



National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TĀEA

Exemplar for Internal Achievement Standard Materials and Processing Technology Level 1

This exemplar supports assessment against:

Achievement Standard 92012

**Develop a Materials and Processing Technology outcome in an
authentic context**

An annotated exemplar is a sample of student evidence, with a commentary, to explain key aspects of the standard. It assists teachers to make assessment judgements at the grade.

New Zealand Qualifications Authority

To support internal assessment

Grade: Achieved

For Achieved, the standard requires the student to develop a Materials and Processing Technology outcome in an authentic context. This involves creating a fit-for-purpose outcome for a person, whānau, or community, using a brief with specifications.

The student has used a brief that identifies the purpose, end user, and the actual environment, and which explores the concept of a person's identity in a textile technology context.

Technological practice is evident in the use of research, ideation, materials and technique testing, and manufacturing. The outcome has been taken to the place it will be used, to see how it works.

As the student undertook technological practice, they were making decisions related to the outcome's fitness for purpose. Fitness for purpose is also demonstrated in the final photograph taken in the intended environment. The evidence also reveals how the requirements of the brief, and the physical and functional specifications, were addressed.

To attain Merit, the standard requires stakeholder feedback from more than one stakeholder, at more than one stage during technological practice, to inform the development of the outcome. For example, the student could have applied feedback from the end user and from people with expertise while developing the outcome.

A Merit grade also requires the student to explain the decisions that inform the improvement of the outcome's fitness for purpose.

At 18 pages, this student folio is within the suggested range.

Mood board 1: my clients identity



Mood board 2: types of hoodies



About my mood board 1 & 2

My mum grew up in a family of 4 kids (including her) She is 45 and a mum of 3 kids, me and my two sisters. We live in XXXX. She loves bees and watching the sunset at the beach with me and my younger sisters. She grew up with a family of three sisters. I'm not fully sure if she is half Samoan because my dad is Samoan.

Mood board 2 is full of different types of hoodies like

- Cropped
- knitted
- normal
- Zip ups
- Extra long hoodies

And those combined to e.g. cropped zip up
 There are lots of different hoodies to fit everyone and their personality. I personally like wearing cropped hoodies for my dancing so it's not too hot and I wear them to look nice but mostly I like wearing oversized hoodies. There are negatives and positives to all hoodies as well.

Interview: why is this person important to me and The Authentic purpose

My mum is important to me because she takes care of me and is always there when I need her she is so strong and she does everything she can to take care of me and my sisters. She is also working so hard at her new job so I want to make a hoodie for her to keep her warm at work on cold days.

Problem

She doesn't have much hoodies to keep her warm for work

Authentic purpose

I wish to create a hoodie for my mum to keep her warm on cold days when she is at work. My mum loves bees and the colours green and yellow. Her birthday was on Anzac day so i might give it to her as a Christmas present.

specifications

- Yellow and green colours
- Bees, flowers
- A zip (easy to remove at work)
- Fluffy fabric inside (to keep her warm)
- Hood (to keep her head warm)
- Cord for the hood
- A little over sized
- Ribbing
- Big warm Pockets

Measurements and special features

bust	66.5cm
Hips	46.5cm
waist	40cm
Shoulder and arm	64cm
Center back	64cm

Special features

- String in hood
- Big hood
- Small bee (screen printed)
- Ribbing
- Fluffy inside
- yellow

Testing

- Test the fabric (warmth)
- Different zips (if adding)
- Stretch and how long it can last
- Shrinkage
- Colour fastness

I will be using an XL or L but make it a little bigger for comfort wearing this and adjust the pattern if needed hoodie because my mum wants an oversized hoodie.

Ideate

- An oversized hoodie to keep her warm/Fluffy fabric to keep her warm
- A zip up hoodie so It's easy to take off
- Pockets for stuff she needs to carry around with her
- A big hood for her head to keep it warm

The design process

Empathy

My Mum is working at XXXXX now so I want to make a hoodie for her to keep warm on cold days

Problem

She doesn't have much hoodies to keep her warm for work

Ideate

- An oversized hoodie to keep her warm/Fluffy fabric to keep her warm
- A zip up hoodie so It's easy to take off
- Pockets for stuff she needs to carry around with her
- A big hood for her head to keep it warm

Testing

- Test the fabric (warmth)
- Different zips (if adding)
- Stretch and how long it can last
- Shrinkage
- Colour fastness

Hoodie fabrics



Jersey knit 100% cotton

The jersey fabric is very thin and would be very cold in the situation we are making the hoodie for. But it would make a perfect summer hoodie.

Sweat shirting 65% polyester 35% cotton

The sweat shirting fabric is soft and warm on one side and smooth on the other. You have more options of what applied design to do because you can do screen printing on the smooth side. The polyester gives strength and the cotton gives warmth and softness.



