William Howe 4100

Product Design - NEA 2024/5

Context: London and inner cities have the highest proportion of under 5s in England, the importance of being introduced to nature, the outdoors and biodiversity is of a high importance as these children don't have such available accessibility to these environments.

Nature and the outdoors can have a considerable positive impact on any human at any point of their lives, but during these fundamental years the importance of the outdoors is crucial for healthy wellbeing.

Since COVID-19 there has been a high rise in poor mental wellbeing of all age groups, spending time in green spaces can be an important factor in promoting children's social and emotional development, it allows children to connect with others build relationships, and develop a sense of self work, which have long lasting benefits for wellbeing



Pet Ownership

Intro: I am going to explore the context of Pet Ownership, in the last 2 years my family has taken ownership of a dog, and we have all witness the benefit of pet ownership. I am going to find information about this context so I can deepen my understanding on this topic and the protentional areas around it, that I could develop a product for to solve a problem.

Introduction to Pet Ownership:

Since the onset of COVID-19, there has been a noticeable increased of pet ownership worldwide. As people adapted from working from home pet provided companionship and emotional support provided by pets. In terms of physical health, **studies have shown that owning pets can lead to lower blood pressure, reduced risk of heart disease, and increased physical activity levels,** as pet owners are often more inclined to engage in regular exercise through activities like walking or playing with their pets. Additionally, the routine care and responsibility associated with pet ownership can install **healthier lifestyle habits**, such as better time management and increased outdoor activity.

Facts and Figures:

There **13 million dogs** in the UK, 31 percent of households own at least one dogs (from www.statista.com 13th Feb). According to a survey carried out between December 2022 to January 2023 94 percent of respondents form the Uk stated that **owning a pet makes them happy. 44 percent that owning a pet has been a lifeline** for the cost-of-living crisis, one major factor being the need to leave the house and enjoy nature. I intend to explore the context to see how I can enhance the owners experience



UK pet populations of dogs, cats and rabbits - PDSA

- **53%** of UK adults own a pet and **29%** of UK adults have a **dog**
- **24%** of the UK adult population have a **cat** - an estimated population of 11 million pet cats
- **2%** of the UK adult population have a **rabbit** - an estimated population of 1.1 million pet rabbits

Due the cost-of-living crisis one of the negative impacts of owning a pet is the financial pressure, this resulted in the increase of stray, negated and unwanted animals.

- In the three months April to June 2020, Battersea received **40,392 applications to rehome dogs**, an increase of **53% compared to the previous three** months.
- **31% of people who acquired a dog or cat** in this period had not been considering becoming pet owners before lockdown.

https://www.battersea.org.uk/what-we-do/animal-welfare-campaigning/impact-covid-19-companion-animal-welfare

Why Pet Ownership?:

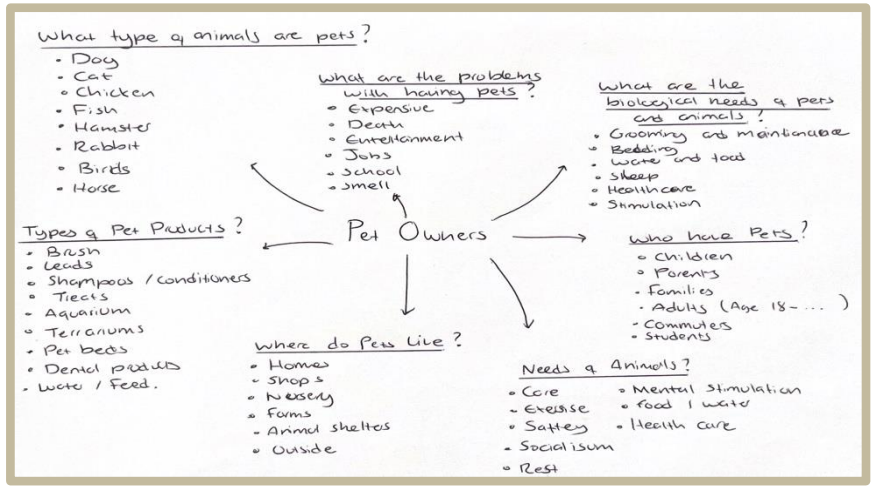
It was a well-known fact that during COVID that the number of pets brought increased massively. Pets from rabbits to dogs lessoned the effects of social isolation and improved the wellbeing of owners mentally and physically. **Pets can include Dogs, Rabbits, Cats, Birds and horses**. All Animals need to be looked after and this includes their maintenance food, exercise and health. Pets can live within the owner's home garden or other locations such as horses live in stables. The type of pet is often reflected on the age and financial background of the owner.

I have researched some existing products and some protentional ideas that could work with this context, I have also **spoken with my cousins** who are pet owners that brought their dog in covid and experience the difficulties off working at home with a pet and keeping them stimulated and exercised during a busy day to day life. In addition, I have also **spoken to my local collie rescue**, who have felt the effects of COVID on stray and neglected animals and the limited stimulation that Charities and rescue facilities can give to all the animals due to the high pressure and strain put on these services.

Reflection on Pet Ownership :

- **13 Million dogs** in the UK**, 31% of households** own a **dog**
- **53%** of adults own a **pet** -UK
- **29%** have a **cat -**UK
- **2%** have a **rabbit -**Uk
- Owning **pets help humans physical** and **mental wellbeing**
- **94% of pet** owners stated owning a pet makes them **happy**
- Multiple **Animal charities** would **buy the product**
- There are many **online companies'** and in person **shops** who could **sell the product. 7,197 Garden Centres & Pet Shops , pet shops are a growth industry**

Garden Centres & Pet Shops in the UK - Number of Businesses | IBISWorld



Commercial Viability:

From my initial research I have identified that **53% percent** of adults own a pets and **29% of those own a dog**. This shows that there is a large protentional target market for a product based on pets and their owners.

There are **7,197 Garden Centres & Pet Shops** businesses in the UK as of 2023, an increase **of 2.1% from 2022.** The number of businesses in the Garden Centres & Pet Shops industry in the **UK has grown 2.1% per year** on average over the five years between 2018 - 2023. Examples being **Pet Fun** and **Pets at Home**

There are multiple **charities** such as **Battersea Dogs** and Cats which could be targeted and would buy the product to help with the "effects of COVID have put pressure on our services due to the increased neglected and stray animals (collie Rescue)". This shows that there is a large amount of **small business and charities** who would by a stimulation product to help with the overwhelming pressure.

Potential Stakeholders:

Families with Pets – needs to be small and portable to se within a home
Elderly people with Pets – Lightweight and easy to carry as may have more mobility issues
Adults who work from home – Needs to be automated so allows stimulation of an animal without the precent of an adult who would be busy
Care homes with wellbeing animals – easy to use / affordance as they may have mobility issues and disabilities
School and nurseries with Pets – interactive and colorful to keep children entertained
Dog walkers – Hardwearing and durable so the product wont break if dropped
Working animals - easy to clean and durable
Police dogs – Resistant and good strength to weight ratio so wont break under high force / bite strength
Pet Companies – Cheap and easy to sell
Vets – Hygienic and easy to clean
Insurance – Safe and qualifies for the BSI act
Dog day care / Kennels – multiple uses and multiple animals can use at one time

Summary:

I have explored this context, Pet Owners, fully by creating a mind map investigating each area in detail, showing the commercial viability of this context and providing statistics to support this, I have also provided initial research which I have completed which has helped my decide whether I go forward with this context – **Possible problems – Cost of living has increased – what are the costs of pets? Post COVID - what happens now I've gone back to work?, how do you keep your et happy and fit?**

Next Steps:

I have decided not to go on with this context. I will now further explore other contexts to gain a deeper understanding and help me decide on which context to move forward with.

Companies and Charities

Battersea Dogs and Cats:
Help and rescue dogs and cats in need by "rehabilitating and rehoming"

Battersea Dogs & Cats Home | Battersea Dogs & Cats Home

Villalobos Rescue center:

"Saving man and man's best friends"

https://www.vrcpitbull.com/dogs/vanessa/

Pet Fun:

Designing and creating sustainable pet toys

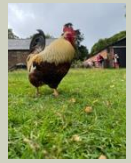
https://pet-fun.com/

Pet and stakeholders


Phills dog Betty


Auntie Jessy Dog Mutely


Maddy


Coopers Chickens

Hockey

Intro: I am going to explore the context of Hockey, as I am a regular hockey player. I am going to find information about this context so I can deepen my understanding on this topic and the protentional areas around it, that I could develop a product for to solve a problem.

Introduction to Hockey:

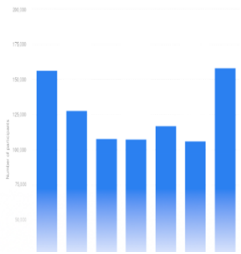
Hockey is a popular sport that is widely accessible, it captivates **over 2 Billion fans** a year who watch (ice or field hockey) the fast paced and exciting sport. Hockey has many advantages such as benefits to a player's physical health. **It enhances the cardiovascular endurance and builds strength, coordination and flexibility**. In addition, the sport requires **quick thinking and focus, stimulating the brain** and helps with mental health. Hockey also contributes to teamwork and communication.

In the evolving world of sports, there has been a significant design shift in its (hockey) equipment. Advances with materials such as carbon fiber, making the sticks lighter and more durable whilst still providing excellent energy transfer for shots. New technologies, making hockey equipment more precise and arcuate, like CNC machines allowing for the creation of quick and precise pieces of equipment being made. This makes equipment more versatile and innovative than its ever been and allow for user centered design making the equipment more suited for a particular person enhancing their performance. Creating and designing training and game equipment, that optimizes the performance but also the evolving needs would be challenging.

Facts and Figures:

Hockey is a **sport rising with popularity** the number of people who play field hockey at least twice a month at any intensity and for any duration has increased in England between 2022 and 2023. As of November 2023 approximately **166.3 thousand adults in England play hockey** monthly.

https://www.statista.com/statistics/899263/field-hockey-participation-uk/#:~:text=The%20number%20of%20people%20who,hockey%20o



England Hockey estimate that there are **15,000 people playing hockey at university and collage** with over 15,000 coaches, umpires that supported by England hockey .

https://www.englandhockey.co.uk/governance/about-england-hockey#:~:text=Around%20140%2C000%20individuals%20play%20regularly,and%20developed%20by%20England%20Hockey.

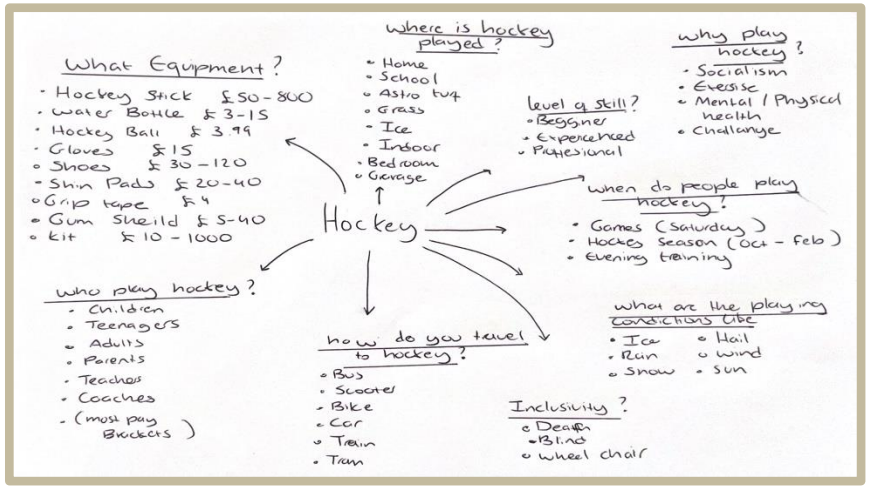
Why Hockey?:

I have chosen this context because I am passionate about hockey and have personally played at a wide range of levels and have friends that have also played at a variety of levels such as university. This is therefore why I why this is an important context as its centred around one of my main passions. As I have played hockey for 5 years it means I have great knowledge and understanding of the sport, its problems to solve and many protentional stakeholders. My large awareness of the sport means I will be able to produce a wide range of designs and ideas that relate to the sport and solve a problem

I have researched some existing products and some protentional ideas that could work with this context, I have also **spoken with my teammates** who play hockey with me and experience many problems that they want to be solved. My teammate Brandon said **"I would like a product that can adapt to help me perform a variety of drills and help store my collection of hockey sticks and equipment"**
In addition, I have also spoken to my coaches, who need constantly evolving changing equipment to enhance the teams' performances.

Reflection on Hockey :

- **166.3 thousand adults** in **England** play hockey
- It enhances the **cardiovascular endurance** and **builds strength, coordination and flexibility**
- **sport rising** with **popularity**
- **15,000 people** playing hockey at **university and collage**
- There are numerous **Sporting Shops such as Sport Direct and Dragon** where the product could be marketed and sold so a large target audience.
- My teammate Brandon said **"I would like a product that can adapt to help me perform a variety of drills and help store my collection of hockey sticks and equipment"**
- captivates **over 2 Billion fans**
- The **global sporting goods market** is estimated to **grow to 395 billion.**



Commercial Viability:

From my initial research I have identified that **approximately 166.3 thousand adults in England play hockey monthly.** This means that there a high consumer market for a protentional product.

There are numerous **Sporting Shops such as Sport Direct and Dragon** where the product could be marketed and sold so a large target audience.

Since COVID 19 more people have been going outdoors and playing sports, this means that more sporting equipment and products will be needed. This therefore supports this context being commercially viable.

By 2025, the **global sporting goods market is estimated to grow to 395 billion.** The sporting goods market includes sporting equipment, sportswear, and sports accessories.. This expected growth shows that sporting products are and will be commercially viable.

Potential Stakeholders:

Schools (Warlingham School) – need a multi purpose product so can be used for many drills as the school is on a limited budget and cannot buy lots of equipment
Teenagers – Brandon wants the product to be cheap so its accessible to many people on the team
Sporting Clubs (Trinity Club) – want the product to be hardwearing and durable so will last a long time and wont break when being used making training more effective
Youth Groups – lightweight and easily portable allowing for the product to be moved from place to place easily so allows access for many people to use
Insurance – safe and meet all standards of the BSI
Sponsors – would like marketing space on the product
Retailers – would like the product to be eye catching so is easy to sell and profitable for the company
Hockey Spectators – would want the product be eye-catching so its exhilarating and fun to watch
Professional Hockey Players and groups – they would want the product to be lightweight and high quality

Summary:

I have explored this context, Hockey, fully by creating a mind map investigating each area in detail, showing the commercial viability of this context and providing statistics to support this, I have also provided initial research which I have completed which has helped my decide whether I go forward with this context. **Possible problems – How do you carry personal belongings and hockey equipment at the same time? How can you practice hockey at home and alone with no teammates?**

Next Steps:

I have decided not to go on with this context. I will now further explore other contexts to gain a deeper understanding and help me decide on which context to move forward with.

Companies and Charities

Dragon Hockey:
Produce high quality durable products and hockey sticks which use cutting edge technology to make and great quality materials

https://dragonhockey.co.uk/hockey-sticks/

Hockey for Hero's:

Raise money for "hero's" military personal by playing hockey games to raise funs

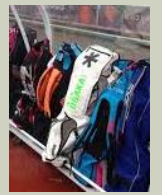
https://hockeyforheroes.co.uk

Grays:

Grays is a multi million-pound company who is the worlds oldest hockey Brand and provide accessible yet high end hockey gear.

https://www.grays-hockey.com/pages/about-us

Hockey and stakeholders


Hockey Storage


Johnny


Hockey Equipment


Warlingham School

Nursery / Pre School

Intro: I am going to explore the context of Nursery and Pre School; I am the oldest cousin of 9 on my Dads side of the family and I have witnessed the effects of Covid 19 on under 5's. I am going to find information about this context so I can deepen my understanding on this topic and the protentional areas around it, that I could develop a product for to solve a problem.

Introduction to Nursery / Pre School:

Children learn many things in nursery, including life skills that will **prepare** them for their **future life and education**. At nursery, a child will spend time singing songs, listening to stories, sharing rhymes, and playing games to build their listening and speaking skills. Every child who attends nursery is encouraged to **learn how to listen, develop concentration**, share ideas and stories, and respond to questions and instructions.

For many children, their parents and family are the only people they interact with on a day-to-day basis. **By attending nursery, children can explore different relationships with other children and nursery practitioners**. boosting their self confidence and independence, preparing them for future formal education and life. Developing social skills is a very important part of children's development, social skills also increases emotional intelligence.

Nursery is often the first official education experience a child can experience in an official learning environment. This is can be a big step in their life. School can be challenging for many children, as **mixing with others and facing all-new experiences** can be very daunting, nursery can begin to introduction a child to learning in a much more casual environment than school, as well as helping them to prepare for school routines and in turn assisting them in not to be so overwhelmed when they start their formal education.

Why Nursery / Pre School:

Most **children missed out on some education because of the COVID-19 pandemic**. Many children experienced longer or more frequent disruptions., research shows the impact of this disruption on children. **Speech and language delays were reported across all age groups as children** had fewer opportunities to develop their communication skills at home. **Children struggled to adapt to new situations** and missed out on opportunities to socialise and develop self-regulation skills. ***My own cousin Mille who was born in the October 2019 just before the start of the pandemic experienced slow development in social skill, she struggled with playing with other children and engaging with adult family members***

Many children spent **less time outdoors** during the pandemic and more time in sedentary activities, their physical development, including their motor skills, were negatively affected.

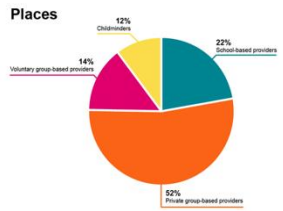
From my research I have identified that the **largest proportion of 5-year-olds and under live in London**. There is also a correlation between inner cities and disadvantaged families **By the time disadvantaged young people sit their GCSEs at age 16 they are, on average, 18.4 months behind their peers and around 40 per cent of that gap has already emerged by age five.** Pre-school has almost as much impact on a child's educational achievement at age 11 as primary school. Using **nature and the outdoors has a massive impact on their development**, as well as their mental wellbeing.

Facts and Figures:

Childcare in the UK - Statistics & Facts

There were **approximately 3.85 million children younger than five years old** in the United Kingdom in 2022, which was around 5.3 percent of the population in that year.

Among regions of the UK, **London had both the highest population of young children in the population at 525,424, and the highest proportions at 5.9 percent**.

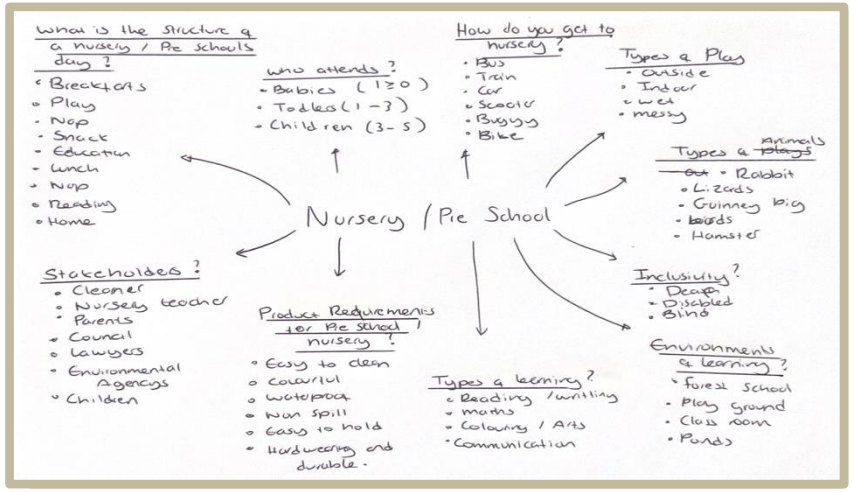


- **Education providers**
- In 2023, there were approx**. 63,207 registered early years childcare providers in England**, providing approx. **1.27 million childcare places**.
- The most common type of childcare providers were childminders, with **around 27,877 of them in 2023, compared with 26,884 non-domestic childcare providers.**
- In the 2022/23 academic year there **were 3,088 nursery schools** in the United Kingdom

Reflection on Nursery / Pre School :

- Approx **3.85 million children younger** than **five years old -**UK in 2022
- In 2022/23 academic year there **were 3,088 nursery schools** in the UK
- **Disadvantaged young people** taking **GCSEs ,** are, on **average, 18.4 months behind their peers** and around **40% of that gap** emerged by **age five**
- There are over **63000 early years childcare providers**
- Most **children missed out on some education** because of the **COVID-19**
- **COVID - Speech and language delays** were reported across all age groups
- **London** had both the **highest population of young** children in the population at **525,424,** and the **highest proportions at 5.9 percent**.

Getting-the-Balance-Right.pdf (suttontrust.com) Childcare in the UK - Statistics & Facts | Statista
Early education and childcare: Changes and challenges for the future | Local Government Association
https://www.local.gov.uk/publications/early-education-and-childcare-changes-and-challenges-future
Childcare and early years provider survey, Reporting year 2023 – Explore education statistics – GOV.UK (explore-education-statistics.service.gov.uk)



Commercial Viability:

From my initial research I have identified that that many children's development, social, academic and mental well being was effect by COVID 19. Children growing up in disadvantage backgrounds often performed way below those who are not. The highest proportion of children live in London who may not have access to quality outdoor learning.

There are **over 63000 early years childcare providers** in England who could benefit from my product. Likewise, there are many Toddler, church and holiday groups. And company's who provide specialized equipment to these organizations and charities.

Many parents and guardians may also like the product I design who may purchase it though companies such as 'The Entertainer' and 'Smyths Toys'

Potential Stakeholders:

Childminders – need a multi purpose product so can be used for a variety of functions as the childminder may be on a limited budget and cannot buy or store lots of equipment

Special School Nursery Classes – needs to be easy to use (affordances) so all students include those with learning disabilities can use the product.

Maintained Nursery Schools – safe and meet all standards of the BSI

Library toddler groups – Hardwearing and durable so the product wont break if dropped and easy to store

Church / Sunday schools & toddler groups – lightweight and easily portable allowing for the product to be moved from place to place easily so allows access for many people to use

Wrap round care (pre and after school clubs)

Schools in hospitals – Hygienic and easy to clean

Forest schools – interactive and colorful to keep children entertained

Parents – Cheap and easy to sell

The impact of COVID on early childhood education and care and opportunities to strengthen the system | Family and Childcare Trust

Summary: I have explored this context, Nursery / Pre school by creating a mind map investigating each area in detail, showing the commercial viability of this context and providing statistics to support this, I have also provided initial research which I have completed which has helped my decide whether I go forward with this context

Next Steps: I have decided not to go on with this context. I will now further explore other contexts to gain a deeper understanding and help me decide on which context to move forward with.

Companies and Charities

RHS:

RHS is a charity that provides support and guidance for gardening within schools champagning to make gardening accessible in school

https://schoolgardening.rhs.org.uk/resources/info-sheet/simple-gardening-club-ideas

Fennies Nursery :

Fennies Nursery for under 5 year old's

https://fennies.com

Tandridge Trust Schools

Designing and creating sustainable pet toys

TTS | School Supplies for Primary, Secondary & Early Years (tts-group.co.uk)

Pred School and stakeholders



Cousins – Zac and Millie



Toys



Friend George



Liz

Chosen contexts and possible opportunities

William Howe

Nursery / Pre School

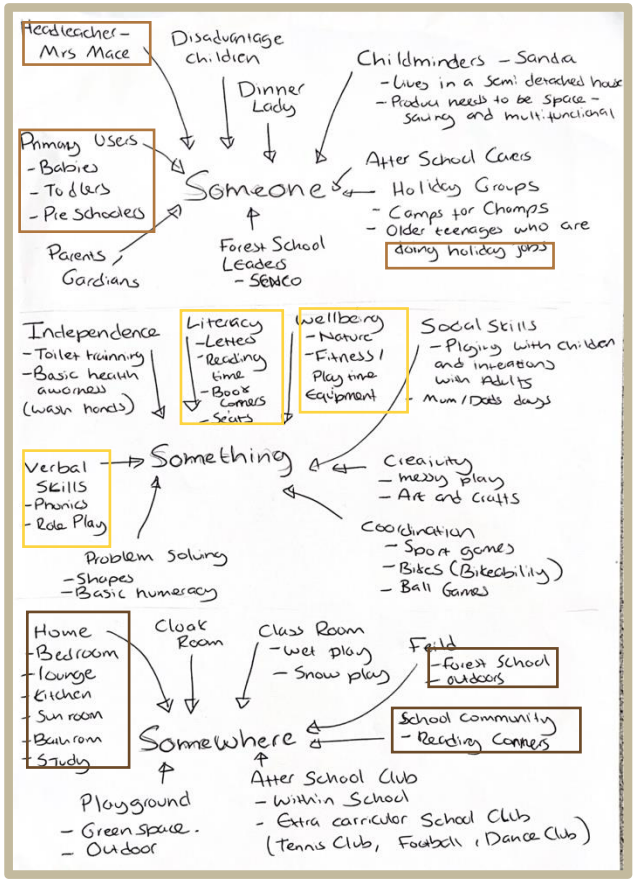
Intro: I am going to further explore the context of Nursery and Pre School by identifying possible **stakeholders and users**, protentional **products** and protentional **places** the product could be used. I will also evaluate the problems on their **strengths, weaknesses, opportunities and threats** around this context.

Having identified three different problems, I will then visit the locations and speak to the Primary user to help me identify which Problem I will base my NEA on.

Swot analysis

- **S**trengths: the advantages within the marketplace against competitors and of the products USP
- **W**eaknesses: problems within the proposed design, in terms of its suitability cost, sale or available resources
- **O**pportunities: identify new opportunities in the market due to challenges in competition, technology, legislation or trends
- **T**reats understand the competition of the possible adverse affects of consumer behavior or legislations

Mind Maps



Existing Products











Problem 1: London and inner cities have the highest proportion **of under 5s** in England, therefore the importance of being introduced to nature, the outdoors and biodiversity is of a high importance as **these children don't have such easy accessibility to these environments**. The importance of nature and the outdoors can have a considerable positive impact on any human at any point of their lives, but during these fundamental years **the importance of the outdoors is crucial for healthy wellbeing**.

Nicki Mace the Head Teacher of **Hamsey Green Primary School,** and **Sarah Morgan** oversees **Warlingham-forest-schoolers** www.warlinghamforestschoolers.org requires outdoors equipment to help develop the children's connection to nature whilst **improving wellbeing and social skills**

Strengths:
- Growing industry due to issues with mental health and funding due government awareness
- The environment and biodiversity is a growing concern so organizations and charities will invest in products
- A product like this will help children gain knowledge and understand the importance of the environment from a young age
- Awareness and importance of a non plastic culture is growing therefore is a market for non plastic and toxic free play products
- I have already been in contact with Mrs Mace who is the head teacher in Hamsey Green school, and she is happy for me to use her school in my project

Weaknesses:
- Products will last in the outdoors will need to be made of high-quality materials to last which results in an increased price
- Some individuals argue that natures own playground is enough so there is no need for products that use energy to create harming the environment and a well designed and made product may be to expensive to buy for its target market

Opportunities
- From my research I have identified there are a number of organizations and people who are in need the product such as childminders and after school clubs
- As the product is about the environment the materials used to make the product could be sourced from recycling
- This product could be used in any under 5 childcare setting

Threats
- Already a growing market, therefore will there be space and opportunity in a competitive market for a new product
- Children's products need to meet legislation in order to be safe to use
- Products currently are more likely to be profitable and successful if they are technology based compared to traditional forms of play and entertainment
- Due to the current financial sate of our economy charities and low income families are struggling with their finances meaning they wouldn't be able to buy this product

Problem 2: **The COVID-19 pandemic** had a large effect on the **communication skills of many children of pre – school age.** Speech and language delays were reported across all age groups as children had fewer opportunities to develop their communication skills at home. **Children struggled to adapt to new situations and missed out on opportunities to socialise and develop self-regulation skills**.

My **Cousin Millie** who was born in the October 2019 just before the start of the pandemic experienced slow development with speech and social skill, she still struggles playing with other children and engaging with adult family members. Millie would benefit from a product to **help develop verbal and communication skills**, the product would be used at her **home.**

Strengths:
- COVID-19 was a recent issue therefore people / children are still feeling and recovering from the impacts of social isolation so they would still require this product
- The COVID-19 pandemic was the first major pandemic in many years resulting in global issues that our generation hadn't seen before, therefore there are limited products out there on the market

Weaknesses:
- The product would only be needed for a short period time as children now being born are not having the same issues, therefore there would be no customer retention and would be a one of purchase
- Traditional toys and nursery allows children to socialize and overcome the issue I identified
- A well designed and made product may be to expensive to buy for its target market
- Despite knowing a parent of a child who is affected by COVID-19 and isolation testing my product on such a small target market would not truly give me a fair representation of what is required

Opportunities
- As current parenting involves large amount of technology which contributes to isolation there is a market for products that both include technology and socialization
- Increasing gang violence and criminal activity, parents are less likely to socialize outside and in parks resulting in children becoming isolated from their friends and not gaining traditional social skills
- This product could be used in any under 5 childcare setting

Threats
- Products in this day and age are more likely to be profitable and successful if they are technology based compared to traditional forms of play and entertainment
- Due to the current financial sate of our economy charities and low income families are struggling with their finances meaning they wouldn't be able to buy this product

Problem 3: By the time **disadvantaged young people sit their GCSEs at age 16 they are, on average, 18.4 months behind their peers** and around 40 per cent of that gap has already emerged by age five. **The importance of accessibility to books is a key part of any child's development with literacy**, community libraries often provide toddler groups such as story time and 'pebble rhymetime'. These groups have been designed to help with speech and language development, whilst being free and accessible to any guardian and child regardless of income.

Tina Picanza is a volunteer at **Warlingham community library**. Tina feels the library would benefit from a product to encourage and engage the enjoyment of literacy and books.

Strengths:
- Literacy is always a government priority with education so a product will always be in demand, therefore its got good commercial viability
- The government and key organizations have highlighted the awareness of poor literacy in disadvantaged young people therefore a product to address this issue is needed, thus it has great commercial viability

Weaknesses:
- As literacy has been a key educational priority there are already many pre existing organizations and products such as different books and libraries so it may be hard to disrupt the market and create a new product with a unique USP
- Although my library is local I do not personally know anyone who works there

Opportunities
- Due to the financial state of the economy libraries are closing so there would be a need for a new product to help with literacy
- All schools have libraries and reading space where the product may be used
- A well designed and made product may be to expensive to buy for its target market
- This product could be used in any under 5 childcare setting

Threats
- Due to the financial state of the economy libraries are closing so there would be limiting places to sell the product
- Children's products need to meet legislation in order to be safe to use
- Products in this day and age are more likely to be profitable and successful if they are technology based compared to traditional forms of play and entertainment
- Due to the current financial state of our economy charities and low income families are struggling with their finances meaning they wouldn't be able to buy this product

Chosen contexts and possible opportunities -Stakeholders and location

William Howe

Nursery / Pre School

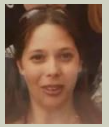
Intro: I have spoken to my Primary Users and visited locations of my 3 possible design briefs to help me have a greater understanding of their needs and identify some possible problems that I could help them resolve. Furthermore, I have identified other Primary users .

Problem 1: Hamsey Green Primary School

Hamsey green primary school is a community primary school for pupils 2 – 11. They have two campuses, campus 1 is the nursery providing wrap around care and education for 2 – 4 year older, the second campus is home to the primary school. The grounds are extensive and offer a range of play equipment and opportunities for outdoor learning in the "forest school".



Hamsey Green Primary School

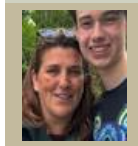


Primary User 1: I visited Hamsey Green Primary School and Nursery spoke to Mrs Nicki Mace the Head Teacher. I took some pictures of the spaces including classrooms, playgrounds, and the forest school and take about some of the schools needs. I identified the Forest School as area that I will focus on



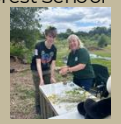




Primary User 2: Sarah from Warlingham Forest School






Primary User 3: Mrs Gill Fernihough SENCO – Speech and Language specialised at Castle Hill Primary School
Primary User 4:: Katy Brown Nippertime, Mint Walk Warlingham

Problem 2: Cousin Millie

My Cousin Mille who was born in the October 2019 just before the start of the pandemic experienced slow development with speech and social skill, she still struggles playing with other children and engaging with adult family members





Primary User 1: I regular meet with Amy Millie's mother at family event, we have often discussed Millie poor communication skills









Primary User 2: Mrs Gill Fernihough SENCO – Speech and Language specialised at Castle Hill Primary School

Castle Hill Primary School
Learning to Succeed, Succeeding to Learn

Primary User 3:: Miss C Walker SENCo at Hamsey Green Primary School
Primary User 4: Katy Brown Nippertime, Mint Walk Warlingham

Problem 3: Warlingham Community Library

Warlingham Library is a Community Partnered Library which is run by volunteers. As well as being a library Warlingham Library caters for the whole community including a number of events and activities for children to help encourage literacy; these include Pebble Rhyme Time, Story Time, Lego club and the summer reading challenge.







Primary User 1: I visited the library and spoke to Tina Picanza the lead volunteer about the Library needs and now the community use it. I took pictures of the space in use including furniture, book storage, workspaces, shelving and displays.










Primary User 2: Mrs Rayner – Warlingham School LRC Manager







Primary User 3:: Mrs Mace Head Teacher at Hamsey Green Primary School
Primary User 4: Mrs Gill Fernihough SENCO – Speech and Language specialised at Castle Hill Primary School

Reflection on why Problem 1:

Problem 1-**Will give me a larger scope for different opportunities within variety of spaces compared to the other problems** . In turn allowing me to explore a larger variety of possible products, from the forest school and outdoor play areas

Problem 1- **I know 2 possible primary users which allows me to access a wider variety of Primary user feedback,** Unlike the other 2 problems this means me I will get more accurate response / feedback relevant to my product, ensuring the user experience will be greater enjoyed with a more effective product.

Summary

: I have identified 3 potential problems that I could design a product for by creating a mind maps on **someone, something and somewhere** . For each problem relating to the context of Nursery / Pre school I have completed a SWOT analysis to identify the strengths, weaknesses, opportunities and threats, allowing me to gain a deeper understating of the problem and protentional products. I have chosen problem 1 as it has the highest number of strengths and the least amount of weakness. In addition, I am in contact with the head teacher (Mrs Mace) allowing me to easily speak with her about the product and allowing me to have access to many primary users and stakeholders to ensure I fit all their requirements. Problem 1 also is a growing industry meaning this option has the best commercial viability, allowing the product to be easily sold and marketed.

Next Steps:

I will speak to Mrs Mace and Sarah Morgan and other stakeholders. I will do some research on existing products. I could also produce a questionnaire that other primary users could answer, this would ensure my product would have greater commercial viability. I will also produce mood boards of biomimicry products as nature adapts to environments and will help inspire products that are used within nature (gardening). I require my product to adapt for its users needs. Other research may include anthropometric data.

Chosen contexts and possible opportunities

William Howe



Intro: I will research and identified my chosen primary user, context and commercial viability of the product by analysing the demand and number of forest schools in the Uk.

Design Brief:

London and inner cities have the highest proportion of under 5s in England, the importance of being introduced to nature, the outdoors and biodiversity is of a high importance as these children don't have such available accessibility to these environments. Nature and the outdoors can have a considerable positive impact on any human at any point of their lives, but during these fundamental years the importance of the outdoors is crucial for healthy wellbeing. Since COVID-19 there has been a high rise in poor mental wellbeing of all age groups, Spending time in green spaces can be an important factor in promoting children's social and emotional development, it allows children to connect with others build relationships, and develop a sense of self work, which have long lasting benefits for wellbeing https://www.countrytrust.org.uk/news/does-nature-impact-child-development#:~:text=Spending%20time%20in%20green%20spaces,in%20life%20(Nurture%20UK) .
Inner cities such as London also home the highest percentage of disadvantaged children where not only academic performance has been proven to be lower than financially stable families. In addition, they are more likely to have mental health issues. Children growing up in disadvantaged families have less financial backing making it hard to access the resources necessary to help address the issues.

