small space for us though. It is not as simple or stream lined as the design that used the Bauhaus style which was uses the geometric and linear patterns that I so like. I would like to see the spiral organiser incorporated in other designs please. Miss Russell</p>
	<ol style="list-style-type: none"> 7. Removing and reattaching the leaf structures to the main body of the table. 8. Sliding the leaf like structures out, (joined by tongue and grove joints). 	<p>however my client thought the idea of the spiral organiser was both innovative and practical to maximising the leaning aid to its full extent.</p>	<p>How do I develop my design further Based of my clients feedback it is evident that she specifically liked the spiral organiser in my desing and I should find a way of incorporating this in to the designs. However reflecting on my designing I think that the tongue and grove joints slotting the wing shaped in and out would not be inefficient, as it was likely the joints could not have held the weight of wing shapes, therefore I need to identity a new joining mechanism between the main square table top and the wing shapes which is just as effective and practical though takes into consideration the weight of the table top wings.</p>
	<ol style="list-style-type: none"> 9. A close eye view of the triangular storage system, for the classroom appliances. 10. The triangular compartments are attached using a strap, which is detachable. 		

Making models to show to my client

Images of the model	Explanation of images (in order)	Summary of my clients feedback	Meeting with my client to discuss the model
	<ol style="list-style-type: none"> 1. The example of the model when it is self standing outside of the classroom. 2. The model form the front facing view of the model. 3. The model with additional wings on the table, in the leaf shape. 4. How the additional leaf shapes are slid in and out of the model when necessary. 	<p>I disused this proposed design idea possibility with my client, she agreed that this was a effective idea, she liked the wing like structures being attached with a tongue and grove joints, as these are not permanent structures and they make the table lighter for transportation. However my client was wary that having the storage systems on top of the table may be distracting for the pupils, they need a clear surface area for good working space and concentration which leaves them plenty of room for inspirational ideas, and for they creativity not be constricted by lac of table space, therefore my client has asked if there is any other way I can store the nessicary appliances elsewhere.</p>	 <p>Image of me and my client discussing my fourth proposed idea, since discussing this idea I wanted to make the 2D drawing into a 3D model so my client could get a visual idea of what this design of leaning aid would look like and how It would work. My client could then visually handle the model and discover what she likes and dislikes based of the 3D model, based of this feedback I could then justify that at I could make my client something she would be satisfied with. The feedback which my client gave me based on my second design after seeing both my drawing and model.</p>
	<p><u>The images to the left</u> These images are of me in the process of making my model out of cardboard one the actual size scale, when I then later showed to my client to give her a visual idea of what the leaning aid would look like in its completed form.</p>	<p><u>How to develop my design further</u> Form the feed back my client gave me was particularly encouraging, I now intend to continue with the simple desing of having extended wings on the perimeter of the rectangular table shape with extend out when nessicary, this design was in keeping with the Bauhaus geometric and linear style. In order to make something which satisfies my client and supported her pupils with leaning differences as much as possible, I will now design a storage system which does not mean the classroom applies are cluttered on the table, this will maximise my leaning aid to reach its full potential.</p>	

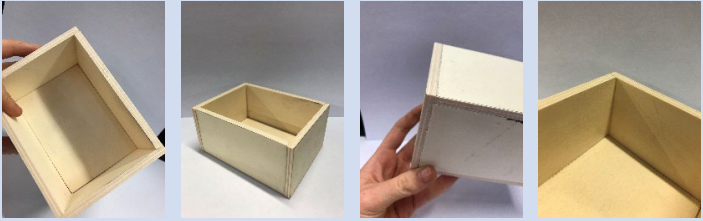

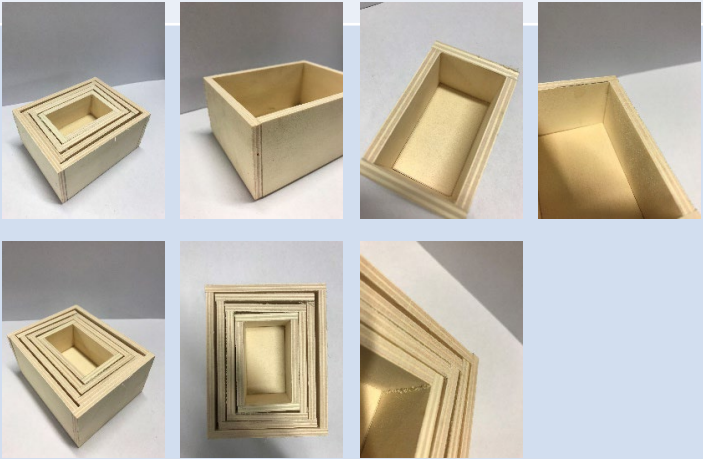
Making the half size model


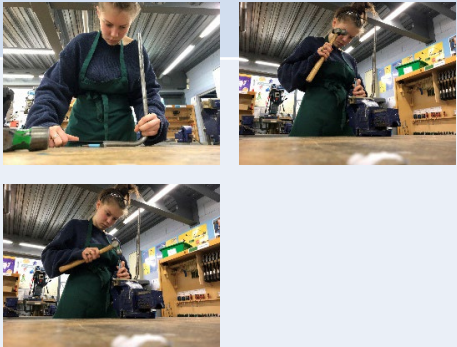

Images of the process of making the model	Description of the image	What I have learnt from this process	Safety equipment/precautions	Quality control checks
	<ol style="list-style-type: none"> 1. The top row is images of me bending the copper tubing into a shape which is a ½ size model using a conduit bender. 2. The bottom row of the images is me ensuring that the copper was at a 90 degree angle, using a spirit level to do this. The table will only stand if the legs are positioned at 90 degrees to the table top. 	<ol style="list-style-type: none"> 1. When bending the copper pipe, it bent due to the force of the steel in the conduit mechanism. Although copper is a ductile material, it is prone to corrosion, and in this case deformation, I made the decision since then to use mild steel for my model as this does not corrode and is also particularly durable, this will link back to my specification to make my product “timeless”, to benefit the pupils for as long as possible. 	<ol style="list-style-type: none"> 1. Safety goggles 2. Aprons 3. Hair tied back 4. Jewellery removed 	<p>When bending the tube a Wiper Die should be used to prevent wrinkles on the exterior of the tube. A Mandrels should be used to prevent wrinkling on the inside of the tube. A try square should be used to measure tube’s angle.</p>
	<ol style="list-style-type: none"> 1. As using one piece of copper for two legs was unsuccessful, I came across this table, which is structured using four legs attached to the table, which inspired me to make my legs in a similar fashion. 	<ol style="list-style-type: none"> 1. As using one piece of material to make two table legs, may be sustainable in terms of minimising material usage, it may give the table slightly less balance, these legs would be more structurally stable for my learning aid, this table inspired this. 	<p>NA</p>	<p>NA</p>
	<ol style="list-style-type: none"> 1. As the copper piping was not durable, I used mild steel within my model, this I bent using the conduit bender, to turn the legs to a 90 degree angle, I used a try square to ensure this was at the correct angle. Finally I compared this to the original copper tubing, evidently the mild steel was more effective. 	<ol style="list-style-type: none"> 1. Using the mild steel was a much more durable materials than the copper, although it has a slightly rustic appearance, if it is surface treated this will give a pristine appearance to the mild steel. The mild steel has high resistance to breakage, meaning that I can withstand heavy leads for instance the triangular tray storage compartments which the mild steel will support. 	<ol style="list-style-type: none"> 1. Safety goggles 2. Aprons 3. Hair tied back 4. Jewellery removed 	<p>A fine permanent marker and masking tape should be used to measure the tube. When bending the tube a Wiper Die and Mandrels should be used to prevent wrinkles on the exterior in interior of the tube.</p>

Making the half size model

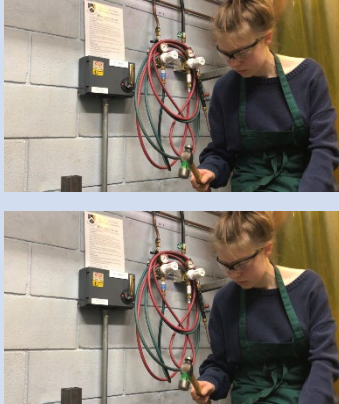
Images of the process of making the model	Description of the image	What I have learnt form this process	Safety equipment/ precautions	Quality control checks
	<ol style="list-style-type: none"> The first two images are of me using the band saw to cut the pieces of plywood out into the nessicary shape. The second two images are of me using the sanding machine to sand down the plywood. 	<ol style="list-style-type: none"> By sanding the triangular storage compartments gave a neat and accurate aesthetic finish to the compartments, by sanding the compartment ensure that no splinters can beak of and harm the user. Sanding will be used for when I make my learning aid. 	<ol style="list-style-type: none"> Safety goggles Aprons Hair tied back Jewellery removed 	<p>A mitre gauge guide fence should be used to guide the wood through the ban saw. A engineer square should be used to ensure the sander is at 90 deegree.</p>
	<ol style="list-style-type: none"> Once I had finished cutting and sanding the components of the triangular trays, I then glued them together using wood glue, once this was done I clamped then to ensure that they maintained their triangular shape. 	<ol style="list-style-type: none"> By being able to make the triangular compartments in a half side model, I was able to get a visual representation of what they would looking like full size and how they would effectively store the classroom appliances and maximise the space in them. 	<p>NA</p>	<p>NA</p>
	<ol style="list-style-type: none"> I experimented with different desing of the triangular trays, to see what looked most aesthetically pleasing, I used the sander to round the corners of the trays which gave a aesthetically pleasing view to the trays. 	<ol style="list-style-type: none"> I was able to explore the aesthetic of the triangular compartments by sanding the corners, initially the compartments appeared bulky and somewhat overpowering. Though by sanding the piece gave a more aesthetic appeal to them which I hope to achieve in my final product. 	<p>NA</p>	<p>NA</p>
	<ol style="list-style-type: none"> The triangular trays are designed to be situated on a table leg like structure, they will be secured in place using a attaching mechanism to fit around the table leg and attach to the storage compartment. By using a round file I made a semi circle indent into the back of the triangular shaped tray so I could test to see if the stage compartment fitted onto the table leg, this worked and the triangular compartment fitted on the leg. 	<ol style="list-style-type: none"> My reasoning for practicing attaching the triangular storage compartments onto a table leg structure, allowed me to get a visual and literal understanding of the support nessicary to support the triangular structures and to ensure that they are stable on the leg. It also gave me a idea of when angles the triangular need to be to fit round the table leg. I now know I need to add a additional attaching mechanism to ensure the triangular compartments maintain their positing and are easily rotatable. 	<p>NA</p>	<p>NA</p>