Polar fleece 100% polyester

Polar fleece is a thick fabric that's fluffy on both sides. It is very warm and soft great for a hoodie but you have less choices of applied designs because you won't be able to do a screen print on the fluffy fleece but it would be suitable for embroidery or applique.



Fabric choice

The sweat shirting fabric is soft and warm on one side and smooth on the other. You have more options of what applied design to do because you can do screen printing on the smooth side. The polyester gives strength and the cotton gives warmth and softness. I chose to use the sweat shirting fabric because it's warm because of the fibre. and And I think the smooth side will give a nice finished look when its done. I also chose this fabric because the polar fleece is really thick and would be hard to work with at times. And there is a bigger variation of applied design ideas I can look forward to do on the hoodie. My client chose this fabric because its light weight and feels super comfy.

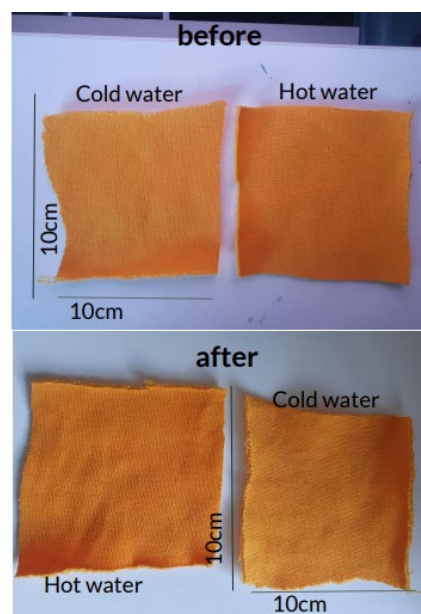


65% polyester 35% cotton

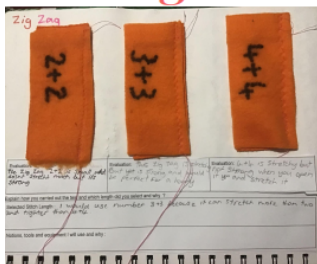
Shrinkage test

The shrinkage test is to wash the chosen fabric and see if it shrinks. I did one hot and one cold to see if they would shrink and made sure to cut them accurately 10 x10 so it would be easy to see if they shrink.

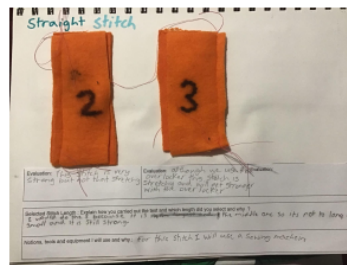
After hot and cold results they are the same they are still 10 by 10. So it is a non-shrinking hoodie fabric perfect to be washed.



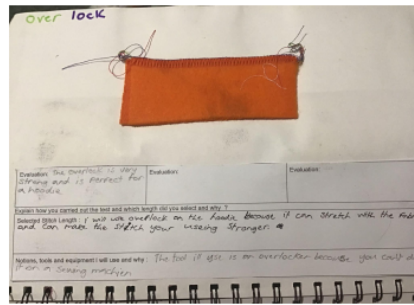
Testing the different stitches



Evaluation: 2+2 is small and strong doesn't stretch well though. 3+3 is the perfect stitch for a hoodie because its strong and stretchy. 4+4 is stretchy but could break after a few washes.
Selected stitch: The selected stitch is 3+3 because its strong and stretchy



Evaluation: 2+2 is very strong and a great stitch and will be very stable. 3+3 is stable and also strong when you pull on it and has a bit more stretch than 2+2

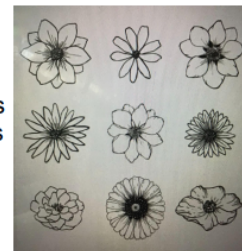


Evaluation: The overlock is very strong and is perfect to make any stitch stronger

Selected stitch: is the over lock on the hoodie because it can stretch with the fabric and can make the stitch your making stronger

design ideas (screenprint) and applied designs

These were design ideas I show my client and she wanted to see them on the 4 concepts to see what they would look like to make her chose but she loved the bee and the idea of flowers on the hoodie. She did think the flowers were a little boring. I think I'm going to do screen printing cause I think it would be easier if she chooses the bee and she also wanted it. The other applied designs to choose from was embroidery and Applique. Embroidery is hand sewing in lots of different ways. My client disliked the look of the embroidery but did like how creative you can be with the design and colors. Applique is when you cut out a piece of fabric and hand or machine sew it to a garment. My client loved this idea and she choose it before the screen print.



Screen printing

For the Applied design I decided to go with screen printing because it would have a nice effect with the fabric and it is fast and easy and cute.

The results from the screen printing were great we did testing on white woven fabric and then made little changes for the testing on hoodie fabric then fixing some little things like another line you can see in the photos onto the real hoodie and it turned out great.