Nicki Mace the Head Teacher of Hamsey Green Primary School introduced a forest school area into her school and **Sarah Morgan oversees Warlingham-forest-schoolers** www.warlinghamforestschoolers.org, both my Primary users require **outdoors equipment** to help develop the children's connection to nature whilst improving wellbeing and social skills. I am going to design and make a product which well **enhance the mental well being and social skills of young children.**

Commercial Viability:

I have identified that that many children's development, social, academic and mental well being was effect by COVID 19. **Disadvantaged young people** taking **GCSEs ,** are, on **average, 18.4 months behind their peers** and around **40% of that gap** emerged by **age five**. The highest proportion of children under 5, live in London, who may not have access to quality outdoor learning. Due to this there is a large market for forest school equipment as many parents could send their children to forest schools so they can enjoy the outdoors.

There are **over 63000 early years childcare providers** in England who could benefit from my product. Likewise, there are many Toddler, church and holiday groups. And company's who provide specialized equipment to these organizations and charities. Therefore, there are many people who need and would buy the product.

Since COVID 19 pandemic, demand for forest schools have increased dramatically. In 2021 the Forest School Association reported that **of 200+ school they surveyed, two thirds said the demand for there services had increased since March 2020**. This shows the demand for forest school and therefore demand for forest school equipment which would be used there.

Many parents and guardians may also like the product I design who may purchase it though companies such as 'The Entertainer' and 'Smyths Toys'

Potential target users:

Primary user 1:

- Mrs Mace -Head Teacher of Hamsey Green Primary school. Mrs Mace has worked in the school for over 20 years she has work in all three Key stages and is Head Teacher. Mrs Mace proactivity feels the outdoors is a key factor in helping children develop their social skills and help improve their well being

Primary user 2:

- Sarah Morgan– Runs the Warlingham Forest Schoolers. She has always worked in early year health and education. Sarah's passion for the outdoors , mental health and supporting children emotionally. Resulted in her setting up the the charity Warlingham Forest Schoolers, aiming to help children affected by the pandemic Covid 19.

Primary user 3:

- Katie Brown – Key Nursery Worker. Katie brown is a dedicated worker who has a love for nature and helps nurturing the young minds and nurturing their love for nature. She feels the outdoors is key in helping children cultivate their creativity, resilience and motor skills.

Research Plan:

How can I make sure my product is the right size - Research existing product sizes.
What products are already on the market - Research existing products.
How can I make my design new, original and interesting - Get inspiration from mood boards and research existing products.
How can I find out what my primary user needs and wants - Provide a questionnaire for my primary user.
Where my primary user wants to use the product - Interview my primary user.
Who else will be using the product and their age - Make a questionnaire for different people.
What materials I can and should use to make the product suitable for its need - What will happen to the product when it's finished with
What materials last the longest outside - Research existing products materials.

Challenges

- Make sure the size of the dimensions needed to make it comfortable to use.
- Make it unique and original.
- Research good and strong joining methods so it doesn't collapse on the children when they play.
- Talking to people who make similar products to mine to get an idea of what's already on the market.
- Making sure the product design fits the users need.

Priorities

- The product needs to provide an area to work efficiently whilst not taking up lots of room.
- It needs to be waterproof and weather resistance as it is for the outdoors.
- Interview my primary user to find out their needs and specifications.
- Look at and identify possible materials I could use.
- Explore different design movements I could base my product on.
- Design different mood boards to inspire my designs aesthetics.
- Gather anthropometric data so my product will fit my primary users and there needs

Primary user profile:

Mrs Mace is the Head Teacher of Hamsey Green Primary School turned large old disused pond within the school grounds into a forest school to give her students the opportunity to have access to a natural forest school open space. Sarah is the founder member of the Warlingham Forest she has been passionate about children having as much access to the outdoors and all it has to offer us, especially the mental health support our natural world has to offer. In addition, they have a key theme of sustainability.

Summary and further analysis:

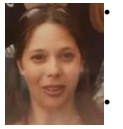
I have identified my chosen context and commercial viability of the product by analysing the demand and number of forest schools in the Uk alone, I have also identified key stakeholders which will be involved in the creation of my project and have created a research plan to help me identified my next steps to create a successful product.

Next steps:

I will next create a more in-depth research plan to allow me to identify the primary and secondary research I need to conduct.

Stakeholders:(A person or organization who impact the products design, manufacturing , use and disposal)

Designer – Impacts the usability, looks and characteristic of the product **Needs** to be athletically pleasing



- **Primary User** – can influence the design and function to suit them. **Needs** to be fun to ride for all the children in the family.
- **Secondary User** – Someone who is also involved in the use of the product – they may have different needs for the same product. Nursery's, infant schools, children play centers. The secondary user may also be responsible for maintenance and cleaning. **Needs** to be lightweight and easily transported and cleaned



Delivery Company – Responsible for getting the product to the costumers -the product will need to be small, lightweight and portable so easy to transport, **Needs** to be lightweight and small in package size.

Retailer – The people who buy and sell products on your behalf e.g. Smiths. **Needs** to be a top seller.

Manufactures – Involved in the process of making the product, they would want the design to make it easy, quick and sustainable to produce. **Needs** to be quick and easy to make using standardize components.

Disposers and recycling plants - The design of the product should be sustainable, recycible 6R's, and easy to dispose off. **Needs** to be easily disassembled and recycled.



Sustainability (Sustainable companies and government policies) – considers the effect of the product on future generations. **Needs** to be sustainable (cradle to grave).



Environment agency's - Monitors the impact of the manufacturing of the product on the environment, when made in the UK. **Needs** to have minimal impact on the environment.

Lawyers – Ensure the product and the manufacturing meets legal requirements. **Needs** to meet all legal requirements.

Producer of the source of material – oil companies, for plastics and paint, forestry industry for wood, companies that source ore and coal for metals. **Needs** to be quick and easy to source and manufacture.

Research Plans

William Howe

Intro: I will identify how I carry out my primary and secondary research for my project. For my primary research I could use questionnaires, interviews, shop visits , site visits and product analysis. This will allow me to have a greater understanding and depth of knowledge to gain a basic idea of my primary user needs and what they are looking for in a product. I will then analyze these results and take these into consideration when designing an interview for my primary user. For secondary research I could use and create mood boards, product research, product analysis of existing products and anthropometric data. This will allow me to make a commercially viable product that fits a wide audience.

Primary Research :

Primary research is where I obtain information directly from a source;

- **Interviews** –I will start the research by interviewing my primary users (Niki Mace and Sarah Morgan), this will allow me to gain first hand, knowledge about what he wants and needs from the product.
- **Questionaries** – I will then conduct a questionnaire with several different people to gain a general idea of what the majority of people would want from the product. This will help me to make my design more inclusive and commercially viable.
- **Site visits** – I will find out the size of the area which the product will be used in, this will help me to work through the project knowing any limitations with size and the site.
- **Existing Products** – Playground equipment's, children kitchen, folding camping table and chairs, water toys
- **Shop / garden center visits** – I will undergo and visit different shops with relevant products, so I am able to analyses the equipment positive and negatives.

Secondary Research :

Secondary research is data I have collect from a secondary source for example, websites and articles.

- **Mood boards** - I will produce mood boards that relate to my context, this will allow me to see what designs are already on the market and also take inspiration from the different designs.
- **Product research** - I will also look at some existing products, which will help me deepen understanding of key mechanisms in the designs. This will also allow me to experiment with different ideas for my project by seeing what could potentially work and not work, and further inspire my product.
- **Anthropometric data** – I will collect anthropometric data for measurements relevant to my context, this will allow me to design ergonomically.
- **Site Analysis (google)** – I will complete a site analysis of my primary user's area to allow me to understand where my product is situated and functions it requires for example, space saving if there little storage on site.
- **BSI** – I must research British safety standards so my product fits all required standards and can be sold commercially.
- **Mechanisms** - I will also conduct research on mechanisms. This will allow me to understand how different mechanisms work and allow me to find ways of implementing them into my designs. I will research things such as; how things could collapse and fold.

User Needs :

- **Weather resistance** as the product will be used outside
- **Durable and hardwearing** as it maybe it will be used as a work bench and multifunction toy with may uses
- **Safety**, the product must be safe to use as you don't want the user to put themselves at any risk
- **Elements of inclusive design** such as wheelchair access or for partially site to accommodate all the children's needs (special needs)
- Multifunctional, so the product can perform a variety of functions, so the children don't get bored .
- **Weight to strength ratio,** so adults are able to move the product with out it breaking and allow children to use and climb on the product.
- **Space saving**, as there is little storage for the product.
- **Stable** so the product does not collapse or fall over causing it harming a child or adult when in use
- Aesthetics, my user would value the product to be aesthetically pleasing and compliments the nature around.

Stakeholder Needs:

- **Interviews** –I will start the research by interviewing my primary users (Niki Mace and Sarah Morgan), this will allow me to gain
- **Designer** – Impacts the usability, looks and characteristic of the product Needs to be athletically pleasing
- **Primary User** – can influence the design and function to suit them. Needs to be fun to ride for all the children in the family
- **Secondary User** – Someone who is also involved in the use of the product – they may have different needs for the same product. Nursery's, infant schools, children play centers. The secondary user may also be responsible for maintenance and cleaning. Needs to be lightweight and easily transported and cleaned
- **Delivery Company** – Responsible for getting the product to the costumers -the product will need to be small, lightweight and portable so easy to transport, Needs to be lightweight and small in package size.
- **Retailer** – The people who buy and sell products on your behalf e.g. Smiths. Needs to be a top seller.
- **Manufactures** – Involved in the process of making the product, they would want the design to make it easy, quick and sustainable to produce. Needs to be quick and easy to make using standardize components. The manufacture would require cost effective production methods, reliable suppliers of materials, and efficient assembly processes to ensure profitability
- **Disposers and recycling plants** - The design of the product should be sustainable, recycible 6R's, and easy to dispose off. Needs to be easily disassembled and recycled.
- **Sustainability** (Sustainable companies and government policies) – considers the effect of the product on future generations. Needs to be sustainable (cradle to grave).
- **Environment agency's** - Monitors the impact of the manufacturing of the product on the environment, when made in the UK. Needs to have minimal impact on the environment.
- **Lawyers** – Ensure the product and the manufacturing meets legal requirements. Needs to meet all legal requirements. Compliance with safety, environmental, and quality standards set by regulatory agencies is essential to meet legal requirements and ensure consumer safety
- **Producer of the source of material** – oil companies, for plastics and paint, forestry industry for wood, companies that source ore and coal for metals. Needs to be quick and easy to source and manufacture.

Summary :

On this page I have explored the methods of research that I will complete in order to find out information and further requirements from my primary user, stakeholders and other potential users of the product within the workplace. In addition, I have further delved into my primary user and stakeholder needs to understand specifically what they both require in the product to ensure it will fit there function and can be commercially viable

Next Steps :

My next steps are going to be to create my interview and questionnaires for my primary user and other users relating to the product. The questionnaires will consist of a range of questions that explore the specific requirements of the user and the interview will have some longer more detailed questions that require a developed response. After analysing these results, I will be able to adapt my outline requirements and create some mood boards.

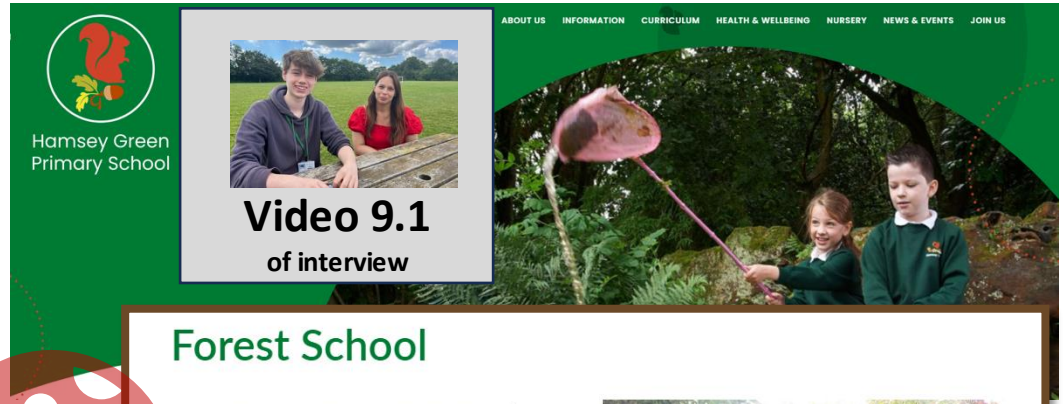
Research - Primary Research - Interview and Site visit

William Howe



Intro: I visited **Hamsey Green Primary School, their forests school**, and spoke to **Mrs Mace the Head Teacher**. I planned to identify some needs and requirements to help me help my primary user.





Mrs Mace is the Head Teacher of Hamsey Green Primary School. During the Covid 19 pandemic she decided to clear a small wooded area of the school ground which included a large old disused pond. **She wanted to give her students the opportunity to have access to a natural forest school open space.** I visited the space and saw where the children build dens, had campfires as well as having access to the large pond which they used for pond dipping. The nursey school also has a small more basic forest school.

"Our aim for Forest School is that it will help to improve physical development, language and communication skills, motivation and concentration, self-esteem and confidence. It also provides the opportunity to learn about the environment and how to care for it."

1. **What age do you cater for? 2-11 years**
2. **Is your forest school open all year round? Open all year round** (summer / winter)
3. **What type of activities do put on?** The children are engaged in a wide range of activities which involve **exploring the area and using natural resources**. They are taught to respect the area and everything that is living in it. They are taught **new skills, such as tying knots and cutting wood.** Activities include **den building, bug hunts, build habitats for local wildlife, help with imagination for story writing, archaeology digs, and pond dipping** to give a few.
4. **What skills are you aiming to develop through your sessions? ie social skills/ fine motor kills/ speech/awareness and understanding of nature?** Connection to the outer environment, **help with their mental health, emotional development , developing life skills, physical / motional development, resilience**. It is excellent for building self-esteem, self-confidence and perseverance through a wide range of activities and crafts. Children learn to **take responsibility for their own safety and take risks in a supported environmen**t.
5. **Which activities are the children's favourite? Pond dipping, using tools and equipment, and making campfires**. The children, staff and parent helpers love their Forest school sessions and we have noticed an impact particularly in the children's language and social skills, with increased vocabulary and confidence
6. **Is there a particular activity the under 5's enjoy most? Getting messy, using tools and equipment**
7. **Do you cater for special needs children?** lessons may be adapted, but the learning experience should always be the same, they have even had **students in wheelchairs.**
8. **Have you brought equipment or do you up-cycled(ie used old furniture and products rather than buying specific forest school equipment?)** Use recycled materials – old tire / pallets and collect foraged material like sticks.
9. **Have you seen any outdoor /forest equipment you would like to buy but haven't due to financial constraints?** There is lots but we do not have the funds to buy anything.
10. **What size groups do the children work in? Up to 30 children or groups of 8 or 15**
11. **What equipment would improve the learning? Easier access to water or a kitchen area**.
12. **Do you have anywhere to store the equipment, or does it stay outside all year long ? Small shed** or put back in the classroom.

Forest School

In Early Years, the children spend time each week at 'Forest School' (a wild area in the far corner of the infant school grounds).

Forest school sessions are planned using the Early Years curriculum, developing skills from all areas of learning. Our aim for Forest School is that it will help to improve physical development, language and communication skills, motivation and concentration, self-esteem and confidence. It also provides the opportunity to learn about the environment and how to care for it.

Forest School is excellent for building self-esteem, self-confidence and perseverance through a wide range of activities and crafts. Children learn to take responsibility for their own safety and take risks in a supported environment.



The children are engaged in a wide range of activities which involve exploring the area and using natural resources. They are taught to respect the area and everything that is living in it. They are taught new skills, such as tying knots and cutting wood.

They have the chance to work collaboratively e.g building a "bug hotel", or in pairs making cosy homes for wild creatures to hibernate in. A lot of the Forest school learning is led by the children's interests and they have the chance to ask questions and explore their own ideas.

The children, staff and parent helpers love their Forest school sessions and we have noticed an impact particularly in the children's language and social skills, with increased vocabulary and confidence.

Reflection on interview :

- Used by **2 - 11 years**
- Used by up to **30 children**
- Prodcuts **uses all year round outside**
- **Activities include – art and crafts / woodworking skills/ cooking/tying knots and cutting wood**
- Children favourite activities, **cutting and sawing / messy activities / campfires**
- Activities to help with **physical, emotional and mental development**
- Needs to be **easy to move and store**
- Needs to be **low in cost** as limited funds
- Need more **easy access to water / cooking facilities**









Mrs Mace also showed me the large outdoors climbing frame and equipment

Summary: I have completed a site visit and interview

Next Steps: I have decided I will complete mood boards on biomimicry, seating and existing products. This will allow me to gain inspiration

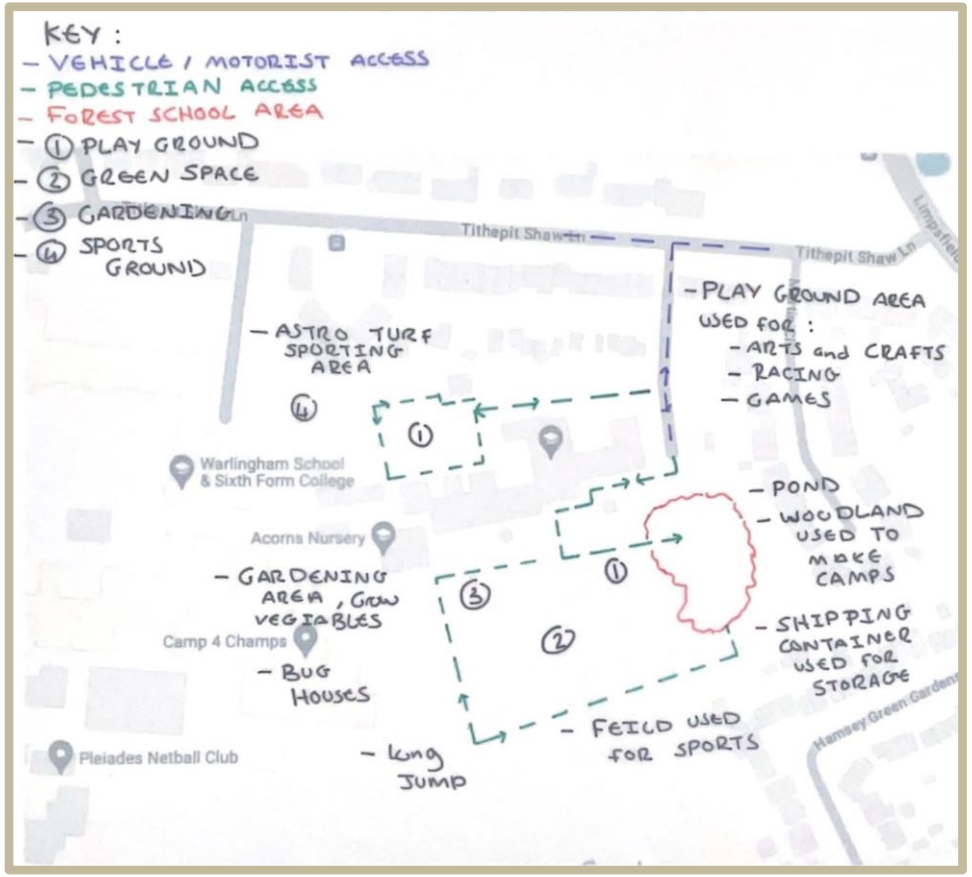


Research - Site Analysis Hamsey Green

William Howe

Intro: I will conduct a site analysis on Hamsey Green to identify different protentional sites that the product could be use. This will allow me to identify the different situations my product would be used in, storage and preexisting toys and structures that the children use to play.

Hamsey Green Primary School





All weather playground

Sports Field



Wooden Climbing frame



Open Woodland



Large stone compass



Tire bug House

Summary :

I have identified key areas where my product could be used within the site and ways that my product could be transported to the site. In addition, I have also identified where the product could be stored and the preexisting toy and product they have on site for the children to use.

Next Steps :

Having visited the site and spent time volunteering I have identified that the most user friendly site for all weather conditions and time of year would be the old tennis court area. I will next produce a questionnaire in which I will ask for some feedback from the parents of my primary users, this will give me insight into what sort of equipment the children particularly enjoy and what they will like using.



Stone Seat by Pond



Large pond with lots of biodiversity



Large Rocks



Shed for storage by entrance

Research - Primary Research - Interview and Site visit

William Howe

Intro: I visited **Warlingham Forest Schoolers** and interviewed **Sara h Morgan**, Sarah is the founder member. I planned to identify some needs and requirements to help me help my primary user.



Sarah Morgan lives in Warlingham Village. She is the **founder member of the Warlingham Forest Schooler**s, in which there are nine dedicated volunteer. She begin the forest school in 2019 during Covid 19, she has always been passionate about children having as much access to the outdoors and all it has to offer us, especially the mental health support our natural world has to offer. Which became even more so important during the pandemic. The WFS's believe there are massive benefit from connecting with nature, learning to appreciate and care for the environment, and acquiring new skills along the way. Surrey County Council gave WFS the site. Additionally, they were entrusted with the planting and maintenance of 500 saplings, making an orchard as part of the Queen's Green Canopy initiative. Their goal is to provide children with the chance to connect with their natural surroundings, fostering respect and fuelling their innate curiosity. Through their interactions with the ever-changing environment, they aim to cultivate a sense of adventure and exploration.

"Forest school was really great. The kids had a great time, learned loads and got to meet, play and learn with other kids with similar interests. The organisers were amazing and really friendly, great with the kids and very caring and helpful. I would recommend it for all ages.— Louisa (Parent)

1. **What age do you cater for? 18 months – 11 years-** (16 years – DofE helpers)
2. **Is your forest school open all year round?** Open all year round (summer / winter), holiday sessions, weekly Thursday under 5 session, working with schools, stargazing and attending fates
3. **What type of activities do put on?** Activities include, **arts and crafts, utilising nature, den building, bug hunts, build habitats for local wildlife**
4. **What skills are you aiming to develop through your sessions? ie social skills/ fine motor kills/ speech/awareness and understanding of nature?** Understand how connecting to the environment affects their **mental health, developing life skills, physical / motional development, resilience** "biggest ethos is never giving up"
5. **Which activities are the children's favourite? Messy and muddy activities**, creating items for example bird boxes in which they leave and allow animals to use
6. **Is there a particular activity the under 5's enjoy most? Climbing, navigating different levels** and textures, **using tools** and equipment
7. **Do you cater for special needs children?** Children may just need additional support
8. **What equipment do you use to run your sessions ? buckets / tables, small hammers and screw drivers, gardening and maintenance too**ls **(spades and shovel)**, disk shape wood
9. **Have you brought equipment or do you up-cycled(ie used old furniture and products rather than buying specific forest school equipment?)** Use recycled materials and collect foraged material like sticks which are stored in a shed to keep dry
10. **Have you seen any outdoor /forest equipment you would like to buy but haven't due to financial constraints?** They have seen climbing equipment and cutting and messy play equipment
11. **What size groups do the children work in? Up to 30 children**, with tools 1 - 4 adult to child ratio
12. **Do you have anywhere to store the equipment or does it stay outside all year long ? Storage sheds and garages**, in the process of getting planning equipment for a shipping container to help store equipment safely
13. **I know the scheme is run by volunteers and understand you are been given money from the national lottery? Do you have any funds to buy equipment? if you do would you be happy to give me an indication of how much a year ?** Apply for different funds / schemes and donation on website, some charges for sessions to allow for a constant flow of money coming in, allowing for the purchasing of equipment, training DBS checks, licences and insurance cost

Reflection on interview :

- Used by **18 months - 11 years**
- Used by up to **30 children**
- Prodcuts **uses all year round outside**
- **Activities include – art and crafts / woodworking skills/ cooking**
- Children favourite activities, **cutting and sawing / messy activities**
- Activities to help with **physical and mental development**
- Needs to be **easy to move and store**
- Needs to be **low in cost** as limited funds

Summary: I have undertaken an interview which has allowed me to identify some of the key features and fully understand their viewpoints and consider the problems they find important. I will intend to design for 18 months – 11-Year-olds which is cheaper and more accessible to buy than current products on the market. I will also consider to include activities such as climbing and arts / crafts within my product.



Video 11.1

of interview

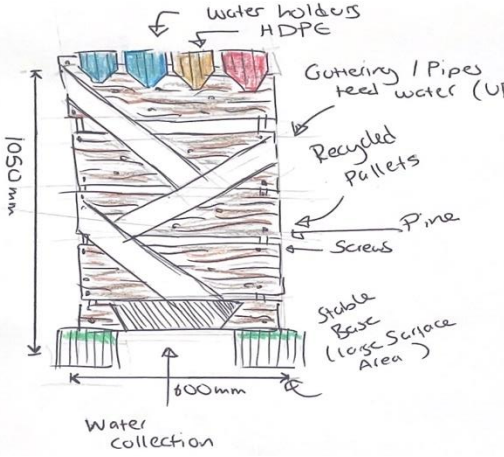
Next Steps: I have decided to now interview Mrs Mace so I can Identify more outline requirements for my products. In addition, I will also create an assortment of mood boards which include Architecture, biomimicry, seating and existing products, these will help inspire features of my concept designs .



I took these photos whilst volunteering at the forest school

Product Analysis :





Function – teach children colours and develop their fine motor skills

Safety – the product is well assembled, stable base due to it having a large surface area

Sustainability / Materials – the product has been made from recycled pine pallets and recycled UPVC guttering

Size – 1050mm by 600mm

Construction – the polymer and timber compotes have been screwed to the pallet

Finishes – none

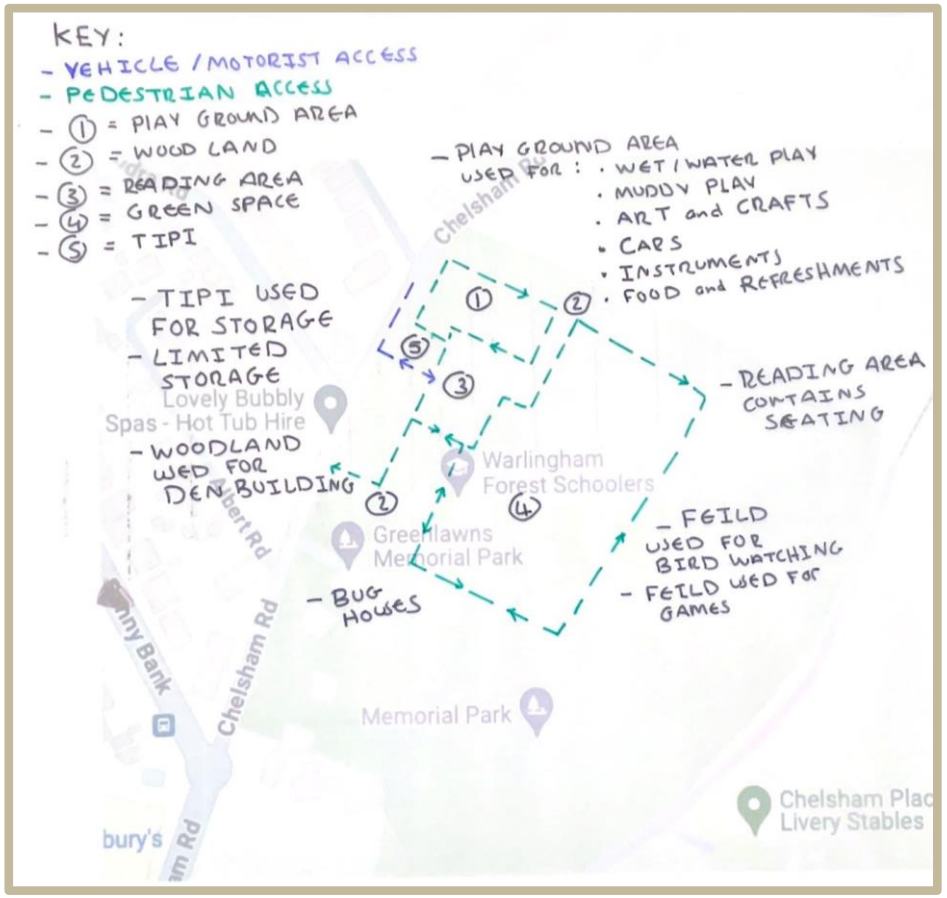
Positives - teaches younger children colors and understanding of gravity and how liquids have greater movement than solids. Stable so wont collapse or fall on the child with the added weight of water.

Negative – smaller children and children in wheelchairs may find it more difficult to use

Research - Site Analysis Forest School

William Howe

Intro: I will conduct a site analysis on Warlingham Forest school to identify different protentional sites that the product could be use. This will allow me to identify the different situations my product would be used in, storage and preexisting toys and structures that the children use to play.





Welcome sign - front gate entrance



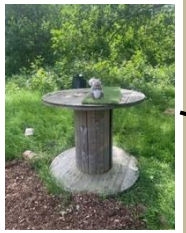
Tipi – Storage



Play area



Garden area



Drawing Table



Refreshments



Castle



Reading area

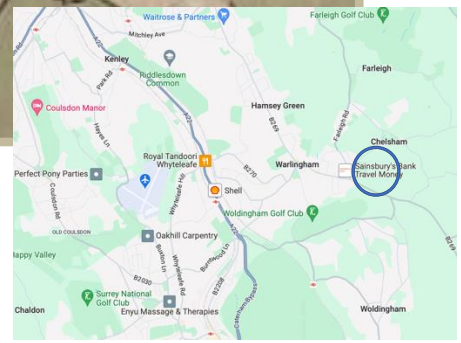


Log storage

Brid Watching



Compost heap



Summary :

I have identified key areas where my product could be used within the site and ways that my product could be transported to the site. In addition, I have also identified where the product could be stored and the preexisting toy and product they have on site for the children to use.

Next Steps :

Having visited the site and spent time volunteering I have identified that the most user friendly site for all weather conditions and time of year would be the old tennis court area. I will next produce a questionnaire in which I will ask for some feedback from the parents of my primary users, this will give me insight into what sort of equipment the children particularly enjoy and what they will like using.

Research - Volunteering and Focus Groups

William Howe

Intro: During the summer of 2024 I have been volunteering on Thursday mornings at a forest school. The group is aimed at pre school children aged 18 months– 5 years, in which the children are give an opportunity to have free play where they have the opportunity to complete and get involved in a variety of different activities. The size of the group included approximately 15 children and their parents. My role was to assist and support the children, this allowed my to gain an in depth understanding of what the children needs are and what they enjoyed. It also gave me the opportunity to speak to the parents and gain there feeds back.

Observation from Volunteering:

Activity's Observed:

- Water Play
- Muddy Play with diggers and garden tools
- Breaking ice activity
- Arts and crafts
- Wheels toys in tubes and guttering
- Reading time / sing and song
- Pans and pots musical instruments
- Tree climbing
- Interactive activity using bells and locks
- Pulley systems






What do the Children enjoy doing :

The children enjoyed the freedom and openness of the space. Despite there being a variety of activates the children congregated towards the muddy activities which included water and mud plus toys. In addition, they enjoyed putting wheeled toys for example toy cars into guttering and tubes. They enjoyed creating sound using a variety of different kitchen equipment which was screwed to a pallet and hitting bamboo sticks of different sizes creating different noises. They also liked to play with the water buckets and guttering,

What are the key issues and challenges I need to address:

- Safety – products need to be safe to use as children will be playing on them, children like to digest and swallow toys they play with.
- Usability – the height of the products need to be easily accessed by children aged 1 and above
- Inclusive design – the product will need to have wheelchair access and include the needs of children with sight issues
- Function – the product needs to be fun, possibly including water, mud, and include space for playing
- Durability – the product must be strong and hardwearing as the primary user may be hitting and putting heavy weights e.g. buckets of water onto the product.
- Products need to be weatherproof as they would be used outdoors and stay outdoors due to limited storage

How can I help the primary user:

I intend to design a product which is multifunctional and may include; the use of water, it needs to be strong and hardwearing, the ability to be adaptable in height so it can meet the needs of all who play with it

What the Parents liked about Forest School:

- It was a safe place for the children to run and explore
- Their own personal gardens and balconies were often small, and had no or few trees and exciting natural areas to play in
- It is a really nice way to meet other children and parents
- It was a change from inside children and parent's groups
- It always involved messy and experimental play

Next Steps: I will next complete a site visit and interview on Hamsey Green primary school.






Questionnaire answered by Parental Focus Group

Design Technology NEA - Forest School Questionnaire Parental

I am currently in the process in producing research for my Design Technology NEA I have chosen to design a product for the forest school to help children development. I would be grateful if you could answer the following questions to help me with my NEA.

Your participation in this survey is voluntary. You may refuse to take part in this research or exit the survey at any time if needed. You are free to decline to answer any questions you do not wish too. By completing this survey you are giving consent to use the data collated in my NEA project. All responses will remain anonymous. Thank you very much for your time.

1. What age is your child?

More Details

1 - 2 years old	2
2 -3 years old	4
3 -4 years old	7
4 -5 years old	1
Other	0



2. How long have you been attending the forest school?

More Details

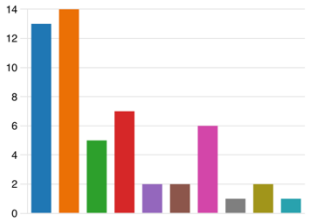
less than a year	4
1 -2 years	3
2 - 3 years	4
3+ years	3



3. What activities are your children favourite (tick 4)?

More Details

Muddy Play	13
Water play	14
Arts and Crafts	5
Wheel toys in tubes and gutteri...	7
Music	2
Pulley systems	2
Climbing	6
Sign song / reading time	1
Breaking ice	2
Bells and locks	1



4. Does your child have a disability?

More Details

yes	4
No	10



5. If you said yes for question 4, What disability does your child have?

More Details

4 Responses

Latest Responses
"Autistic '

6. What skills do you think they have developed through attending the forest school?

More Details

Social skills	11
Sharing skills	8
Fine motor skills	8
Empathetic to nature	7
Self esteem	5



7. Do you attend the forest school throughout the year, weather permitting e.g if its raining?

More Details Insights

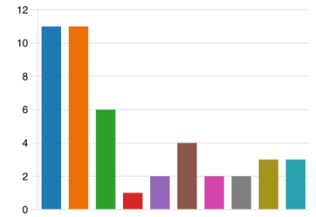
Yes	10
No	4



8. What activities would you like to see more off?

More Details

Muddy Play	11
Water play	11
Arts and Crafts	6
Wheel toys in tubes and gutteri...	1
Music	2
Pulley systems	4
Climbing	2
Sign song / reading time	2
Breaking ice	3
Bells and locks	3



9. Does your child enjoy doing shared activities or playing alone?

More Details Insights

Playing alone	1
Playing in groups of 1 -3	4
Playing in groups of 3+	8



Summary: From my observations and from my primary user's parents questionnaire I have identified that children of 1 – 5 years will use the product. I have noted that the children's favorite activities are muddy play, water play and wheel toys in tubes and guttering, climbing and arts and crafts, my product will need to meet the needs for SEN children (sight and wheel chair access). The product will need to be used in all weather conditions as children still attend the forest school in these conditions. Parents felt their children would like more water, muddy and arts and crafts.

Research - Designer Research

William Howe

Intro: I will conduct research on three designers, one focusing on biomimicry and organic shapes within their designs and the other on creating a product that adapts to fit a variety of users of different sizes and ages. This is so I ensure that the product will meet the users needs. After conducting interviews and surveys, I gained insights into my clients needs. As well as looking into Andy Goldsworthy who produces artwork using nature and natural environment

Thomas Heatherwick :

was born on the 17th February 1970 and is an English designer and the founder of London-based design practice Heatherwick Studio. He works with a team of more than 200 architects, designers and entrepreneurs from his studio in Kings Cross London. Heatherwick's projects, many of which have won design awards, include the renovation of the Hong Kong Pacific Place , the Olympic Cauldron for the 2012 Summer Olympics and Paralympics, *Vessel* in New York City, and the New Route master bus stop. His designs are inspired by nature allowing him to create sunning and practical buildings such as, the East Beach café.
https://heatherwick.com

Thomas Heatherwick is renowned for his innovative use of materials and his nature-inspired designs. His work often blends traditional craftsmanship with cutting-edge technology, resulting in structures that are both functional and visually captivating. Heatherwick's approach to materials emphasizes sustainability and creativity. His designs frequently mimic patterns and structures found in nature, seamlessly integrating them into urban landscapes. Whether using metal, glass, or wood, Heatherwick's material choices enhance his biomimetic designs, creating a sense of harmony between the built environment and nature.