Making the half size model

Images of the process of making the model	Description of the image	What I have learnt form this process	Safety equipment/ precautions	Quality control checks
	<p>1. This is a square shaped box which I experimented with making to see other shape possibilities which would better maximise the space nessicary for storing classroom appliances. I also fitted the based of the storage compartment inside the four sides this maximised space and looked more aesthetically pleasing.</p>	<p>1. This process has allowed me to identify the best possible shape for my storage systems in terms of both practicality and aesthetic appeal. I have now drawn the conclusion that the square shape will allow more classroom appliance to fit within the structures, thus have maximised the space and he squares are similar to the Bauhaus style of geometry which references one of my specification points.</p>	<p>1. Not nessicary</p>	<p>NA</p>
	<p>1. I wanted to ensure that the classroom appliances would fit exactly inspired the storage components, I therefore drew up the classroom appliances inside the boxes to ensure that they fit precisely.</p>	<p>1. Through measuring out the classroom appliances my reasoning for doing this was to maximise the amount of negative space used to store the classroom appliances to ensure that by minimising waste this will make my product evidently more sustainable.</p>	<p>1. Not nessicary</p>	<p>NA</p>
	<p>1. I was slightly concerned the storage compartments would appear slightly out of place and bulbus on the table leg, and I was keen to find a way to make them both as practical as possible and more aesthetically pleasing. By being able to compress the storage compartments down when empty into a Russian doll fashion, this will mean that less space is taken up if the learning aid is to be put into storage and the geometric puzzle like style of the box is visually appealing. The boxes decrease in size by 5mm.</p>	<p>1. By look at different forms to make the something which is made to be practical (the storage compartments) into something which can be both practical and aesthetically pleasing is essential for my clients satisfaction. I have now considered exactly how I can link the Bauhaus style into my project, in this case using the geometric boxes to compress meaning "less is more" and the style of the box is in a geometric form, which is symmetrical and finished to a high standard which I have assured my client I will achieve within my project. I now know that the Russian doll like style is effect and I will use this within my learning aid.</p>	<p>1. Not nessicary</p>	<p>NA</p>

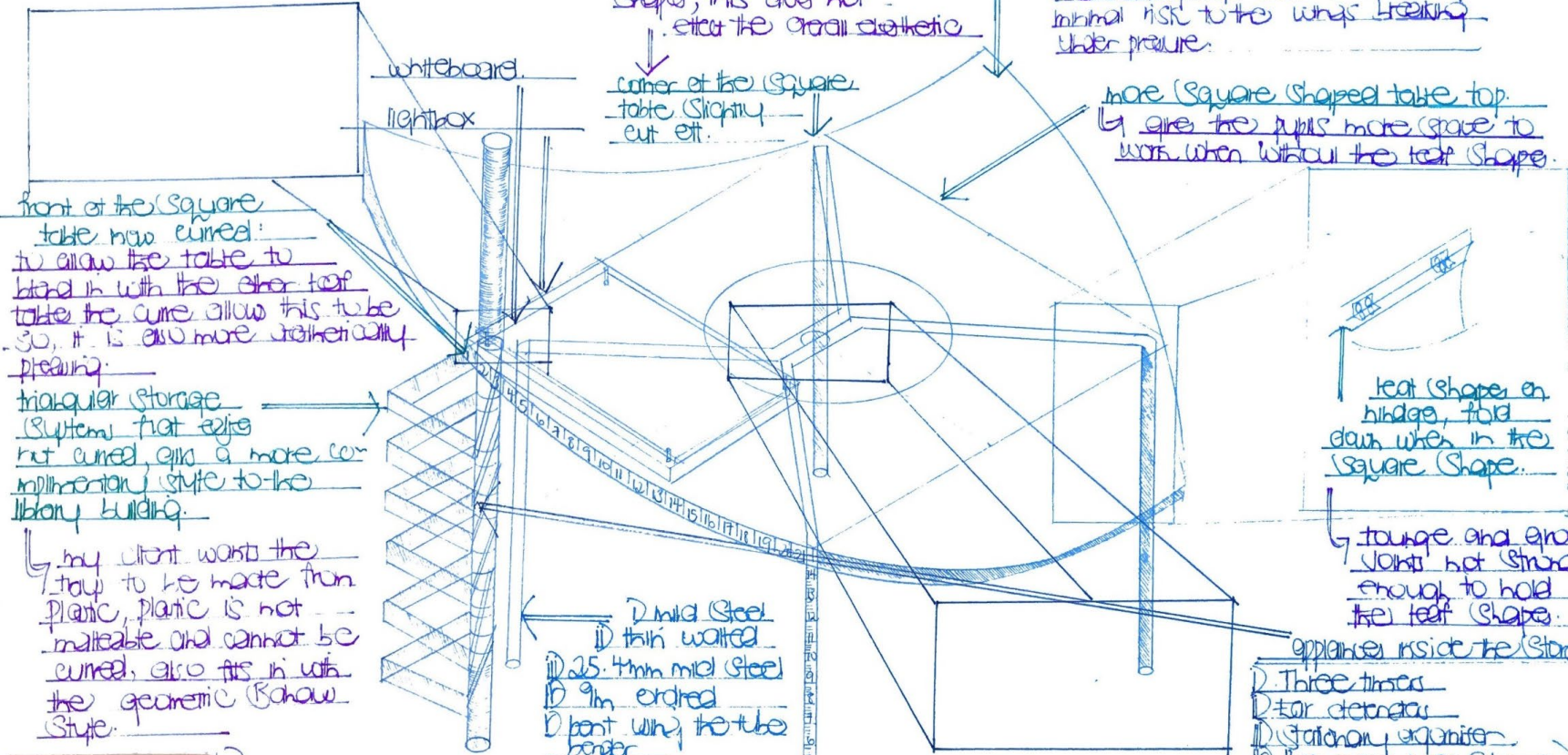
Images of the process of making the model	Description of the image	What I have learnt form this process	Safety equipment/ precautions	Quality control checks
	<p>1. in this image I have cut sections of clear acrylic tube into 40mm lengths to use as dividers between the storage compartments, this is to ensure the boxed have flexible rotatory movement. And they do not scratched if when they collide and any chance of dame to the boxes in minimised because of these. It also ensures that the classroom appliances can be easily accessed without the boxes needing to be separated to do so.</p>	<p>1. Since meeting with my client and establishing that she would be happy for me to use clear cylindrical tube as a divider between the boxes. I have learnt that by using a simple piece of tubing I have overcome three issues: being able to access the classroom appliances easily, being able to rotate the compartments when nessicary, and diminishing the possibility of scratching. i now know how to use the acrylic bandsaw to cut these cylindrical tubes and I also know how to use the rotatory acrylic sander safely, to ensure that harm to the user is minimised due to the edges being sanded. Acrylic tubing is relatively cost affective and will be a hugely beneficial component to my learning aid.</p>	<p>1. Not nessicary</p>	<p>NA</p>
	<p>1. At this point I need to attach my table leg to the table top. The table legs should be attached to a cylindrical rotatory dis, which is attached to the table top, this will allow the able legs to move and support the wing structures of the table. I began attaching the legs by drilling two holes in the legs 30mm apart, in this image I am centre punching the mild steel in order for the steel to be easily drilled.</p>	<p>1. I now know that when centre punching the mild steel, this ensures that the drill bit has a physical resting place when drilling, to ensure that the hole I drilled in the required place. Accuracy is essential specifically for drilling these holes, as the legs need to stand at 90 deegree when supporting the table top, by fitting the screws I the right place to secure the table legs to the table top, will ensure that the learning aid stands correctly. I now understand the importance of using a centre punch.</p>	<p>1. Safety goggles 2. Aprons 3. Hair tied back 4. Jewellery removed</p>	<p>The mild steel tube should be marked out using a centre fine permanent marker, a ruler and a try square should be used to accurately mark out where the tube should be centre punched. The tube to be secured in the vice with aluminium vice jaws to prevent damage to the mild steel tube. This also ensures that the mild steel tube is secured in place before being centre punched. The tube should only be punched/hit once with the ball peen hammer to ensure there is only once dot for the drill bit to bit onto .</p>
	<p>1. Once I had centre punched the mild steel, I then drilled 3mm holes in the mild steel, I did have some difficulty drilling the holes due to the bend in the mild steel it meant that the mild steel needed to be positioned vertically in the air, securing these to ensure that the holes were drilled in the right place was essential.</p>	<p>1. From the process of drilling the holes, originally I had some difficult ensuring that they were clamped in the exact place where the entre punch mark would match up with the drill bit, I had to repeatedly alter the mild steels positioning to ensure that I drilled the holes in the correct place. I now know how to use the pillar drill both safely and effectively and realise its reliability to drill accurate holes nessicary to fit my table legs onto my table.</p>	<p>1. Safety goggles 2. Aprons 3. Hair tied back 4. Jewellery removed</p>	<p>The mild steel tube should be clamped in a vice before being drilled, the vice should then be clamped using G clamps it maintains its secure place. a 600 by 400mm try square should be used to ensure that the mild steel tube is 90 deegree to the drill bit. The operating handles should be used to line up the mild steel against the centre punched mark before the clamps are secured in place.</p>

Making the half size model

<u>Images of the process of making the model</u>	<u>Description of the image</u>	<u>What I have learnt form this process</u>	<u>Safety equipment/ precautions</u>	<u>Quality control checks</u>
	<p>1. There were two ways in which I could attach the mild steel, the first being to drill holes in the cylindrical steel legs and use rivets as a attaching mechanism, and the second and potential more secure attaching mechanism was to flatten the part of the mild steel to be attached to the rotatory disk attached to the table top, and then weld the mild steel onto the disk. I wanted to experiment with this process, therefore by using a rubber mallet and an anvil, I flattened the mild steel so it could be easily welded.</p>	<p>1. This process allowed me to identify a different attaching method, I was able to experiment with a attaching methods I had not previously considered and I could now make a decision based on which attaching method would be the most effective, to comply with my specification point of making my project durable in ensuring it doesn't break. I have learnt how to use different tools in the process of flattening the material, I have also acquired the knowledge of a new process which I could potentially use in attaching the mild steel legs to the table top in my learning aid.</p>	<ol style="list-style-type: none">1. Safety goggles2. Aprons3. Hair tied back4. Jewellery removed	<p>A combination of a ball peen hammer and a rubber mallet should be used to flatten the mild steel, the majority of the flattening should be done using a ball peen hammer and the finish should be made using a rubber mallet to ensure the mild steel is as smooth as possible. Marking should be made on the mild steel tube to determine exactly just how much mild steel should be flattened, the markings should be made in a fine permanent marker to ensure that the measurements are as accurate as possible. The mild steel should be flattened onto the anvil, the anvil is smooth, therefore there is no risk of damage to the mild steel, when striking the mild steel with the ball peen hammer, the hits should be distributed evenly between the end of the mild steel to ensure that there is no deformation of the mild steel, this will justify that the mild steel has a even finish.</p>

Key

- /// ~ why the change was made
- /// ~ what was the change:
- /// ~ materials:
- /// ~ incorporated appliances:



to fit the largest possible square in, one corner is slightly cut off to accumulate the leaf shape, this does not effect the overall aesthetic

wing shape are more evenly proportioned previously the wing shape were dramatically disproportionate to each other, now they are both feel enough to be supported by the ruling legs and there is minimal risk to the wings breaking under pressure.

