

	Grade Boundary: Low Merit
3.	<p>For Merit, the student needs to undertake in-depth brief development to address an issue within a determined context.</p> <p>This involves demonstrating how the specifications allow a judgement of an outcome's fitness for purpose in the broadest sense.</p> <p>This student has developed a brief for a storage solution to be located in a teenager's bedroom. Not seen in this exemplar is evidence of the establishment of the issue, need or opportunity. The student has also explained related context considerations and reflected on the views of key stakeholders.</p> <p>There is sufficient depth in the evidence to place the sample at Merit. Consideration of the outcome's social acceptability (1) is seen throughout the final brief, and the final specifications also allow a judgement of the outcome's fitness for purpose in the broadest sense, including:</p> <ul style="list-style-type: none"> • determination of life cycle, maintenance and ultimate disposal (2) • health and safety (3). <p>For a more secure Merit, the specifications should be communicated in more measurable terms to demonstrate precisely how they allow a judgement of fitness for purpose in the broadest sense. Additional consideration for the technical acceptability of the potential outcome and views of wider stakeholders would also strengthen the evidence.</p>

Context. With the current economic crisis that has hit New Zealand since Covid lockdown, there has been a rising problem with a lack of houses. To overcome this problem, some building developers have started to design and make houses that fit into a smaller land size. The impact of doing this is that it causes the rooms to all be smaller and that generates a problem with storage. I am going to focus my design project on this context to see if I can identify a problem to solve.

Identified Issue. In this context, there were possible storage problems for each room in a house. In a kitchen, there can be a problem with storing the recycling stuff before it goes out to the bin outside. In a bedroom there can be lack of space for storing things such as shoes etc. There could be a need for space saving furniture in a lounge but this would probably be totally dependent on how many people live in the house and have regular access to the lounge area because they would all have competing needs.

Considerations. I chose to design a seat that can fit in a standard sized bedroom and has some sort of integral storage capacity within it. This presents a range of problems such as: -

I decided that my target audience will be teenagers (either gender). This is because when I discussed it in my group, we all agreed that most adults would not have as much of a need for this kind of furniture. Teenagers tend to use their bedroom as a personal living space and somewhere to get away from the family, so having increased storage and seating would be an advantage for them.

After researching existing ideas for storage solutions I decided in order for my final design to be fit for purpose it will need to include the following specifications.

1. It must be comfortable to sit on for at least one person. This is based on the needs of the primary users. To make sure that it is comfortable it will need to be designed to fit an ergonomic average sizes and weights. The way to test the comfort will be in two ways. First at the prototype stage, modelling can be carried out to check that the sizes are comfortable. Secondly, the final product will need to be designed with some kind of soft furnishing so that it is not a hard surface that is being directly sat on. Finally, actually testing will need to be carried out by a range of target user groups people to make sure that it is comfortable to sit on for periods of time.
2. It must be made from a durable material that is easy to keep clean. This will be identified by researching a range of different materials to find out which is the most suitable. After this, those materials can be strength tested using weights to find out how much a material will bend before snapping. Finally, the materials can be tested to see how easy they are to clean. Suitable materials will be reviewed to see which ones look the best, are easy to work with and are cheap to buy.
3. It needs to be made to a size that easily fits through doorways. This is an obvious issue because the furniture needs to be able to fit through normal doorways and be easily moved around in a house so that it can get to the bedroom area without bashing the walls or other furniture. This can be tested at school with the doorways there but it will also need to be done with an actual bedroom because the room layout of a bedroom with other furniture is different to that of a classroom at school.
4. It must fit into a standard sized bedroom in a normal New Zealand house. If the final design is too big it will not sell so it has to be designed at a size that potential buyers can see it will easily fit into the bedrooms and can be moved around with other furniture. This will require some housing measurements from plans and then some functional modelling in a marked off area at school to make sure it fits
5. Because this item of furniture is going in a house it will have several different groups of people who may use it. This means it will have to be designed so that it takes these other people into consideration. Apart from the functional aspects of a seat and storage there are other things to bear in mind such as the aesthetic impact on other people. This will include things like making sure that the design is not culturally inappropriate by having markings or patterns that can cause offence.
6. Also, certain trees in New Zealand have a cultural significance so care should be taken with the choice of materials so that it does not contravene any cultural issues like tikanga. On a wider scale, it is important not to design an item of furniture that can cause social awkwardness like making a seat for two that is not quite big enough and forces people to be too close together. Or even a seat for one that is actually too small and embarrassing for a large person to sit on.