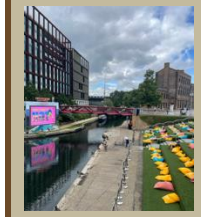
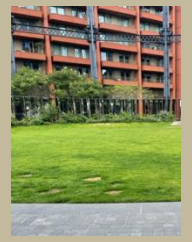


East Beach café

Seating: Throughout the space seating was predominated. Heatherwick used organic shapes to create wave like seats, as well as using colorful deck chairs and bean bags to make a relaxed yet buzzing atmosphere

Thomas Heatherwick site visit coal drop yard :

I visited a site that Thomas Heatherwick designed where he bring nature into a man-made structure, creating a architectural building that's sympathetic to its surroundings.




Materials: Bricks, slate, steel, glass, timbers and concrete

Other Products:



Thomas Heatherwick's spun rocking chair

The Spun Chair by Thomas Heatherwick is a sculptural piece made from rotationally moulded polyethylene. Inspired by spinning tops, its circular design allows users to sit and spin, blending playfulness with functionality. Lightweight and durable,, transforming a traditional chair into an interactive experience which flows like nature.

Feedback :

My primary user likes how the designer has integrated nature into their designs and would like me to do the same

Peter Opsvik:

was born on March 25, 1939, in Norway, is a industrial designer best known for his innovative and ergonomic furniture designs. His work focuses on creating seating solutions that promote movement and adaptability, challenging conventional ideas of static sitting. Opsvik is most famous for the Tripp Trapp chair, designed in 1972, which grows with the user and is beloved for its versatility and functionality. Throughout his career, Opsvik has prioritized sustainability and user-centered design within his products.

Stokke's Tripp Trapp Chair:

The chair is made of beech wood. The two vertical side pieces, each in the shape of an inverted 7, have grooved inner surfaces to accommodate various horizontal elements, such as a baby rail, a seat, a footrest and stretcher rods. As the child grows, the baby rail can be removed and the depth and height of the seat and footrest changed to accommodate various sizes simply by sliding the seat and footrest into position. For a full-sized person, the lower stretcher rod and original seat are also removed, and the footrest then becomes the seat. The basic design has remained unchanged since 1972. Opsvik's chair designs are based on his aim of creating rational, ergonomic products that can accommodate different body types and sizes. The manufacturer's slogan for the Tripp Trapp is: 'the chair that grows with your child'. The high chair is designed so that a child can use it at various ages as it can be adapted for a variety of different needs .
https://collections.vam.ac.uk/item/O1373017/tripp-trapp-chair-chair-opsvik-peter/#~:text=The%20'Tripp%20Trapp'%20is%20an,manufactured%201979%20by%20Stokke%20AS.




Feedback :

My primary user likes how the product adapts to a variety of different users and grows with the child meaning they wouldn't have to buy new products as frequently saving money. She also likes the natural wood looking asethics.

Summary and Next Steps:

I have researched into designers and got feedback from my primary users to understand the aspects of the designs they like; I will take influences from these designers as they fulfill the requirements of my client. I will next look at protentional sustainable companies and materials to gain an understanding of what my product will be made off.

Philip Stark:

is a French post-modernist industrial designer known for his avant-garde, sometimes surrealistic designs.






Feedback :

My primary user likes how the wooden stool can be flat packed then assembled effortlessly together

Andy Goldsworthy:

born 25 July 1956, is an English sculptor, photographer, and environmentalist who produces site-specific sculptures and land art situated in natural and urban settings. He grew up in Harrogate. From the age of 13, he worked on farms as a labourer and had a likeness to the repetitive quality of farm tasks to the routine of making sculpture. The materials used in Goldsworthy's art often include vibrant flowers, icicles, leaves, mud, pinecones, snow, stone, twigs, and thorns to mimic nature and biomimicry. https://andygoldsworthystudio.com/split-oak-wood/







Feedback :

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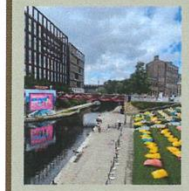
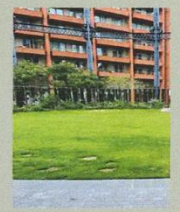


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Biomimicry

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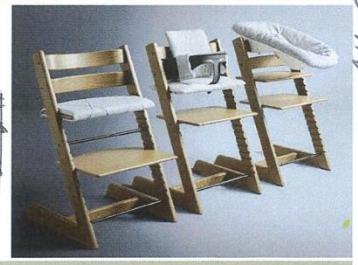
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Wave

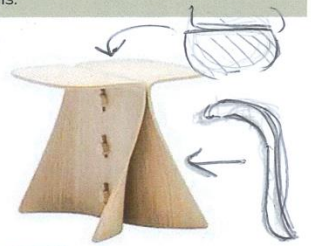
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Compact

Curvy

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Organic

Spiral

Research - Sustainable Company – Vestre

William Howe

Intro: I will research a sustainable company creating outdoor products that can influence my designs.

Summary and Next Steps: I have researched into a sustainable company and will take inspiration of there design and sustainable thinking when designing my product. I will next look at more sustainable materials to further allow me to identify the best material for my product.

Vestre?:

Vestre is a Norwegian manufacturer of urban furniture. For more than 75 years, we have helped create social meeting places for millions of people. It is one of Scandinavia's leading manufacturers of sustainable furniture with Scandinavian design for urban and outdoor environments.
https://vestre.com/uk/

Sustainability: Vestre ensures sustainability:

Building solar panel systems on their factories and helping to fund the new construction of renewable energy through long-term power purchase agreements (PPA).
Vestre works with due diligence throughout the value chain to ensure good working conditions and traceability of materials in line with OECD guidelines.
They create secure jobs and contribute tax revenues, and refuse to supply hostile designs, such as benches with spikes designed to keep the most vulnerable people in society away from our shared outdoor spaces.
Vester's goal is to be recognized as the world's most sustainable furniture company. They are also seeing a trend towards more densely populated cities. We need to create social meeting places that provide people with the best possible experiences in public spaces
Their vision is that we should not make a single product that doesn't last forever, we call this "Vestre Vision Zero." This is possible through correct use and maintenance and a scheme whereby worn-out furniture can, after many years of use, be returned to the factory for restoration and reuse. They take no shortcuts in production and offer a lifetime guarantee against rust, a 15-year guarantee on powder-coated surfaces and a 15-year guarantee against rot. We supply spare parts with no time limit; no products go out of date. If we don't have the parts in stock, we'll make them for you. None of our products go out of date. They also have a decarbonisation plan to lover their emissions by reducing wastage and efficiency in their production.

https://vestre.com/uk/

Products:



General materials:

- **Steel** as its durable and got a good strength to weight ratio
- **Nordic Pine** FSC®-certified pine from Norway and Sweden (*Pinus Sylvestris*). Owing to the cold climate the trees grow slowly and can only be felled after 80–120 years. Thus, Scandinavian pine is harder and more suitable for outdoor furniture than pine from warmer areas, which generally grows 3–5 times faster. The felling of virgin forest is prohibited by law
- **Aluminium** as its lightweight, corrosion resistant
- **Concrete** used for stability and modern designs

General Finishes:

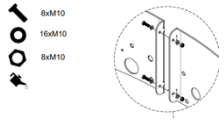
- **Powder Coating**: Durable, weather-resistant, eco-friendly, and low-VOC, with a wide colour range.
- **Wood Treatments**: Protects against moisture, UV radiation, and biological degradation for extended outdoor life. Vester's timber is applied with natural linseed oil which offers lasting protection against rot and virtually maintenance-free use. After some time outdoors, the surface will develop a grey patina. Vestre's timber is applied with natural linseed oil which offers lasting protection against rot and virtually maintenance-free use. After some time outdoors, the surface will develop a grey patina.
- Gallisation to resist corrosion and rust

Product Analysis:

I visited Gordon Street in London, where the area had been recently renovated .The new street scene introduces a small slice of tranquillity to the heart of Bloomsbury, providing a shared space for the public with new cycle lanes and the installation of plants and fixed street furniture. It includes new cycle lanes and biodiverse planting, bug hotels well as generous places to sit, work, lunch The scheme links into the Camden Council Green Corridor which will provide walking and cycling routes from Euston Road to the River Thames.







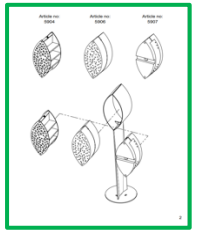
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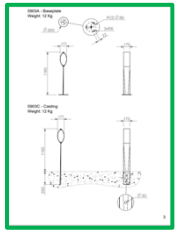
Material & finishes Hot-dip galvanised steel
All steel components are hot-dip galvanised. With a lifetime anti-rust warranty. Corrosion class

Finishes and maintenance Vester's timber is applied with natural linseed oil which offers lasting protection against rot and virtually maintenance-free use. After some time outdoors, the surface will develop a grey patina.









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William Howe

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Products:

General materials:

- **Steel** as its durable and got a good strength to weight ratio
- **Nordic Pine** FSC®-certified pine from Norway and Sweden (*Pinus Sylvestris*). Owing to the cold climate the trees grow slowly and can only be felled after 80–120 years. Thus, Scandinavian pine is harder and more suitable for outdoor furniture than pine from warmer areas, which generally grows 3–5 times faster. The felling of virgin forest is prohibited by law
- **Aluminium** as its lightweight, corrosion resistant
- **Concrete** used for stability and modern designs

General Finishes:

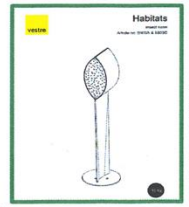
- **Powder Coating**: Durable, weather-resistant, eco-friendly, and low-VOC, with a wide colour range.
- **Wood Treatments**: Protects against moisture, UV radiation, and biological degradation for extended outdoor life. Vester's timber is applied with natural linseed oil which offers lasting protection against rot and virtually maintenance-free use. After some time outdoors, the surface will develop a grey patina. Vestre's timber is applied with natural linseed oil which offers lasting protection against rot and virtually maintenance-free use. After some time outdoors, the surface will develop a grey patina.
- Gallisation to resist corrosion and rust

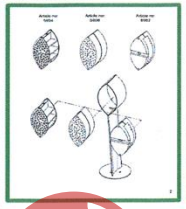
Product Analysis:

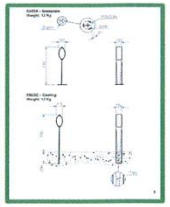
I visited Gordon Street in London, where the area had been recently renovated .The new street scene introduces a small slice of tranquillity to the heart of Bloomsbury, providing a shared space for the public with new cycle lanes and the installation of plants and fixed street furniture. It includes new cycle lanes and biodiverse planting, bug hotels well as generous places to sit, work, lunch The scheme links into the Camden Council Green Corridor which will provide walking and cycling routes from Euston Road to the River Thames.









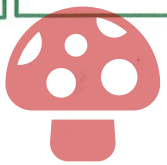


Material FSC®-certified pine from Norway and Sweden (*Pinus Sylvestris*). Owing to the cold climate the trees grow slowly and can only be felled after 80–120 years. Thus Scandinavian pine is harder and more suitable for outdoor furniture than pine from warmer areas, which generally grows 3–5 times faster.
The felling of virgin forest is prohibited by law

Material & finishes Hot-dip galvanised steel
All steel components are hot-dip galvanised. With a lifetime anti-rust warranty. Corrosion class

Finishes and maintenance Vester's timber is applied with natural linseed oil which offers lasting protection against rot and virtually maintenance-free use. After some time outdoors, the surface will develop a grey patina.





Research - Generic Material Research

William Howe

Intro: I will research into a variety of materials in detail that I could potentially use. I will analyse the materials on factors such as sustainability, life cycle analysis, qualities and suitability to the outdoors

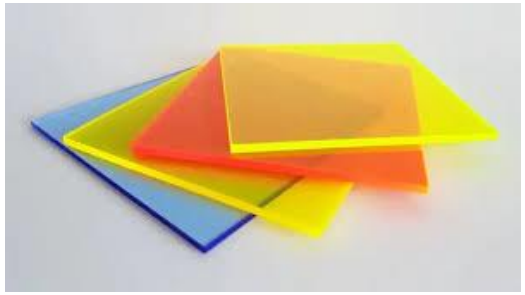
Acrylic:

Life Cycle Analysis: Acrylic is made from oil-based materials such as propylene, contributing to its environmental impact. It is energy-intensive, involving polymerization and shaping processes, and due to this has a high carbon. It is non-biodegradable and not widely recycled, though specialized facilities can recycle acrylic. It's a thermoplastic.
Aesthetic: Clearer than glass, available in various colours, textures, and finishes. Can be moulded into complex shapes.
Practical: Lightweight, durable, UV-resistant, and versatile displays and windows. Can be easily cut, shaped, and polished.
Properties: Impact-resistant, and lightweight. Resistant to UV degradation and weathering as its durable but prone to scratches. Easily shaped, drilled, and bonded, suitable for custom designs.
Disadvantages: Made from non-renewable resources, not biodegradable, and challenging to recycle so not environmentally sustainable. Its prone to scratching compared to other materials like glass. Acrylic is brittle and can crack under heavy impact or stress. In addition, it's also flammable.

Aluminum:

Life Cycle Analysis: Extracted from bauxite ore in an energy-intensive refining and smelting processes. The extracting of the ore can result in loss of habitat / scarring, oil spills and pollution (air). It has a hight carbon footprint however this can be reduced by recycling at the end of its life.
Aesthetics: Sleek, modern finishes (brushed, polished, anodized, painted).
Practical : Lightweight, corrosion-resistant, energy-efficient, highly recyclable, and versatile for various applications.
Properties: High strength-to-weight ratio**.** Its an Excellent thermal and electrical properties. Easily shaped and formed. Its self-protecting oxide layer prevents rust so is corrosion resistance.
Disadvantages: Primary production has high energy and carbon costs. Its softer than steel; prone to denting and deformation. Mining causes habitat destruction and produces toxic by-products.









Nordic Pine:

Life cycle analysis: Slow-growing in Nordic climates, often FSC/PEFC certified. Usually takes around 50-120 years to grow. It uses minimal energy during processing and is typically sawn, dried and treated. In addition, due to Carbon Sequestration it absorbs carbon during growth, offsetting emissions. It has a long lifespan with proper treatment, especially in outdoor environments. In addition, at the ned of its life the pine can be reused, upcycled, or used for biomass energy.
Aesthetic: Warm tones, visible growth rings, and natural knots; customizable with stains/paints.
Positives: Lightweight, sturdy, and cost-effective; versatile for furniture
Properties: Moderate density (~500 kg/m^3), easy to work with, elastic, and durable with treatment. Good thermal insulation and noise damping. Suitable for indoor and treated outdoor use as the wood is head wearing and durable.
Disadvantages: Prone to rot, pests, and fungi without treatment. Knotty texture may weaken wood in structural uses. Moisture Sensitivity expands and contracts with humidity, risking warping or cracking. Fire Risk flammable unless treated.

Beech:

•**Life cycle analysis:** Beech trees grow in temperate climates and are often sourced from FSC/PEFC-certified forests. When the tree is growing the Beech absorbs and stores carbon during growth, helping mitigate climate change. The material requires moderate energy use when milling and drying, with low emissions compared to other materials. In addition, at the end of its life beech is biodegradable and recyclable, suitable for composting.
Aesthetic: Light in colour with fine, straight grain. Takes stains and finishes.
Practical: Strong, durable, and affordable compared to other hardwoods. Easy to work with and versatile for furniture.
Properties: Density of 700–750 kg/m^3, making it strong. Durable so moderate natural resistance to decay; treated wood can withstand outdoor conditions. Workability it's easy to machine, sand, and finish, holds finishes well. Moderate thermal insulation and good sound-damping qualities.
Disadvantages: Prone to warping or cracking without proper treatment due to moisture. Not resistant to decay or insects unless treated. Prone to dents and scratches due to relative softness in the surface which may make a product look bad over time. The wood colour darkens over time with exposure to light. More expensive than softwoods, though less costly than some hardwoods.

Plywood:

Life cycle analysis: Made from layers of wood veneers, typically from softwoods. It uses moderate energy due to the adhesives and pressing involved. Plywood stores CO2 during its life by the adhesives can contribute to emissions. At the end of its life, it can be recycled, although adhesives would make it hard to recycle or need to be removed.
•**Aesthetics**: Offers natural wood grain patterns and can be veneered or laminated for various finishes, making it suitable for decorative and functional uses.
•**Practical**: Lightweight, cost-effective, strong, and versatile, it has a good strength-to-weight ratio.
Properties: High strength in bending, shear, and torsion due to its layered structure. Vulnerable to moisture unless specially treated (e.g., marine plywood for wet environments). Easy to cut, shape, and finish. Provides moderate thermal insulation and soundproofing.
Disadvantages: Standard plywood can swell and change shape in moisture unless treated. Glue may be toxic. The surface veneer can be prone to scratches and dents





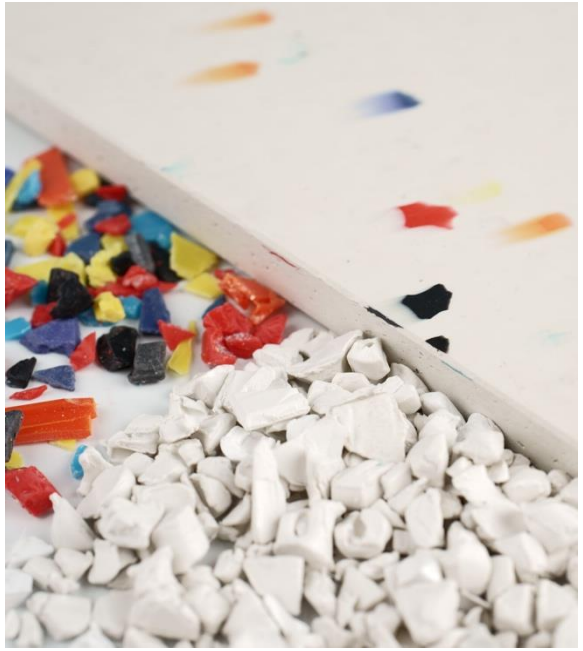


William Howe

Intro: I will research into a variety of materials in detail that I could potentially use. I will analyse the materials on factors such as sustainability, life cycle analysis, qualities and suitability to the outdoors

Polygood:

Life Cycle Analysis: Polygood is made from 100% recycled and recyclable polystyrene (PS), sourced from reputable recycling centres. Each panel gives new life to post-consumer and post-industrial PS waste from various sources, including refrigerator insulation, electronics, CD cases, disposable food containers, toys, and building components. This transformation creates a planet-friendly surface material that meets strict project environmental and health standards, while ensuring full recyclability at the end of its life cycle.
Aesthetic: Polygood can come in a variety of colours and patterns to the designer's needs.
Practical: Lightweight, durable, waterproof.
Properties: lightweight, material is constant so the material will be look and have the same properties in a industrial scale product. Its thermoformable so can easily be formed / shaped with heat and pressure.
Disadvantages: The material may be more expensive as they must use lots of energy and process to recycle material into polygood. In addition, depending on the plastic used may affect the properties like temperature resistance or structural integraty.
https://thegoodplasticcompany.com/polygood/
https://polygood.com



Fiber glass:

Life Cycle Analysis: Made from silica sand, limestone, and other raw materials melted at high temperatures to produce glass fibres. It is then combined with resin (a petroleum derivative) to form the composite, making it partially dependent on fossil fuels. Energy-intensive due to the high temperatures required to produce glass fibres and the curing of resin. It has a moderate-to-high carbon footprint due to raw material extraction, high energy use in production, and the petroleum-based resins. It is a long-lasting material with resistance to corrosion, moisture, and UV radiation. It is non-biodegradable and challenging to recycle, often disposed of in landfills or incinerated.
Aesthetics: Smooth or textured finishes and it is customizable in colours and shapes to get a required look.
Properties: Highly versatile, weather-resistant, corrosion-resistant, durable, and lightweight so will make a good material to be used outside.
Disadvantages: Energy-intensive production and hard to recycle, meaning it is bad for the environment. Cutting and sanding create dust that can irritate skin, eyes, and lungs. Fibre glass can crack or splinter under heavy impact due to it being brittle. It has a higher cost for custom moulds or depending on the resin used.



Bio-Polymers:

MATERIALS	ORIGIN / END OF LIFE	RESOURCES	PROPERTIES	APPLICATIONS
Equivalents to oil-based versions (BioPET, BioPE, BioPA, BioPP, etc.)	20 to ≈ 100 % biobased, not biodegradable nor compostable	Sugar cane, molasses, vegetable oils	Equivalent to standard polymers, remain recyclable and not biodegradable, easy to process	All kind of applications
PLA	≈100% biobased and 100% biodegradable and compostable	Corn starch, sugar cane, sugar beet, etc.	Transparent, rigid, low thermal resistance, low barrier properties	Food and cosmetic packaging, consumer goods, fibres , 3D printing
PHAs	≈100% biobased and 100% biodegradable and compostable	Corn starch, sugar cane, sugar beet, other biomasses	Opaque to translucent, rigid to very soft, good thermal resistance and barrier properties	Consumer goods, agriculture, packagings, water treatment
Biopolyesters	Partially biobased and 100% biodegradable and compostable	Corn starch, sugar cane, sugar beet, etc.	Opaque to translucent, rigid to very soft, good thermal resistance , low barrier properties	Bags, agriculture, packagings, consumer goods
Cellulose based	Mainly biobased and could be biodegradable and compostable	Wood pulpTransparent, rigid, low thermal resistance, low barrier properties	Transparent, rigid, good thermal resistance and barrier properties	Packagings, consumer goods, cosmetic and luxury
Biobased elastomers	Mainly partially biobased	Biobased polyols (vegetable oils, sugars, etc.)	Very soft, low hardness, good mechanical properties	Consumer goods, construction, automotive, sport and leisure
Starch based	Partially biobased and could be biodegradable and compostable	Starch (corn, potatoes, tapioca, etc.)	Soft, sensitive to moisture, controled biodegradation	Bags, agriculture, packagings, consumer goods
Biocomposites	Partially biobased and could be biodegradable and compostable	Natural fibers with standard or biopolymers	Rigid, good mechanical properties, natural aspect	Consumer goods, automotive, construction

BIODEGRADABLE	PBAT, PCL, PBSA	PBS, TPS, Starch-based compound, biobased TPE	PLA, PHAs, TPS
NON BIODEGRADABLE	PE, PP, PS, PET, PVC, PUR, PC, ABS, PA, etc.	Biosourced PET, biobased PA 6-10, biobased PC, biobased PUR, biobased TPE, PTT, biobased Copolyesters, Cellulose esters, Hybrids	Biosourced PE, biobased PP, biobased PA-11, biobased PA 10-10
	NON BIOBASED	**PARTIALLY BIOBASED**	**BIOSOURCED**

https://natureplast.eu/en/the-bioplastics-market/



Summary and Next Steps: I have researched into a variety of materials to help me further develop my knowledge of materials. I have looked at a variety of materials to I could potentially use in my product and analyses the pros and cons so I can compare the materials and analyze the best ones to use for my project. I will next produce outline requirements on my research I conducted so my product hits all its puns and will also look at legislation and initial anthropometric data of children to give me an idea of my product size.

Evaluation of research:

Introduction:
On this page, I will complete my evaluation of research. This is a summary table where I will talk about the usefulness of the research I have completed throughout my project. I will also highlight areas where further research could be completed to increase the detail of information that is already gathered. This table will consist of the 11 main research areas I have conducted.

Research method	Primary or secondary	Was the information useful?	Any further research?
Questionnaire	Primary	I sent out a questionnaire to a variety of different people, using s variety of people allowed me to gain a wide range of potential users answering the questionnaire, this meant that the answers I received were accurate and allowed me to see what a wider variety of people would want. This research was useful as it allowed me to have a broad understanding of what potential users would want and need from the product and what features were most important to them.	Further research could include asking my primary user some more specific questions taking into account the previous answers I have already gathered. This information will help me consider my primary users needs and wants.
Site Visit	Primary	I visited Hamsey Green Primary School, their forests school, and spoke to Mrs Mace the Head Teacher. I planned to identify some needs and requirements to help me help my primary user. I visited Warlingham Forest Schoolers and interviewed Sarah Morgan, Sarah is the founder member. I planned to identify some needs and requirements to help me help my primary user. I also observed the children so I could assess their needs	I will carry interviews with both Mrs Mace and Sarah, as well as asking parents from the Forest school to complete a questionnaire heling me identify the needs of the primary users
Interview	Primary	The interview has given me some more specific answers to more specific questions. This information allows me to understand how the product will be used and interacted with within its primary environment. The information I received from my primary user was very useful as it allowed me to understand exactly what he wants form the product, therefore, allowing me to design with these in mind later on in my project.	Further research I could include is interviewing more stakeholders to find out more information on what they would want from the product. This would allow me to design the product with more than just one person's needs in mind.
Mood boards	Secondary	The mood boards I have created consist of a range of different ideas including previous existing products, different shape changing/ collapsible mechanisms within products and biomimicry/ natural material choices. This information is very useful to me as it gives me a reference point to return to when designing my product as it contains valuable inspiration.	Further research I could conduct could be looking at other design movements to vary my inspiration for design later on, this would also allow me to see some interesting shapes and patterns. I could also look to develop my existing mood boards by looking at more photos and designing from those.
Material research	Secondary	Material research gave me an initial insight into a different rang of commercially viable materials. The research was useful as I was able to analyse some of the strengths and weaknesses of different materials. This research was also useful as I will be able to use this when choosing what materials to make my product with, taking into considerations the strengths and weaknesses of each, and seeing what materials would be suitable.	Some more research I could do, could potentially be looking at the life expectancy of these materials, to see which would be best for my product. This would therefore also allow me to accurately estimate the life expectancy of my product.
Product research	Secondary	Researching existing forest school products has been highly useful in understanding the common trends and materials used in this type of design. I have identified that most of these products are made from sustainable materials, such as pine, and are designed to be modular and adaptable, which is important for functionality in a dynamic forest environment. Additionally, I noticed that water features are a recurring theme throughout many of these products, adding an element of natural interaction. While these products are successful in their practicality and sustainability, I feel they lack creativity and originality. This insight has prompted me to explore biomimicry	This research could allow me to start to develop some initial ideas and implement some of the features into some designs of my own.
Product analysis	Primary	I have researched into one of my primary users forest school toys and have identified the positives and negatives about the product. This allowed me to gain some understanding when starting of what is a successful forest school product.	This research could be continued by studying more products that have interesting use of materials and interesting mechanisms. This will allow me to take inspiration and create a product that stands out and looks unique compared to anything else.

Evaluation of research:

Research method	Primary or secondary	Was the information useful?	Any further research?
Designer Research	Secondary	Thomas Heatherwick , works with a team of more than 200 architects, designers and entrepreneurs from his studio in Kings Cross London. Heatherwick's projects, many of which have won design awards, include the renovation of the Hong Kong Pacific Place , the Olympic Cauldron for the 2012 Summer Olympics and Paralympics, *Vessel* in New York City, and the New Route master bus stop. His designs are inspired by nature allowing him to create sunning and practical buildings such as, the East Beach café. Peter Opsvik:is most famous for the Tripp Trapp chair, designed in 1972, which grows with the user and is beloved for its versatility and functionality. Philip Stark: is a French post-modernist industrial designer known for his avant-garde, sometimes surrealistic designs. Andy Goldsworthy: born 25 July 1956, is an English sculptor, photographer, and environmentalist who produces site-specific sculptures and land art situated in natural and urban settings. These 4 designers allowed me to think about nature and organic influence in design work.	I have researched into designers and got feedback from my primary users to understand the aspects of the designs they like; I will take influences from these designers as they fulfill the requirements of my client. I will next look at protentional sustainable companies and materials to gain an understanding of what my product will be made off.
Anthropometric data	Primary and secondary	I researched hey size information relating to my product, this allowed me to gain a good understanding of what sizes my designs will need to be. This will also allow me to design ergonomically; making the product comfortable and easy to use. Using this anthropometric data I researched was useful as it also gave an insight of what needs to be considered when I reaserch he designing stage of my project.	Further research could include looking at some sizes of other products that my primary users use, such as shovels so I can allow for them to function within my design and be used. I will also do more specific anthropometric research on more sizes of the children the product is accessible to use and be used by a variety of users.
Legislation	Secondary	Researching relevant legislation has been crucial in ensuring that my design for the forest school project meets the necessary legal and safety requirements. Understanding regulations around outdoor education spaces, building codes, and sustainability standards has provided clear guidelines on what is feasible and required for the project. This has helped me make informed decisions about materials, structure, and design features that align with safety and environmental regulations. This will ensure my product is safe to use.	I don't think I need to conduct any further research
Sustainable company's	Secondary	Researching sustainable companies, such as Vestre, has been incredibly valuable in shaping my approach to the forest school project. Vestre's commitment to sustainable materials, eco-friendly manufacturing processes, and innovative design solutions has provided me with key insights into how modern companies integrate sustainability into their products. This has influenced my understanding of how I can create a design that is not only functional and aesthetically pleasing but also environmentally responsible. Learning from companies that prioritize the planet has inspired me to carefully consider the materials I use and how my design can contribute to a more sustainable future.	Further research I could conduct is further research into sustainable materials. This will allow me ensure my product fits with the ethos of the forest school.

Research - Outline requirements

William Howe

Intro: I indent to use my research to help me identify some key requirements that my product should include. Having identified a number of outline requirements I will then select 10 which I will consider to be my PUNs (primary user needs) these PUNs should be meat throughout my design process.

No.	Topic.	PUNs	Requirements	Justification.	Stakeholders	Priority? H/M/L
1	**Colour.**		The colour must be **sympathetic to the surroundings** and include **colours inspired by nature.**	I will need to research into **natural / sympathetic colors via the use of mood boards and existing products**, this is so the product will complement the nature around without obstructing the surroundings.	Primary users – Children Secondary users - Sarah and Nick mace Designer	**M**
2	**Shape.**	2	The product should have **aspects of nature and biomimicry in its design.**	I will need to research into **natural / sympathetic colors via the use of mood boards and existing products**, this is so the product will complement the nature around without obstructing the surroundings	Designer Manufacture Primary user – Children	**H**
3	**Product Size. / Storage**	3	The product must be able to **fit into a shed or shipping container** when being stored. In addition, the product needs to fit into the pre-existing play space / forest school.	After conducting an interview on share and Mrs Mace the product would need to be stored in a shed or shipping container, therefore it needs to be able to fit through the doors. I need to Research **Size of door frame or sheds / container ships** to allow the product to be stored over winter.	Delivery company Secondary users – Sarah and Nicki Mace (when they move the product) Manufactures Primary users children	**H**
4	**Component size**		The components should **not be small enough to swallow or digest**, however cannot be so big that children cannot use them.	Through my observations I have discovered that young children (6months – 4) like to mouth and eat toys / components, therefore the components must be large enough that children do not digest them. I will need to conduct research on **Anthropometric data of children 6months – 13 years old**	Primary users Manufactures Designers	
5	**Weight.**		The product needs to **light enough to be carried by two adults** without them harming themselves, but heavy enough so the product is stable when in use and during poor weather conditions (Wind)	Through my observations at the forest school during my volunteering work, during packing away of equipment two adults would carry the equipment to the storage facility (tipi). This means the product must be light enough for two adults to carry and move. I will conduct further research of **f accepted weights for adults to carry**	Secondary users Delivery Companies	**L**
6	**Structural integrity**		The product should be designed so it is **stable when in use / windy weather conditions**, so the product does not topple over and harm the children or get damaged.	Through my interviews and questionnaire, I have identified that my primary users enjoy climbing on the toys, in addition, through my observations many children thrown and play roughly with toys. This means the product must have a stable base and good structural integrity so when climbing the product does not fall over (even in windy conditions) and if dropped the product wont break. I will need to conduct **research and model stable structures**	Primary users Secondary users Designer	
7	**Style/Theme.**		The theme should **represent nature for example, forest / wooden fauna and flora.** In addition, elements of biomimicry.	I will need to further **interview my primary users to understand the key theme** of the product however, I found out through talking with parents that they would like the theme of the product to include aspects of nature around.	Primary users – Children Secondary users - Sarah and Nicki mace Designer	**H**
8	**Ergonomics**	5	The product should be designed so the **primary user understands the affordance with the product**	Through my questionnaires I have found out that the product needs to be designed for children from 6months – 13 years, this means the product must be interfaceable and useable (understand how to play with the product) for a variety of ages. I will need to look at **existing products to gain an understanding has affordance** has been used in children's products	Primary user Designer	
9	**Anthropometrics for primary users**	4	The product must be able to be **accessible and easy to use by all users**	Through my questionnaires I have found out that the product needs to be designed for children from 6months – 13 years, this means the product should be assessable to a variety of ages and children of different sizes. I will need to research **anthropometric data 6 months – 11-year-olds**	Primary users	
10	Inclusivity	**6**	**The product must be accessible to children with disabilities, these could include, sight, mobility and dexterity**	**Through my questionnaire and interviews with Sarah and Mrs Mace I have I identified that they cater for special needs, this means I must design a product that is accessible to all children with sight, mobility and dexterity disabilities.** **I will need to do further research on inclusivity**	**Designer**	**M**

Research - Outline requirements

William Howe

Intro: I indent to use my research to help me identify some key requirements that my product should include. Having identified a number of outline requirements I will then select 10 which I will consider to be my PUNs (primary user needs) these PUNs should be met throughout my design process.

No.	**Topic.**	PUNs	Requirements	Justification.	Stakeholders	Priority? H/M/L
11	Aesthetics	7	The product must be **aesthetically pleasing to my primary user and look sympathetic to its environment**	I will need to research into **natural / sympathetic colors via the use of mood boards and existing products**, this is so the product will compliment the nature around without obstructing the surroundings. In addition, I will need to further **interview and question my primary users to understand how they would like the aesthetics ls of the product to look**	Designer Primary users Secondary users	
12	Materials.	3	The product must be sourced by a **sustainable source**	Through my interviews I have identified that sustainability is a core aspect of the forest schools. This is due to them upcycling and recycling many products, furthermore they want to teach children the importance of the environment and sustainability (sourcing). I need to research **sustainable materials and sources**	Manufacture Producer of material source Environment agency Legislation Sustainability Disposal companies	
13	Finish.		The finish of the product needs to be **weatherproof and nontoxic** to my primary user	Via my interviews I have identified that the product will be used in all weather conditions, therefore the product must have a weatherproof finish to enhance and protect it. IN addition, through my observations I have discovered that young children (6months – 4) like to mouth and eat toys / products, this means the product will need to be nontoxic, so If a child swallows the product they are not harmed by toxic chemicals. I will need to research into **finishes and legalisations regarding children's play equipment**	Manufacture Environment agency Legislation Sustainability Disposal companies	
14	Product life cycle assessment		The product must last for a long time, sourced sustainably, well made and have the ability to adapt to the different primary user needs . When it comes to the end of its cycle is should be easily dismantled so it can be recycled	Through my and interviews I have identified that sustainability is a core aspect of the forest schools, this means the product should be sourced sustainably and must be easily dismantlable so the product can be recycled at the end of its life.	All stakeholders involved in the products life	**L**
15	Safety.	1	The structure must have **smooth edges** and designed for both children to play with / on, and for Adults to carry minimising injury	Through my observations I have discovered that young children (6months – 4) like to mouth and eat toys / products, this means the product will need to be nontoxic, so If a child swallows the product they are not harmed by toxic chemicals. In addition, the product must be ergonomically designed (smooth edges) so when the primary user interfaces with the product they do not get hurt / harmed. I will need to do additional research onto **children's outdoor play equipment and their legislations**	Legislation Designer Manufacture Primary users Secondary Users	**H**
16	Function	10	The function of the product is to **encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.**	After speaking to the parents and via my interviews and questionaries I have identified that the product will need to encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.	Primary user	**H**
17	Manufacturing Cost	8	The product should where possible use **standard components and minimal manufacturing process**.	Through my interviews I have found that the forest schools have a tight budget due to limited funds, this means I need to create an affordable product and reduce costs where I can without compromising the product. I will need to complete research into **relevant components**	Sustainable product source Manufacture	**M**
18	Maintenance	9	The product must be easy to **repaired, clean and maintain** when in use.	Through my interviews I have found that the forest schools have a tight budget due to limited funds, this means I need to create an affordable product that can easily be maintained and repaired to prolong the life of the product. In addition, through my interviews I have identified that they will be used outdoors in all conditions so must be easy to clean and maintain, so they are safe to use. I will need to look at **existing products to look at which materials and finished have been used for outdoor equipment**	Secondary User Manufacture Designer	**H**

Summary and Next Steps :

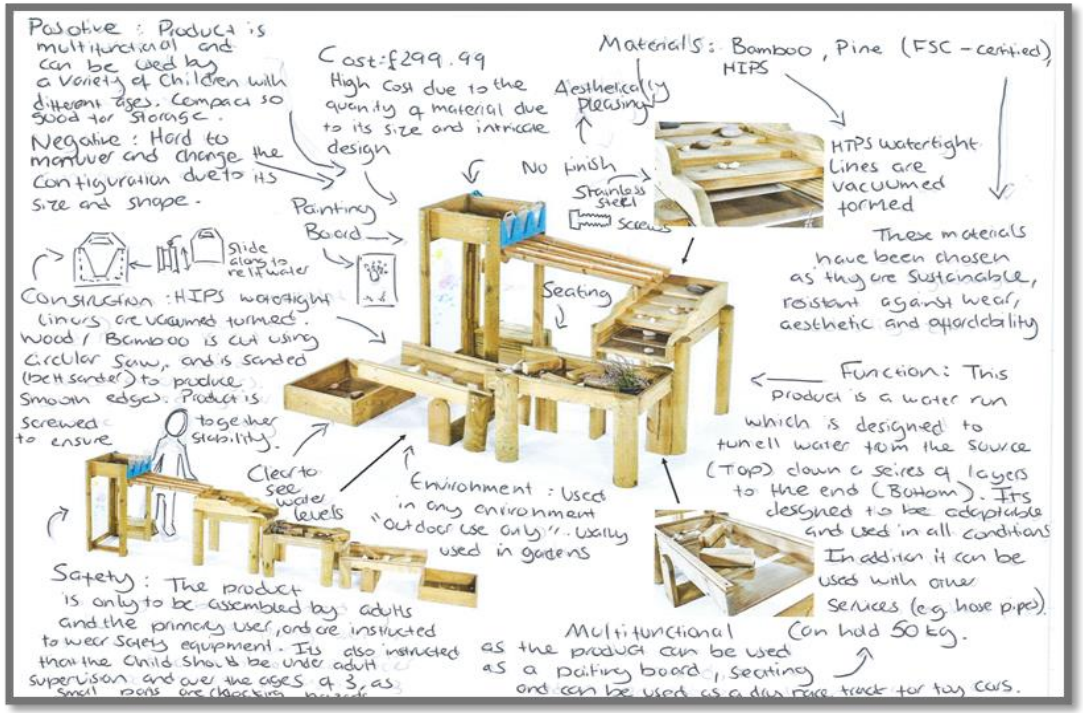
I have identified all the outline requirements that my product should include, by using primary and secondary data that I have collected. I have next identified 10 PUNS that should be met through the design process. I will next complete intal concept sketches to generate ideas for my designs.