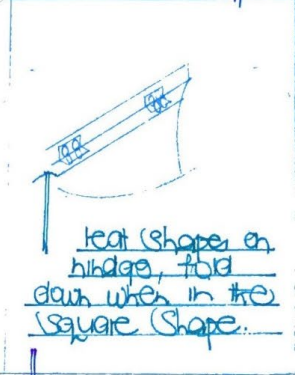
corner of the square table slightly cut off.

more square shaped table top. give the pupils more space to work when without the leaf shape.

front of the square table now curved: to allow the table to blend in with the other leaf table the curve allow this to be so, it is also more aesthetically pleasing.

triangular storage system that fits but curved, also a more complementary style to the library building.

my client wants the tray to be made from plastic, plastic is not malleable and cannot be curved, also fits in with the geometric bahaw style.



leaf shape on hinges, fold down when in the square shape.

lounge and chair joints not strong enough to hold the leaf shape.

- 2 mild steel 10mm thick wall
- 1 25.4mm mild steel
- 1 9m endrod
- 1 bent wing the tube bender

appliances inside the storage trays

- 1 Three times
- 1 star detector
- 1 stationary organizer
- 1 bar magnet (large)
- 1 a continuous ruler
- 1 coloured eraser storage
- 1 flash card storage
- 1 a permanent marker

ruler made to the cylindrical mild steel table leg which is 735mm high.

due to the curve.



a bahaw inspired design, triangular



tube bender pictured.

Analysis of design 4 (chosen design), yellow: if it meets the

specification

Key specification points

1. To provide aid to three main types of leaning difference, Dyslexia, Dyspraxia and ASD
2. Be useful to 150 plus users in the Learning Support.
3. Be supportive to 16 pupils with severe learning Differences.
4. My learning aid should aid pupils with SpLD (Specific Learning Differences)
5. Literacy and numeracy are the two key factors my learning aid will need to provide for, as these are the key pastoral bases.
6. To provide a learning area which makes the pupils feel calm in the classroom environment, (the use of colour will support this).
7. Incorporate the post modernism style, like that of the centre Pompidou, replicating elements of the learning support department building, (the library)
8. Follow the style "Form follows function".
9. Replicate the Bauhaus style, in particular the curvaceous shapes used, and with the simplicity.
10. Incorporate elements of Philippe Starck's use of colour, and "personality".
11. Be durable.
12. Be sustainable.
13. Be timeless.
14. Must have elements of post modernism of the library building presented in it.
15. Have calming colours to maintain the pupil's concentration.
16. Must accommodate for these classroom appliances:
 - I. A lighting appliance
 - II. A time management system
 - III. Three timers
 - IV. Bar magnifier (large)
 - V. A centimetre ruler
 - VI. A light box for handwriting
 - VII. Colour overlays
 - VIII. Ear defenders
 - IX. A organiser for stationary
 - X. Soothing material
 - XI. Flash card storage
 - XII. A number line
 - XIII. A permanently attached pen
 - XIV. Additional learning words for multiple subjects
1. Be convertible to different shapes within the classroom.
2. Have an adjustable angular setting on the desk.
3. To be light enough to be carried by the teacher, no more than 30kg
4. To be able to stand spontaneously.
5. Have whiteboard table surface.
6. My learning aid needs to fit in the space of which is maximum of 600 mm wide, with a depth of 600 mm and 962 mm deep when it is situated outside the classroom, though when it is in the classroom it needs to fit exactly into the space which is, 700 mm of the ground, (this would only be an issue when regarding weight) it should be of a width which is 830 mm wide, and it should have a depth of 830 mm. The learning aid needs to be transferable between the two situations.
7. The learning aid needs to fit through the door with measurements of 1024 mm wide, 2163 mm high.

Aesthetics

1. The use of the straight lines reflects the style of the library building, the straight rectangular shapes within are pristine and make the piece accurate and ensure all the pieces fit together.
2. The piece will have neutral colours such as light browns and cream tones, with hints of blue to replicate the colour of the circular table within the classroom.
3. The piece should appear simple like the Bauhaus style, it is minimalist at first glance when all the wings and the adjustable drawing board is flat, though it expands to suit all the pupils needs.
4. The piece should be delivered to a high-quality finish through the combination of the laser cutter and the sander the edge of the components will be straight, so to ensure the pupils are not distracted by the unfinished appeal.
5. The centre Pompidou style is evident, as the mechanisms for the adjusting drawing board can be seen, as can the hinges for the wings on the table, giving a structural aesthetic.

Specification consideration analysis

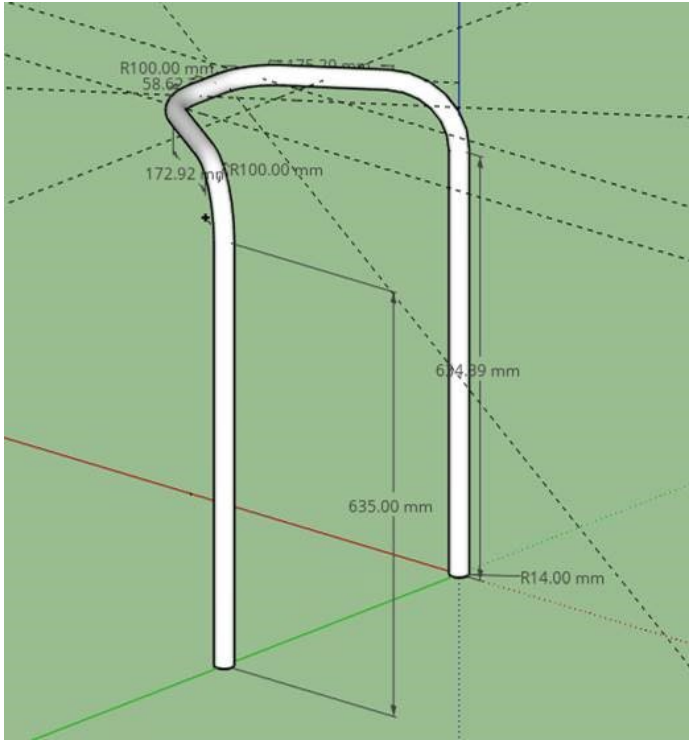
1. The leaning aid can be both self standing and fit into a segment of the circular table, making it adaptable to suit the classroom environment.
2. The piece is timeless the use of conventional rectangular shapes maintain constantly in fashion, ensuring that the piece can be aesthetically beneficial to the user as well as remain attractive to suit the classroom environment.
3. The legs are detachable allowing the shape to be compressed thus making it transferable from position to position to be easily carried.
4. The product supports a wide array of specific learning differences through the multiple learning appliances incorporated within it, for instance the adjustable drawing board is proven useful for dyslexic pupils to work more efficiently on more vertical angle, rather than a flat surface.
5. The subtle, calming colours will allow the pupils to feel relaxed in their environment.

Materials

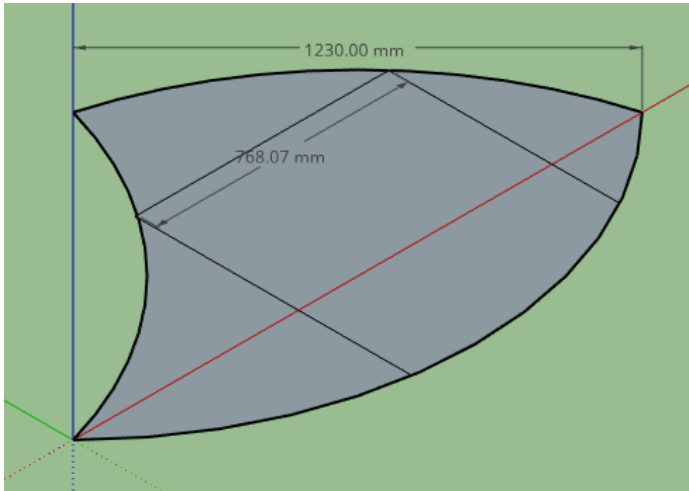
1. Plywood, plywood is a cost effective, it is particularly strong due to the multiple veneers, due to the grain of the plywood the layers can be painted effectively, this broadens my options to decorate the learning aid. The plywood I would use for the surface of the table, and varnish or paint it to make sure there is no risk of splinters.
2. For the legs of the learning aid, I would like these to be made from oak is known for being strong, hard and tough, this will ensure durability is certified within my product, and that it lasts a long time, oak is also known for its aesthetic appeal I hope that this will enhance my products aesthetic even more so.
3. Stainless steel will also be used for the bars on the adjustable drawing board, this is to ensure that the drawing board can be secured on an angle that suits the pupil most, stainless steel is corrosion resistant and very strong.