4 Concepts

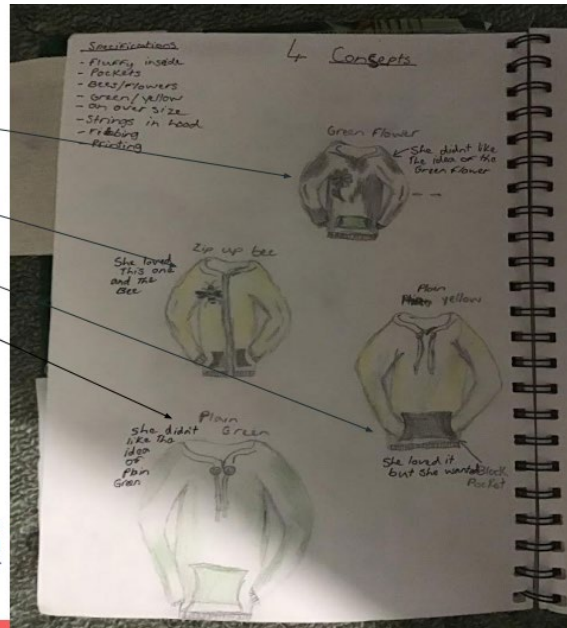
- Black hoodie with green flower
- Yellow with bee
- Plain yellow
- Plain green

specifications

- Yellow, green
- Bees, flowers
- A zip (easy to remove at work)
- Fluffy fabric inside (to keep her warm)
- Hood (to keep her head warm)
- Cord for the hood
- A little over size
- Ribbing
- Big warm Pockets

Feedback

My client loved them all but she thought the plain yellow and green were a bit to plain. She also didn't like the idea of the black with a green flower although she loved the flower idea. She loved the yellow with the bee because she said it brings out her love for bees and the colour yellow



This is the finished product of the hoodie. We did decide not to go with a zip but it still works perfectly. This photo was taken at XXXXX garden which is where my mum works. This product is suitable for my client it has warmth, it's a little oversized and has a bee that she loved. I chose this bee design to represent my clients love of bees and the garden. This chosen fabric was the type of fabric that I could do a screen printing on.

- A zip (easy to remove at work)
- Fluffy fabric inside (to keep her warm)
- Hood (to keep her head warm)
- Cord for the hood
- A little over size
- Ribbing
- Big warm Pockets

Except for the zip to make a fast and easy to put on hoodie, I would say it meets the specifications very well. The big hood, yellow, bee print, warmth, drawstring in hood and ribbing are all a success.



Finished product

Grade: Merit

For Merit, the standard requires the student to refine a Materials and Processing Technology outcome in an authentic context. Feedback is needed from more than one stakeholder at more than one stage during the technological practice to inform the development of the outcome. An explanation of the decisions that inform the improvement of the outcome's fitness for purpose is also required.

This student has used a brief that identifies the purpose, end user, and the intended or actual environment, and which explores the concept of identity for whānau. They have applied technological practice in a Processing Technology context.

Stakeholder feedback is used to inform the development of the spring roll, and has been documented in writing and sourced first-hand as the recipes were tested. The final outcome was then presented to the whānau. More than one stakeholder has been consulted at more than one stage during development.

The student has explained their development decisions and how these decisions have informed the improvement of their outcome. In this example, the decisions that inform the outcome's improvement have generated successful results, e.g. crunchier pastry, more palatable filling, and less vinegary dipping sauce.

For Excellence, the student could have analysed, explained, and interpreted (rather than just applied) the stakeholder feedback and how it informed the development of the outcome. The final evaluation of the outcome against the brief could also have more specifically assessed how the specifications were met (or not met), and also how the outcome could be considered as fit for purpose.

I am designing and making a savoury food product that represents the identity of my family.

Specifications

- Have three components:
- An edible “wrapping” or outer layer
- A savoury or sweet filling
- Served with dipping sauce
- Able to fit in one hand
- Appealing to look at
- Delicious to eat
- Affordable to make
- Suitable family recipe to pass on to your whanau.
- Be served to your whanau at home.

Interview with my stakeholders (Mum, Dad and my brother). I made some questions and they gave me answers to guide my design

- Mum was born in England and Dad was raised in Papua New Guinea. My brother was born here.
- No one has any allergies
- They all like to try new foods
- Mum and Dad like fruit and my brother prefers to eat vegetables
- They don't like anchovies, tofu, eggplant and olives
- I found out that my family is really interested in Asian foods. They also like fried rice a lot
- Hoisen sauce was new to me. I thought that my Dad's favourite sauce was a honey marinade but it's Hoisen sauce.
- All my family members said that they liked herbs and spices so I need to keep in mind that they enjoy herbs when designing my food product. My dad doesn't like things too spicy.

First trials we did as a whole class to try different ways to wrap fillings.



Paper Modeling - wrapping and folding

In class we made different shapes, we were able to be creative and by doing this it allowed us to see what the different shapes advantages and disadvantages were. It is important for us to test these different shapes out so then when we make our final prototype we will know which shape best fits.