I showed four ideas to the stakeholders and had a discussion with them to see what they thought about my ideas.

1. They all didn't like my first idea of a lidded box seat because they said it looked bulky and old fashioned and they would not really want it in their room.
2. The end of bed storage with the baskets (concept 2) was not popular as well because stakeholders thought that it would stick out too far on the end of the bed and then need the extra space to be able to pull the baskets out fully. Some of the stakeholders said this would not fit into their current room layout (so not practical).
3. Concept 3 was having a seat that was made from individual units. This was popular because it gave freedom for laying it out however you wanted it and could fit into any room. It could also be increased by adding more units. This idea would have a long term market appeal for mass production because it can be used in so many contexts and moved about to fit in. So people would buy more units.

4. All the stakeholders liked my final idea because it kind of built on concept 3 but does it in a way that it turns into an actual seat. Some stakeholders asked if it was possible to design a range of different furniture that was all made from the individual storage units and could be made to turn into seats, beds, desks, and other things. This was something to think about with the final design. Also the stakeholders preferred the idea of rounded surfaces on the arm rests just because it would look nicer. They also wanted some way that the units could be locked in place so that they don't come apart when being used.

Development of my idea

There are four things that I needed to refine in relation to my design to make sure it looked right and was also user friendly and safe.

First, I needed to find out the best dimensions for sitting at. This is important because it needs to be comfortable otherwise it will not get used. I could have done this with measurements but I wanted to find out how accurate things would be realistically so I made some scrap wooden boxes for seating and tested it with a range of people. Based on what they said, I made adjustments until I got to a comfortable average. I then used these as the dimensions that I would have for the seating heights and the depth of the seat.

The second thing was to test the materials. I had planned to use some sort of wood for this because it would be strong enough and cheaper than metal. When I talked to the stakeholders and showed them some samples they all preferred the MDF and the Plywood. They both look good enough to use, they are easy to work with and can be painted if necessary.

I then decided to carry out strength tests to see which would be better. I predicted that it would be the plywood because of the alternating grain direction. I tested the structure in two ways. First I cut a plank of both wood and put it across a gap between two benches. Then I loaded them with weights to see what happened. They both flexed a bit but the MDF was way worse and in the end, it broke (at about 35kg).

The next test was to look at the joining on the edges. I used glue and screws and set the wood at 90 degrees. I then tested them with a load after the glue had dried and the MDF broke first because the actual wood came apart. So from these two tests, I decided to use 18mm Plywood.

I showed the test results to the stakeholders and they agreed with my decision.

Final brief and considerations for the storage seat

Now that the final concept design has been developed and agreed upon by the stakeholders, I now need to evaluate it to make sure it meets the original design brief and is fit for purpose. I have divided this into different sections.

- I looked at the appropriateness of style. Knowing that it is mainly targeted at a young group of people, I think that the style is suitable because it is minimalistic which fits in with the majority of young people's current style (verified by the stakeholder group I was using). 1
- The ergonomic features of the design are a good balance of the different people I measured. I used a range of heights and sizes within the group to make sure I got a good mean average. This was tested with functional modelling to make sure the height and the depth of the seating was comfortable. The offset of this is that it does mean the storage cupboards are a bit deep but that was OK with most of my stakeholders. 1
- The idea of having a lifting seat makes good use of what would normally be dead space. The seat is held on with a piano hinge to spread the load between multiple fixing positions to make it stronger. After modelling this I decided that it would probably be a good idea to include an extra bit of reinforcing plywood near where the hinge is to take any extra weight when it is sat on. The rest of the weight comes down onto the edge of the plywood so it is strong enough that it will not break or flex. 3
- The final design solves the two problems that were identified (storage and seating) and it can easily be used in a young person's bedroom. Further to this, it is a design that can easily be transferred to a flatting situation or maybe a rental. It could even be used in university halls for students. So as a final design it will have scope to be developed further so that it can meet the needs of a mass produced item (or at least as an item that is part of a range). 1
- With the whole thing being made from plywood there is little problem with the carbon footprint for either the manufacture or the disposal of the item when it is no longer needed. 2
- From a cultural point of view, it is generically bland so it does not have any issues regarding causing offence to other cultures (although there are some aspects of this design which can be viewed as being similar to some Japanese styled furniture and this could be something to consider if the final product is ever sold to the Japanese market). Overall, the final proposal meets the needs of the stakeholders and is fit for the intended purpose (storage and seating) so it is worth making the prototype. 1