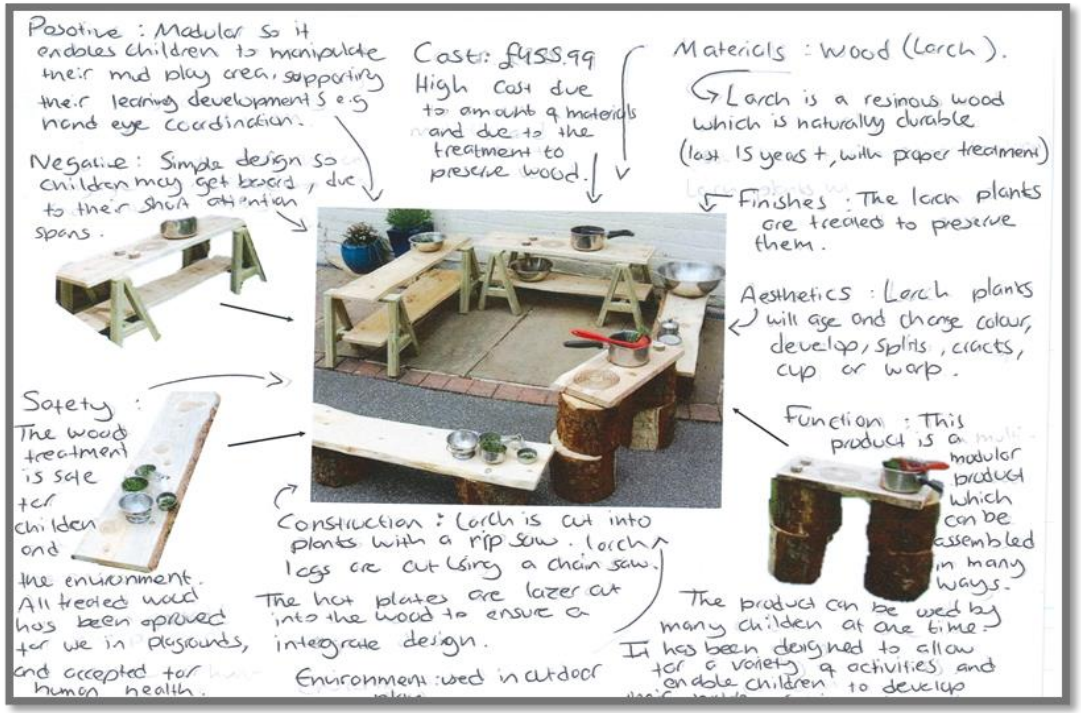
Research - Secondary Research
- Product Analysis

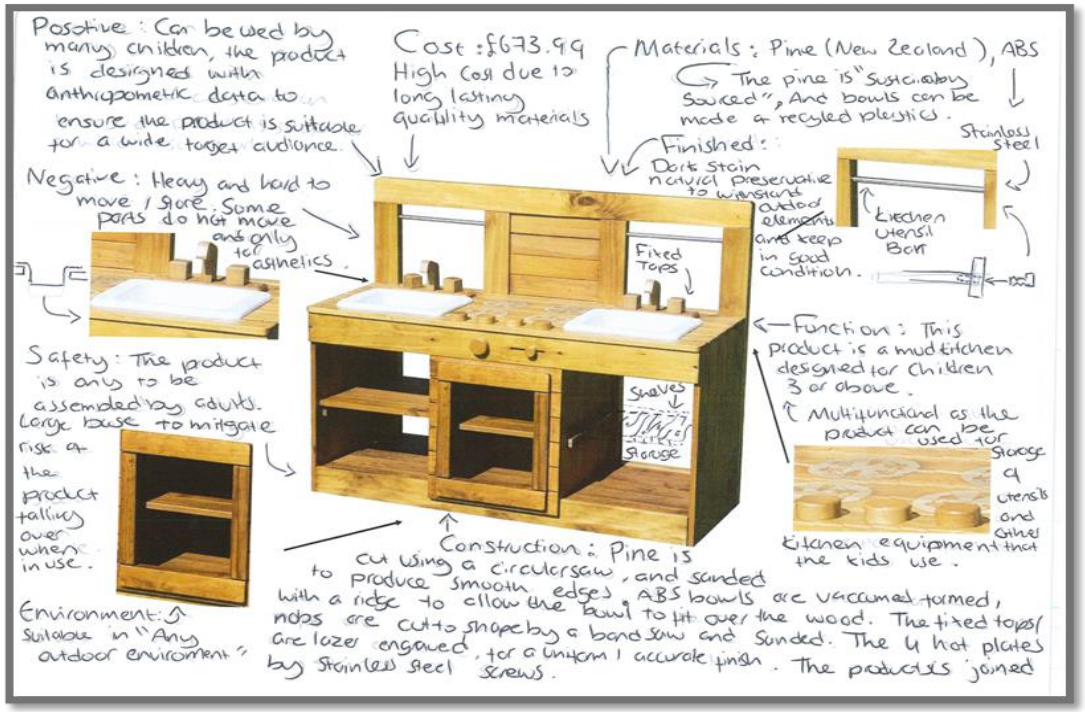
Intro: I research into a variety of existing forest school product. I will analyzing the type of toy, positives / negatives, materials / finish, safety and cost of the design from a variety of products. This will allow me to identify and understand what makes a commercially viable and successful forest school product.

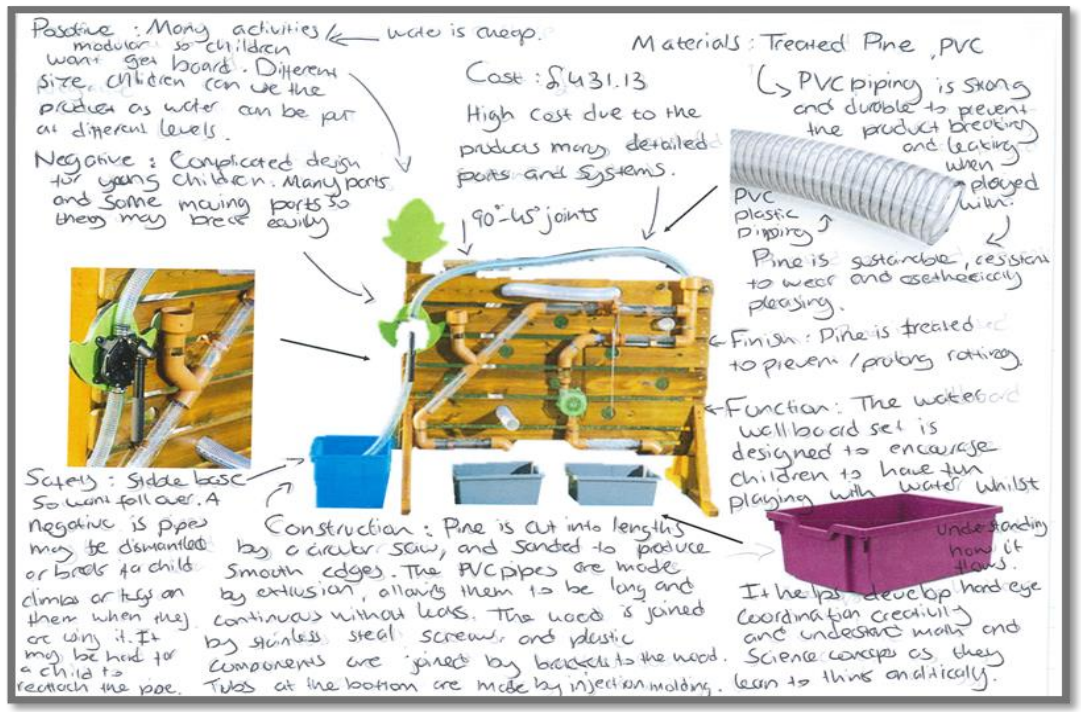
Summary and Next Steps :

I have researched into a variety of forest school products and have identified that all the products are made mainly form a sustainable material such as pine. In addition, most products are modular and adaptable with key themes such as water running throughout project. Although all these products are successful, I believe that all lack creativity. For this reason, I will next look into biomimicry mood boards to help develop some initial ideas.





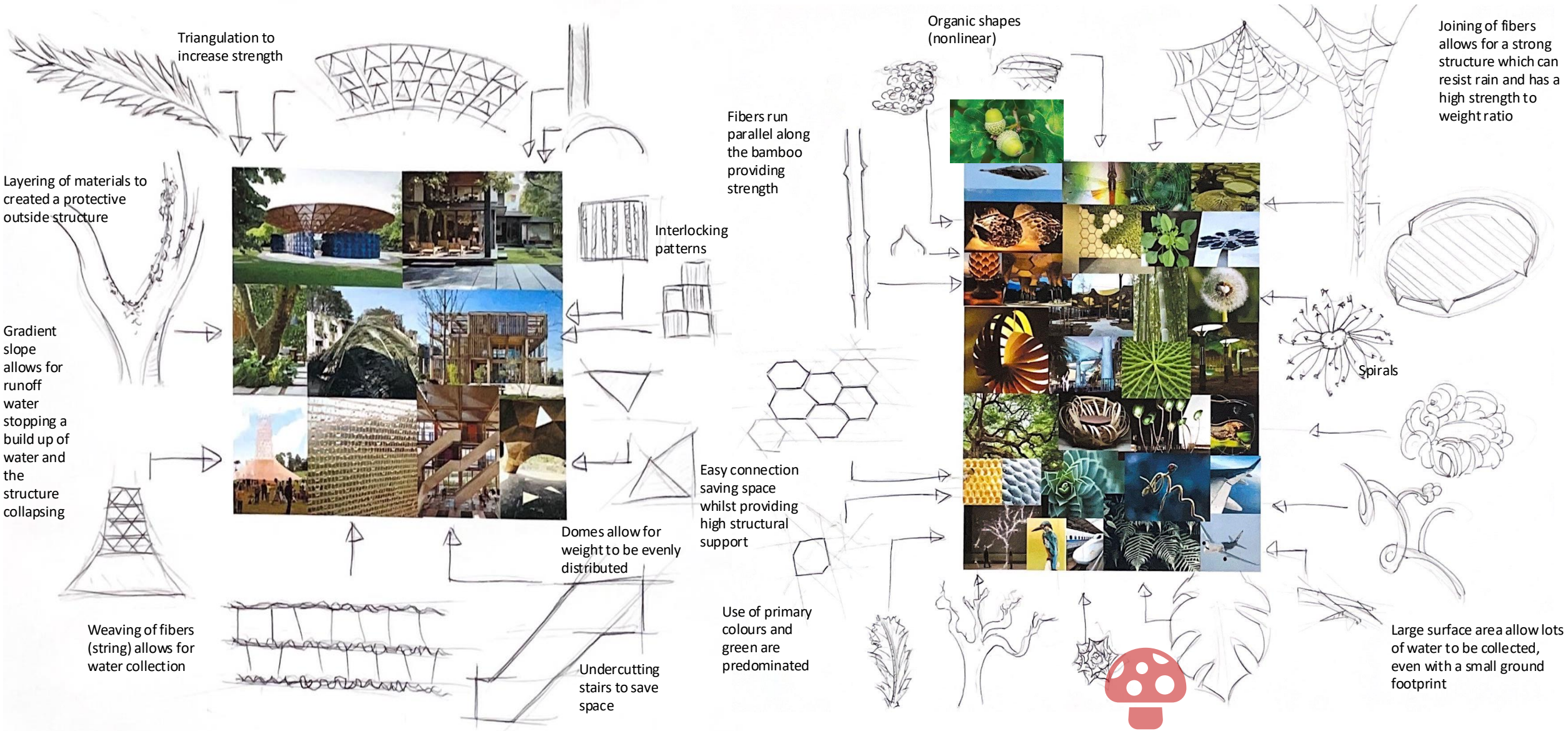




Research - Biomimicry Mood boards

William Howe

Intro: I will create two mood boards based on the theme of biomimicry. One will focus on biomimicry in architecture and building design, exploringhow nature has inspired innovative structures. The other will be purely centred on natural examples of biomimicry, such as patterns, forms, and systems found in plants and animals. These mood boards will serve as key sources of inspiration, helping me to generate ideas for my own design. I will draw and annotate around them, picking out elements that could influence the aesthetic and functional aspects of my final concept.



Summary and Next Steps :

I have taken inspiration from aspects I liked on the mood boards doodling and developing them. My next steps will be on completing another set of mood boards on existing architecture and multifunctional furniture. This research will help me identify space-saving techniques and clever design solutions that could be integrated into my forest school project.

Research - Architecture and Multifunctional Furniture Mood boards

William Howe

Intro: I will create two mood boards based on existing architecture and multifunctional furniture. This research will help me identify space-saving techniques and clever design solutions that could be integrated into my forest school project, as they lack space within the forest school (Sarah interview). These mood boards will further inspire my deisngs.

Inspired by biomimicry

Different materials to reflect heat and light

Materials consist of woods, concrete, stone and earth

Organic shapes

Curves to reflect light and heat

Triangulation to provide strength

Domes allow for weight to be evenly distributed

Geometric shapes



Threaded tube allows the table to move whilst holding its position

Ball bearings allow for the extensions of draws

Interlocking parts reduce waisted space

Collapsible mechanism so can be easily stored, takes up minimal space

Use of hydraulics means that the table can easily open and close

Hinges help the smooth opening and closing of objects



Summary and Next Steps :

Overall, this mood board has helped me explore how architecture and multifunctional furniture can influence my design. It's allowed me to develop initial concept sketches, while also giving me inspiration for incorporating space-saving ideas and multifunctional elements into my forest school project / future designs. I will next produce a final mood boards on woodland flora / fauna to ensure that my product will have an exiting design and fit into its environment at the forest school

Research - British Forest and Woodland Mood boards

Intro: I will next produce a final mood board focused on woodland flora and fauna. This will help ensure that my product not only has an exciting and engaging design but also blends naturally into the forest school environment. By studying the colours, textures, and forms found in nature, I aim to create a product that feels connected to its surroundings while still being functional and visually appealing.



Summary and Next Steps :

My favourite designs form this page where the mushrooms, acorns, leaves and the squirrel. My next steps will be to create a large amount of concept sketches which have drawn inspiration from these mood boards, getting my primary users to give feedback on those designs. I will also complete research on legalisation and anthropometric data to ensure my designs are safe and the product will be ergonomical when in use.

Research - ISO / British standards and Anthropometric data

William Howe

Intro: I will identify and understand the legislation related to children's products and gather anthropometric data for my target group. Additionally, I will research accessibility requirements and investigate the carrying weight capacity of an average adult to ensure my design is safe, functional, and user-friendly.

Legislation :

What are the laws for UK toys - Within Britain all toys must comply with the safety regulations, and it is a criminal offence to supply (or offer for supply, expose for supply or possess for supply) toys that do not comply. Toys are defined as any product or materials designed or clearly intended for use in play by children under the age of 14 years.

EN71 regulation - Safety Requirements (EN 71 Testing): The directive defines safety requirements that toys must comply with, covering aspects such as mechanical and physical properties, flammability, chemical composition, and specific hazards. These requirements aim to prevent potential risks and hazards associated with toys.

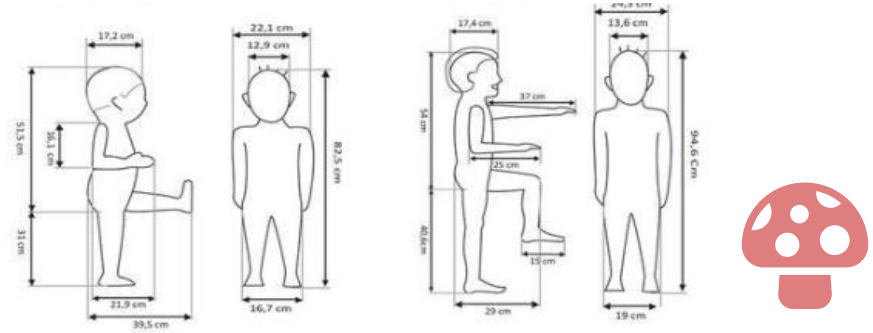
CE Mark - All toys being sold in the European Union must bear the CE mark, indicating that they comply with EU harmonised standards for health and safety. The EU Toy Safety Directive 2009/48/EC outlines the physical, mechanical, chemical and electrical requirements that a toy must meet to be sold in the EU

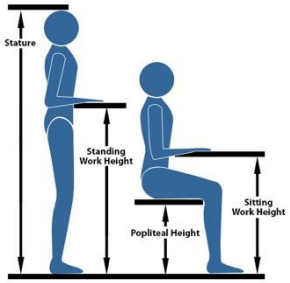
Lion Mark - The Lion Mark is a British consumer symbol developed in 1988 by British Toy & Hobby Association (BTHA) and used to identify toys denoted as safe and of high quality. It represents a red and white lion face in a triangle with a yellow background and green borders.

EN1176 - EN1176 includes provisions for the installation and maintenance of playground equipment, including requirements for the installation of equipment on a stable foundation and the maintenance of the equipment to ensure that it remains safe for children to use.

Children Act – Playgrounds in facilities which have been registered under the Act's requirements need to be safe and suitable for their purpose and meet relevant standards

Occupiers Liability Act - These Acts requires that people can expect to be reasonably safe when using the playground. Greater care is required where children are concerned. There is a limited duty of care to trespassers. Notices have limited applicability





Standing /Sitting Position

Children's table height should matches the height of their elbows.

The children's elbows shoulder be at a 90-degree position angle, whilst their necks are at neutral and their wrists are in front of them.

Why is the Height Of the Table Important?

The Childrens's desk/table height can profoundly affect children's lives, the dimensions of their workspace can affect their productivity, posture, and health.

Age Category	Approximated Age	Children's Heigh	Children's Table Height	Children's Chair Height	Foor to elbow Height
Infant	6 to 12 months	66-76 cm	30 to 33 cm	13 to 15 cm	41 – 46 cm
Toddler	1 to 2 years old	76-87cm	33 to 35 cm	15 to 18 cm	46 – 51 cm
Toddler/Preschool	2 to 3 years old	87-96cm	40 cm	20 cm	51 – 56 cm
Toddler/Preschool	2 to 4 years old	96-105cm	43 cm	23 cm	56 – 61 cm
Preschool/School Age	4 to 6 years old	106-114 cm	48 cm	28 cm	61 – 66 cm
School Age	6 to 8 years old	115 – 124 cm	50 cm	30 cm	66 – 71 cm
School Age	6 to 9 years old	125 – 134 cm	53 cm	33 cm	66-71 cm
School Age	10 to 11 years old	135 – 144 cm	61 to 66 cm	41 cm	71 – 76 cm
School Age	12 to 13 years old	145 – 155 cm	61 to 74 cm	43 cm	76 – 81 cm
School Age	13 + years old	156 – 165 cm	66 to 76 cm	46 cm	86 – 91 cm







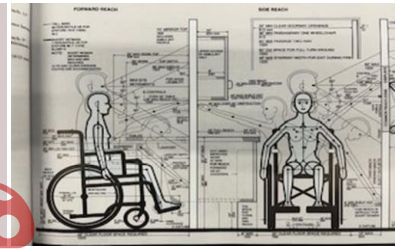
Manual Handling Weight Limits for Men/ Women

Men - **25kg**, Women - **16 kg**, grabbed close to the body at a height below the elbow but above the knuckle.

Men **- 20kg**, Women - **13 kg**, picked close to the body, below knuckle height but above mid-leg height.

[Manual Handling Weight Limit in the UK (For Man & Woman) – Training Express]







Disabilities: Due to the forest school being inclusive for all children. I have done research into the anthropometrics of a wheelchair allow my product to be accessible by all users at the forest school. Whilst designing my product I will keep affordance in mind to further allow my product to be easy to use by all users.

Summary:

To ensure my product meets regulations and is safe for use, I have researched a variety of BSI standards relevant to my design. This has helped me align my work with industry requirements and safety guidelines. Additionally, I have analysed anthropometric data for children aged 6 months to 13 years to ensure the product is appropriately sized and accessible. I have also studied different body positions, such as sitting postures and elbow heights, to enhance ergonomic comfort and usability. Furthermore, I have considered weight limitations to ensure the product is light enough to be carried and stored safely, reducing the risk of injury during handling. This research ensures that my final design will be both functional and user-friendly for its intended age range

Next Steps:

- I will conduct further investigation into movement of children, I will look at the way in which my cousins interact with a product (e.g mud kitchen) as they are within the age range and will give me variety of feedback.
- I will also start to design / produce concept sketches to help me visualize and develop my product.

Movement study- Primary research

William Howe

Intro: I spent an afternoon observing my 3 younger cousins age ranging 2-8, **Millie age 5, Zac age 8, Jasper age 2** as I wanted to see how they interacted with a product when they played. One of their favorite toys was their Ikea kitchen, it was very helpful observing the children as It allowed me to understand engage with the same product at a variety of different ages. I also took videos of them incase I want to refer to the children movement later in my project.

Reaching:
Millie's arms are extended above shoulder height to reach the top shelf



Norm reaching height:
Millie's arms are at right angles when above the surface so its easy for her to play. Straight posture.

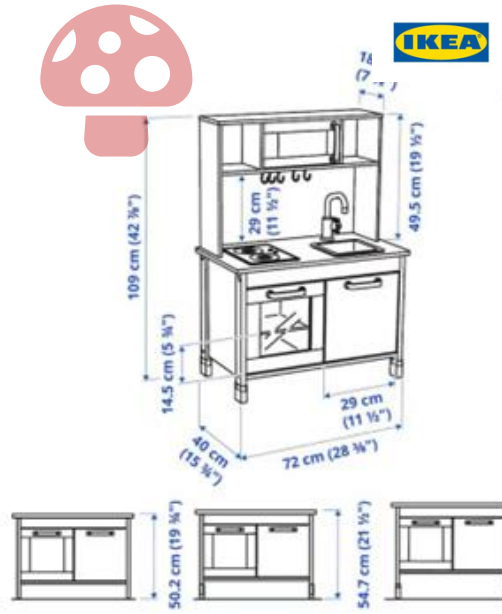


Work surface use :
Millie's can comfortably sit on the surface without too much leaning or change in posture.



Sat on the floor:
When sat on the floor the products lower shelfs are at eye level.







Outdoor flower bed:
Comfortable height arm can rest easily on the side.




Video 29.1


Video 29.2


Video 29.3

Videos showing Mille, Reaching above head height, playing while standing at a surface and playing on the floor


Video 29.4


Video 29.5


Video 29.6

Videos showing Zac, Reaching above head height, playing while standing at a surface and playing on the floor

Reaching:
Zac is hunched over trying to see inside of the cupboard. Curled posture. Still assessable



Work surface use:
Zac is hunched over, uncomfortable position – hard to be mobile and play for long durations



Sat on the floor :
Zac's arms comfortably able to reach the height of the self.



Outside play :
When sat on the floor the products lower shelfs are at eye level.



Reaching:
Jaspers arms are extended above shoulder height, hard reach the top shelf



Norm reaching height:
Millie's arms are at right angles when above the surface so its easy for her to play. Straight posture.



Sat on the floor:
When sat on the floor the products lower shelfs are at eye level.




Video 29.7


Video 29.8


Video 29.9

Videos showing Jasper, Reaching above head height, playing while standing at a surface and playing on the floor

Summary: All the children mainly stood when playing with the kitchen, however I also know this was seen throughout both inside and outside therefore I do not consider the need for seating. I also observed their arm movements both in front and reach up and down. I will not be including seating, make it raisable so fits a variety of children. I like he Ikea children play kitchen – I will design a product that change in heights to meet the different children's needs, also seen in stokes trip trap chair.

Next Steps:

- I will also start to design / produce concept sketches based on my mood boards to help me visualize and develop my product.
- I will then develop these sketches with primary user feedback.

Research - Outline requirements V2

William Howe

Intro: I indent to use my research to help me identify some key requirements that my product should include. Having identified several outline requirements I then select 10 which I will consider to be my PUNs (primary user needs) these PUNs should be meat throughout my design process. Having completed further reach I have undated my requirements. I will now also update my Design Brief

No.	Topic.	PUNs	Requirements	Justification.	Stakeholders	Priority? H/M/L
1	**Colour.**		The colour must be **sympathetic to the surroundings** and include **colours inspired by nature.**	Through my mood boards and interviews and questionnaires I know my product should be **natural / sympathetic colours** this is so the product will complement the nature around without obstructing the surroundings.	Primary users – Children Secondary users - Sarah and Nick mace Designer	**M**
2	**Shape.**	2	The product should have **aspects of nature and biomimicry in its design.**	Through my mood boards and interviews and questionnaires I know my product should be **natural or a sympathetic shape** this is so the product will complement the nature around without obstructing the surroundings	Designer Manufacture Primary user – Children	**H**
3	**Product Size. / Storage**	3	The product must be able to **fit into a shed or shipping container** when being stored. In addition, the product needs to fit into the pre-existing play space / forest school.	After conducting an interview on share and Mrs Mace the product would need to be stored in a shed or shipping container, therefore it needs to be able to fit through the doors. I need to Research **Size of door frame or sheds / container ships** to allow the product to be stored over winter.	Delivery company Secondary users – Sarah and Nicki Mace (when they move the product) Manufactures Primary users children	**H**
4	**Component size**		The components should **not be small enough to swallow or digest**, however cannot be so big that children cannot use them.	Through my observations., which include my own younger cousins I have discovered that young children (6months – 4) like to mouth and eat toys / components, therefore the components must be large enough that children do not digest them. I have also conducted **Anthropometric data of children 6months – 13 years old research**	Primary users Manufactures Designers	
5	**Weight.**		The product needs to **light enough to be carried by two adults** without them harming themselves, but heavy enough so the product is stable when in use and during poor weather conditions (Wind)	Through my observations at the forest school during my volunteering work, during packing away of equipment two adults would carry the equipment to the storage facility (tipi). This means the product must be light enough for two adults to carry and move. I have also conduct further research o**f accepted weights for adults to carry.**	Secondary users Delivery Companies	**L**
6	**Structural integrity**		The product should be designed so it is **stable when in use / windy weather conditions**, so the product does not topple over and harm the children or get damaged.	Through my interviews and questionnaire, I have identified that my primary users enjoy climbing on the toys, in addition, through my observations many children thrown and play roughly with toys. This means the product must have a stable base and good structural integrity so when climbing the product does not fall over (even in windy conditions) and if dropped the product wont break. I will need to conduct **research and model stable structures this will be done through physical modelling**	Primary users Secondary users Designer	
7	**Style/Theme.**		The theme should **represent nature for example, forest / wooden fauna and flora.** In addition, elements of biomimicry.	I found out through talking with parents that they would like the theme of the product to include aspects of nature around. Through my mood boards and interviews and questionnaires I know my product should be **natural / sympathetic colours** this is so the product will complement the nature around without obstructing the surroundings.	Primary users – Children Secondary users - Sarah and Nicki mace Designer	**H**
8	**Ergonomics**	5	The product should be designed so the **primary user understands the affordance with the product**	Through my questionnaires I have found out that the product needs to be designed for children from 6months – 13 years, this means the product must be interfaceable and useable (understand how to play with the product) for a variety of ages. I have also conducted Anthropometric data of children 6months – 13 years old research	Primary user Designer	
9	**Anthropometrics for primary users**	4	The product must be able to be **accessible and easy to use by all users**	Through my questionnaires I have found out that the product needs to be designed for children from 6months – 13 years, this means the product should be assessable to a variety of ages and children of different sizes. . I have also conducted Anthropometric data of children 6months – 13 years old research	Primary users	
10	**Inclusivity**	6	The product must be **accessible to children with disabilities**, these could include, sight, mobility and dexterity	Through my questionnaire and interviews with Sarah and Mrs Mace I have I identified that they cater for special needs, this means I must design a product that is accessible to all children with sight, mobility and dexterity disabilities. I have also complete further research on wheelchair heights.	Designer	**M**
11	Aesthetics	7	The product must be **aesthetically pleasing to my primary user and look sympathetic to its environment**	Through my mood boards and interviews and questionnaires I know my product should be **natural / sympathetic colours** this is so the product will complement the nature around without obstructing the surroundings.	Designer Primary users Secondary users	
12	Materials.	3	The product must be sourced by a **sustainable source**	Through my interviews I have identified that sustainability is a core aspect of the forest schools. This is due to them upcycling and recycling many products, furthermore they want to teach children the importance of the environment and sustainability (sourcing). **I need to research sustainable materials and sources**	**Manufacture** **Producer of material source** **Environment agency** **Legislation** **Sustainability** **Disposal companies**	

Research - Outline requirements V2

William Howe

Intro: I indent to use my research to help me identify some key requirements that my product should include. Having identified a number of outline requirements I will then select 10 which I will consider to be my PUNs (primary user needs) these PUNs should be met throughout my design process.

No.	**Topic.**	PUNs	Requirements	Justification.	Stakeholders	Priority? H/M/L
13	Finish.		The finish of the product needs to be **weatherproof and nontoxic** to my primary user	Via my interviews I have identified that the product will be used in all weather conditions, therefore the product must have a weatherproof finish to enhance and protect it. IN addition, through my observations I have discovered that young children (6months – 4) like to mouth and eat toys / products, this means the product will need to be nontoxic, so If a child swallows the product they are not harmed by toxic chemicals. I have completed research into finishes and legalisations regarding children's play equipment	Manufacture Environment agency Legislation Sustainability Disposal companies	
14	Product life cycle assessment		The product must last for a long time, sourced sustainably, well made and have the ability to adapt to the different primary user needs . When it comes to the end of its cycle is should be easily dismantled so it can be recycled	Through my and interviews I have identified that sustainability is a core aspect of the forest schools, this means the product should be sourced sustainably and must be easily dismantlable so the product can be recycled at the end of its life.	All stakeholders involved in the products life	**L**
15	Safety.	1	The structure must have **smooth edges** and designed for both children to play with / on, and for Adults to carry minimising injury	Through my observations I have discovered that young children (6months – 4) like to mouth and eat toys / products, this means the product will need to be nontoxic, so If a child swallows the product they are not harmed by toxic chemicals. In addition, the product must be ergonomically designed (smooth edges) so when the primary user interfaces with the product they do not get hurt / harmed .I have completed research onto children's outdoor play equipment and their legislations	Legislation Designer Manufacture Primary users Secondary Users	**H**
16	Function	10	The function of the product is to **encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.**	After speaking to the parents and via my interviews and questionaries I have identified that the product will need to encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.	Primary user	**H**
17	Manufacturing Cost	8	The product should where possible use **standard components and minimal manufacturing process**.	Through my interviews I have found that the forest schools have a tight budget due to limited funds, this means I need to create an affordable product and reduce costs where I can without compromising the product. I will need to complete research into **relevant components such as water pumps, LEDs, solar packs and glow in the dark material**	Sustainable product source Manufacture	**M**
18	Maintenance	9	The product must be easy to **repaired, clean and maintain** when in use.	Through my interviews I have found that the forest schools have a tight budget due to limited funds, this means I need to create an affordable product that can easily be maintained and repaired to prolong the life of the product. In addition, through my interviews I have identified that they will be used outdoors in all conditions so must be easy to clean and maintain, so they are safe to use. I will need to look at **existing products to look at which materials and finished have been used for outdoor equipment.**	Secondary User Manufacture Designer	**H**

Updated -Design Brief: London and inner cities have the highest proportion of under 5s in England, the importance of being introduced to nature, the outdoors and biodiversity is of a high importance as these children don't have such available accessibility to these environments. Nature and the outdoors can have a considerable positive impact on any human at any point of their lives, but during these fundamental years the importance of the outdoors is crucial for healthy wellbeing. Since COVID-19 there has been a high rise in poor mental wellbeing of all age groups, Spending time in green spaces can be an important factor in promoting children's social and emotional development, it allows children to connect with others build relationships, and develop a sense of self work, which have long lasting benefits for wellbeing **https://www.countrytrust.org.uk/news/does-nature-impact-child-development#:~:text=Spending%20time%20in%20green%20spaces,in%20life%20(Nurture%20UK) .**
Inner cities such as London also home the highest percentage of disadvantaged children where not only academic performance has been proven to be lower than financially stable families. In addition, they are more likely to have mental health issues. Children growing up in disadvantaged families have less financial backing making it hard to access the resources necessary to help address the issues.

Nicki Mace the Head Teacher of Hamsey Green Primary School introduced a forest school area into her school and **Sarah Morgan oversees Warlingham-forest-schoolers** **www.warlinghamforestschoolers.org**, both my Primary users require **outdoors equipment** to help develop the children's connection to nature whilst improving wellbeing and social skills. I am going to design and make a product which well **enhance the mental well being and social skills of young children.**

My focus for my Design Brief will be designing a product that will be suitable for schools, nurseries and forest school. Through conversations with Primary User and completing my research I am aware of the need to positively help enhance the mental well being and social skills of young children, and the importance of the outdoors and nature in helping with this.

Summary and Next Steps :

I have identified all the outline requirements that my product should include, by using primary and secondary data that I have collected. I have next identified 10 PUNS that should be met through the design process. I will next complete initial concept sketches to generate ideas for my designs.

Research - Initial ideas

William Howe







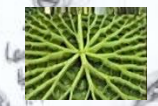




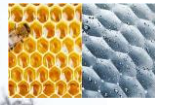





















Research - Initial concept ideas

William Howe

Intro: I will produce a variety of initial idea sketches based of my mood boards and addition research. I will then show these to my Primary Stakeholders (Sarah and Niki Mace) who will pick their favorite designs.



Primary Stakeholders Sarah Morgan and Niki Mace



Primary User Comments :

Sarah likes the biomimicry inspired designs, however, is less keen of the tall standing structures as she is worried about the safety of the student.