We then trialled some recipes with the different shapes and different fillings to see what worked and what didn't.



Fruit puff pastries

This wasn't complicated and I enjoyed the taste of the finished product, we were able to be creative and make lots of different shapes, including triangles, squares and ovals. The combination between berries and the pastry tasted good and had a nice texture which was a little bit hard on the outside and soft in the inside. I also liked the finishing touch which was adding icing sugar. My favourite shape was the bottom triangle one in the photo, I liked this shape as it was able to hold the inside ingredients, I think this would be a good shape design for this meal.



Dumplings

This design really fitted the paper modeling and - wrapping + folding design, I used the steam fry technique and I enjoyed it but I tried some of the deep fried dumplings and I preferred them better as it was crunchy on the outside and moist on the inside.

Green Thai curry fillo pastry

I enjoyed making these but I don't really like green Thai curry so I didn't like the taste of the final product, although I really enjoyed the taste and the texture of the pastry but not the inside, we also did not have enough time and I don't think it was cooked enough. I would try making this meal again when I have more time.

Feedback on some concepts

Concept	Short description	What do you like about this idea?	What do you dislike about this idea?	How could I change or improve this idea?	Summary - which is your favourite concept/s
1	Hash browns bites wrapped in bacon with maple syrup	Sweet and savoury I think the flavours will go well together	Im not to sure about the portion sizes I need to figure out a sizing for each one	Use a different wrapper	My family most liked the sound of concept 4 which was the Vegetable and beef sprince spring rolls served with swet chilli suace. My family really likes mince and they enjoyed spring rolls.
2	yorkshire pudding with kumara and mash potato mixed together with gravy	An intersting combination and the flavours would be yummy mixed together	Has a lot of english culture	Add in cheese to go with the mash potato	
3	butter chicken pie with kumara on top instead of potato with tomato suace	A different combination and would be interesting to see if the ingredients go well together	Not sure if they flavours will go well together	Test out which one is better wether its Kuamara on top or potato	
4	vegetable and beef mince spring roll with sweet chilli suace	I think the suace would go well with the vegetables	Its an original suace	Have different pastries	
5	Rice and chopped vegetables inRice paper rolls with ginger, soy suace and sweet chilli suace	I think the suaces and the vegetables will go well together	Mums not too keen on rice so woudnt be a good meal for her	Have a different filling that all my family likes such as a meat	
6	yorkshire pudding filled with lamb and ontop of the lamp with a maranade cotained of herbs and spices.	Lots of different tastes and textures	Dont know how I would present the lamb in the pudding	I dont really like herbs and spices but my family does	
7	Falafel wrap - A wrap that includes falafel balls, hummus, salad, and a yogurt-based sauce wrapped in a flatbread.	Different textures and Different ingridients used.	Dosen't really represent my culture that well	Have a different suace that replaces the hummus	

Recap - Brief Development

WHAT To design a food product that reflects the history of my family and represents my family

WHY We get to find out more background information about my family's history and the more we know ourselves makes us more strong designers and also makes us better with making our own recipes, more skills in the kitchen.

WHO The members of my whanau who are giving me feedback are my dad,mum and my older brother. My friends, XXXX and XXXXXX and my teacher will also help me develop my product with taste testings and advice on my cooking.

HOW After interviewing my whanau, alongside the specifications from my teacher, I need remember to

- Include cultural ingredients commonly used in the following countries: England and Papua New Guinea
- Use cooking techniques typical of these countries, such as: Roasting, stewing, frying
- Keep the spice/heat tolerance as: mild
- Not to include anchovies, tofu, eggplant and olives as these are ingredients members of my whanau won't eat
- Include one/some of these favoured ingredients: Hoisin sauce, chilli sauce or fried rice
- Keep the size no bigger than my hand

Results from my filling tests

Final Recipe for Beef spring roll filling

- 2 leafs Cabbage
- 1 leaf spring onion
- 150g minced beef
- 1 carrot
- ½ thumb size of ginger
- ½ squeezed lemon juice
- 1 tsp crushed garlic

1. Cook mince in a medium frying pan on a medium heat.
2. Grate carrot, ginger, dice cabbage, spring onion
3. Once the mince is almost cooked, add in vegetables and stir.
4. Squeeze lemon juice on the top and mix crushed garlic in with the other ingredients.
5. Once all stirred take of the heat.
6. Dish up and enjoy.



Feedback received from classmates

Positive comments	Negative comments	Other ideas/suggestions
The flavours and textures went really well together.	Mince was a little dry and needed another flavour.	Adding lemon and garlic to add more flavour.

My evaluation and next steps:

The texture of the first test was good, but it was a little bit burnt. I didn't taste too much of the burnt bits but it was dry but then I took XXXXX's advice and added lemon.

For the second test it had the right amount of lemon in it which just made the flavouring a lot better. I will keep the lemon and add garlic to the last test.

For my prototype I will add lemon and to my recipe to make the flavourings stronger and better.