Process

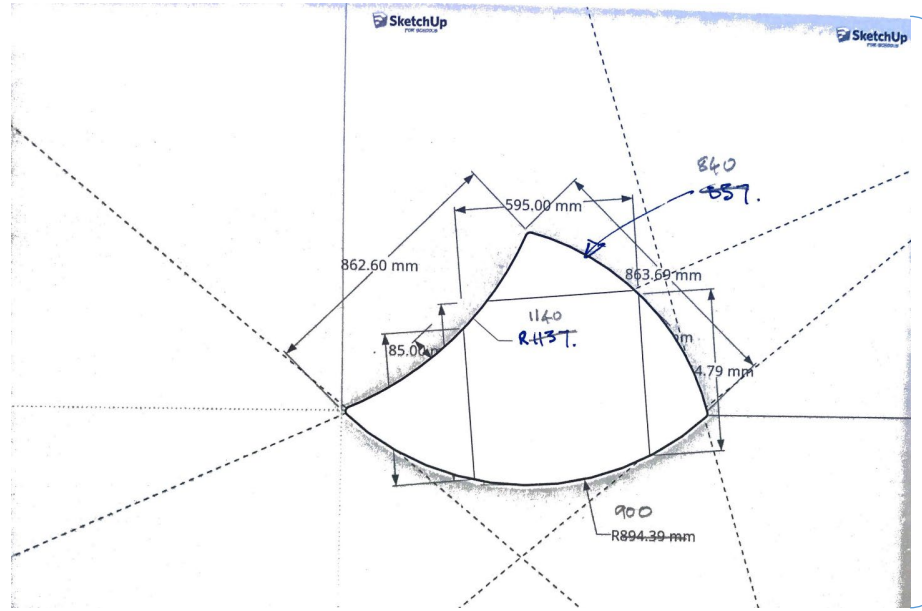
1. I hope elements of the plywood will be recycled to ensure my product is sustainable, the plywood will be measured then cut to ensure not only does the square fit in the accurate position though also to ensure the wings make a segment of the circular table.
2. The different segments for the learning appliances will then be cut using a hole saw, to ensure that they are secured in place, for instance an insert in the wood will be made to insert to make sure the timers are secured.
3. Once this is complete using the sander the edges of the plywood will be sanded reducing splinters and making the edges flat and aesthetically pleasing.
4. The different components of the table top will then be joined using mechanisms such as the hinges for the wings of the table, hinges will also be used to secure the adjustable drawing board in place there will be three bars running on the underside of the drawing board these will provide different height settings for the given pupil, these too will be inserted now.
5. The oak legs will then be inserted again using a hole saw, the circular legs will be made using a wood turner, chisels are used as the leg rotates to create the rounded shape, they can be sanded on this to give the oak a pristine finish.
6. Once this is complete the classroom appliances can be fitted to the leaning aid and the learning aid is complete.



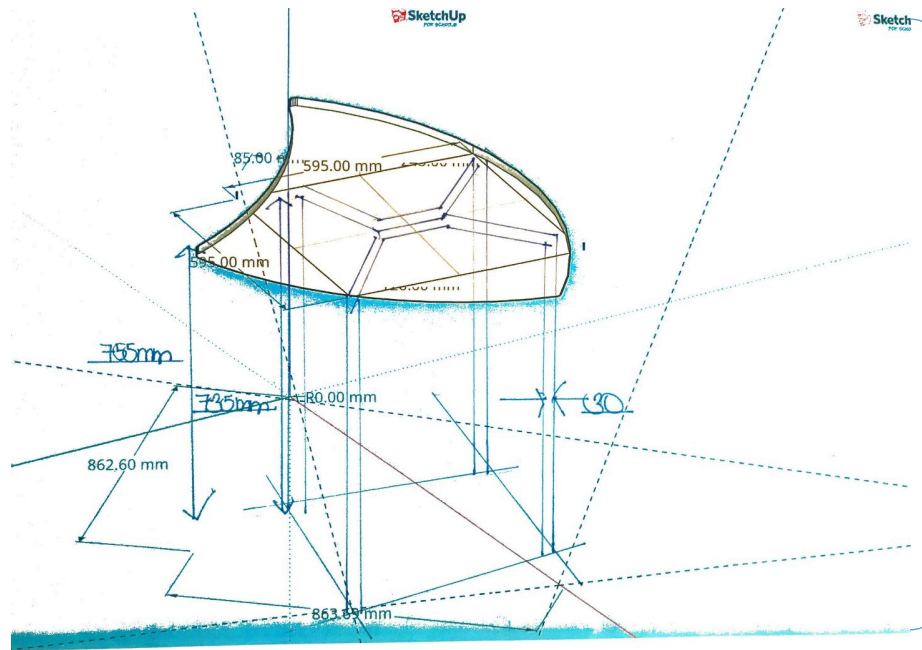
The learning aid table legs



The learning aid table top

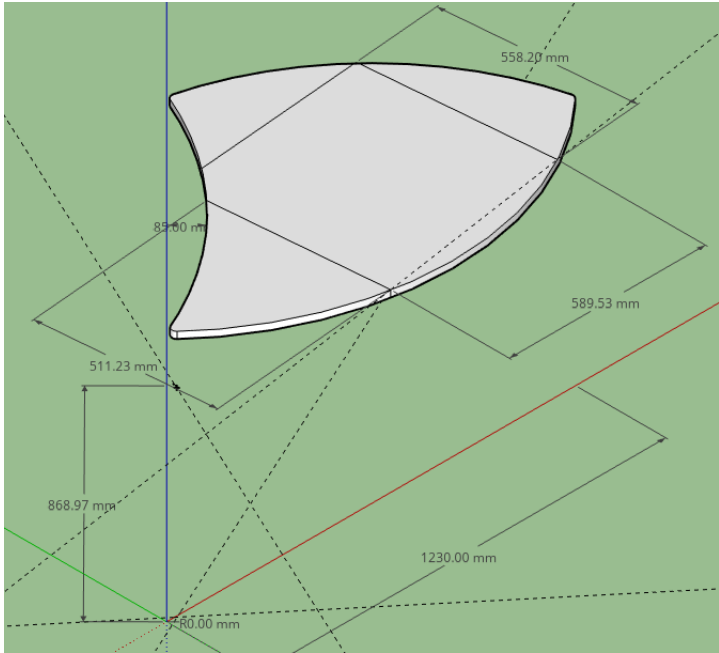


The learning aid table top (with completed dimensions)

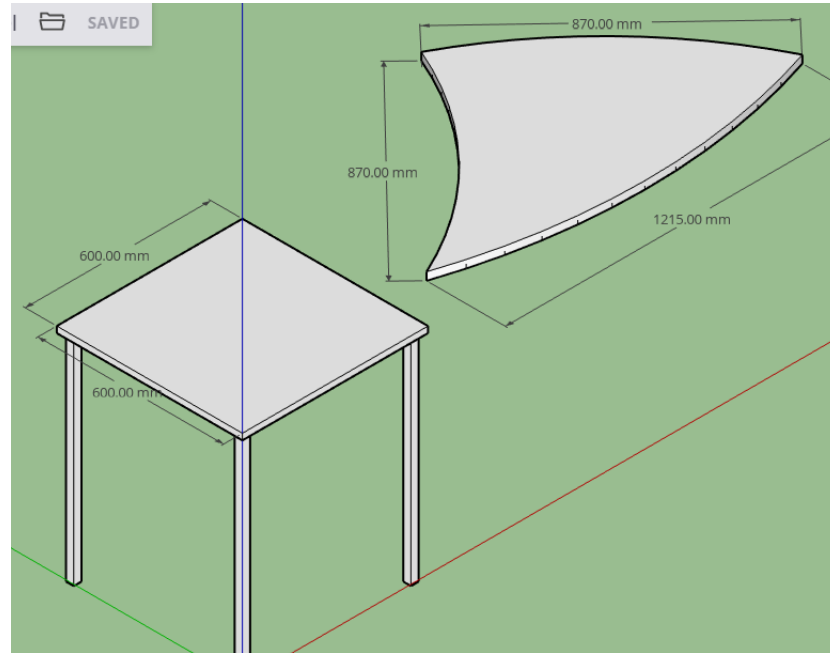


The completed sketch up drawing of the learning aid with dimensions

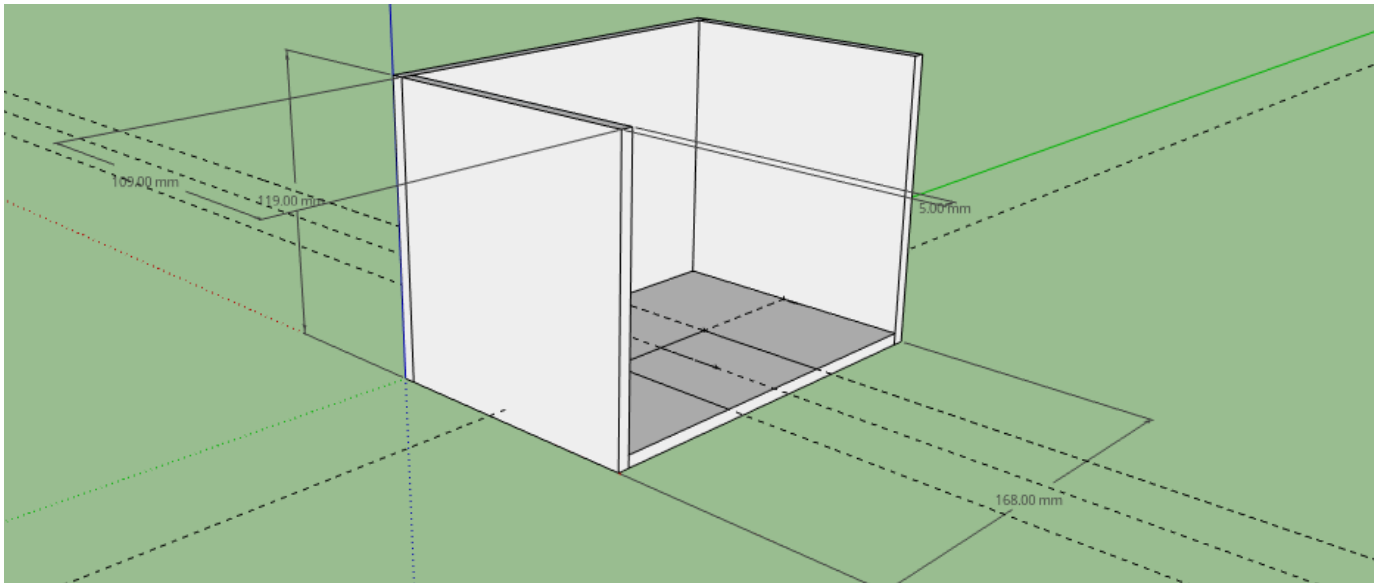
CAD drawings (chosen design)



The leaning aid table top (with completed dimensions)