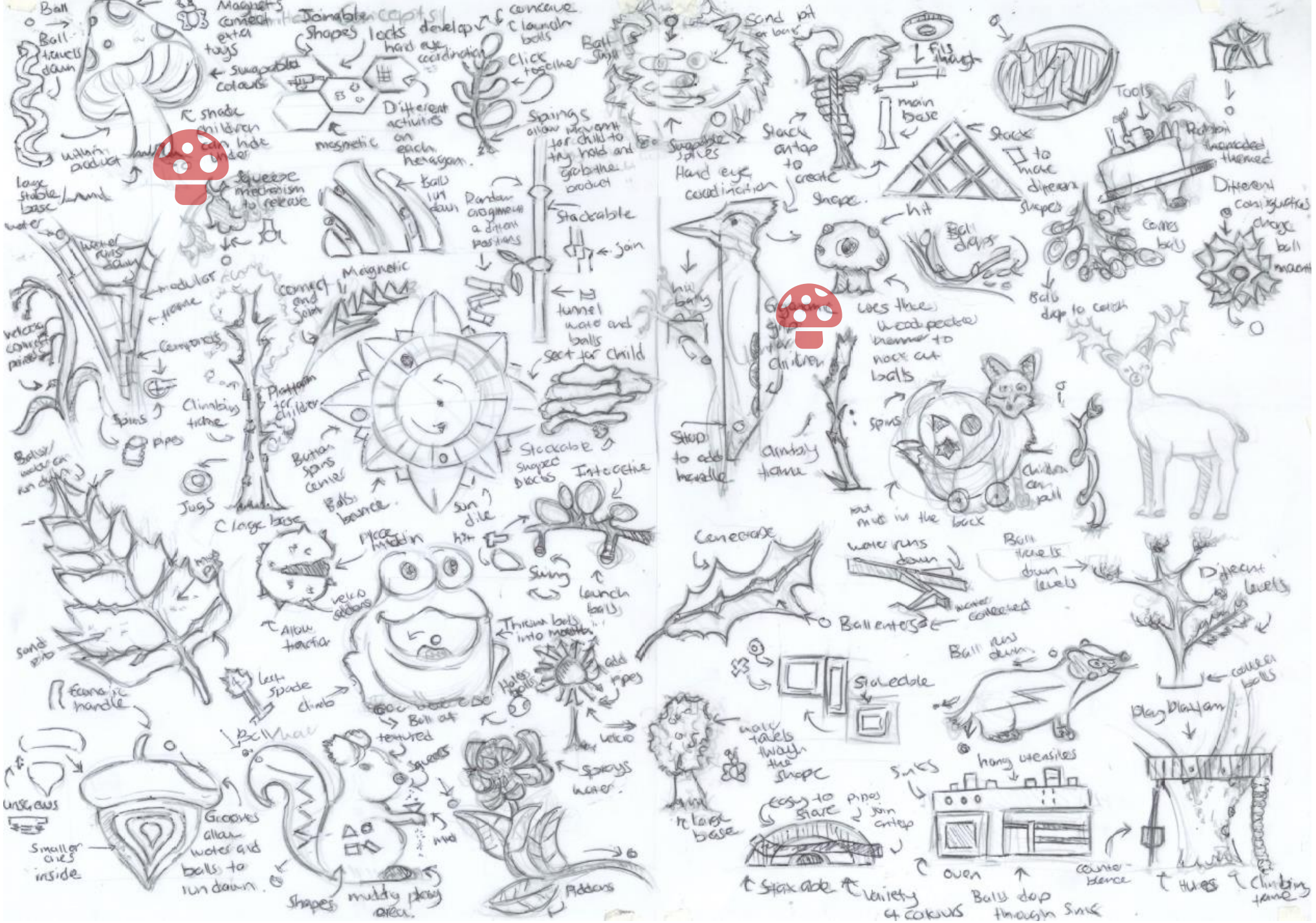
Sarah like how most toys could were multifunctional and could provide a variety of activities for the children.

Sarah was concerned how most the products would be stored as most of the ideas look large as they are fitting many users at one time.

Mrs Mace preferred products that sat on the ground rather than hung on trees as it would be easier to set up and their would be less concerns of the product falling of the tree and fitting into the space.

Niki Mace said that she wanted the children to have a larger space to do activities like Arts and crafts as this is one of the groups favorite activities

Niki Mace believes the small parts of the different product may get lost when used outdoors by children.



William Howe

Initial concept ideas primary user comments

KEY:

- Sarah Morgan favorite designs
- Niki Mace favorite designs



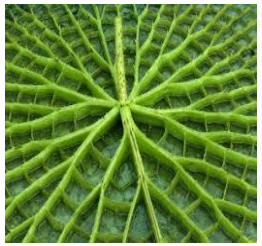
Video 34.1

I gained feedback from Mrs Mace on my Initial concept ideas

Summary: I presented my designs to my primary users and got them to identifying their favourite designs. This feedback has allowed me to pinpoint the most preferred designs, which I will now bring forward for further refinement and development.

Next Steps: I will next develop these selected designs in greater detail, conducting a thorough analysis of their pros and cons to identify areas for improvement. Additionally, I plan to combine elements from different designs. As part of this process, I will evaluate each design against my PUNS (Primary User Needs) to ensure they effectively address the requirements and preferences of my primary users.











different cereals
Child
magnetic
mud pit
Segments join and have different games/ activities
Rubber
Ball runs down the middle.
Leaf Spade
runs down middle.

Start Platform
Water or balls can be used
Quick fit, parts click into place
PVC tubing used due to its flexible durable and heard wearing properties
Quick fit push to release
Attach to nature (trees) and contrast different patterns
Use pegs at the bottom to hold down structure

The circle spins/ rotates to make the product more engaging
Fox inspired
Wind Chimes
Funnels allow for fun games using water and balls
Ball bearings on the base of the for help spin the cylinder on top.











Gravity
kitchen
tunnel exit for slide
Large Surface area in contact with the ground to ensure stability
Ladder to climb up
Slide

Water pump so kids can play with water.
Bucket integrated to supply water
Tunnels for the movement of balls
Large Surface Area for Stability
Plan view
Plastic Tubing
Bucket





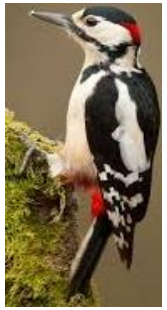






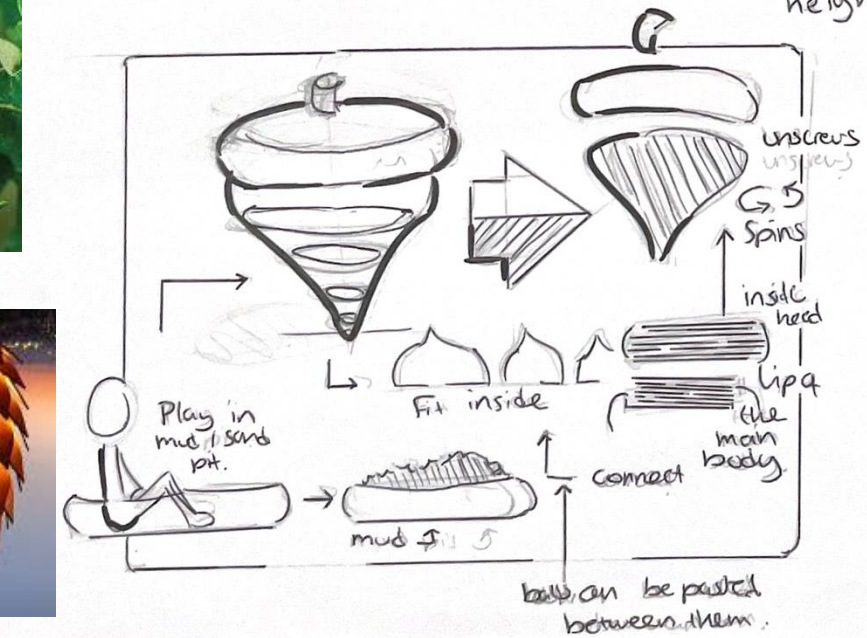


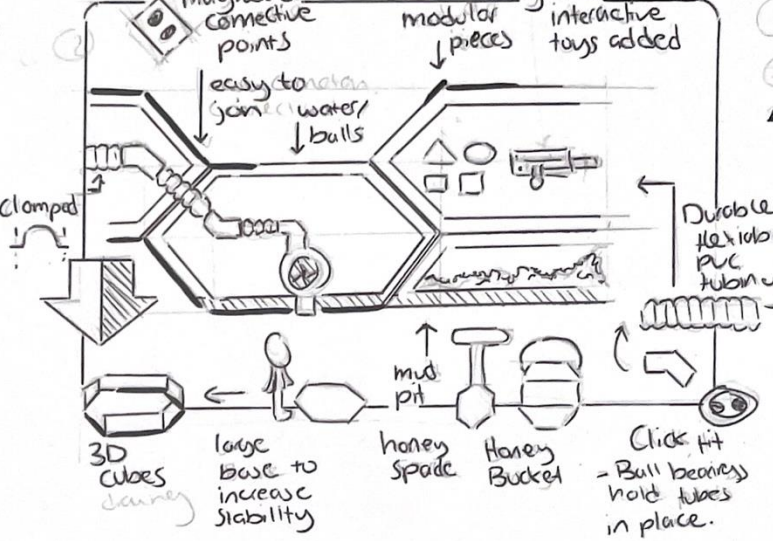


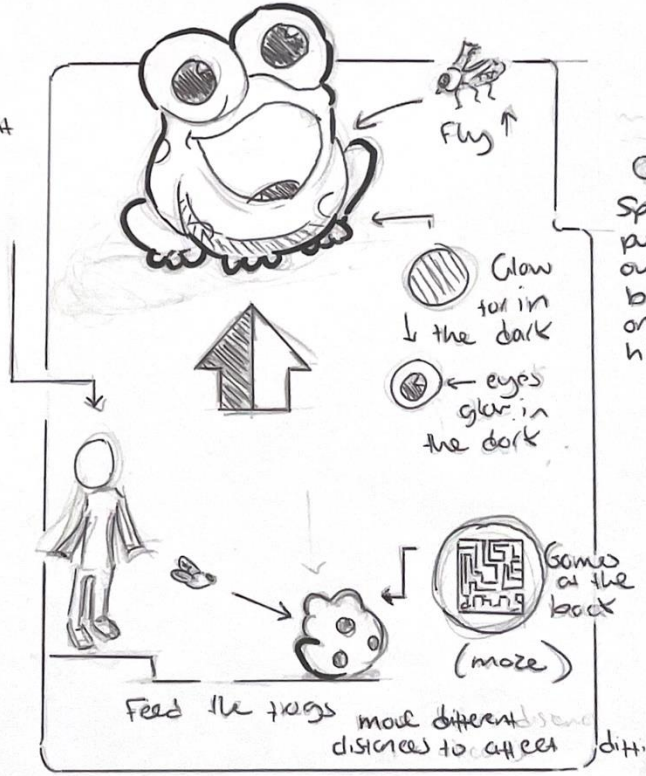


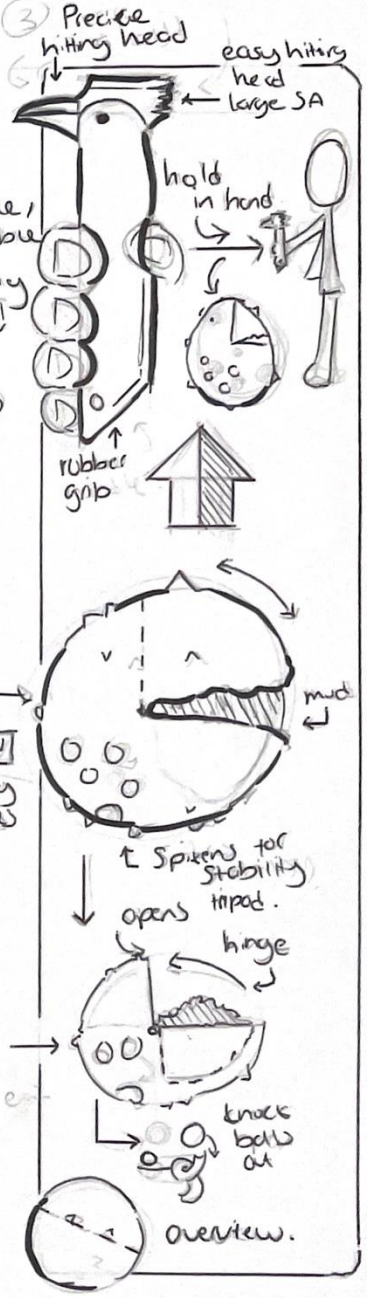


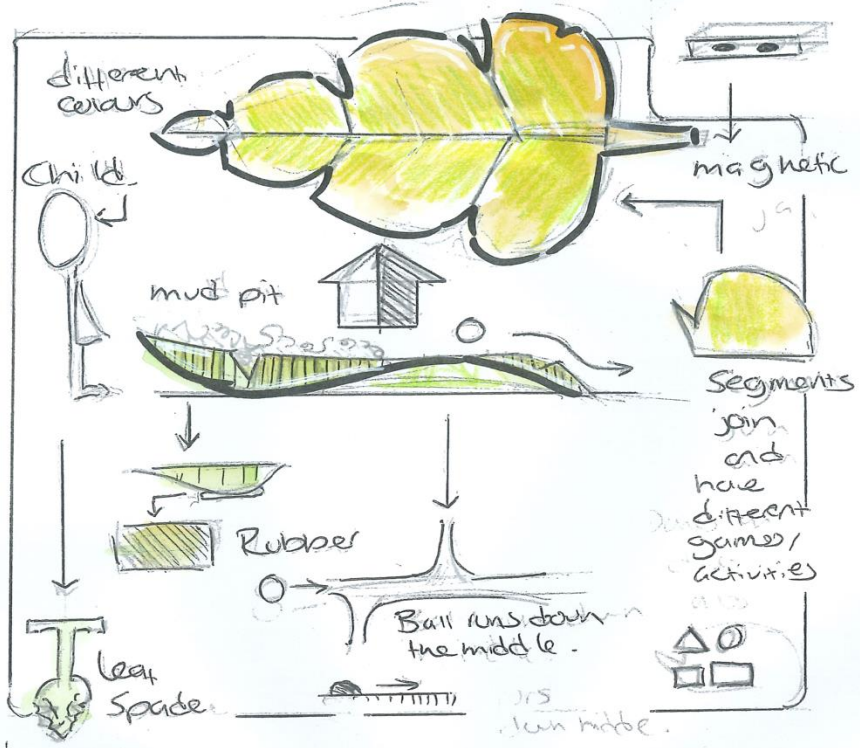


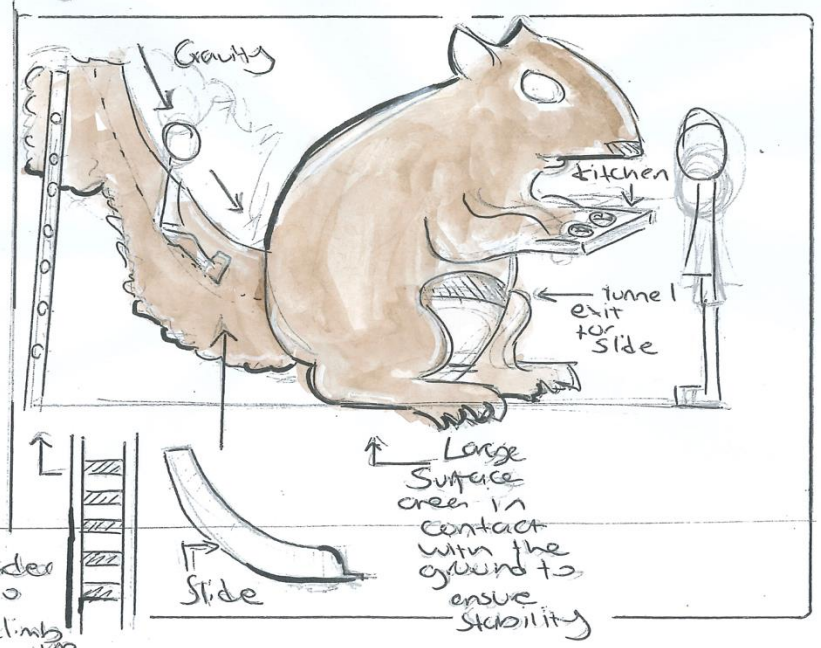

Swappable coloured spots
String to stop lose a animal
Solar panels encase under-glow beginning
Magnetic add on animals
Balls / water travel down interactive pathways
underglow pannels
exit at the bottom
Top view
Children can use to shelter and play hide and seek ect.
addons / modular. Fungi to grow water / balls movement
Loose base to increase stability
excable by different heights
unscrews
5 Spins
inside head
lips
the main body
Fit inside
Play in mud / sand pit.
connect
mud
balls can be pasted between them.

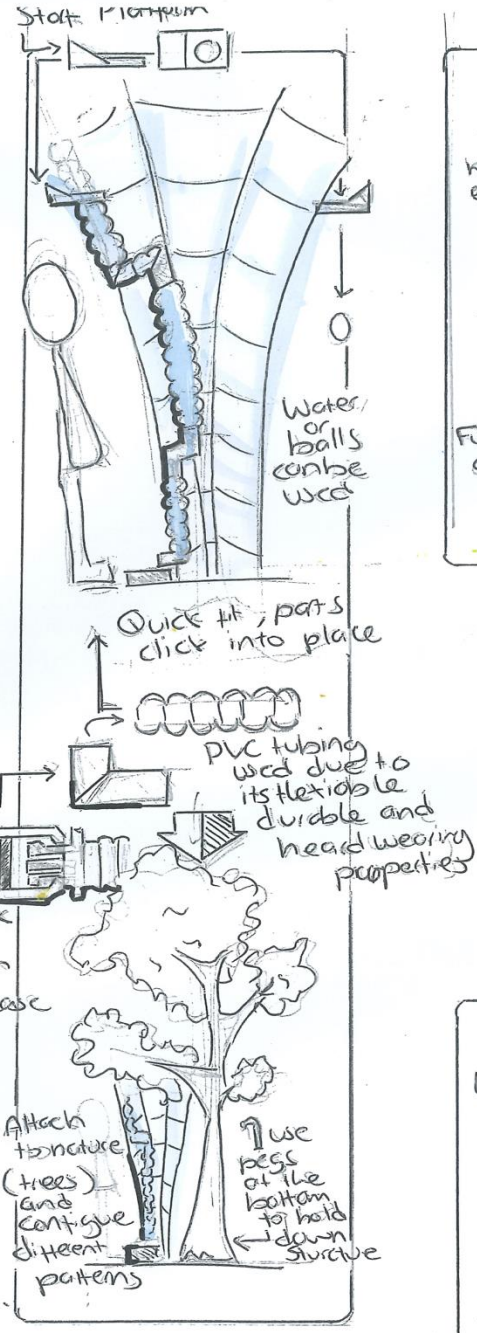

magnetic connective points
modular pieces
games/ interactive toys added
easy to join
water/ balls
clamped
Durable / flexible PVC tubing
mud pit
3D cubes
large base to increase stability
honey spade
Honey Bucket
Click fit - Ball bearings hold tubes in place.

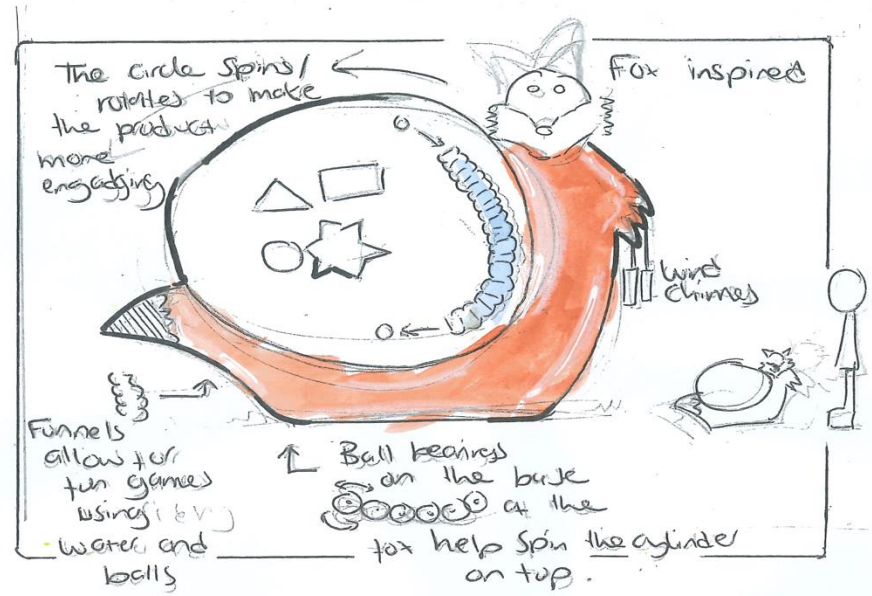

Fly
Glow for in the dark
eyes glow in the dark
Games at the back
(maze)
Feed the frogs
move different distances to affect
difficulty.

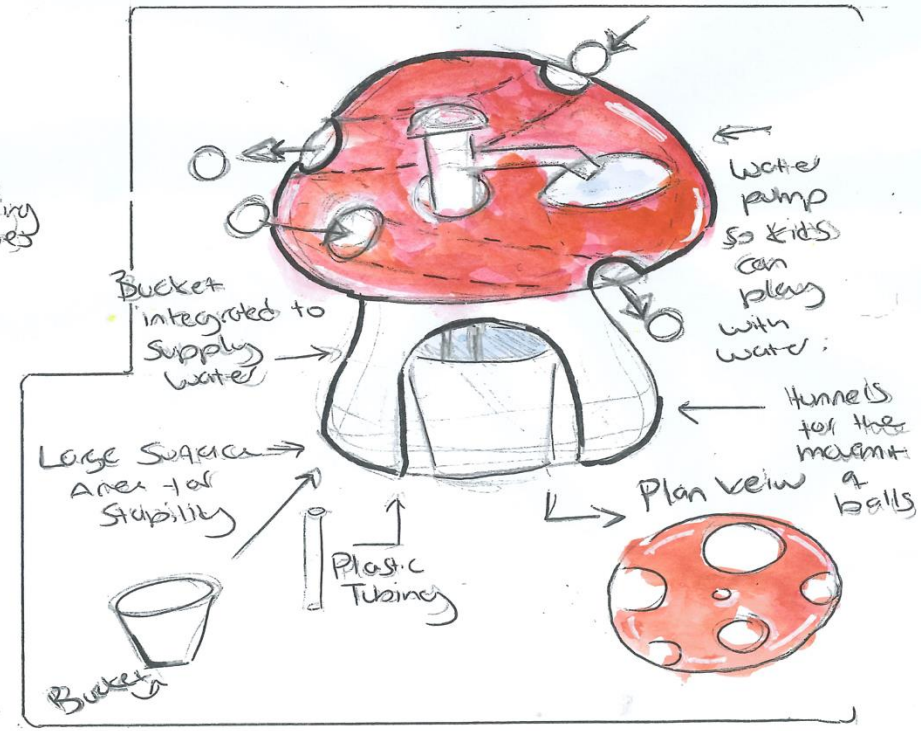

Precise hitting head
easy hitting head large SA
hold in hand
rubber grip
Spiny pushes out ball once hit
mud
Spikes for stability tripod.
opens
hinge
knock ball out
overview.

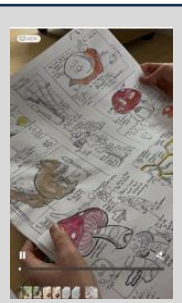

different colours
Child
magnetic
mud pit
Segments join and have different games/ activities
Rubber
Ball runs down the middle.
Leaf Spade


Gravity
kitchen
tunnel exit for slide
Large Surface area in contact with the ground to ensure stability
Ladder to Climb up
Slide


Start Platform
Water or balls can be used
Quick fit, parts click into place
PVC tubing used due to its flexible durable and head wearing properties
Quick fit push to release
Attach to nature (trees) and contigue different patterns
Use pegs at the bottom to hold down structure

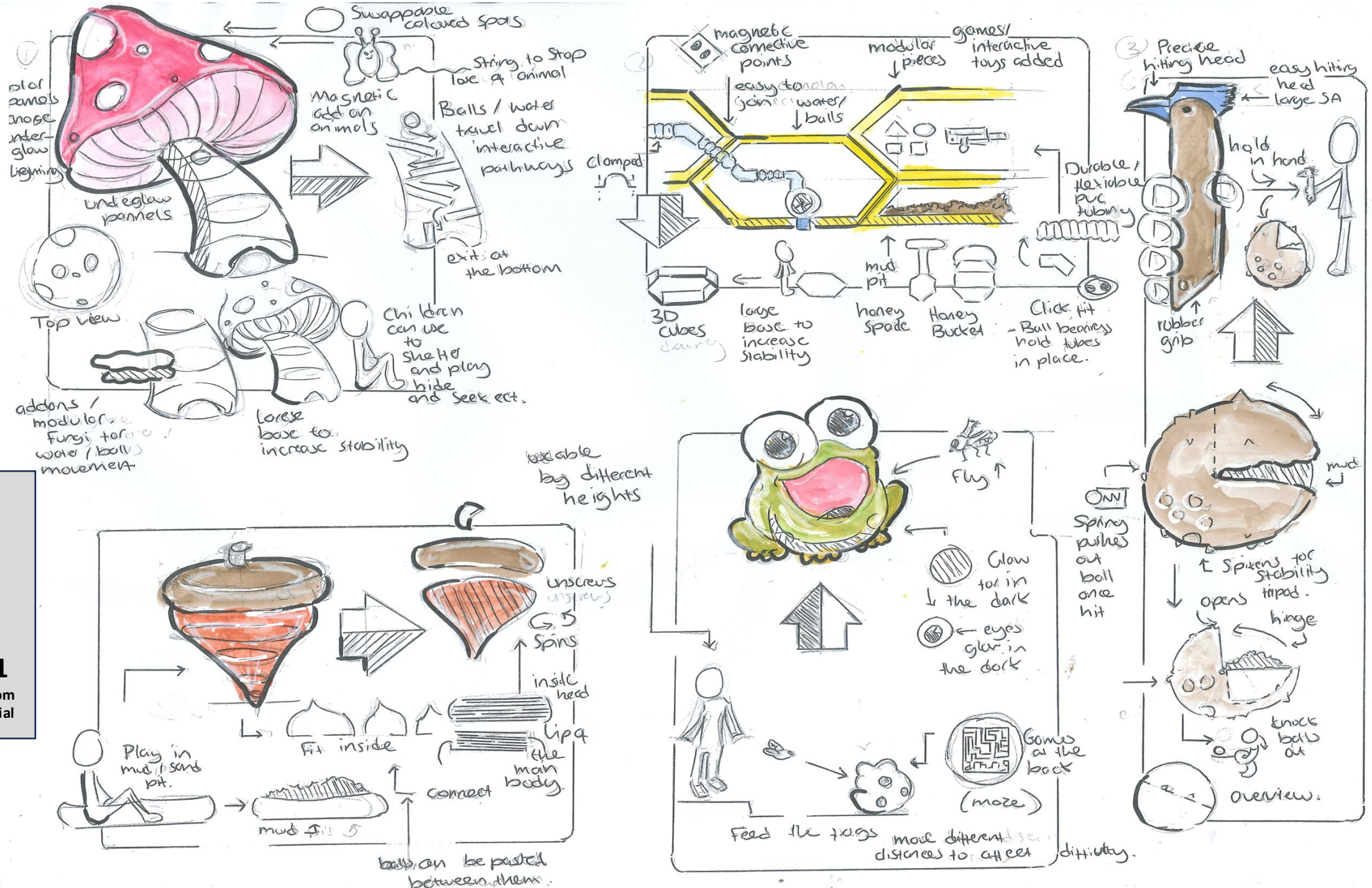

The circle spins/ rotates to make the product more engaging
Fox inspired
Wind Chimes
Funnels allow for fun games using water and balls
Ball bearings on the base of the cylinder for help spin the cylinder on top.


Water pump so kids can play with water.
Bucket integrated to supply water
Funnels for the movement of balls
Large Surface Area for Stability
Plastic Tubing
Plan view
Bucket

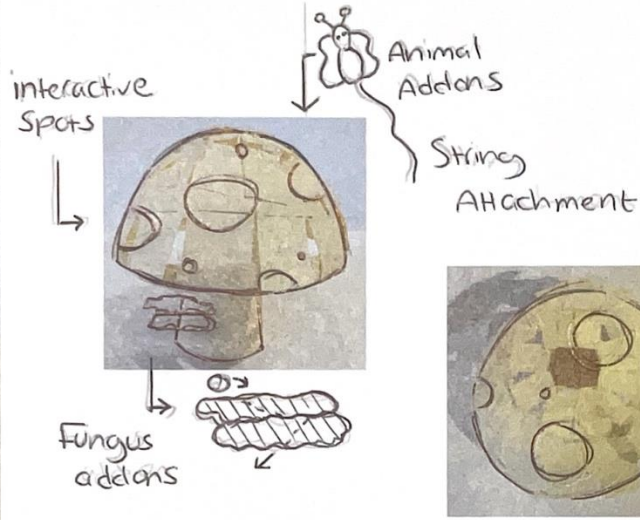


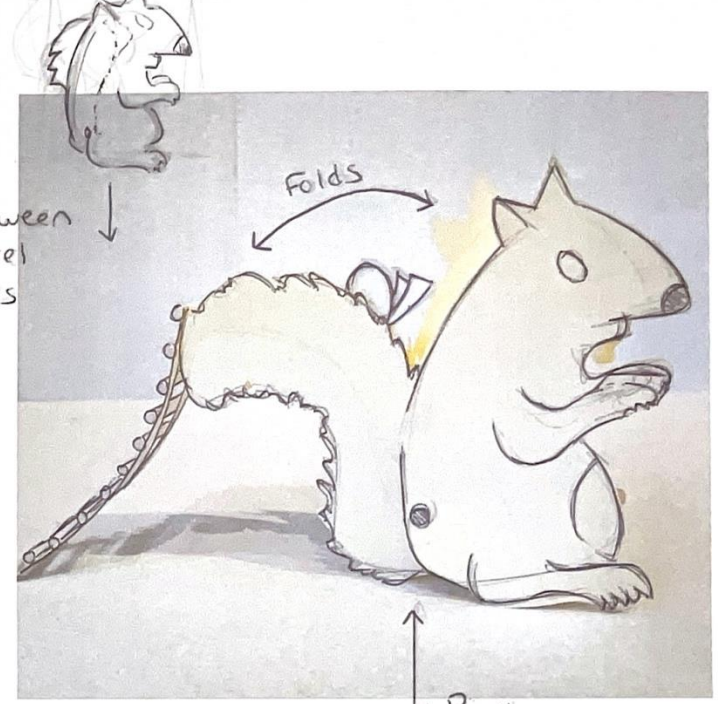
Video 38.1

I gained feedback from Mrs Mace on my Initial ideas

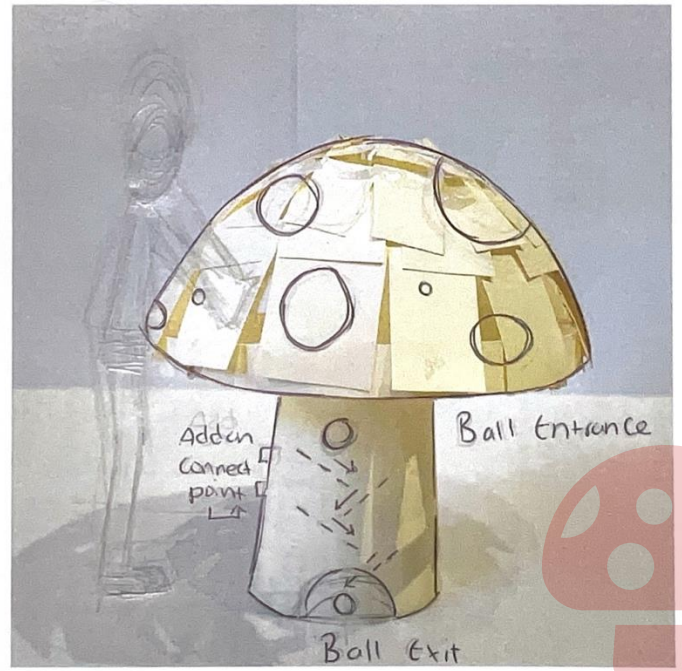



Multiple can fit inside


interactive Spots
Animal Addons
String Attachment
Fungus addons

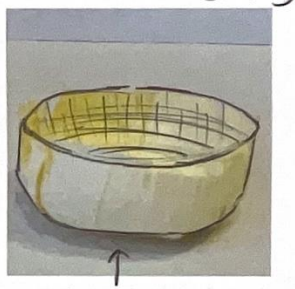

tail slide and ladder fold imbetween Squirrel sides
Folds
Pivot
So slide can fold to save space