Sample A: Beef mince and my recipe vegetables

Sample B: Added ½ squeezed lemon

Sample C: Same as sample A and but added Lemon and crushed garlic

Results from these tests

Sample A: Filo Pastry

Sample B: Puff Pastry

Sample C: Wonton pastry



Feedback received from my classmates

Positive comments	Negative comments	Other ideas/suggestions
Textures for puff pastry and filo pastry went really well. The filo pastry had a nice crispy texture.	After a while the puff pastry got a bit sickly to eat. The wonton pastry was really hard to cook right	To have different shapes on the plate to make it look more appetising.

My evaluation and next steps:

The texture was crunchy and went well with my mince filling. I enjoyed the taste with both the fillings.

I agree with my feedback I agree that the filo pastry went best for my filling.

So for my prototype, I will need to adapt my recipe by choosing the filo pastry

Testing my dipping sauce recipe



Base recipe

- ¼ cup rice vinegar
 - ¼ cup water
 - 1 Tbsp sugar
 - 1 Tbsp Sambal oelek
 - ½ tsp cornstarch + 1 Tbsp water
- Add the rice vinegar, sugar, water and sambal oelek to a sauce pot, heat and stir the mixture over medium heat until the sugar is fully dissolved.
 - Stir the cornstarch into the 1 Tbsp of water until dissolved, then pour it into the sauce pot with the sweet chili sauce. Continue stirring and heating until the mixture comes up to a simmer, at which time the cornstarch will thicken the sauce and it will go from appearing cloudy to then becoming clear.
 - The sauce will now be ready, enjoy.

Sample A: base recipe

Sample B: added ¼ teaspoon of paprika

Sample C: added 1 teaspoon of sugar

Feedback received from my classmates

Positive comments	Negative comments	Other ideas/suggestions
The flavours were good, after the sugar was added it was sweet and not sour.	The original sample we had wasn't the best as it tasted too vinegary.	Adding more sugar or adding less vinegar to make the overall sauce balanced.

My evaluation and next steps:

The taste was alright but it needed to be improved, the texture was like original sweet chili sauce so that was good. To make it taste less bitter, an idea was to add more sugar so I did this in my second test and it made the sauce a lot better and nice and sweet. For my prototype, I will need to adapt my recipe by adding sugar to make it less bitter and more sweet.

Final prototype recipe

Ingredients:

Filling:

- 2 leafs Cabbage
- 1 leaf spring onion
- 150g minced beef
- 1 carrot
- ½ thumb size of ginger
- ½ squeezed lemon juice
- 1 tsp crushed garlic

Wrapper:

- 6 filo sheets

Dipping Sauce:

- ¼ cup rice vinegar
- ¼ cup water
- ¼ cup sugar
- 1 Tbsp Sambal oelek
- ½ tsp cornstarch + 1 Tbsp water

Complete method:

1. Cook mince in a medium frying pan on a medium heat.
2. Grate carrot, ginger, dice cabbage, spring onion
3. Once the mince is almost cooked, add in vegetables and stir.
4. Squeeze lemon juice on the top and mix crushed garlic in with the other ingredients.
5. Once all stirred take of the heat.
6. Set up filo pastry sheets
7. Add filling into the sheets and fold into spring roll shape or any shape you desire.
8. Once they are all folded, put them into a deep fryer and wait until a golden and crispy look.
9. Take them out once they have reached the amount of time that they need to cook.
10. Damp with paper towels to decrease the amount of oil.
11. Now for the sweet chili sauce .
12. Add the rice vinegar, sugar, water and sambal oelek to a sauce pot, Heat and stir the mixture over medium heat until the sugar is fully dissolved.
13. Stir the cornstarch into the 1 Tbsp of water until dissolved, then pour it into the sauce pot with the sweet chili sauce. Continue stirring and heating until the mixture comes up to a simmer, at which time the cornstarch will thicken the sauce and it will go from appearing cloudy to then becoming clear.
14. The sauce will now be ready, enjoy.
15. Dish up and enjoy.



Evaluation - Was my dish fit for purpose?

My spring rolls had Filo pastry, A mince, vegetable, lemon juice with a sweet chili sauce as my dipping sauce. This dish was very easy to hold, and it fitted into one hand. The golden and crunchy look to it made the meal look appetizing. I know that it was delicious as I tasted it, and my family also tasted it and they demonstrated their appreciation by telling me how much they enjoyed the spring rolls. If I were to calculate my ingredient costs, I think it would be cheap as I could get some of the ingredients (vegetables) from school and from home. It is a suitable meal for my family as it was mixed with Papua New Guinea and England foods. It was also quick and easy to prepare and cook.

Mince is an important ingredient to put on a plate with food in Papua New Guinea and England. This is where I got my ingredients from to make my spring rolls. I fried them in a deep fryer. It included lemon, beef mince and vegetables so my family would enjoy the taste. Overall my family and I loved these spring rolls, and they would like me to make them at home for lunch or dinner.