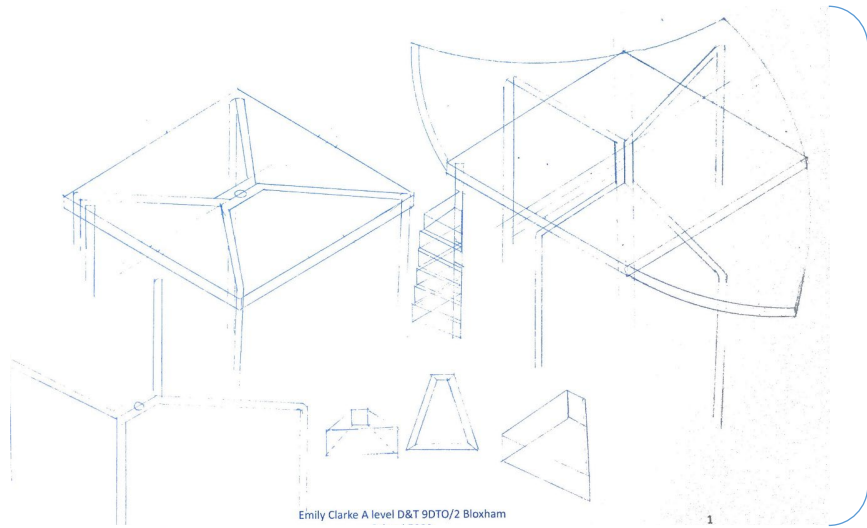


The leaning aid table tops appearance, the square table top when the leaning aid is situated outside the classroom and the leaf shape for when the leaning aid is inside the classroom



The storage box to be fitted on my leaning aid table leg

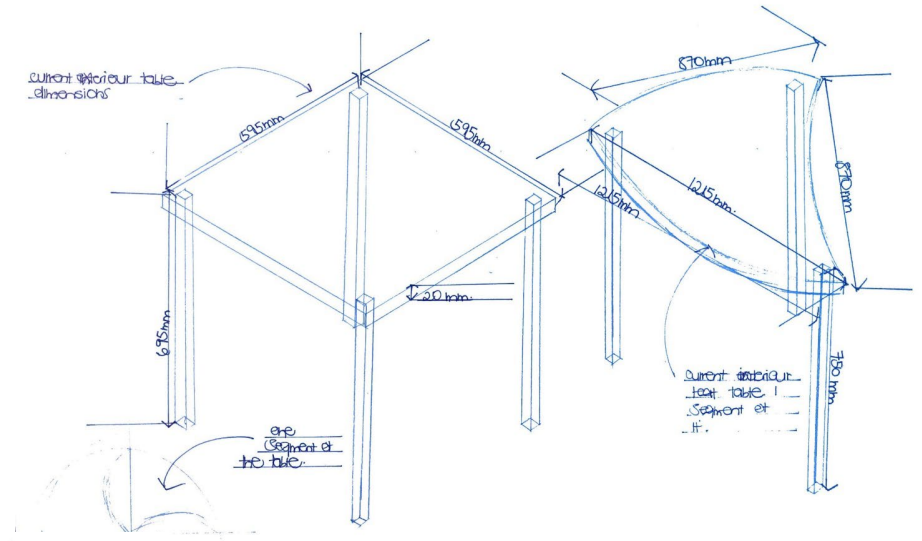
The learning aid dimensions and drawings (chosen design)



Emily Clarke A level D&T 9DT0/2 Bloxham

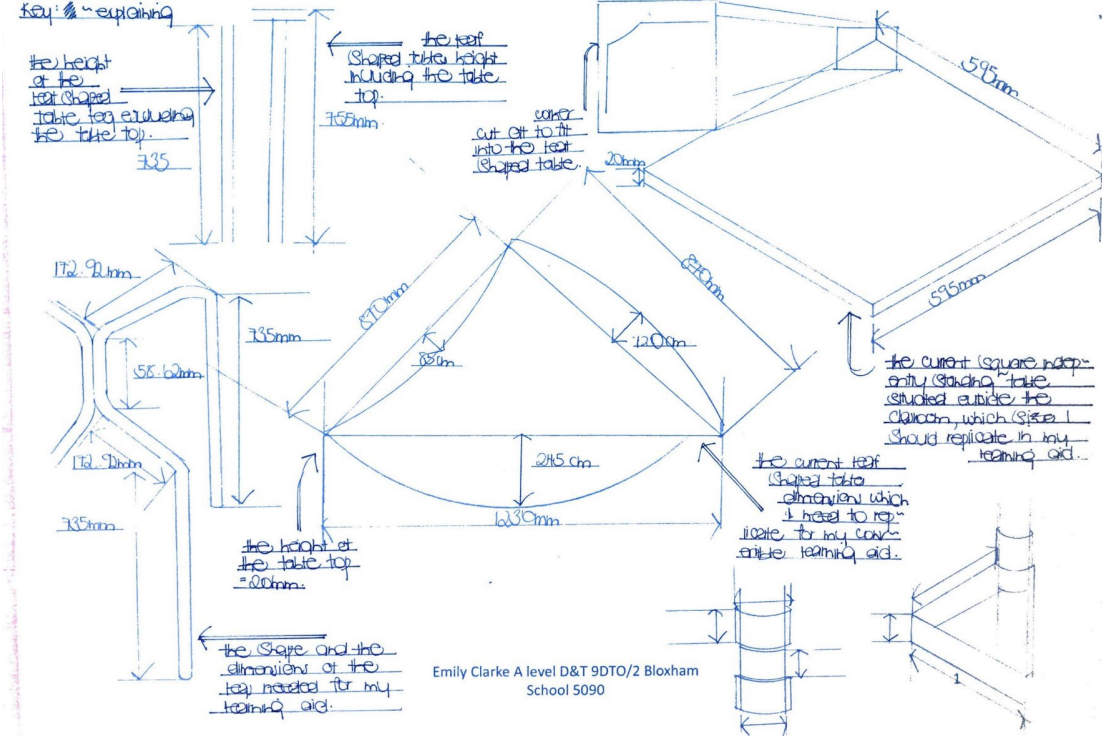
The two different table top appearances

The interior and exterior table dimensions

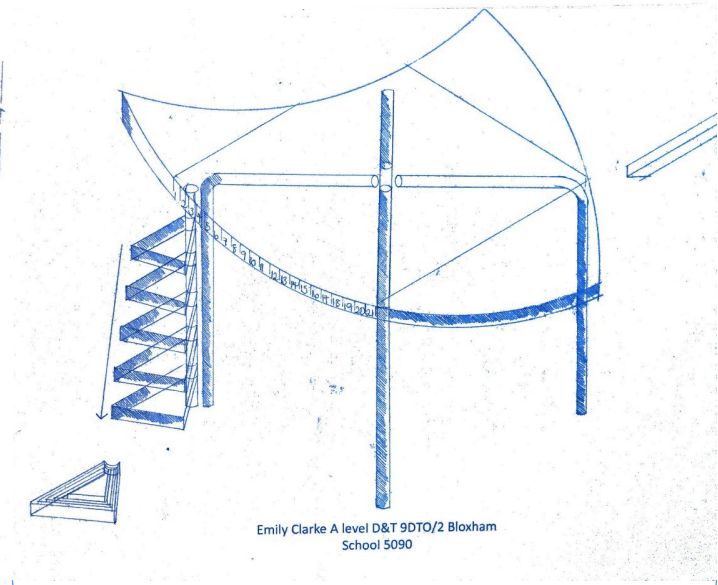


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Measurements
Key: explaining



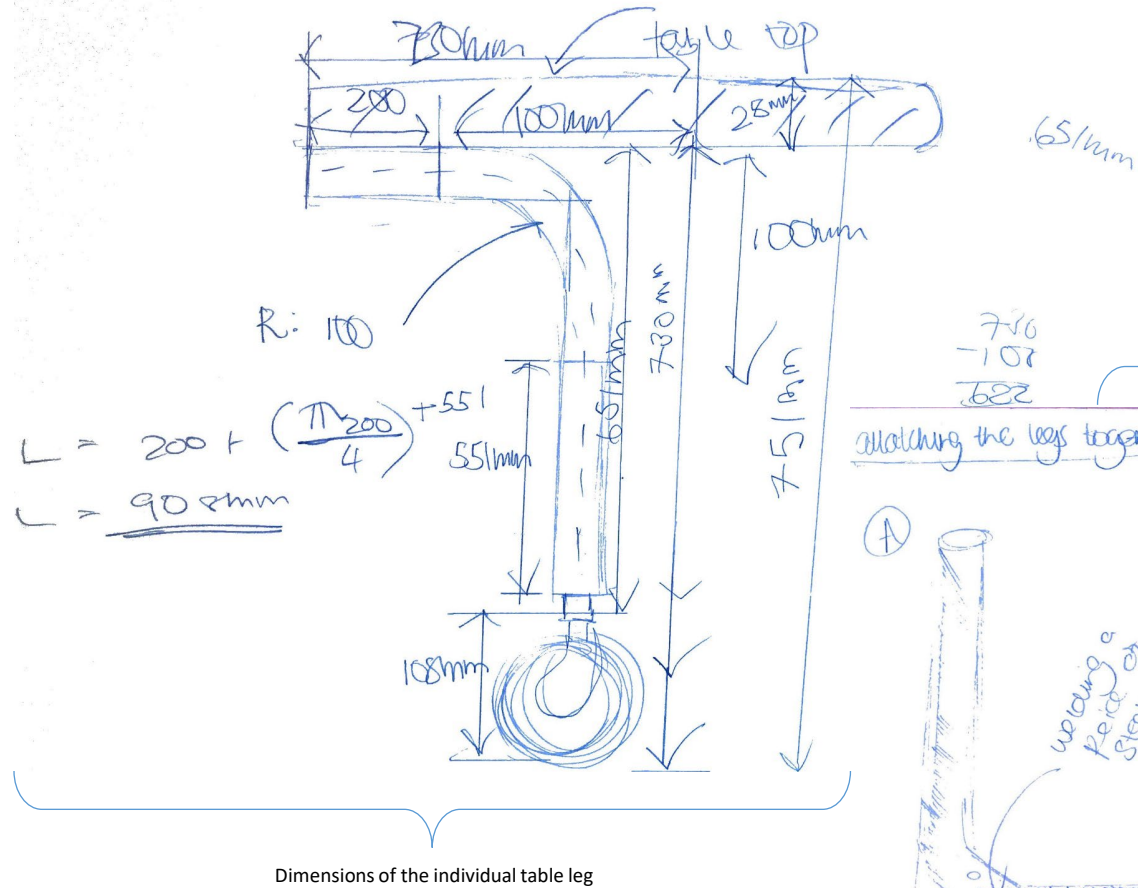
Emily Clarke A level D&T 9DT0/2 Bloxham School 5090