Screw together
Join together for Storage

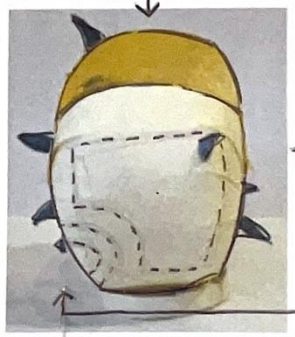

Addon connect point
Ball Entrance
Ball Exit


Tray
mud
Slide


Ladder

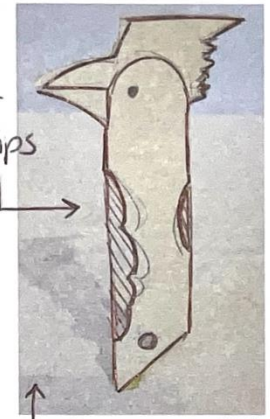

Water pit


Mud / Sand pit

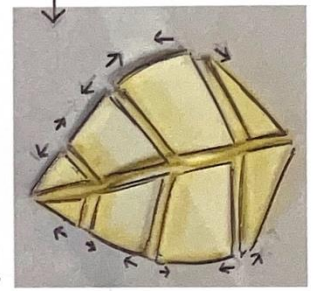

mud linning
Tunnels for Balls

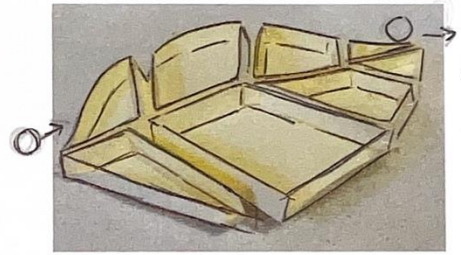

Lid opens and closes
Hinge

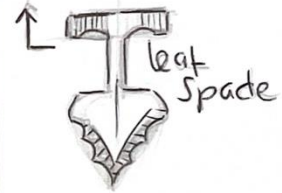

hand

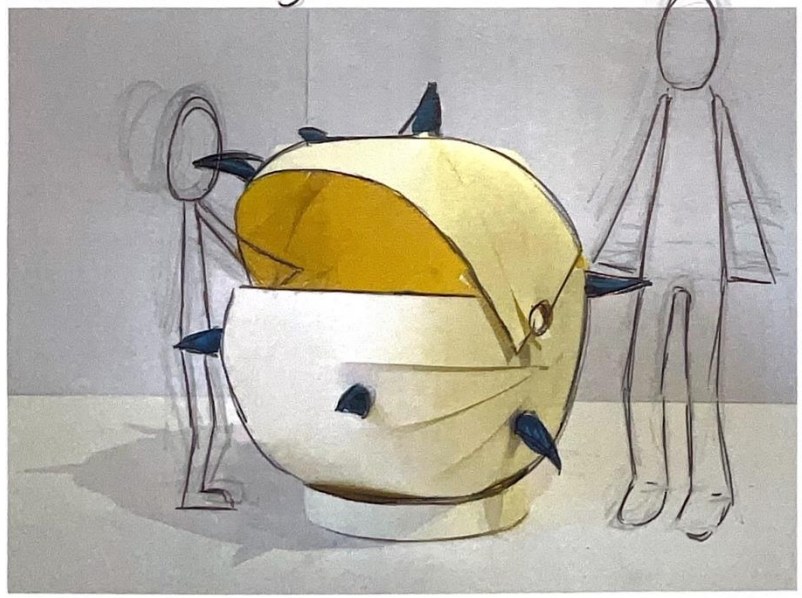

Finger grips
Rubber Grips

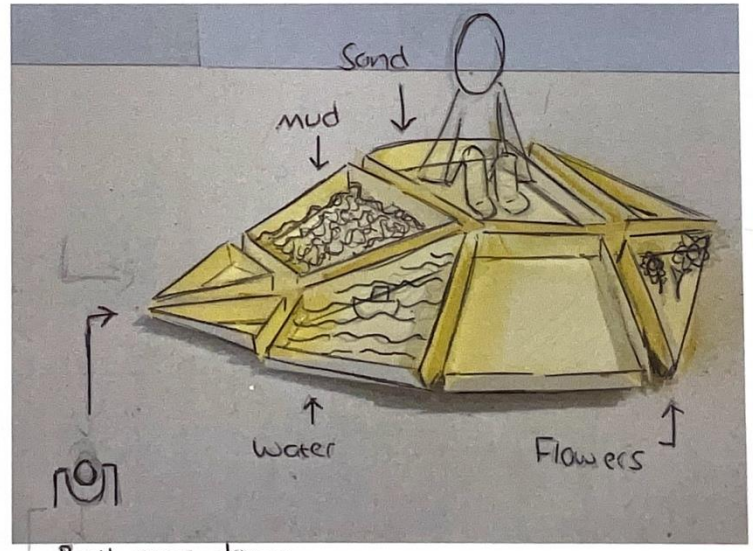

Segments Stack for Storage

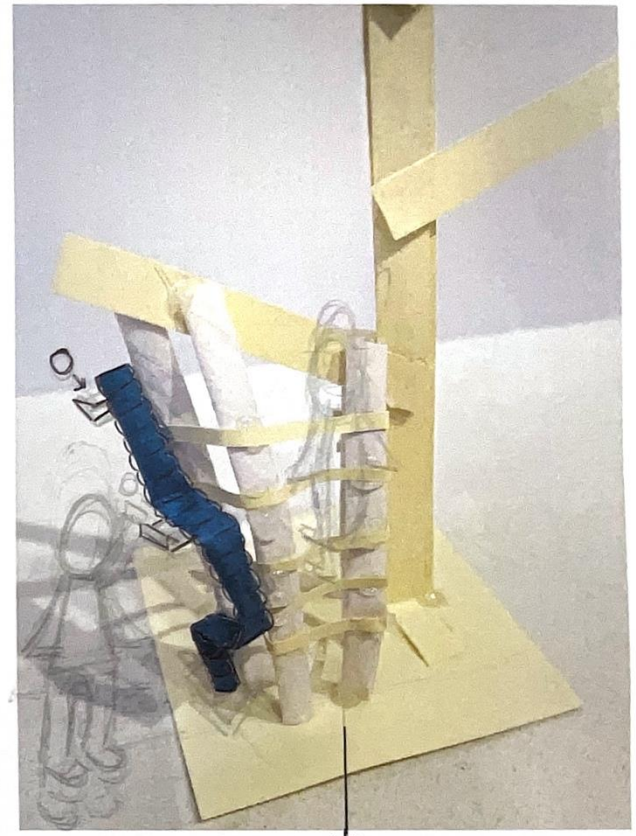

Segments join together




Leaf Spade




Sand
mud
water
Flowers
Ball runs down

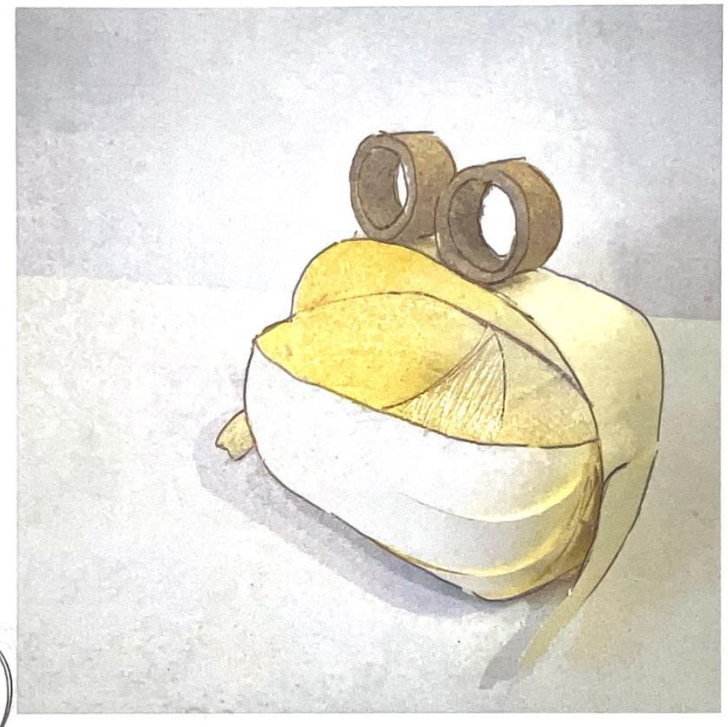

Climbing Frame


Box to collect







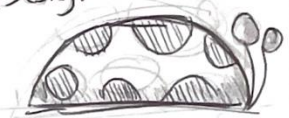


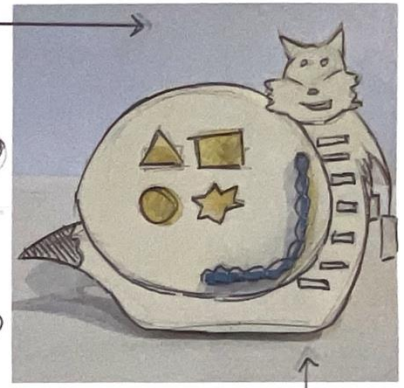


Other Designs can slide inbetween



Other Designs





Climbing frame

tunnels for balls to roll out

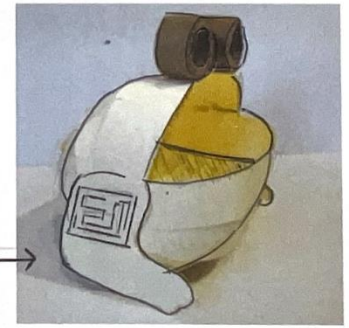


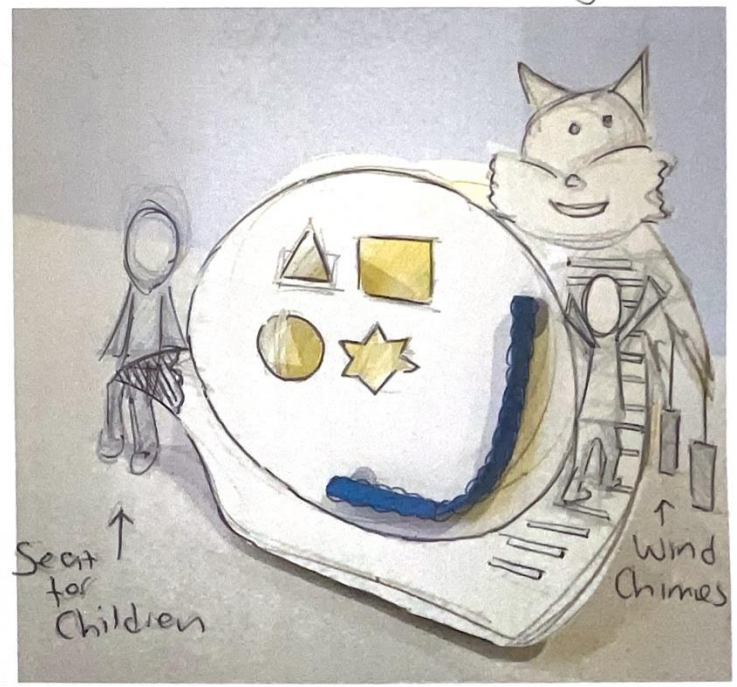
Ball rolls out

Bucket to Collect water



Maze





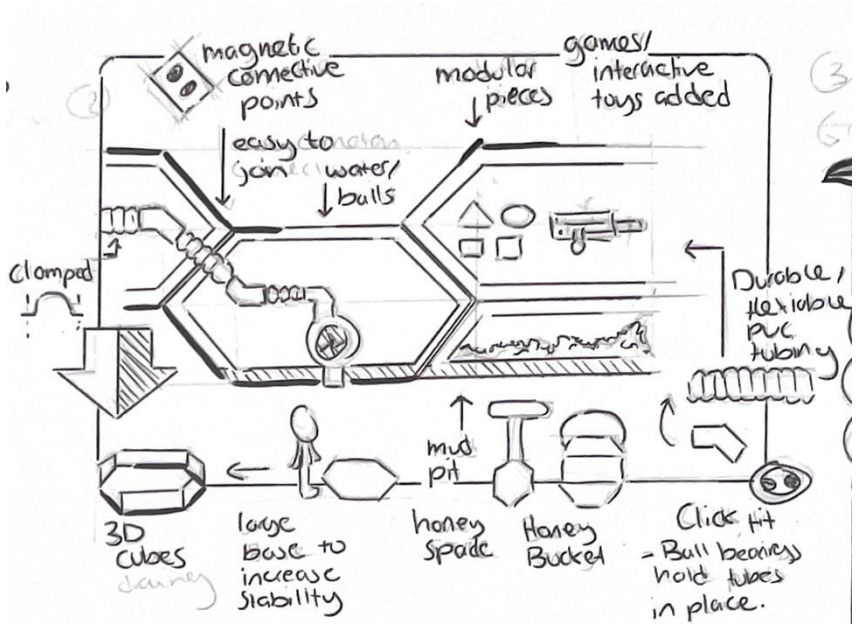
Seat for Children

Wind Chimes

Initial Ideas – Honeycomb

William Howe

Intro: I am going to develop my initial concept sketches into Initial designs, I will evaluate each design against my PUNS and their strengths and weakness to identify the best designs to take forward and design.



Design Thinking :

The Modular Honeycomb Outdoor Play System is a interactive setup for children's outdoor activities. The design features hexagonal modules that mimic a honeycomb structure, each offering a different type of activity such as sensory, wet and muddy play, allowing children to play together building necessary social skills. These modules are designed to connect using magnetic components, making it easy to rearrange them into various configurations. The system is built with a wide, sturdy base to ensure stability and safety during use. One of its standout features is a water play module, where flexible tubing can be easily clicked into place, allowing children to create their own water flow systems. The product would also include honeycomb themed spades and buckets. Each hexagonal module have a different activity within allow children to easily change and swap to their liking.

Strengths

- Modular so children can switch between different activates, keeping playtime exciting.
- Safety, wide base and magnetic connections ensure the structure remains secure when in play and wont harm the children
- Collaborations, the collaboration of children playing with the system will help develop the children's communication and social skills.
- Interactive water play, the flexible water tubing will allow children to experiment with different combinations and help develop there problem solving skills
- Different activities can adhere to a variety of different skill levels allowing many children of all ages to play.
- Aesthetically pleasing due to the geometric pattern.
- Easy to store due to stack ability
- Easily to repair

Weaknesses

- Over time magnets may weaken causing the product to be unstable and they may rust due to being outside.
- Smaller components may get lost easily
- The initial cost of the modular set may be high, although forest schools could buy individual modals if funding is limited
- The product looks hard to transport to storage due to the bulky design
- Not easy to clean due to the variety of parts

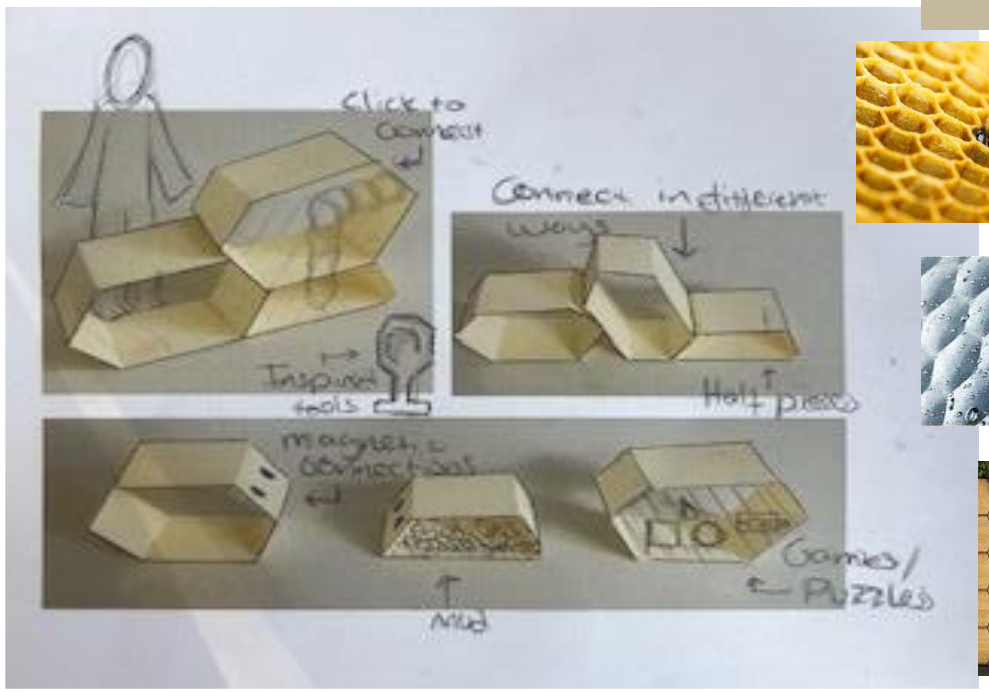
Primary User Comments :

Sarah likes the aesthetics of the design and believes it fits into the style of the forest school.

However, she believes the small parts of the product may get lost easily like PVC piping.

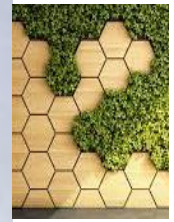
She said that she wanted the children to have a larger space to do activities like Arts and crafts as this is one of the groups favorite activities

She liked the idea of the magnetic connection as it would allow her to easily assemble the product with limited people. However, she was worried about the strength of the magnets as they would start to rust in the outdoors and become less strong resulting in a safety concern due to the product not connecting properly.









Puns	Topic.	Requirements
1	**Safety.**	Smooth edges, meet British standards and safety legislation
2	**Shape.**	Aspects of nature and biomimicry in its design.
3	**Product Size. / Storage**	Fit into a shed or shipping container when being stored.
4	**Anthropometrics for primary users**	Aaccessible and easy to use by all users
5	**Ergonomics**	Primary user understands the affordance with the product
6	**Inclusivity**	Accessible to children with disabilities, these could include, sight, mobility and dexterity
7	**Aesthetics**	Aesthetically pleasing to my primary user and look sympathetic to its environment
8	**Manufacturing Cost**	Use standard components and minimal manufacturing process.
9	**Maintenance**	Repaired, clean and maintain
10	**Function**	Encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.

Improvements:

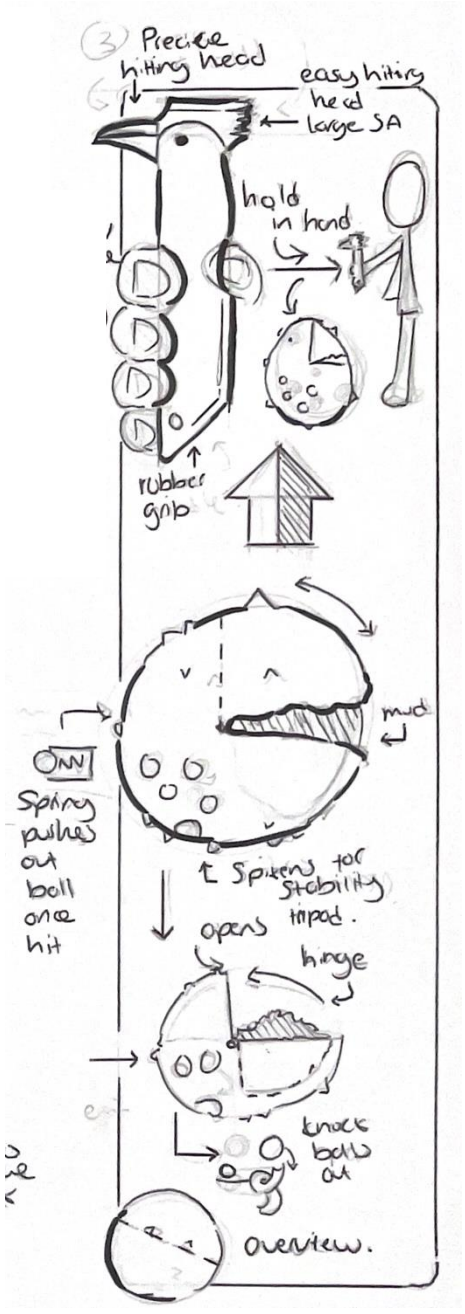
- I could use a different type of connection compared to magnetic which would rust and weaken.
- PUN 9 – I could include water drainage areas so sections don't get filled in by rain and make each box sloping in a particular direction making it easy to clean
- PUN 1 – I could round the edges of the modules to make them safer to children.
- - PUN 8 – I could use less components on each module reducing the cost and they could be brought separately.

Next Steps: I will not be taking this design forward due to the product being high cost to maintain as there are a variety of small components to clean. In addition, the product looks hard to transport and store due to the bulky design.

Initial Ideas – Conker

William Howe

Intro: I am going to develop my initial concept sketches into Initial designs, I will evaluate each design against my PUNS and their strengths and weakness to identify the best designs to take forward and design.



Design Thinking :

The Conker's main feature is a large, conker-shaped structure with a lid that opens to reveal a fun mud pit, designed for messy. In addition to the mud pit, on the outer side of the conker there is an area for children to play with balls, in which the children would put the balls in holes and watch them fall out. This game will allow them to develop their fine motor skills and physical wellbeing. An accessory to the conker is the Kingfisher inspired hitting tool, designed to resemble the bird's sharp beak, the children can use this product when messy in messy play and for hitting the balls through the conker. I added this feature as in an interview Sarah described that the children loved playing tools such as hammers. I designed the product in a forest and nature theme to adhere with forest schools aesthetics.





Strengths

- Aesthetically pleasing due to nature inspired design
- I like the idea of the ball games
- Easy to repair as the mechanisms are simple such as a hinge to open and close the mud space
- Easily to clean due to minimal parts

Weaknesses

- Not modular so children may get bored easily.
- Limited activities
- Smaller components such as the hitting tool may get lost easily
- The product looks hard to transport to storage due to the bulky design
- Circular shape means the product wouldn't be stable which reduces the safety of the product making it unsafe.
- Due to the limited activities, it may only suit a concise age range of children and may not be mentally stimulating to some.
- Limited space, only a limited number of children could use it resulting conflicts between children.
- The circular and organic design would be hard to manufacture.

Primary User Comments :

Sarah likes the aesthetics of the design and believes it fits into the style of the forest school.

However, she believes the small parts of the product may get lost easily.

She said that she wanted the children to have a larger space to do activities like Arts and crafts as this is one of the groups favorite activities

She was concerned about safety as the circular shape of the product means it wouldn't be stable. She had concerns about children climbing on it and it toppling over.

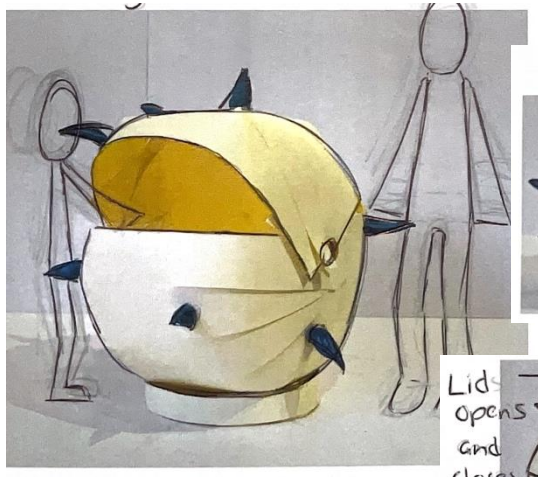
She was also concerned that the spikes may lead to injuries if children run into them as they are not smooth edges

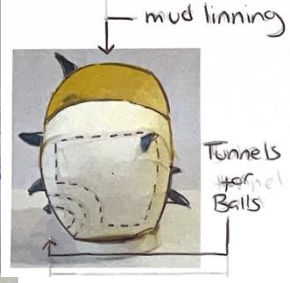
Only a limited number of children could use it resulting conflicts between children.

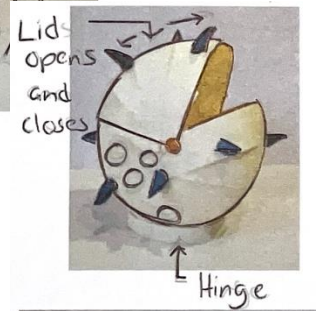
Improvements:

- PUN 1 I could round the conkers spikes making the product safer for young children or make them out of a soft material.
- PUN 3 I could make the conker collapsible so it can be easily folded up and stored.
- PUN 3, PUN 4 I could make differ sized conkers with different activities that can be stored with one another to ensure that a variety of children could play with the products.
- I could add space by creating an expanding surface to allow for art and craft activities.

Next Steps: I will not be taking this design forward as the product has limited activities so it may only fit one age group.

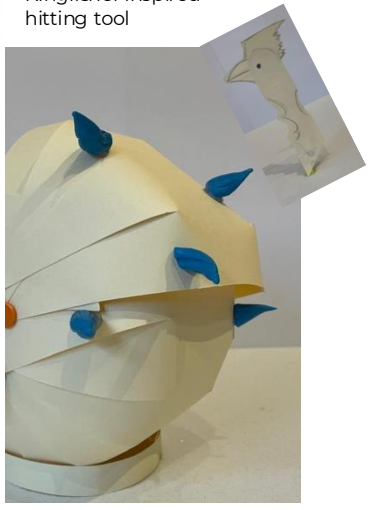






Conker throw away model – made of paper and plasticine

Kingfisher inspired hitting tool

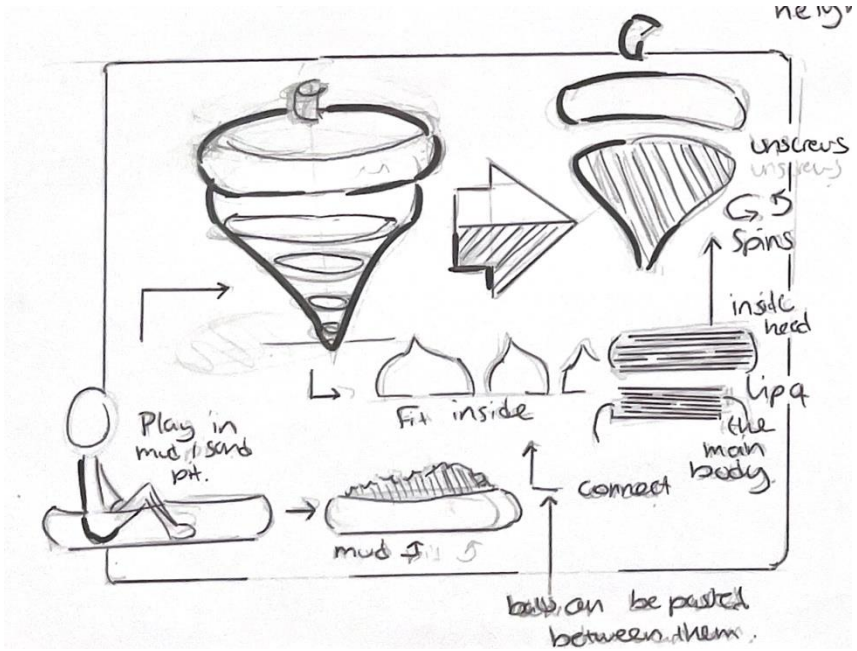


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7	**Aesthetics**	Aesthetically pleasing to my primary user and look sympathetic to its environment
8	**Manufacturing Cost**	Use standard components and minimal manufacturing process.
9	**Maintenance**	Repaired, clean and maintain
10	**Function**	Encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.

Initial Ideas – Acorn

William Howe

Intro: I am going to develop my initial concept sketches into Initial designs, I will evaluate each design against my PUNS and their strengths and weakness to identify the best designs to take forward and design.



Design Thinking :

The Acorn Playset is a unique, space-efficient outdoor toy with a design that allows the acorn-shaped pieces to fit inside one another, inspired from Russian nesting dolls. The largest acorn has a removable top, which can be unscrewed to create a sand or mud pit for children to play in. The smaller acorns inside can serve as individual buckets or can be used as separate play areas for various activities, like holding sand, water, or toys. This setup offers a variety of ways for kids to play, encouraging creativity, while also being easy to store when not in use. The acorn design is inspired from my nature and biomimicry mood boards and fits with the theme of the forest schools.

Strengths

- Modular so children can switch between different activates in the different acorn sections, keeping playtime exciting.
- Safety, wide base of the sand / mud pit ensures the structure remains secure when in play and won't harm the children
- Stacking the acorns will help develop the children's problem solving and communication skills.
- Aesthetically pleasing and fits the theme of the forest school
- Easy to store due to stack ability making the product compact
- Easily to repair due to limited mechanisms

Weaknesses

- No space for art of craft activities
- The forest schools must find activities to put in the other smaller acorns
- Lacks activities so children will get bored.
- Unusual shape will make it hard to move and transport to storage

Primary User Comments :

Sarah likes the aesthetics of the design and believes it fits into the style of the forest school.

She said that she wanted the children to have a larger space to do activities like Arts and crafts as this is one of the groups favorite activities

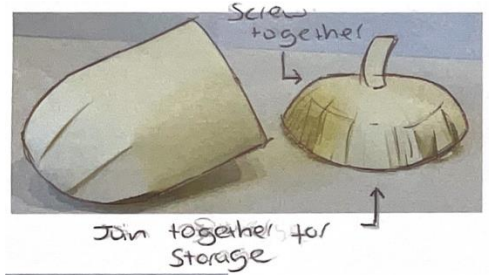
She believes the acorn lacks activates meaning the children will get bored quickly and therefore won't use the product.

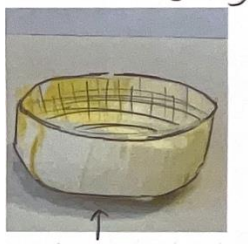
She likes how it stacks minimizing storage space as they have limited storage.

However, she's concerned about stacking the acorns will make the product heavy and hard to transport. In addition, the unusual shape will make it hard to move and transport to storage



Acorn throw away model – made of paper







Puns	Topic.	Requirements
1	**Safety.**	Smooth edges, meet British standards and safety legislation
2	**Shape.**	Aspects of nature and biomimicry in its design.
3	**Product Size. / Storage**	Fit into a shed or shipping container when being stored.
4	**Anthropometrics for primary users**	Aaccessible and easy to use by all users
5	**Ergonomics**	Primary user understands the affordance with the product
6	**Inclusivity**	Accessible to children with disabilities, these could include, sight, mobility and dexterity
7	**Aesthetics**	Aesthetically pleasing to my primary user and look sympathetic to its environment
8	**Manufacturing Cost**	Use standard components and minimal manufacturing process.
9	**Maintenance**	Repaired, clean and maintain
10	**Function**	Encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.





Improvements:

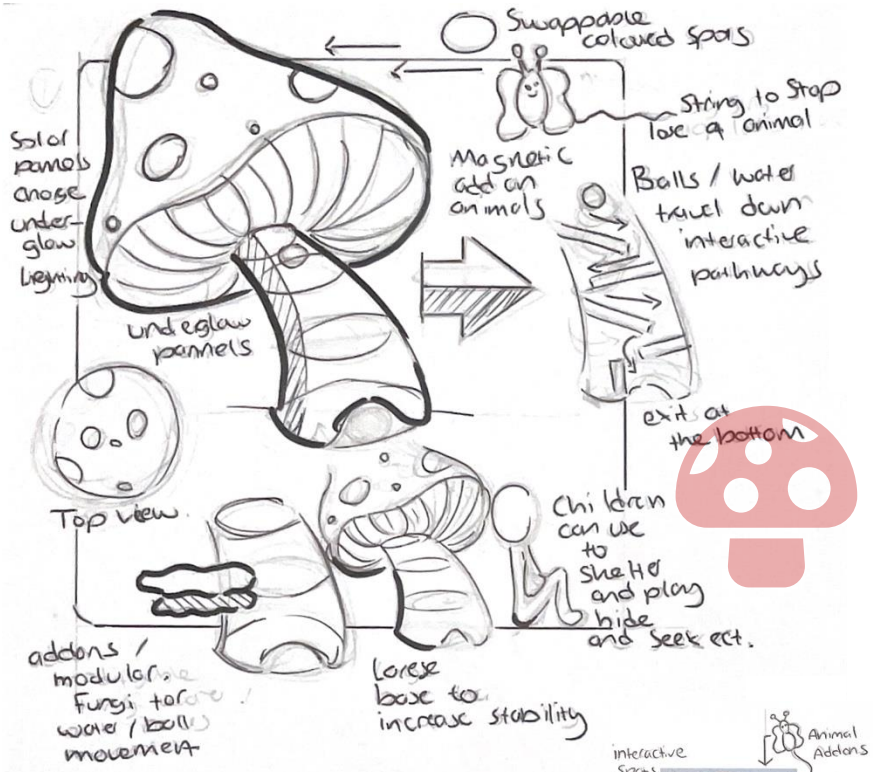
- PUN 4, PUN 6 Add a space of wheelchair accessibility so all children can play in the mud / sand pit.
- I could add space by creating an expanding surface to allow for art and craft activities.
- PUN 1 I could add a wider base at the top of the acorn compared to the sharp point

Next Steps: I will not be taking this design forward as the design is not easy to use by all. In addition, there's a lack of activities and space for arts and craft so children may get bored.

Initial Ideas – Shroom

William Howe

Intro: I am going to develop my initial concept sketches into Initial designs, I will evaluate each design against my PUNS and their strengths and weakness to identify the best designs to take forward and design.



Design Thinking :

The Mushroom product is a playful outdoor structure designed for children to explore and engage with. The mushroom's surface has indented spots that act as areas for sand or mud play areas. Around the mushroom cap there are glow-up spots that charge through solar panels during the day, lighting up at night for evening play and events. In the middle of the structure, there's a ball and water game, which can be expanded by adding more "fungi" pieces, making it possible to adapt the game. The mushroom has a wide base for stability, allowing children to play underneath it safely, and the top of the mushroom can be lifted to store toys or other items when not in use. The product is inspired by the biomimicry and nature mood boards so it ensures the product will fit with the forest school theme.

Strengths

- Modular so children can switch between different activates, keeping playtime exciting.
- Safety, wide base ensure the structure remains secure when in play and wont harm the children
- Interactive water / ball system, allow the children to further interact with the product.
- Different activities can adhere to a variety of different skill levels allowing many children of all ages to play.
- Aesthetically pleasing due to nature inspired design
- The product can store other toys that the forest school may have in its cap
- Easily to repair as parts are simple.
- The light up panels means the product could be used during their night-time events such as stargazing.

Weaknesses

- No space for art of craft activities
- Unusual shape will make it hard to move and transport to storage
- Not easy to clean due to the organic shapes of the parts.
- Solar panels will need to be protected in some way so children don't damage them and stop them from working.

Primary User Comments :

Sarah likes the aesthetics of the design and believes it fits into the style of the forest school.

She said that she wanted the children to have a larger space to do activities like Arts and crafts as this is one of the groups favorite activities

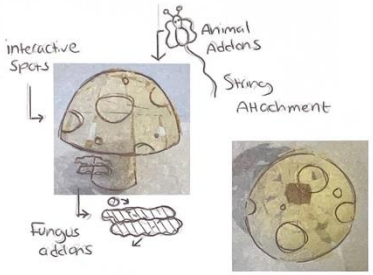
Sara was very fond of the light up panels so the product could be used in the dark and at events such as star gazing.

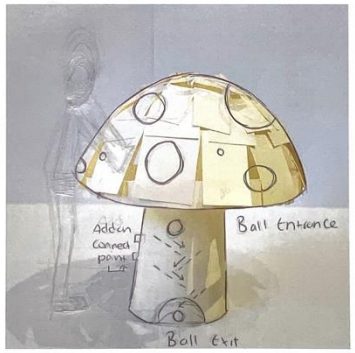
She like the variety of activities the mushroom could have.

She was encaustic about the storage in the head of the mushroom for other forest school toys as there is limited storage space.
She said that she wanted the children to have a larger space to do activities like Arts and crafts as this is one of the groups favorite activities



Mushroom throw away model – made of paper





Puns	Topic.	Requirements
1	**Safety.**	Smooth edges, meet British standards and safety legislation
2	**Shape.**	Aspects of nature and biomimicry in its design.
3	**Product Size. / Storage**	Fit into a shed or shipping container when being stored.
4	**Anthropometrics for primary users**	Aaccessible and easy to use by all users
5	**Ergonomics**	Primary user understands the affordance with the product
6	**Inclusivity**	Accessible to children with disabilities, these could include, sight, mobility and dexterity
7	**Aesthetics**	Aesthetically pleasing to my primary user and look sympathetic to its environment
8	**Manufacturing Cost**	Use standard components and minimal manufacturing process.
9	**Maintenance**	Repaired, clean and maintain
10	**Function**	Encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.







Improvements:

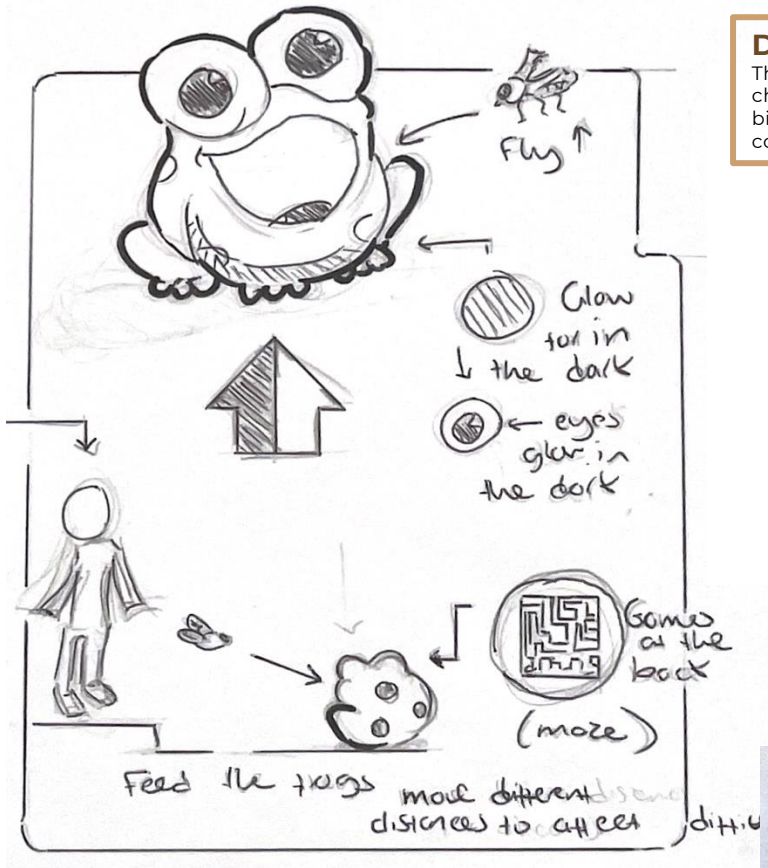
- I could add space by creating an expanding surface to allow for art and craft activities.
- I could add storage in the cap of the mushroom instead of the product needing to be moved.
- PUN 8 I could reduce components such as nature inspired toys

Next Steps: I will be taking this design forward as it hits majority of my puns successfully and my primary user also thinks the design is very successful.

Initial Ideas – Frog Toss

William Howe

Intro: I am going to develop my initial concept sketches into Initial designs, I will evaluate each design against my PUNS and their strengths and weakness to identify the best designs to take forward and design.



Design Thinking :

The Frog Toss game is a product where children aim to throw small fly-shaped pieces into the open mouth of a frog. This simple activity helps develop fine motor skills by requiring children to focus on hand-eye coordination and control. On the back of the frog, there's a maze game where kids can guide a small ball through a series of twists and turns, adding a bit of challenge and encouraging problem-solving. The frog's eyes glow in the dark, making it an interesting feature for play in dimmer light. The toy combines physical play with a cognitive puzzle, offering different types of engagement for children.

Strengths

- Safety, wide base (large frog feet) ensure the structure remains secure when in play and won't harm the children by falling over.
- The cognitive game at the back will develop the children's problem-solving skills.
- Aesthetically pleasing due to the cute frog design
- Easily to repair due to limited parts
- I like the glow in the dark eyes, it means the product could be used during their night-time events such as stargazing.