Grade: Excellence

For Excellence, the standard requires the student to evaluate a Materials and Processing Technology outcome in an authentic context. This involves analysing how stakeholder feedback informed the development of the outcome, and evaluating the outcome against the brief with specifications for fitness for purpose, in the actual or modelled intended environment.

This student has used a brief that explores the context of manaakitanga and applied technological practice in a hard materials context.

Technological practice is evident as the design develops, and the student has made clear decisions about improving the outcome's fitness for purpose at key design and construction stages. These decisions are evident in the student's sketches, mock-ups, and photographs, and have been explained in the written descriptions.

Feedback has been sourced first-hand on Post-it Notes, and more than one stakeholder has been consulted at more than one stage of development. The student has analysed individual feedback and taken relevant suggestions on board, revealing that feedback has clearly informed the development of the storage box at key decision-making stages.

The final stage of the technological practice was the evaluation of the finished outcome. The student has evaluated the outcome firstly against the brief, including physical and functional specifications, and then for fitness for purpose when tested in the actual intended environment.

At 19 pages, this student folio was within the suggested range.

Opportunity or need identified

After a lot of thought I decided that I will demonstrate manaakitanga by making a container for my brother XXXXX (he is 12 years old and my primary stakeholder) to store his rubix cubes to make it easier and more convenient to store them. Because he doesn't have an associated spot to put his cubes and they can be a bit of a hazard when they're lying around everywhere. He does try to avoid this, but I think if there was a unique and associated place to put his cubes, they'd be in a safer spot and won't get damaged. It will also make use of better storage space in his bedroom that he with our younger brother.

Specifications-

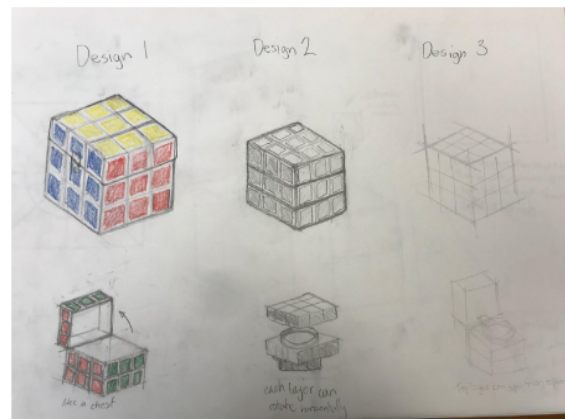
- It opens like a chest
- The minimum volume is 5000 mm³
- It must look like a rubix cube
- It must fit in the intended environment
- It must interpret the characteristics of my stakeholder
- It can store up to 20 cubes max
- Must have a spinning mechanism to it

Development of design ideas

I first gained inspiration from a photo I found on the internet of a rubix cube inside a rubix cube. The main changes of my concepts were all in thought of 'is this what my stakeholder would want?'. The **first design** as shown in the image is using the concept of that of a minecraft chest as it was what my stakeholder described when I asked him 'what is your preferred way to open a container?'



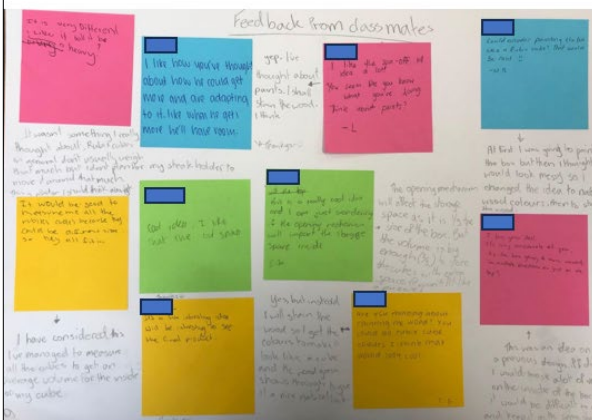
In my **second concept** I was more inspired by the first photo I saw which inspired me with a spinning mechanism. The inside was going to be somewhat a cylinder shape and there would be layers that could spin to give the effect of a real working rubix cube.



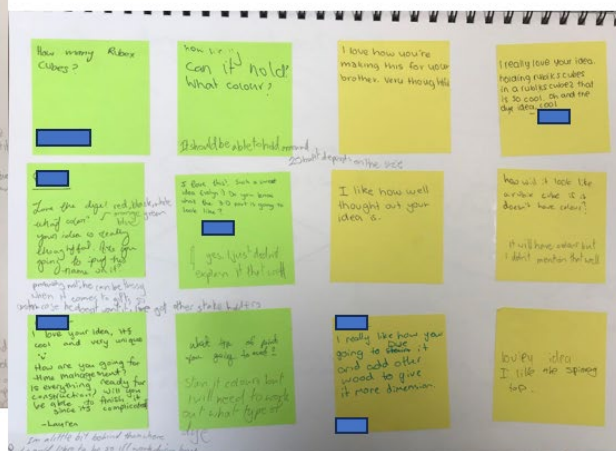
Lastly, my **3rd design** is like a combination of both. The bottom 2 layers are solid so my stakeholder can store more cubes but the top layer can spin and there is a hinge so the lid can still open up like a minecraft chest, as what my stakeholder wanted.