Emily Clarke A level D&T 9DT0/2 Bloxham School 5090

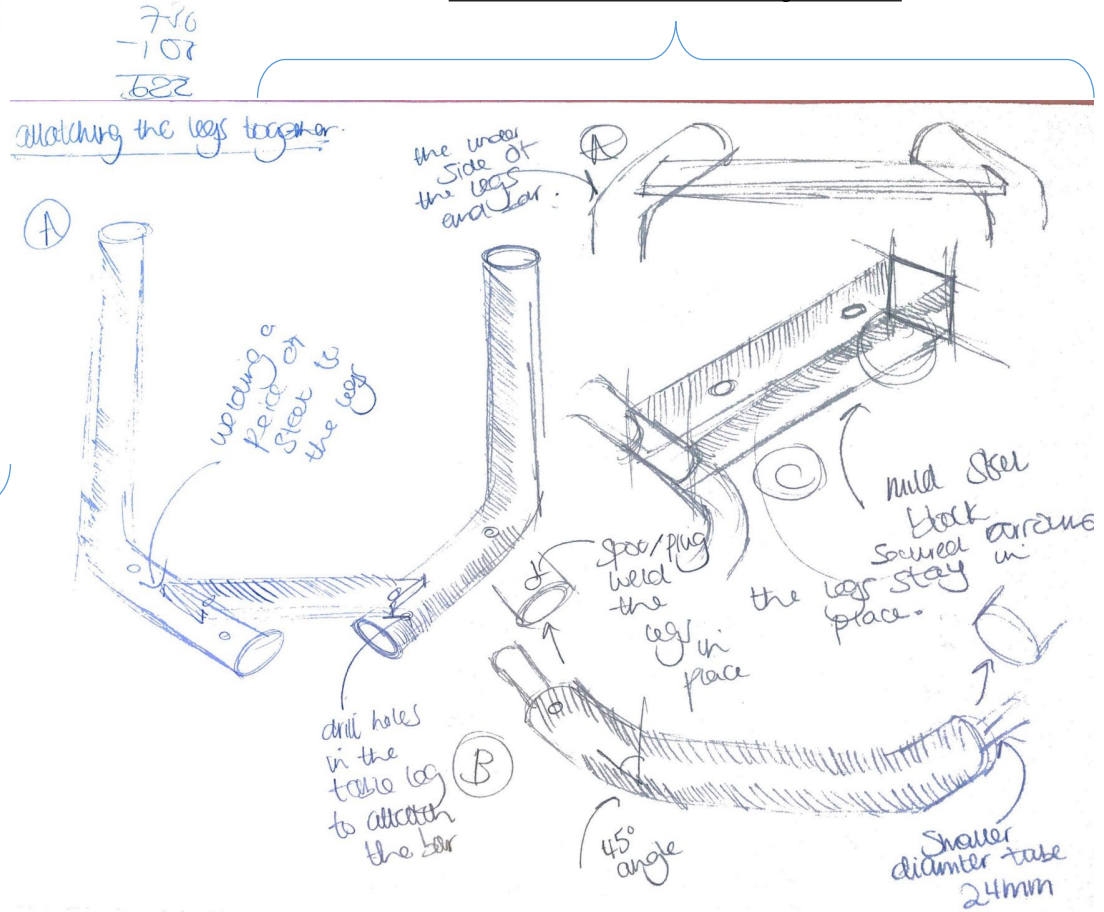
First draft of what the final design will look like

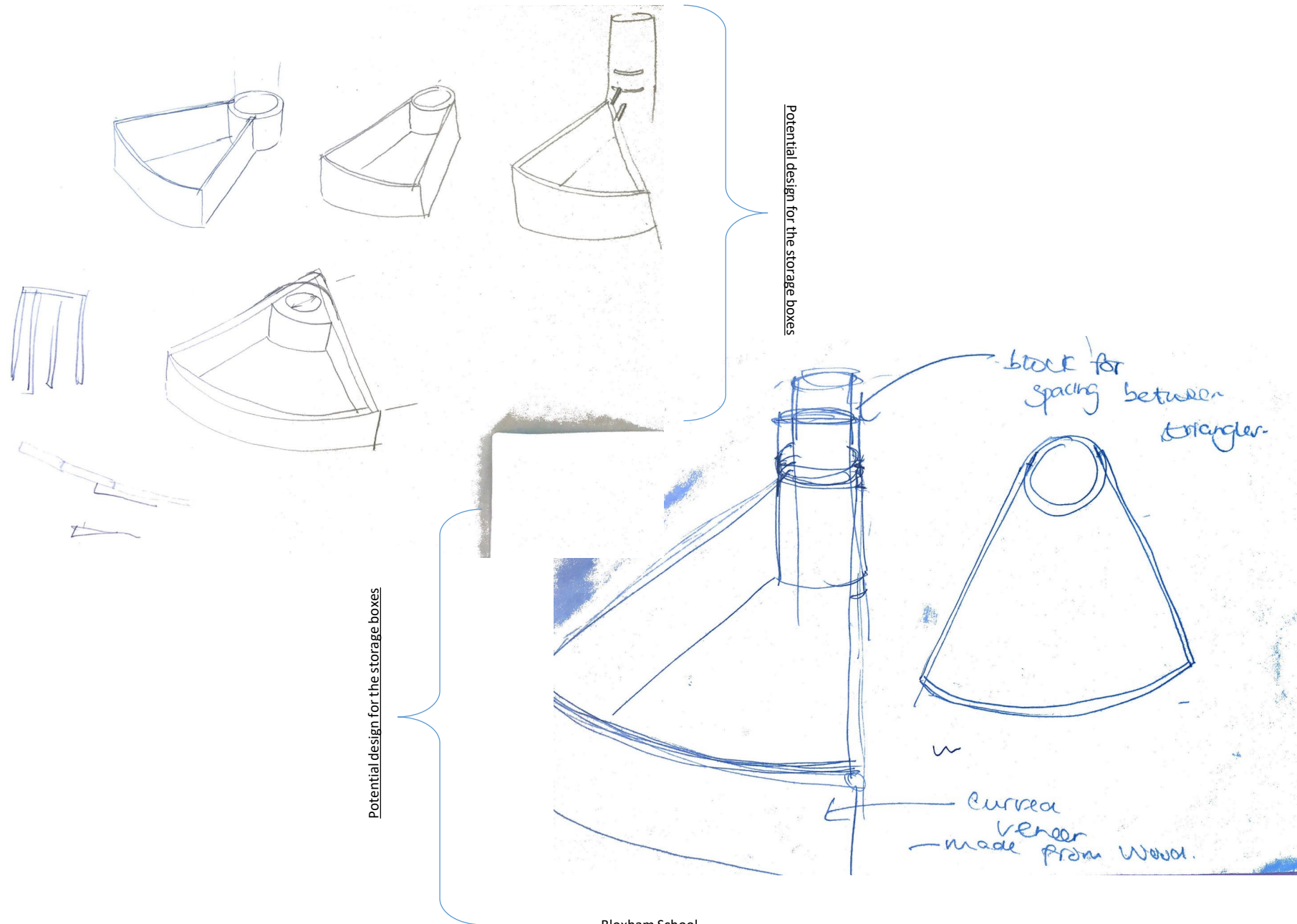
The table legs (chosen design)



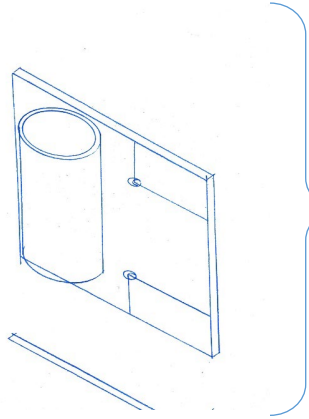
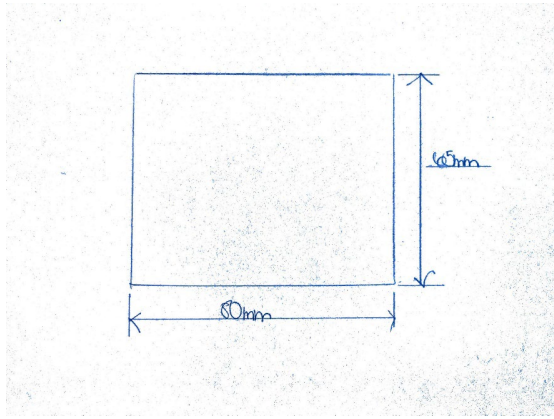
Dimensions of the individual table leg

Different solutions to make the table legs not wobble



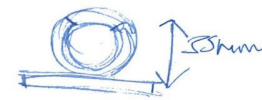
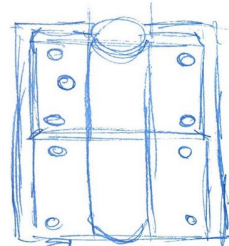
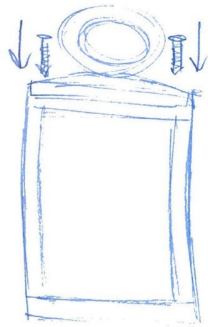


The 3D printed mechanism (attaching the storage boxes to the table leg)

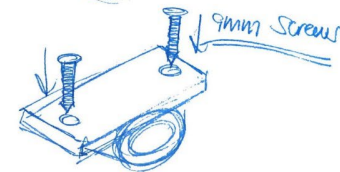
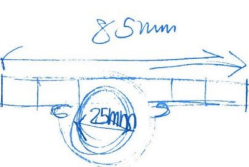
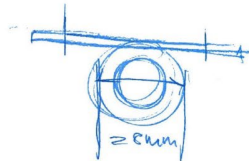
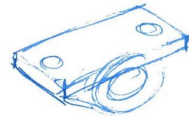
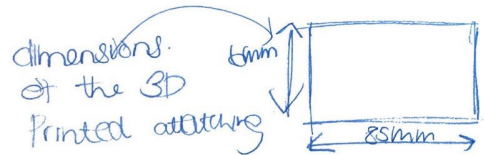