Weaknesses

- Limited activities so children may get bored easily.
- Smaller components such as the fly's may get lost easily
- The product looks hard to transport to storage due to the bulky design
- Due to the limited activities, it may only suit a concise age range of children and may not be mentally stimulating to some.
- Limited space, only a limited number of children could use it resulting conflicts between children.
- The organic animal design would be hard to manufacture at a low cost

Primary User Comments :

Sarah likes the aesthetics of the design and believes it fits into the style of the forest school. She said "this design would be most appealing to the younger children due to the cute frog design".

However, she believes the small parts of the product may get lost like the fly's.

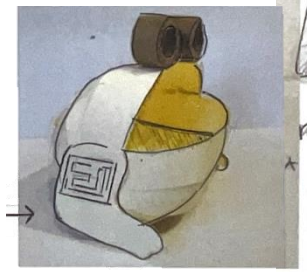
She likes the idea of the cognitive game over believes it will break quickly due to the outside conditions and will get clogged with mud and dirt.

She would like a messy play area added as it's the children's favorite activity.

She said that she wanted the children to have a larger space to do activities like Arts and crafts as this is one of the groups favorite activities

Sara was very fond of the glow in the dark eyes so the product could be used in the dark and at events such as star gazing.







Frog throw away model – made of paper and carboard tubes

Puns	Topic.	Requirements
1	**Safety.**	Smooth edges, meet British standards and safety legislation
2	**Shape.**	Aspects of nature and biomimicry in its design.
3	**Product Size. / Storage**	Fit into a shed or shipping container when being stored.
4	**Anthropometrics for primary users**	Aaccessible and easy to use by all users
5	**Ergonomics**	Primary user understands the affordance with the product
6	**Inclusivity**	Accessible to children with disabilities, these could include, sight, mobility and dexterity
7	**Aesthetics**	Aesthetically pleasing to my primary user and look sympathetic to its environment
8	**Manufacturing Cost**	Use standard components and minimal manufacturing process.
9	**Maintenance**	Repaired, clean and maintain
10	**Function**	Encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.





Improvements:

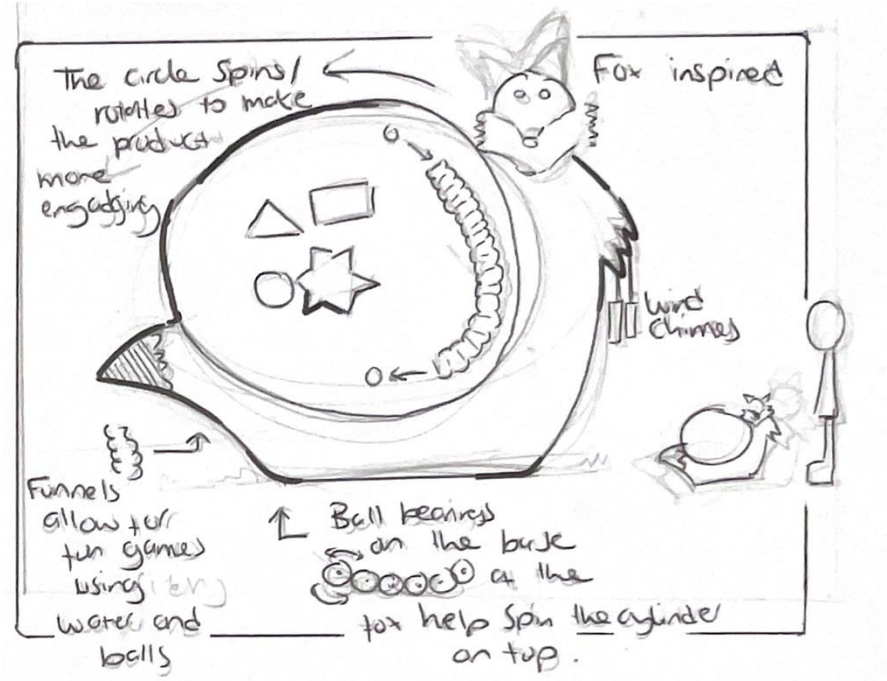
- PUN 1 I need to add more activities of the children which encourage more skills, than just problem solving a map on the back.
- I could add space by creating an expanding surface to allow for art and craft activities.

Next Steps: I will not be taking this design forward design is not easy to use by a variety of users. In addition, there's a lack of activities and space for arts and craft so children may get bored.

Initial Ideas – Fox

William Howe

Intro: I am going to develop my initial concept sketches into Initial designs, I will evaluate each design against my PUNS and their strengths and weakness to identify the best designs to take forward and design.



Design Thinking :

The outdoor fox toy is a play structure packed with activities designed to encourage children' communication and creativity. Its tubing system, woven through the fox's body, allows kids to roll balls through the paths, intern helping with hand-eye coordination and motor skills. Built into the design is a shape-matching game, where kids can fit brightly coloured shapes into their corresponding slots, helping them develop problem-solving abilities, spatial awareness, and fine motor control. The toy's playful design is enhanced by a rotating fox back, which adds a interactive feature that kids can spin and explore. In addition, the fox has a set of wind chimes which further add to the experience due to a different sense being engaged

Strengths

- Safety, wide base (large frog feet) ensure the structure remains secure when in play and won't harm the children by falling over.
- The cognitive shape game will develop the children's problem-solving skills.
- Aesthetically pleasing due to the fox design
- Wind chimes add another sensory experience to the toy

Weaknesses

- Limited activities so children may get bored easily.
- Smaller components such as the shapes may get lost easily
- The product looks hard to transport to storage due to the bulky design
- Due to the limited activities, it may only suit a concise age range of children and may not be mentally stimulating to some.
- Limited space, only a limited number of children could use it resulting conflicts between children.
- The organic animal design would be hard to manufacture at a low cost
- Ball bearings on the spinning circle may be broken in the outdoor conditions of the forest school.
- Hard to repair due spinning function in the design

Primary User Comments :

Sarah didn't like the design of the fox

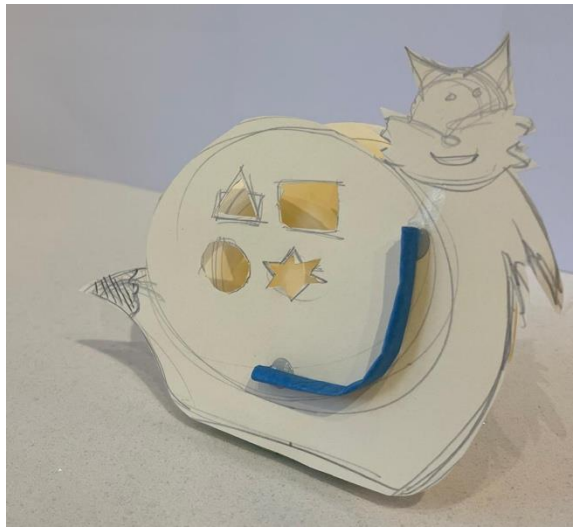
However, she believes the small parts of the product may get lost like the colored shapes.

She likes the idea of the cognitive game

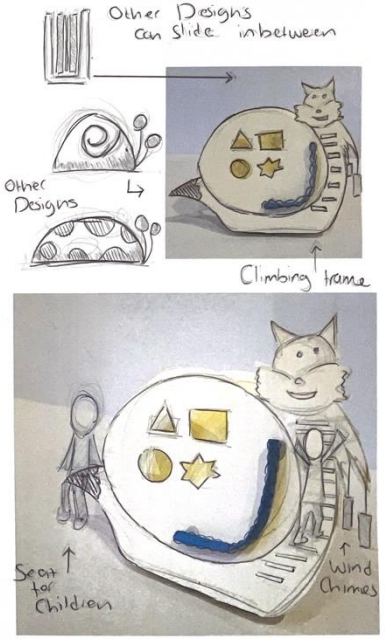
She would like a messy play area added as it's the children's favorite activity.

She said that she wanted the children to have a larger space to do activities like Arts and crafts as this is one of the groups favorite activities

Sarah was fond of the windchimes however said she already had some at the forest school so they wouldn't be necessary



Fox throw away model – made of card and paper tubes



Puns	Topic.	Requirements
1	**Safety.**	Smooth edges, meet British standards and safety legislation
2	**Shape.**	Aspects of nature and biomimicry in its design.
3	**Product Size. / Storage**	Fit into a shed or shipping container when being stored.
4	**Anthropometrics for primary users**	Aaccessible and easy to use by all users
5	**Ergonomics**	Primary user understands the affordance with the product
6	**Inclusivity**	Accessible to children with disabilities, these could include, sight, mobility and dexterity
7	**Aesthetics**	Aesthetically pleasing to my primary user and look sympathetic to its environment
8	**Manufacturing Cost**	Use standard components and minimal manufacturing process.
9	**Maintenance**	Repaired, clean and maintain
10	**Function**	Encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.





Improvements:

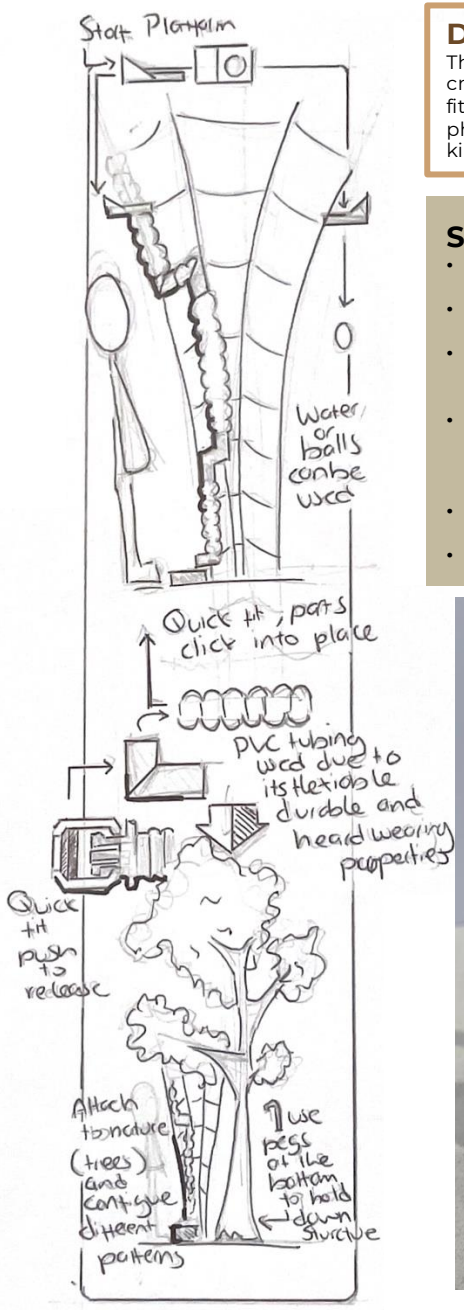
- I could add space by creating an expanding surface to allow for art and craft activities.
- PUN 3 I could make the product collapsible so it can be stored easily or make it a storage unit.
- PUN 9 I need to reduce the components or find another mechanism to spin the top of the product.
- PUN 7 I need to change the aesthetics and design of the product as my primary user didn't like the look of the product.

Next Steps: I will not be taking this design forward as due to the product being high cost to maintain and keep in safe playing condition. In addition, the product looks hard to transport and store due to the bulky design.

Initial Ideas – Webbing

William Howe

Intro: I am going to develop my initial concept sketches into Initial designs, I will evaluate each design against my PUNS and their strengths and weakness to identify the best designs to take forward and design.



Design Thinking :

The webbing toy is a flexible outdoor structure designed for children's play and exploration. It features a web-like base that can either stand on its own frame or be attached to trees, creating a versatile platform for various activities. The webbing is equipped with modular plastic fittings that allow for customisation of the toy to fit to the primary user's needs.. These fittings allow children to connect PVC piping, which can be used to build ball runs or water channels. The webbing itself is strong enough to serve as a climbing frame allowing for physical activity and helping children develop coordination and confidence as they navigate its surface. In addition, the structure can also be used as a foundation for den building, where kids can drape blankets or other materials over it to create their own cosy hideout.



Strengths

- Modular so children can switch between different activates, keeping playtime exciting.
- Safety, strong connections and frame to support children so it won't break when in use.
- Collaborations, the collaborate nature of playing with the system will help develop the children's communication and social skills.
- Interactive water play, the flexible water tubing will allow children to experiment with different combinations and help develop there problem-solving skills
- Different activities can adhere to a variety of different skill levels allowing many children of all ages to play.
- Easy to store due as the webbing can be folded up

Weaknesses

- Smaller components may get lost easily
- The initial cost of the set may be high
- Not easy to clean due to the variety of parts
- Hard to repair, they will have to buy a whole new set of webbing.
- The product will have to be constantly checked for weakness within the webbing so it doesn't break when children are playing on it

Primary User Comments :

Sarah likes the aesthetics of the design and believes it fits into the style of the forest school.

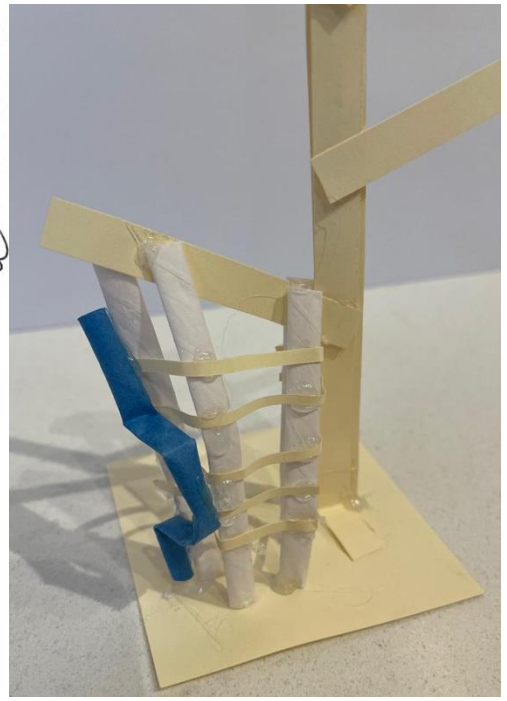
However, she believes the small parts of the product may get lost easily like PVC piping.

She said that she wanted the children to have a larger space to do activities like Arts and crafts as this is one of the groups favorite activities

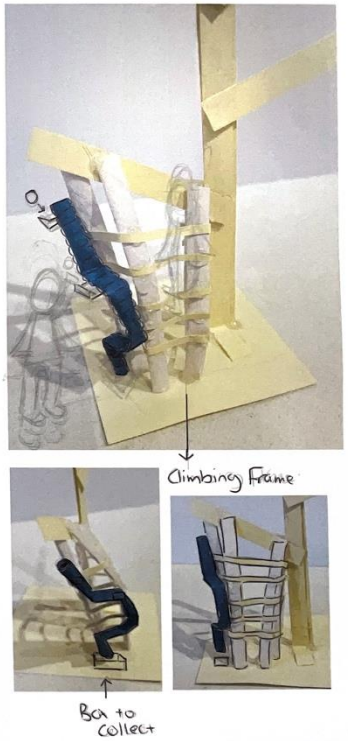
She likes the idea of the den building use of the webbing but was concerned with the climbing feature and how many children it would be able to support at a single time.

Sarah liked the multifunctionality of the product, as it would financially benefit them if the product did more than one thing.





Webbing throw away model – made of card and paper tubes



Puns	Topic.	Requirements
1	**Safety.**	Smooth edges, meet British standards and safety legislation
2	**Shape.**	Aspects of nature and biomimicry in its design.
3	**Product Size. / Storage**	Fit into a shed or shipping container when being stored.
4	**Anthropometrics for primary users**	Aaccessible and easy to use by all users
5	**Ergonomics**	Primary user understands the affordance with the product
6	**Inclusivity**	Accessible to children with disabilities, these could include, sight, mobility and dexterity
7	**Aesthetics**	Aesthetically pleasing to my primary user and look sympathetic to its environment
8	**Manufacturing Cost**	Use standard components and minimal manufacturing process.
9	**Maintenance**	Repaired, clean and maintain
10	**Function**	Encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.

Improvements:

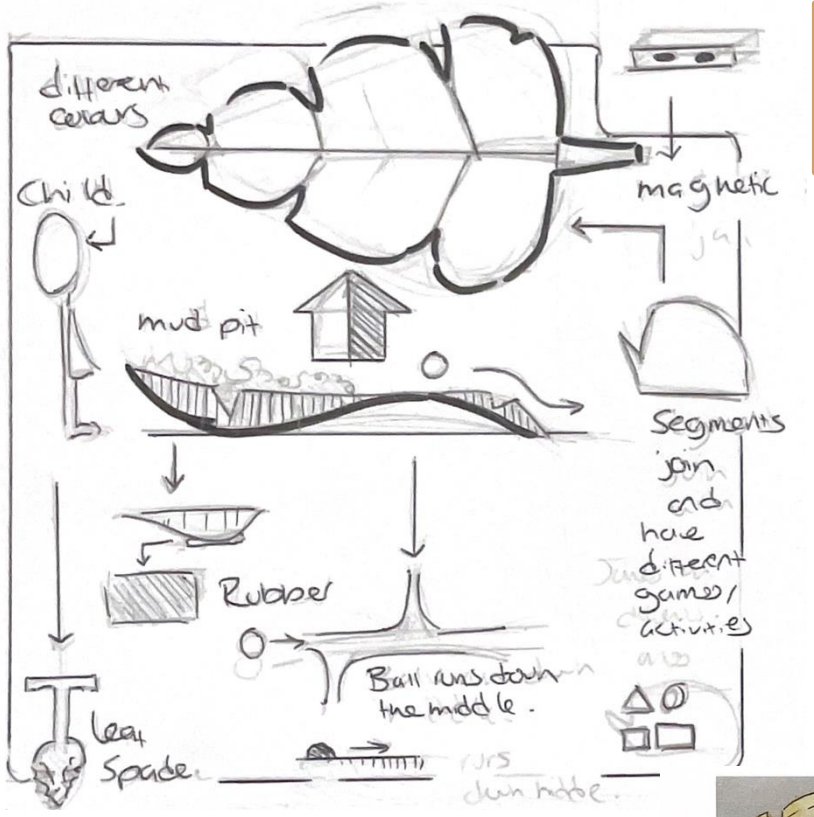
- PUN 1 I need to look into a feasible way to connect the webbing to the tree, and a suitable material so it doesn't break when multiple children are using it.
- PUN 9 I should reduce components making the product easier to repair and clean.
- I could add space by creating an expanding surface to allow for art and craft activities.

Next Steps: I will not be taking this design forward due to the high maintenance to ensure the product is safe to use and it may not be accessible to all users.

Initial Ideas – Leaf

William Howe

Intro: I am going to develop my initial concept sketches into Initial designs, I will evaluate each design against my PUNS and their strengths and weakness to identify the best designs to take forward and design.



Design Thinking :

The Modular Leaf Outdoor Play System is a interactive setup for children's outdoor activities. The design features organic modules that mimic a leaf's structure, each offering a different type of activity such as sensory, wet and muddy play, allowing children to play together building necessary social skills. These modules are designed to connect using magnetic components, making it easy to setup and arrange. The system is built with a wide, sturdy base to ensure stability and safety during use. Its main features is a large mud / sand play site and a track in the middle which separates modules can can allow rubber balls to easily move down the leaf. The product would also include leaf themed spades and buckets. Each organic module have a different activity within allow children to easily change and swap to their liking.

Strengths

- Modular so children can switch between different activates, keeping playtime exciting.
- Safety, wide base and magnetic connections ensure the structure remains secure when in play and wont harm the children
- Collaborations, the collaboration of children of playing with the system will help develop the children's communication and social skills.
- Interactive ball track, will allow children to experiment with different combinations and ball sizes to help develop there problem solving skills
- Different activities can adhere to a variety of different skill levels allowing many children of all ages to play.
- Aesthetically pleasing due to the organic pattern.
- Easy to store due to stack ability
- Easily to repair as you can buy individual modules

Weaknesses

- Over time magnets may weaken causing the product to be unstable and they may rust due to being outside.
- Smaller components may get lost easily
- The initial cost of the modular set may be high, although forest schools could buy individual modals if funding is limited
- The product looks hard to transport to storage due to the bulky design
- Not easy to clean due to the variety of parts

Primary User Comments :

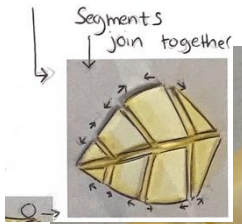
Sarah likes the aesthetics of the design and believes it fits into the style of the forest school.

She said that she wanted the children to have a larger space to do activities like Arts and crafts as this is one of the groups favorite activities

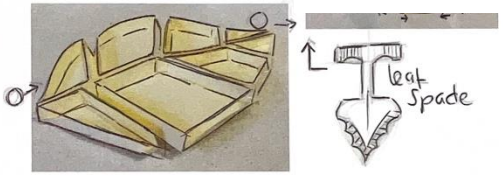
She liked the idea of the magnetic connection as it would allow her to easily assemble the product with limited people. However, she was worried about the strength of the magnets as they would start to rust in the outdoors and become less strong resulting in a safety concern due to the product not connecting properly.

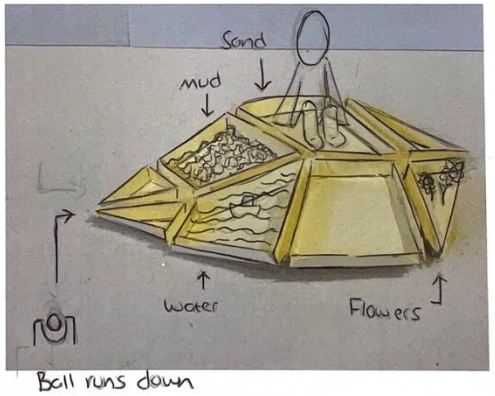
She likes how it stacks minimizing storage space as they have limited storage.





Leaf throw away model – made of card





Puns	Topic.	Requirements
1	**Safety.**	Smooth edges, meet British standards and safety legislation
2	**Shape.**	Aspects of nature and biomimicry in its design.
3	**Product Size. / Storage**	Fit into a shed or shipping container when being stored.
4	**Anthropometrics for primary users**	Aaccessible and easy to use by all users
5	**Ergonomics**	Primary user understands the affordance with the product
6	**Inclusivity**	Accessible to children with disabilities, these could include, sight, mobility and dexterity
7	**Aesthetics**	Aesthetically pleasing to my primary user and look sympathetic to its environment
8	**Manufacturing Cost**	Use standard components and minimal manufacturing process.
9	**Maintenance**	Repaired, clean and maintain
10	**Function**	Encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.







Improvements:

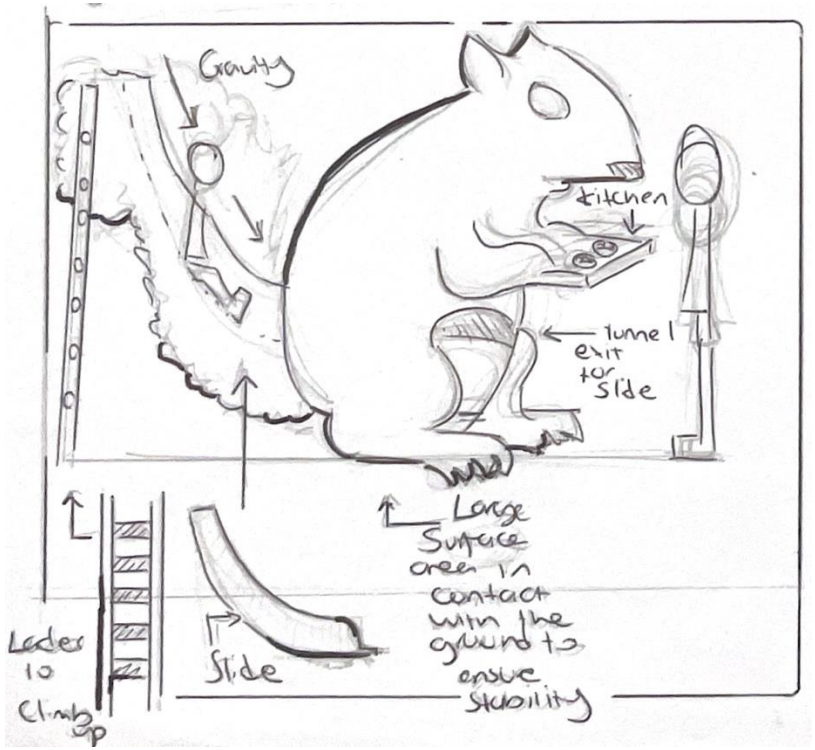
- I could use a different type of connection compared to magnetic which would rust and weaken.
- PUN 9 – I could include water drainage areas so sections don't get filled in by rain and make each box sloping in a particular direction making it easy to clean
- PUN 4 – I could add space for wheelchair access.
- I could add space by creating an expanding surface to allow for art and craft activities.

Next Steps: I will not be taking this design forward as I feel it is basic and just a differently shaped sand pit.

Initial Ideas – Squirrel

William Howe

Intro: I am going to develop my initial concept sketches into Initial designs, I will evaluate each design against my PUNS and their strengths and weakness to identify the best designs to take forward and design.



Design Thinking :

The outdoor squirrel toy is a versatile structure designed for children to enjoy a variety of activities. Its design allows kids to climb on its tail, offering a fun way to develop physical skills like strength and balance. At the front, nestled between the squirrel's hands, is a mud kitchen, where children can engage in imaginative play by mixing, pouring, and pretending to cook. The structure also includes a slide, providing an additional element of fun and movement. When not in use, the toy can be folded down into a compact form, making it easy to store which adds to its practicality for outdoor play areas.

Strengths

- Modular so children can switch between different activates keeping playtime exciting.
- Safety, wide base of the squirrel ensures the structure remains secure when in play and won't harm the children
- Aesthetically pleasing and fits the theme of the forest school
- Easy to store due its folding feature making the product compact

Weaknesses

- No space for art of craft activities
- The forest schools must find activities to put in the other smaller acorns
- Lacks activities so children will get bored.
- Unusual shape will make it hard to move and transport to storage
- Easily to repair due to limited mechanisms
- The slide goes into the mud kitchen which means children may collide when playing which may result in injury

Primary User Comments :

Sarah likes the aesthetics of the design and believes it fits into the style of the forest school.

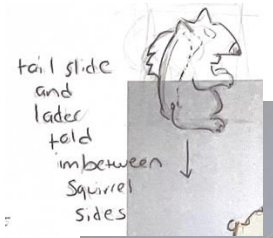
She said that she wanted the children to have a larger space to do activities like Arts and crafts as this is one of the groups favorite activities

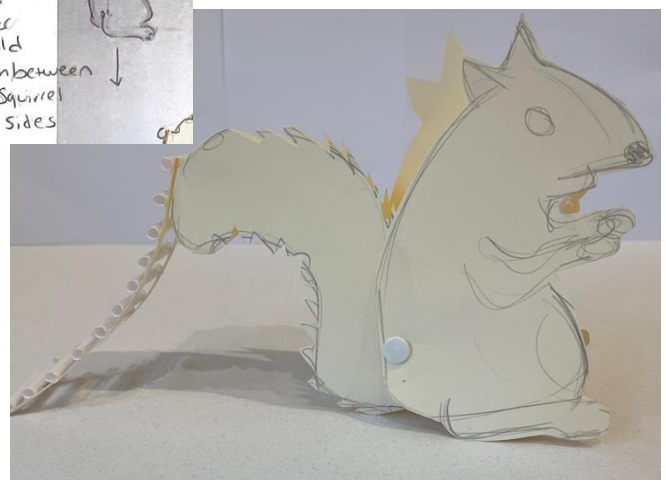
She believes the squirrel lacks activates meaning the children will get bored quickly and therefore won't use the product.

She likes how it folds minimizing storage space as they have limited storage.

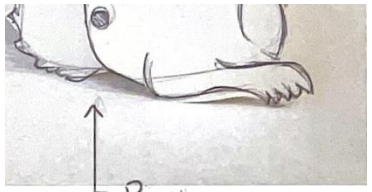
Sarah thinks it will be hard to transport due to the bulky design.

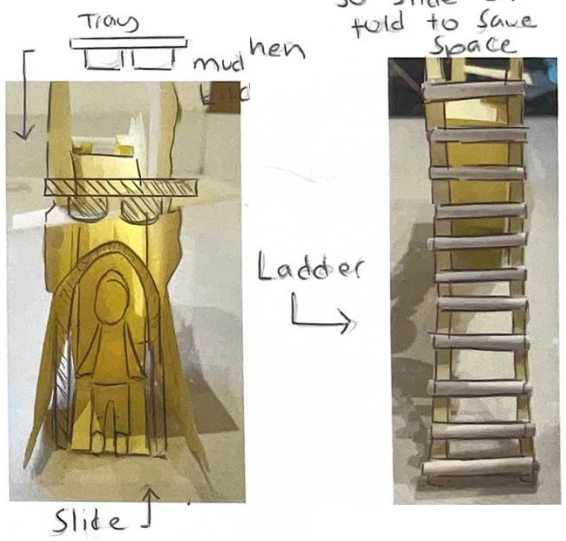
She is concerned about the slide and the mud kitchen, she is worried about children getting injured as the children will hit into the ones at the mud kitchen when coming of the slide.





Squirrel throw away model – made of card and paper tubes





Puns	Topic.	Requirements
1	**Safety.**	Smooth edges, meet British standards and safety legislation
2	**Shape.**	Aspects of nature and biomimicry in its design.
3	**Product Size. / Storage**	Fit into a shed or shipping container when being stored.
4	**Anthropometrics for primary users**	Aaccessible and easy to use by all users
5	**Ergonomics**	Primary user understands the affordance with the product
6	**Inclusivity**	Accessible to children with disabilities, these could include, sight, mobility and dexterity
7	**Aesthetics**	Aesthetically pleasing to my primary user and look sympathetic to its environment
8	**Manufacturing Cost**	Use standard components and minimal manufacturing process.
9	**Maintenance**	Repaired, clean and maintain
10	**Function**	Encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.



Improvements:

- I could add space by creating an expanding surface to allow for art and craft activities.
- PUN 3 I could make the product collapsible, so it fits into the storage.
- PUN 4 I could

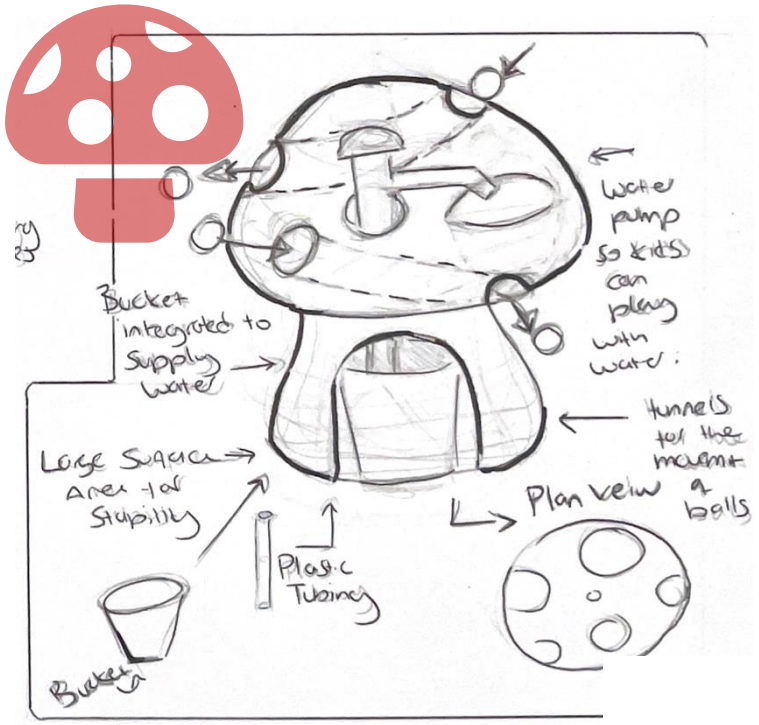
Next Steps:

I will not be taking this design forward due to the product being high cost to maintain and keep in safe playing condition. In addition, the product looks hard to transport and store due to the bulky design

Initial Ideas – Mushroom

William Howe

Intro: I am going to develop my initial concept sketches into Initial designs, I will evaluate each design against my PUNS and their strengths and weakness to identify the best designs to take forward and design.



Design Thinking :

The mushroom-shaped outdoor toy offers a range of activities for children to explore. Its sturdy, wide base provides stability, making it suitable for active play with a large number of children. At the top there are , indented white spots serve as areas for mud or sand play, giving kids space for tactile and creative activities. A bucket at the base collects water, which can be pumped up through PVC piping using a simple manual water pump built into the structure for water play. In the head of the mushroom, there are features for ball games, allowing children to experiment with movement and coordination as they drop or roll balls through various channels. The design encourages open-ended play while being stable and practical for outdoor use.

Strengths

- Modular so children can switch between different activates, keeping playtime exciting.
- Safety, wide base ensure the structure remains secure when in play and wont harm the children
- Interactive water / ball system, allow the children to further interact with the product.
- Different activities can adhere to a variety of different skill levels allowing many children of all ages to play.
- Aesthetically pleasing due to nature inspired design
- Easily to repair as parts are simple.

Weaknesses

- No space for art of craft activities
- Unusual shape will make it hard to move and transport to storage
- Not easy to clean due to the organic shapes of the parts.
- Solar panels will need to be protected in some way so children don't damage them and stop them from working.

Primary User Comments :

Sarah likes the aesthetics of the design and believes it fits into the style of the forest school.

She said that she wanted the children to have a larger space to do activities like Arts and crafts as this is one of the groups favorite activities

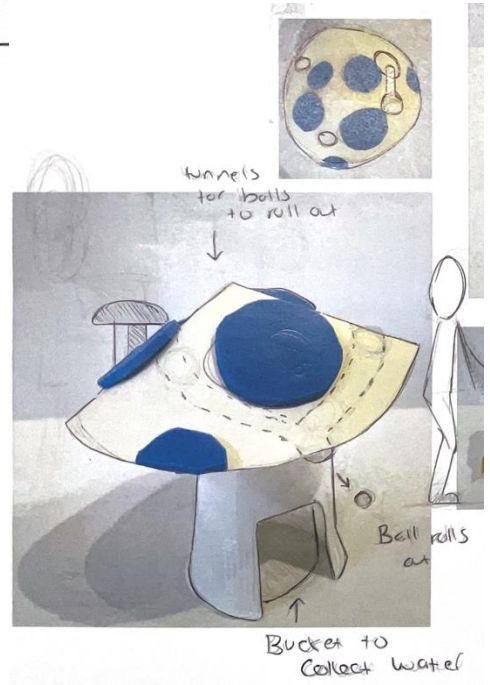
Sarah would like more storage space within the product, as it looked bulky to carry and transport to storage

She like the variety of activities the mushroom could have.

She said that she wanted the children to have a larger space to do activities like Arts and crafts as this is one of the groups favorite activities



Mushroom throw away model – made of paper, felt and plastic cups



Puns	Topic.	Requirements
1	**Safety.**	Smooth edges, meet British standards and safety legislation
2	**Shape.**	Aspects of nature and biomimicry in its design.
3	**Product Size. / Storage**	Fit into a shed or shipping container when being stored.
4	**Anthropometrics for primary users**	Aaccessible and easy to use by all users
5	**Ergonomics**	Primary user understands the affordance with the product
6	**Inclusivity**	Accessible to children with disabilities, these could include, sight, mobility and dexterity
7	**Aesthetics**	Aesthetically pleasing to my primary user and look sympathetic to its environment
8	**Manufacturing Cost**	Use standard components and minimal manufacturing process.
9	**Maintenance**	Repaired, clean and maintain
10	**Function**	Encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.







Improvements:

- I could add space by creating an expanding surface to allow for art and craft activities.
- I could add storage in the cap of the mushroom instead of the product needing to be moved.
- PUN 8 I could reduce components such as removing the balls

Next Steps: I will be taking this design forward as it hits majority of my puns successfully and my primary user likes the water feature and the variety of different activities on the design. Also, they believe it aesthetically pleasing and sympathetic with the environment.