Originally I believed I could work my way around the hinge opening and it could still work but during this process I came to the conclusion that it was never going to work so with the help of my expert stakeholder we came up with a working solution that was the best of both worlds

Comments and suggestions



This is the first part of feedback I received from my classmates during the designing stage of our Projects



This is the second part of feedback I received from my classmates near when we have all started the construction process of our projects 4

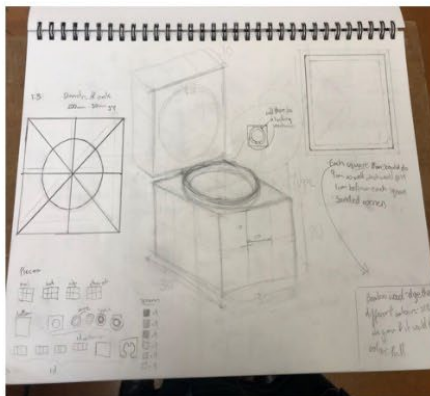
Initial ideas and first feedback

The most common suggestions I received from my classmates was 'Are you going to paint it?'. Initially i was going to paint it but then I thought it would look messy with the paint strokes so I then decided to use different colours of wood so it would still look somewhat like a rubix cube, and it would embrace the fact that it is made out of wood. But due to the amount of suggestions of how cool making it colourful would look, I then decided to combine both ideas using woodstain. This would get me the colours I wanted and it would show the texture of the wood underneath. I talked about it with my Mum (who represents my stakeholder as I want this to be a surprise) and she thought this was the best solution for it.

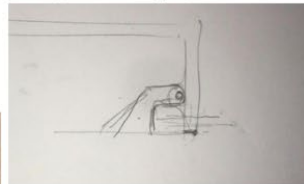
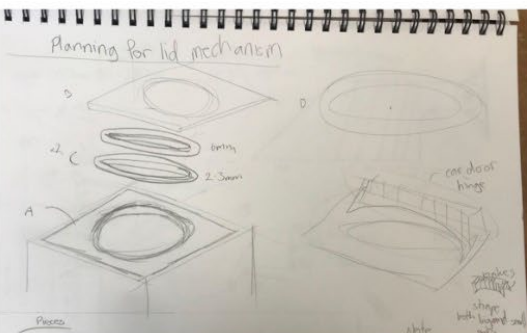
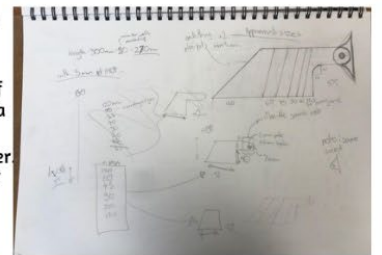
One comment asked me if the mechanism would impact the storage space. I also received multiple comments asking how many it will hold. When I started this project, the first thing I did was measure the intended environment to see the maximum dimensions of the container and calculated the total volume of all my stakeholders cubes to see the minimum dimensions I would have to make the cube. The minimum volume was approximately 5000mm³ and the maximum volume was 400 x 450 x 500 mm³. So In conclusion I knew size wouldn't be much of a problem and the dimensions had to be less than 400 mm. In the end I decided on clean measurements of 300 x 300 x 300 mm³ (I also checked this with my representative stakeholder and she approved on the sizes and thought it was a suitable size for a container).

Lastly, during the second part of my feedback, I went through a phase where I was almost considering on changing my concept back to the original design, easy, plain and simple (basically giving up on the fancy mechanism idea). But after a lot of convincing from my peers with comments on how cool the mechanism would be and from my representative stakeholder she thought the lid would be interesting and unlike any other, I decided to continue working on the lid mechanism so make it work with both function and aesthetic.

Development of design ideas



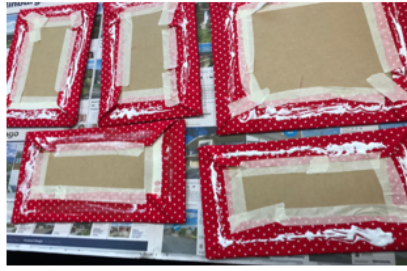
My original idea was for it to open like a chest using 2 hinges. This was then changed to an idea of having multiple spinning layers and the lid would just be something you would take off. I then scrapped this idea because my stakeholder prefers containers to open like a minecraft chest. A recommendation from expert stakeholder was a spinning mechanism where only the top lid spun and it could open up. Having a hinge to open it up wasn't going to work. With the amazing help of my expert stakeholder we came up with a concept where it uses the idea of a car door hinge. We cut out test pieces to get an idea of how it works and I developed it further to make it fit for the opening mechanism of the container. This was the hardest part of the construction process as it took many, MANY hours of planning and developing it to make it work and fit properly.