Drawings for the 3D printed attaching mechanisms

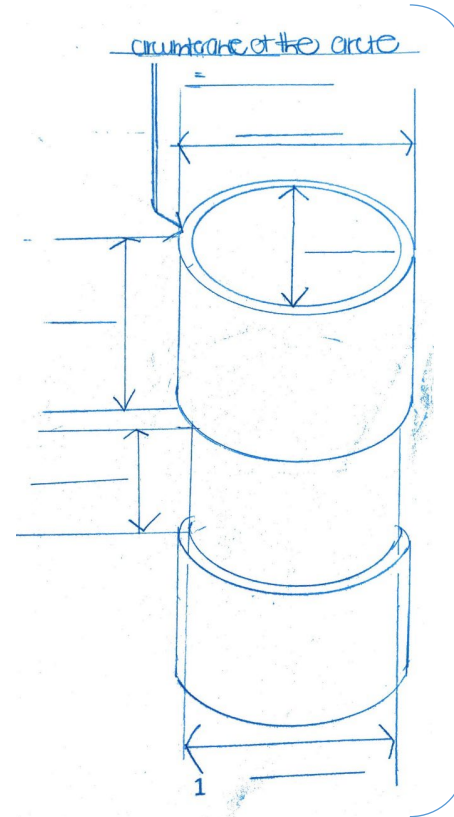
3D Printed attaching mechanisms



for the larger box attach 2 3D printed bridges to the box

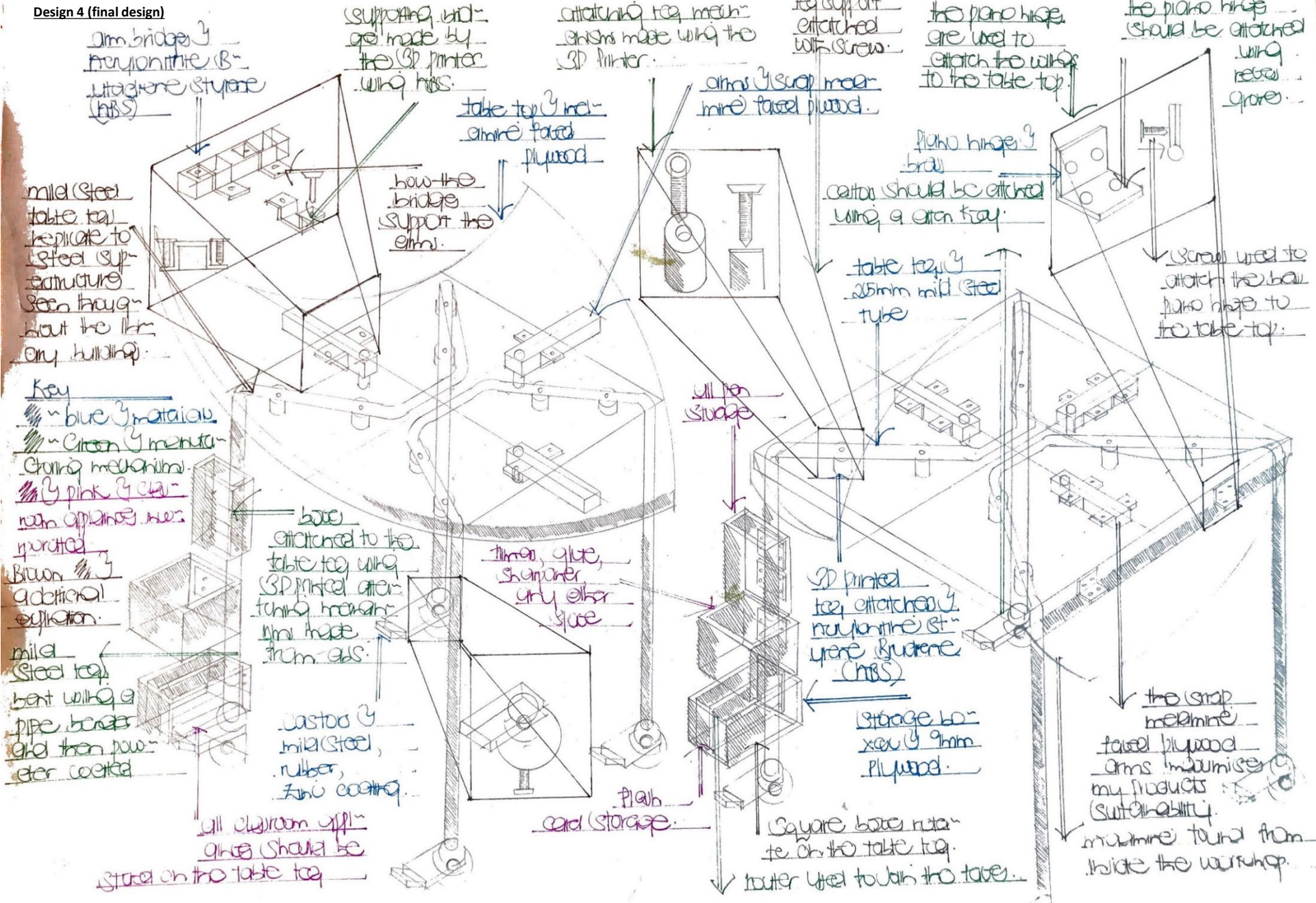


Drawings for the 3D printed attaching mechanisms

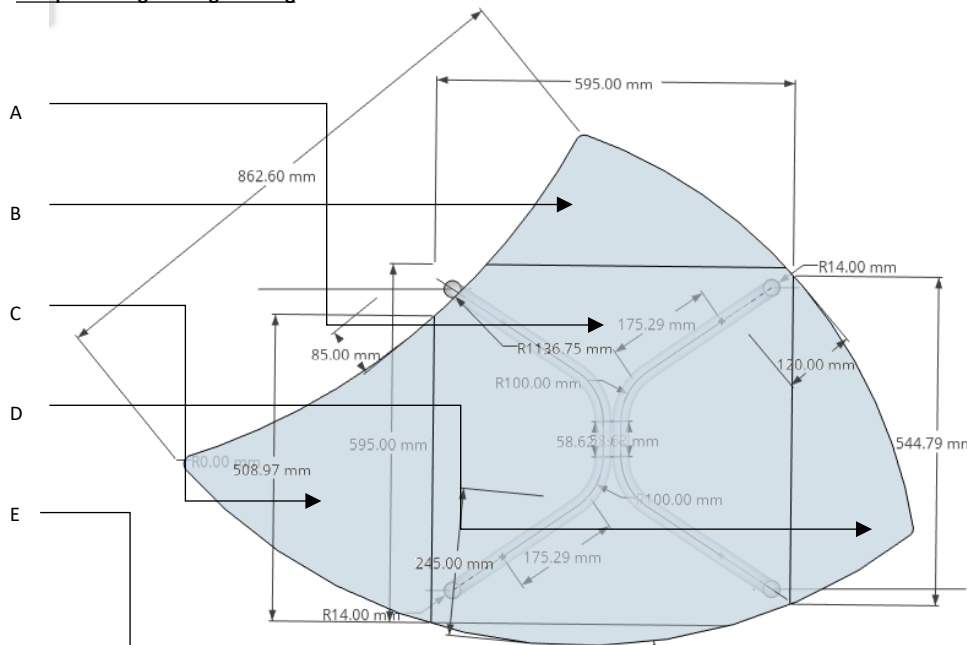


Dividers/spacers to be placed in-between the 3D attaching mechanisms

Design 4 (final design)

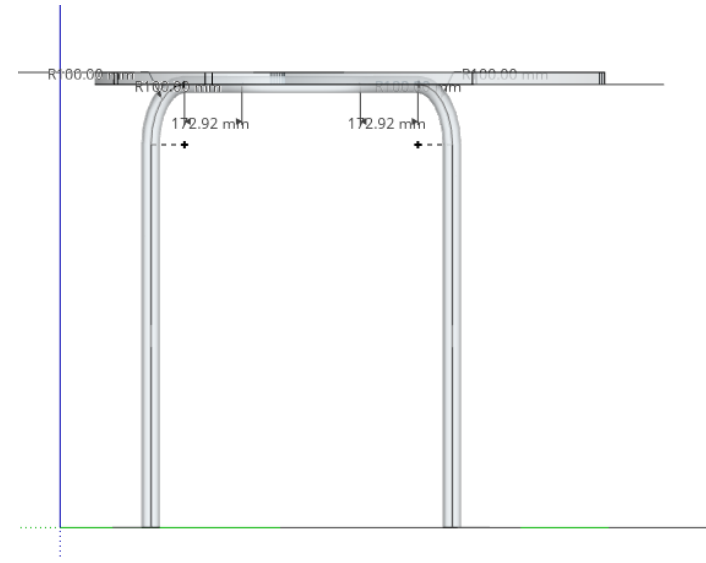
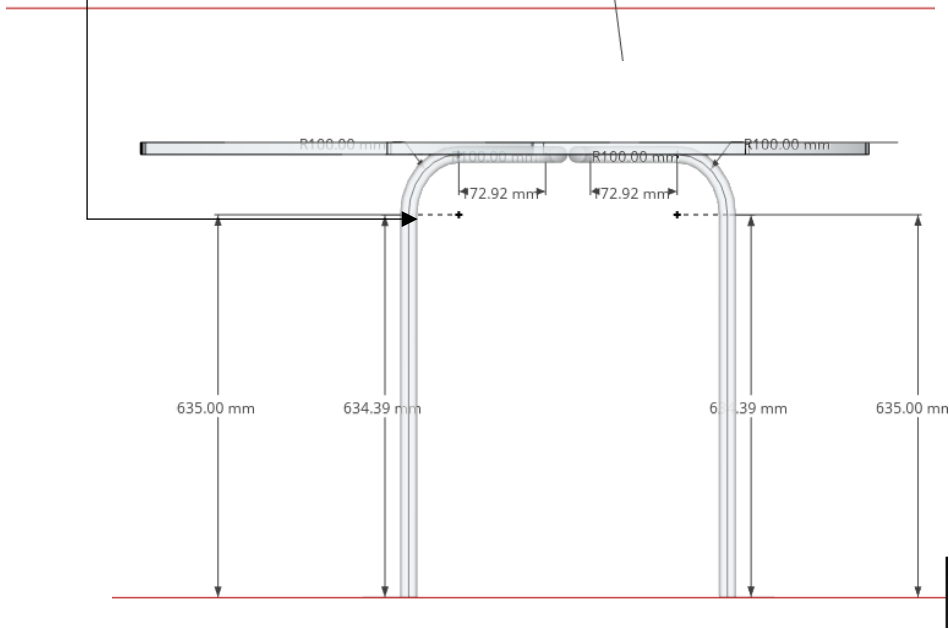