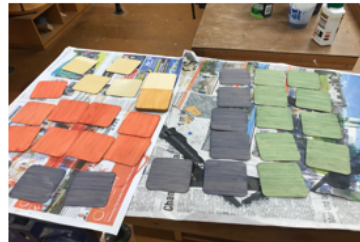
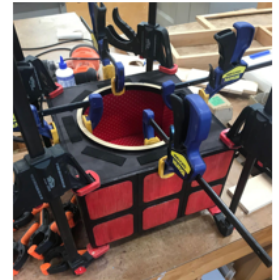
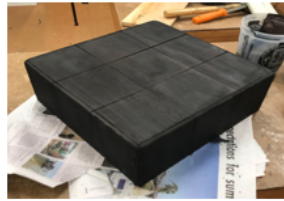
During the process of designing the mechanism for the second time the length from the side of the lid had to be longer and lower in order for the joint to make it work better which meant I had to remove some of the pieces because they were just too small and weren't doing anything other than looking pretty.

Construction Process

Before I stained I did a lot of sanding to make it smooth. I used a router but that backfired as a part of the plywood had an air hole and so I decided to file the rest of the container. After a labored process of sanding I then got to begin the staining process. I had a good blue, white, red and green which I used which made the panels look like rubix cube. After all the staining I decided on the interior of the container. I used cardboard, batting, fabric (colour was chosen by my stakeholder), tape, adhesive spray and glue. This added cushioning so that when the rubix cubes are put into the container they won't get damaged.



Gluing the panels was a lot more tedious than I thought it would be. When I glued them on, they started curling so I had to use a lot of tape to glue down the corners. I used a fine piece of sandpaper to give the container a final smooth surface then varnished to protect the whole thing.



This is my Manaakitanga Product in its intended environment. The location is a shelf in my stakeholder's wardrobe. Previously he stored all of his rubix cubes on the shelf, it was a convenient spot to place them as they were easily accessible, but I believed the shelf could be put to better use of storage space.

Stakeholder's reaction:

I finished my project on the 23rd of June which was a rather convenient timing because it was his birthday the following day. I decided to wrap it so it would be more of a surprise when he opened it. When he saw the enormous cube he was a little confused, but he had a big grin on his face, so that was a plus. When he opened it up I could tell that his face lit up. He said that it looked really realistic, and it looked pretty cool. He even went to get his own Rubix cube to check that the colours were on the right side and it passed, I had a small sigh of relief. I told him to open it and first he was a little stumped but when he opened it, he was impressed. I told him how it worked and according to his actions he was rather fascinated at how it was all put together, so I think he really liked how it opened and how it spun like a normal cube.

Overall, from his reactions I think he is really happy with it and likes it a lot.

Fitness for purpose and conclusion

Overall I believe my project is fit for purpose, I personally believe that it does fit the brief and all the specifications I wanted to include in this project. I think I have interpreted Manaakitanga well because sometimes my brother has trouble fitting in so he spends a lot of time focusing on his hobbies. I wanted to show him that I am interested in his hobbies as much as him so we have a way to connect through Rubix cubes. He is rather protective over his cubes (as many arguments have started over them because of it) but he never had an associated spot to store them other than on a shelf which other family members could easily access them (primarily our little brother). They also risked getting damaged. In previous moments he has sometimes broken his cubes so by storing them in a more protective environment they are safer and have a smaller risk of getting damaged. I asked him for feedback on it and he said 'I like it, there's nothing I would change about it, it's pretty cool'. I find that a big win.

Specifications-

- It opens like a chest ✓
- The minimum volume is 5000 mm³ ✓
- It must look like a rubix cube ✓
- It must fit in the intended environment ✓
- It must interpret the characteristics of my stakeholder ✓
- It can store up to 20 cubes max ✓
- It must be able to be fit for purpose for other stakeholders (just in case) ✓
- Must have a spinning mechanism to it ✓

Overall I think I have done each specification- by using a unique mechanism it can both open like a chest and has a fun twist to it, literally. It does fit in the intended environment, and even better the lid can open inside it. He has put his cubes in the box and it does all fit. Lastly my other stakeholders I had in mind was my other little brother who said he quite liked it alot and my third stakeholder was my cousin. When she saw it she was rather interested in it so even if my primary stakeholder didn't like it, I think my other stakeholders would happily use the container.

Reflection and Evaluation

In terms of the brief for this project, it was to design a container that would fit 20 rubix cubes and be stored on a shelf in a wardrobe with ease. I wanted to make this so my brother would have a safe spot to store all his rubix cubes so they have a place to belong. The primary brief was to interpret Manaakitanga; I think I have interpreted this because I have shown interest in one of my brothers hobbies and made something that is functionally helpful for him and is aesthetically pleasing to look at and know what is being stored in it.