Completed engineering drawing

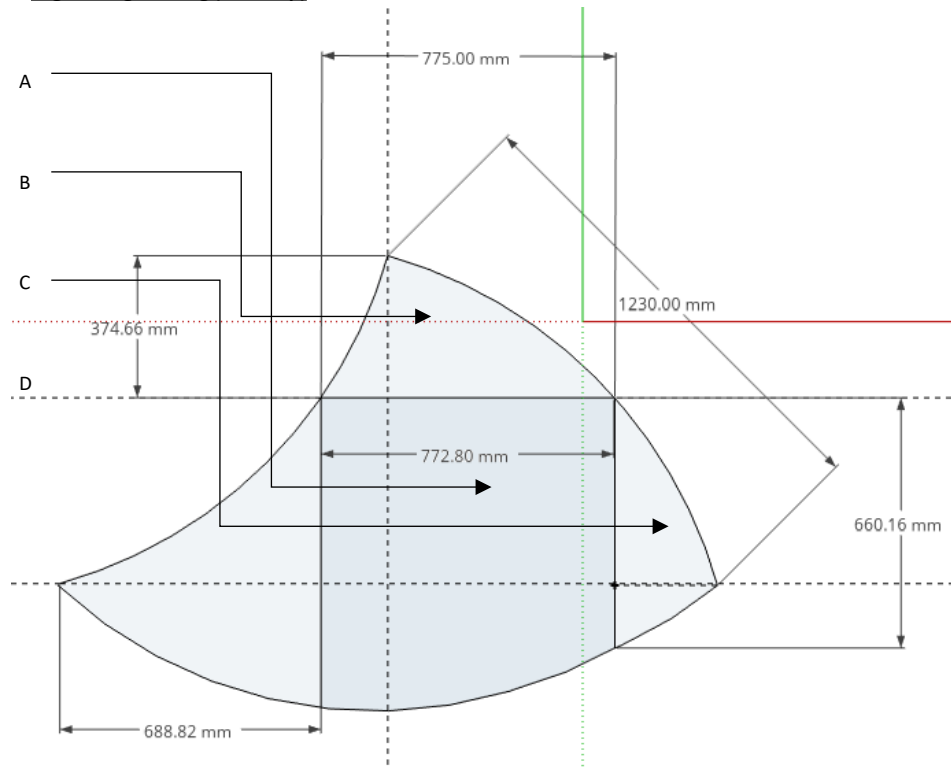


Component	Name	Material	Length	Width	Thickness	Quantity
A	Square table top	Melamine faced plywood	772.80mm	660.16mm	28.00mm	1
B	Top wing	Melamine faced plywood	775.00mm	374.66mm	28.00mm	1
C	Left wing	Melamine faced plywood	508.97mm	688.82mm	28.00mm	1
D	Right wing	Melamine faced plywood	544.79mm	660.16mm	28.00mm	1
E	Table leg	Mild steel	634.39mm	522.12mm	24.5mm	1

Scale 1:10

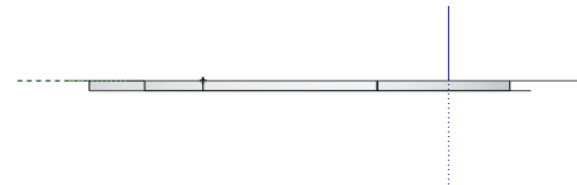
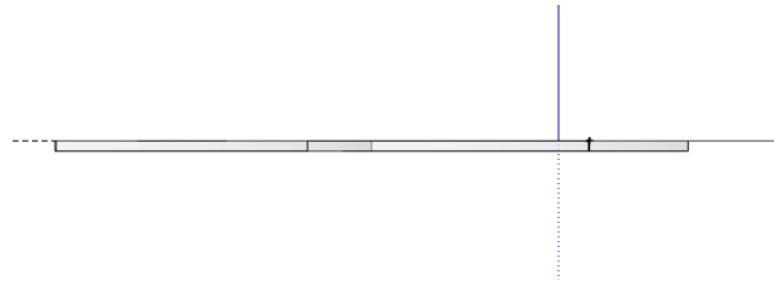


Engineering drawing (table top)

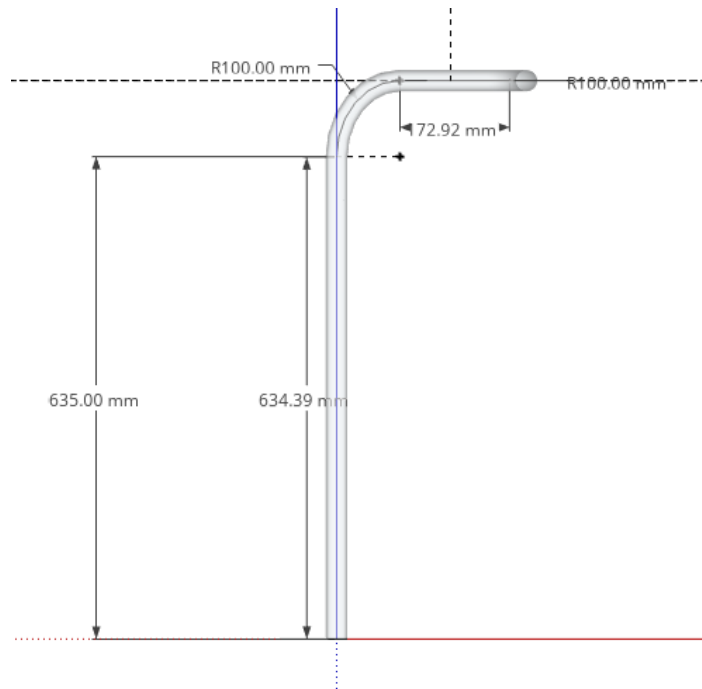
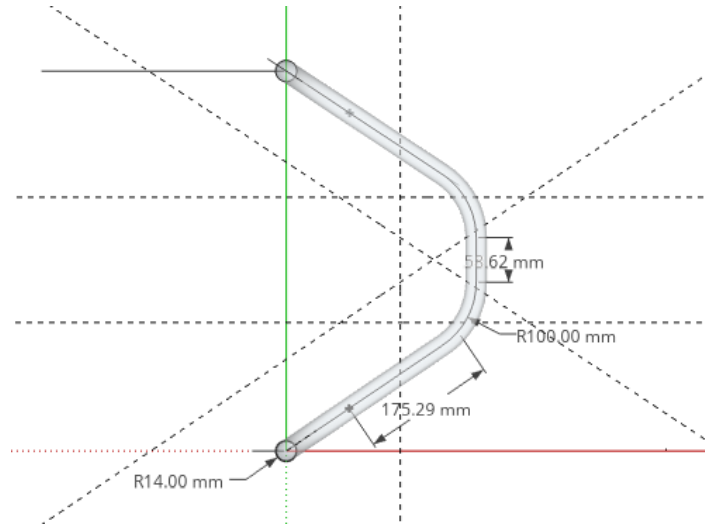


Component	Name	Material	Length	Width	Thickness	Quantity
A	Square table top	Melamine faced plywood	772.80mm	660.16mm	28.00mm	1
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D	Left wing	Melamine faced plywood	508.97mm	688.82mm	28.00mm	1

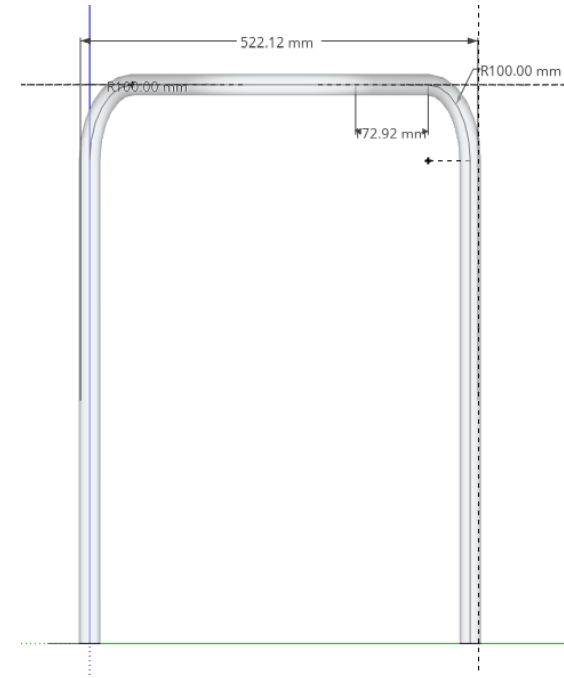
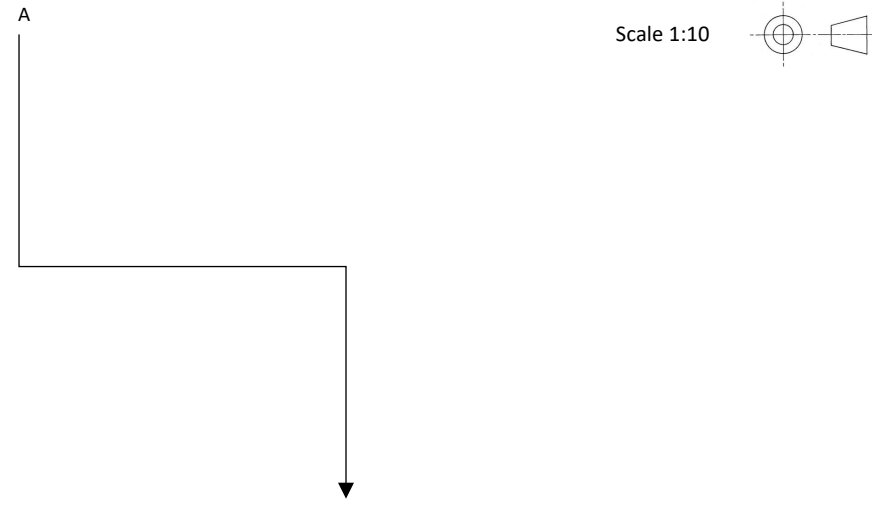
Scale 1:10 



Engineering drawing (table legs)



Component	Name	Material	Length	Width	Thickness	Quantity
A	Table leg	Mild steel	634.39mm	522.12mm	25mm	1



Photos of the finished learning aid



The learning aid inside the classroom amongst the other tables.



The learning aid situates outside the classroom



The learning aid with its wings folded inward



The learning aid with its wings folded outward