Pump

Top

Expanding

Base

LED underglow

Pump

Move and adjust pump

Pipes Run through center

Button to move the mushroom up and down

Indented Spurs

Expanding Surface

Ball game

Solar Pannell Spot

Need the base to adapt height

Water bucket

wide base

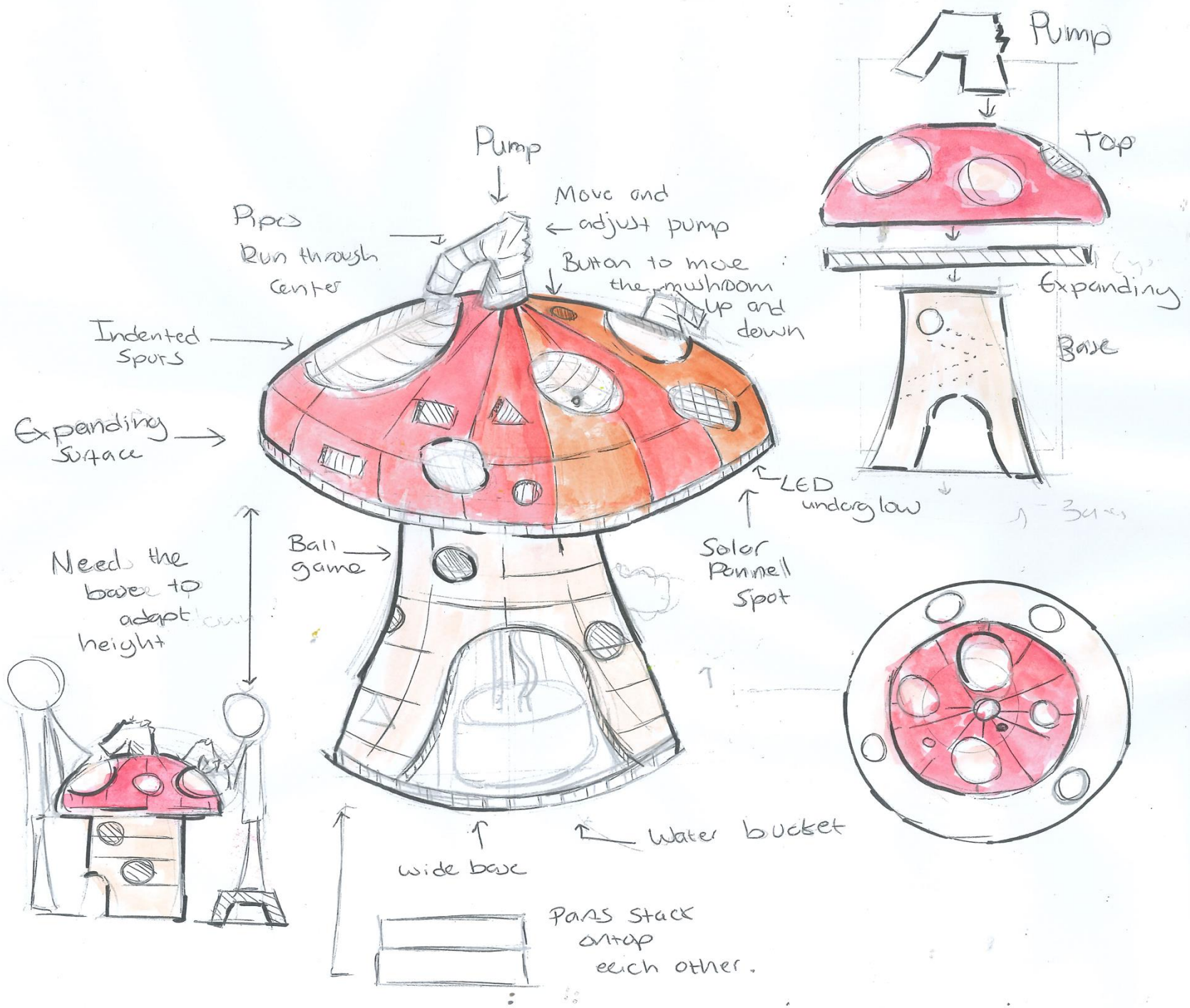
Pans stack ontop each other.

Proposed Final Design 1

William Howe

Intro: Following my initial ideas I have decided to take forward and combine my initial mushroom concept designs as these were my primary users favorite design and also met my PUNS.

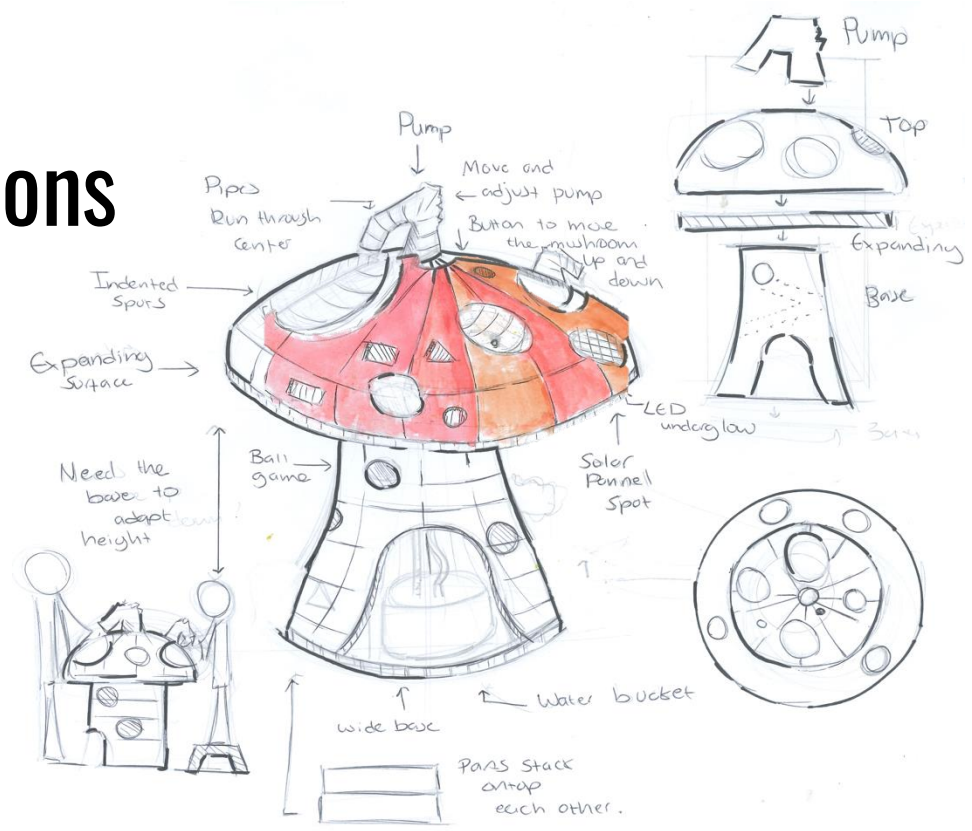
Puns	Topic.	Requirements
1	**Safety.**	Smooth edges, meet British standards and safety legislation
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8	**Manufacturing Cost**	Use standard components and minimal manufacturing process.
9	**Maintenance**	Repaired, clean and maintain
10	**Function**	Encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.



Summary/Next Steps:

- I am going to develop the different parts of the mushroom, so that my design meets my PUNS and my outline requirement.

Cap Design Iterations

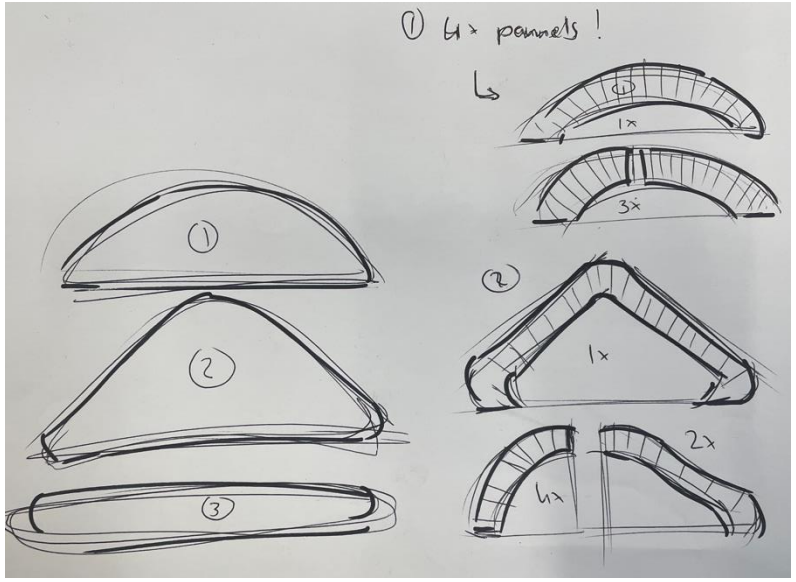


Mushroom Cap Iteration 1- Cap Development

William Howe

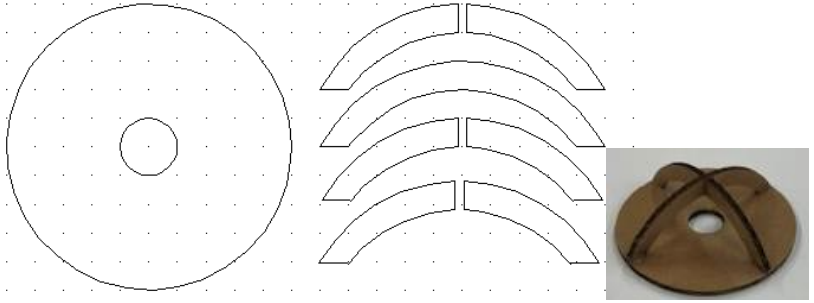
Intro: I will design, iterate and model the mushroom cap from my proposed concept 1 design.

I sketched differently shaped mushroom heads based on my mood boards and initial ideas to help me identify the best mushrooms head. I looked at a variety of mushrooms, such as flat top and domed.

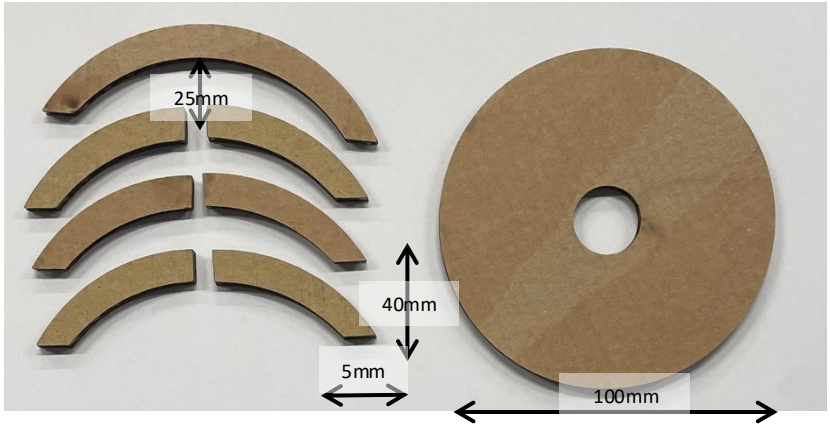


I decided I wanted the mushroom Cap to have a slight curve for aesthetics. However, I wanted the slope of the mushroom to be gradual so the children could use the Cap for a play space as my primary user wanted, without their toys / objects falling off. Therefore, I decided to go with a design in-between the very domed mushroom and a flat one

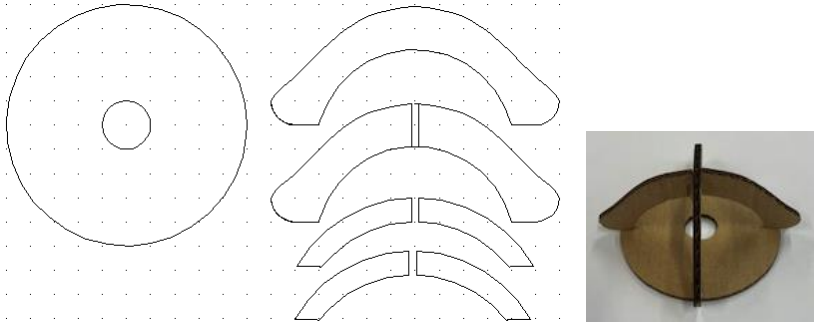


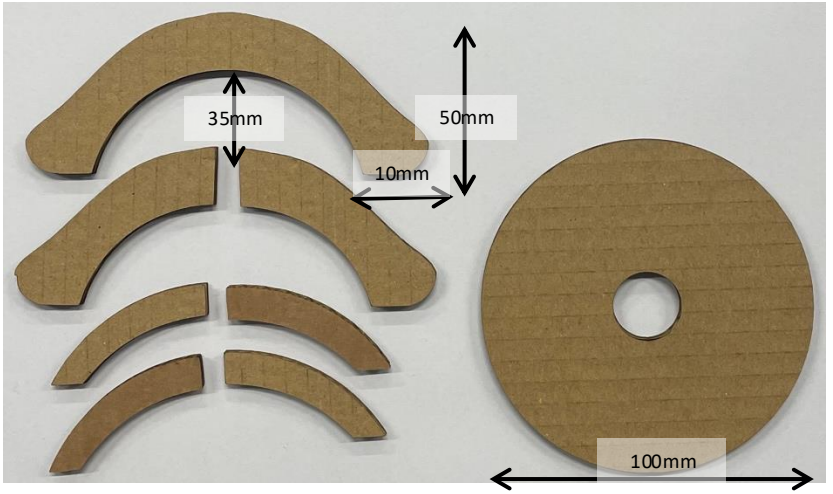


I created a 2 sketch of my favourite design on 2D design so I could laser cut the shape of the mushroom out quickly and efficiently. In addition, using 2D design allows me to easily change and iterate my design further on in the process.



I liked the angle of and height of the dome in proportion to its base however, the shape was to curved and didn't look aesthetically like a mushroom. Therefore, I iterated my design on 2D design adding curves around the bottom of the base and changing the upper side of the arch structure.





Good:

- The shape of the mushroom is aesthetically pleasing
- There's a hole in the base to allow for water pipes to go through as shown in my proposed concept model

Bad:

- The model has weak structural integrity, so will collapse under slight pressure
- I need to make the product easy to assemble as gluing the model was difficult even at a small scale
- The underside of the model is not curved
- I need to add spots for the play areas and research into how the play areas will be put in and supported by the mushroom
- I need to make a larger model to ensure the angle is correct and okay for children to use / play on.

Improvements:

- I will investigate how I can further develop the structural integrity of mushroom, I could add more supports
- I will create a slight curvature on the underside base to make the product more aesthetically appealing
- I will create slight grooves for the spots of the mushroom.

Next Steps:

- I will create a quick CAD model with improvements to help me visualize the mushroom head. I will then splice the model and lazer cut it out.
- I will also look at structural integrity, so the mushroom is strong enough to support the wight of the play areas and children's toys.
- I will investigate a way to make the mushroom cap more easy to assemble.

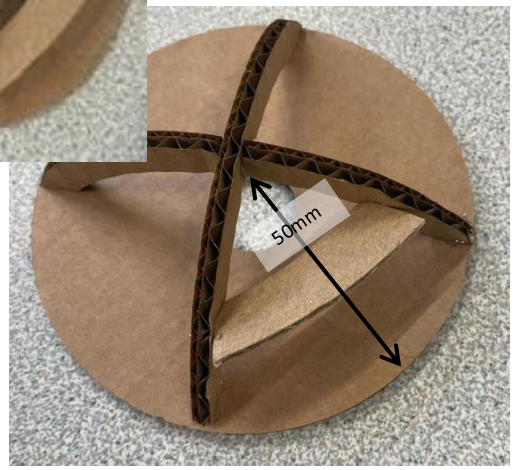
William Howe

Mushroom Cap Iteration 2- Cap Development

Intro: I will continue to develop the structure and develop the mushroom cap to ensure it has good structural integrity and will support the weight of itself and other pressure, whilst looking aesthetically pleasing .

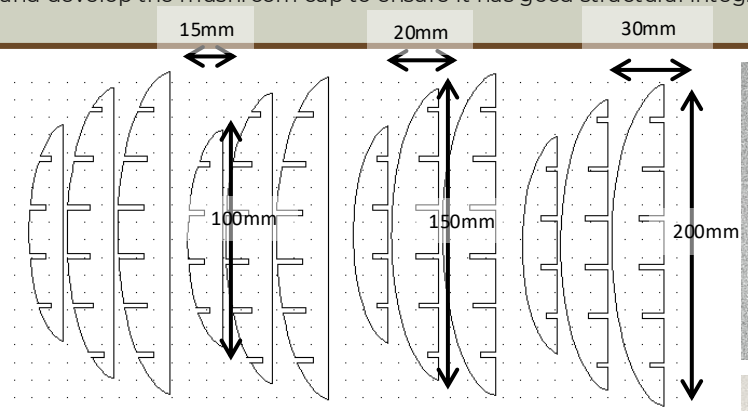
I after creating the design of the head of the mushroom I identified that it had weak structural integrity. To ensure children can play on this toy with the additional weight e.g. toys I will investigate a way of creating a both strong and lightweight design that follows the form of my previous shapes. I initially thought of adding extra beams to support the mushroom shape



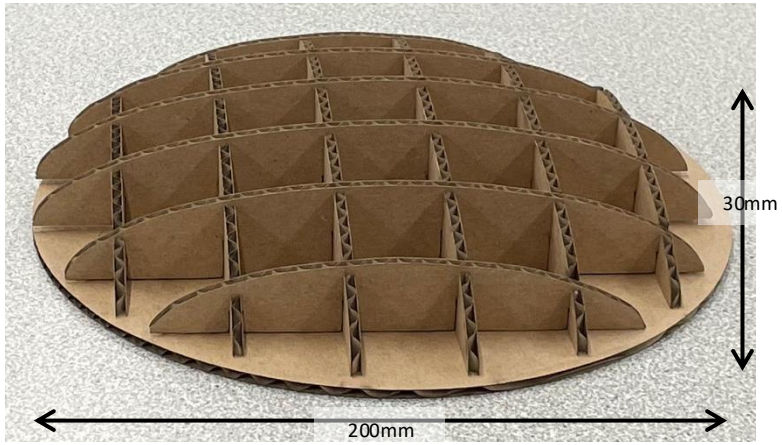


I identified that although I thought they would maintain and strengthen the structure they added no difference. In addition, they impacted the design and made it look less attractive. Due to this I then pivoted my research into looking at lattice structures as I know they provide strength / greater structural integrity by spreading the additional weight over a larger area.

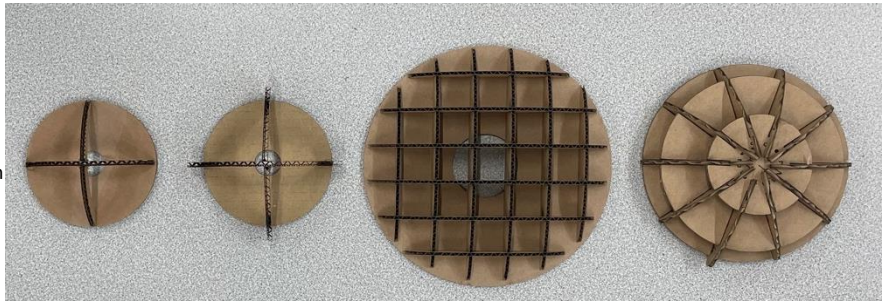
I initially designed the lattice shape on CAD keeping in mind the size of the 3mm corrugated card. I then used the laser cutter to cut out the design and put it together. It maintained good structural integrity. However, I didn't like the aesthetics and shape of the design as it had lost its mushroom looking shape due to it being flat as there was no space for spots and became domelike. For this reason, I decided to change the design.







I have used fusion 360 to create an iteration of the mushroom head. I added embossed holes on the model for the children play spaces (mud and sand pit). I also curved the underside of the mushroom to make it more aesthetically pleasing and slightly reduced the slope making it easier for the children to play on.





Primary User Comments :

- Sarah "I love the mushroom shape, it all looks in proportion. I would like deeper mushroom holes.
- Sarah liked the design however wants me to deepen the mushroom holes allowing for a larger area of play, and a part that can hold more things e.g. sand or water for the children.

Good:

- The shape of the mushroom is aesthetically pleasing (e.g. the underside of the mushroom is now slightly curved)
- Easy assembly
- Good structural integrity
- The angle of the mushroom is adequate for it required purpose of being a play space.

Bad:

- There's no hole in the base to allow for water pipes to go through as shown in my proposed concept model
- No evidence of spots

Improvements:

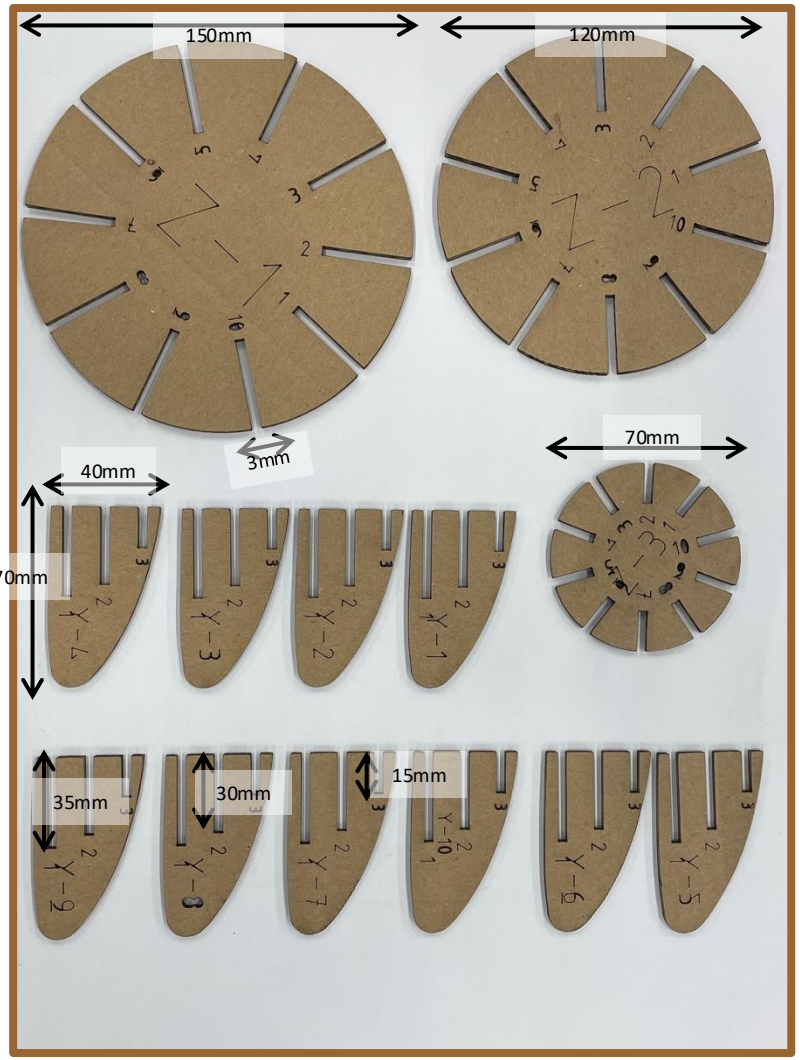
- I need to create a cover / cap over the base to create a seamless design with space for children to play on.

Next Steps:

- I will investigate into materials and ways I can cover top of the mushroom to create a seamless mushroom cap
- I will investigate into moulding and other process that could assist into the creation of the mushroom top.

Mushroom Cap Iteration 1- - Cap Development – **Chosen Iteration**

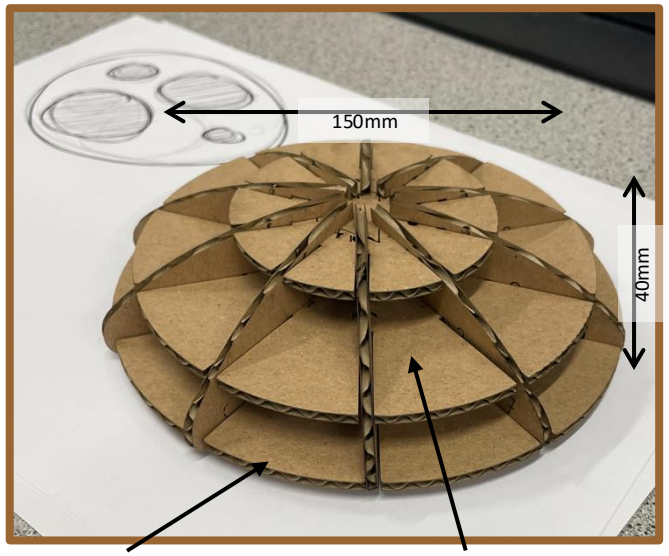
William Howe



Main pieces that the shape is comprised from. Due to this being a scale model it means if I make it like this for my prototype, I will have to add a greater number to ensure stability.

Dome Development:

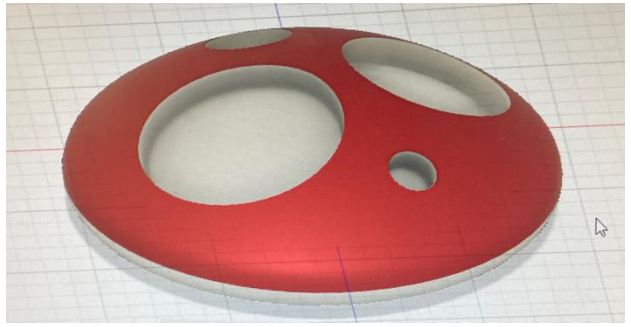


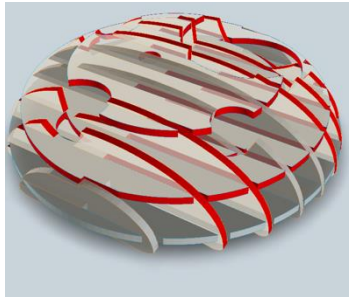


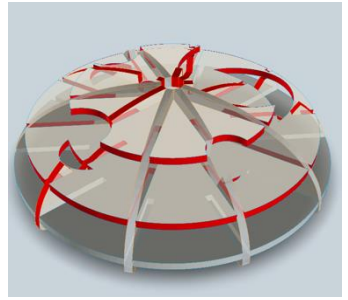
Great structural integrity: The additional layers help maintain shape and strength.

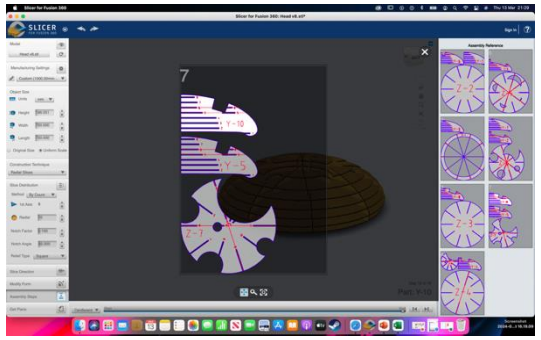
No space for water pipes: There is no hole to allow for water pipes to flow as discussed in my proposed concept model.

I next spliced the fusion 360 model using a splicer. This allows me to create a model of the mushroom Cap that it structurally sound and can be flat packed and easily assembled due to the grooves in the design. In addition, each part is labelled further assessing with assembly of the model.



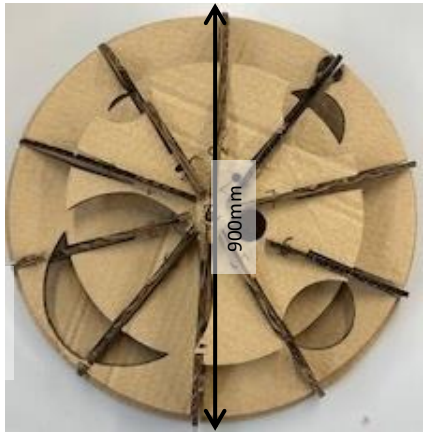






I decided to take forward the first sliced model as it minimises waste due to the differently shaped parts and arrangements making it a more sustainable design. In addition, it was the simplest way to assemble the part with readymade grooves and look most aesthetically pleasing. However, the mushroom spots didn't successfully show however, I can change the design slightly to further show the spots.





I laser cut the spliced designs, as it ensures accuracy within my project, and it will be a true to scale representation.

Mushroom - Cap Material Testing / Protentional materials

William Howe

Introduction Using my most recent dome model, I covered it with cling film and layered a variety of materials over it creating the mushroom shape that they were moulded over. This will allow me to help identify the best material to use for my product.





Fiber glass

I experimented with using fibreglass and moulding it around a piece of laminated wood. It formed a protective layer to increase the product's strength, durability, and resistance to weathering, making it more suitable for long-term outdoor use in the forest school environment. In addition, it was easily mouldable. However, its not sustainable so I won't use the material



Bag for Life's

are often made from calico.

Calios is a heavy plain-woven textile made from unbleached, and often not fully processed, cotton. It may also contain unseparated husk parts.

The are very readily available

26 Jan 2021 — A new study has found that **UK supermarkets sold enough "bags for life" in 2020** for every household in Britain to have 57 each.
UK Supermarkets Sold 57 'Bags for Life' Per Household in 2019 — More Than 1 a Week





Flour Mache

Make up the glue paste in a large bowl by mixing the flour with equal parts water e.g. one cup of water to one cup of flour.

This is very sustainable; and it was very strong, but I had concerned about it longevity. I also felt it was not using any waist product







Stream bending

I experimented with steam bending by holding thin strips of wood over the steam from a kettle, testing whether the heat and moisture would make the wood flexible enough to bend and shape. This worked well however, I could not be achieved by a primary user with limited skill set.





Paper

is made from wood

Paper is very readily available

UK Paper Recycling Rates and Statistics Nearly 4 million tonnes of packaging waste in the UK is made from paper and cardboard, and around 8 million tonnes of this packaging waste is recycled each year.





Hessian (Jute) Sacks

Often bag for life are made from Hessian.

Jute stands out as a sustainable material for several compelling reasons:
1.Biodegradability: Unlike synthetic materials, jute is 100% biodegradable and compostable..
2.Low Environmental Impact: The production of jute involves significantly less water and fewer pesticides and herbicides compared to other crops like cotton.
3.Carbon Footprint: Jute plants have a high carbon dioxide assimilation rate, which means they absorb more CO2 from the atmosphere than many other plants.
4.Durability and Reusability: Jute bags are incredibly durable and can withstand heavy loads, making them perfect for repeated use.
5.Economic Benefits: Jute farming and processing provide livelihoods for millions of people in developing countries, supporting economic growth and reducing poverty.



Baby muslins

Muslin cloths are usually **made from cotton or bamboo.**

Bamboo's is a biodegradation sustainable materials. At the same time, bamboo has a high capacity to absorb carbon dioxide, which makes it an ally in mitigating the effects of global warming.

Muslins are ultra versatile baby essential, which most families have when having a baby. Most parents want new products for their babies.

In 2023: There were 591,072 live births in England and Wales its thought the average number of muslins a baby has is 10, resulting in millions of muslins disposed of each year



Laminating

I experimented with laminating veneers of wood to see if it was possible to bend the material enough to form a dome shape, helping me assess whether this method could be used effectively for the curved mushroom top in the final design. This worked well however, I could not be achieved by a primary user with limited skill set.



Jeans

Denim is made from cotton fibres using a twill weave. This fabrication creates the diagonal ribbing that is iconic to denim material. While denim is ultimately the same in appearance, there are some types of denim that have slight variations. It is a very strong and hard-wearing fabric

Jeans are vey readily available

Each year over 70 million pairs of jeans are sold in the UK

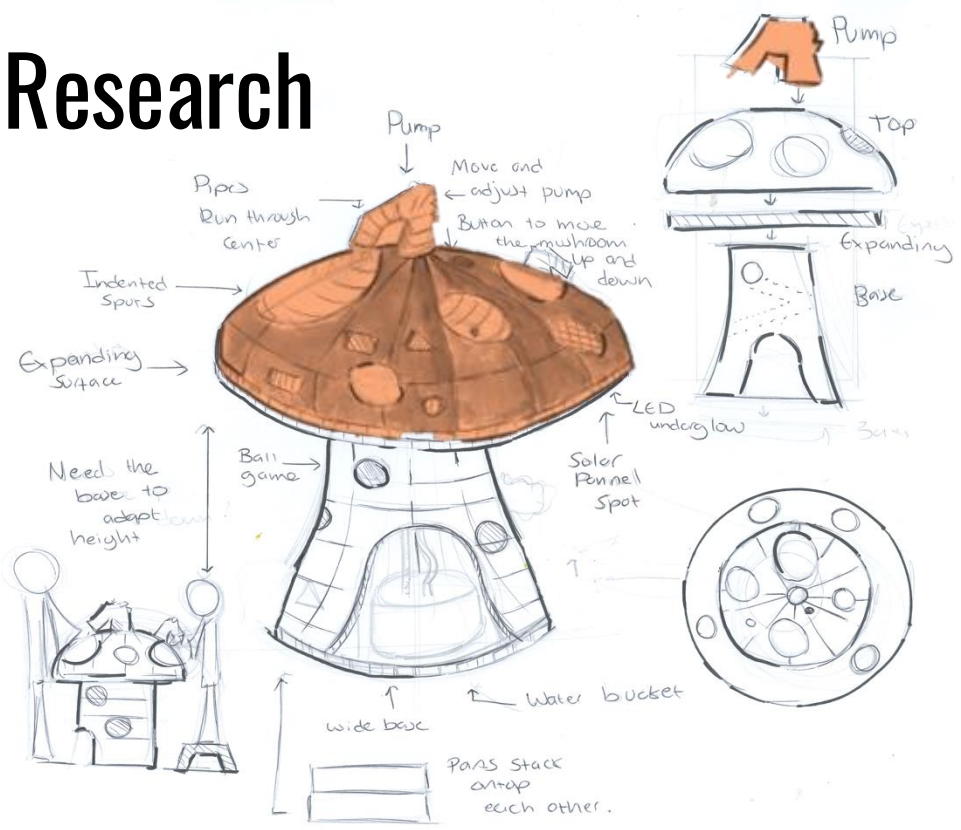




Summary: I have research into everyday waist and wanted to think how I could use it to cover my product. The most successful materials I felt were the fabrics, all in which are very readily available. I felt the strongest and most durable fabrics were Denim and Hessian

Next Steps: I have decided. will try to use Denim and Hessian in cover the mushroom product , this material will be very suitable as it will be made from recycled materials a

Cap Accessories Research



Mushroom – Water Pump Research

William Howe

Intro: I will conduct research on manual and solar water fountain pumps. I will look at the pros and cons of both systems and identify a suitable pump for my product as my Primary User identified water play a being a feature the children enjoy very much.



Senders Solar Fountain Pump

Strengths

•6 Different Nozzles There are 6 different types of nozzles which helps to change the height of water in different water patterns. The water can rise up to 30-55 cm approx.

•Multiple Applications -This Eco friendly solar pump is perfect for bird bath, fish tank, small pond, pool, garden, water circulation for oxygen..

•Environmental : 1W solar fountain, maximum 55cm height solar water pump with 6 different nozzles. No cables needed, just put the pump well on the water, If the solar panel gets enough power, it will start in 3 seconds. No need for battery or electricity, 100% safe and environmentally friendly. ***making good for my product***

•Weakness

•Solar Fountain Pump - No battery needed. Solar water fountain pump with monocrystalline solar panel, In the enough sunlight automatically pumps water. – ***only works in the sunshine – this may not be good for my product***

•Easy to Use/Move/Clean-. Removable nozzle to clean It easily -***small parts making not good for my product***





Siphon Pump is ideal for cleaning gravel and siphoning water from small aquariums.

Strengths

-Simple -Quick and simple to use it has a built-in priming aid . ***making good for my product***

-**Long**-Measures approximately 160cm in length . ***making good for my product***

-**One handed** – can be uses with only one hand . ***making good for my product***

-Low cost ***making good for my product***

Siphon Pump for Petrol Oil Fuel Petrol Diesel Fluid Water Fish Tank,

Strengths

-Simple -Manual Hand Pump Transfer Pump ***making good for my product***

-**2 Different Hoses-** 2 Durable PVC Siphon Hoses (15mm)

Weakness

- **Central pump -**may make it hard to install ***– this may not be good for my product***



Whale V Pump MK6 Manual Hand Pump

Strengths -**Long**-With a length of 275mm (10.83 inches) and a stretching length of 410mm (16.14 inches), it can be easily used in different settings. ***making good for my product***

-Efficient - This hand pump allows water supply on both the up and down movements, efficient and convenient water pumping. ***making good for my product***

- Easy to install -This water hand pump is designed for easy installation and use.. ***making good for my product***

Weakness

-High quality Made from metal, this water hand pump is built to last. Its sturdy construction ensures long-lasting performance, making it a reliable tool for various activities and recreational vehicle use. – making it an expensive product to buy use – ***this may not be good for my product***





Supernic Hand Transfer Siphon Syphon

For the extraction of all types of engine, transmission and lubricating oils

Strengths

-Multi purpose -siphon pump transfers most liquids

- **Quick** -Transfers liquids rapidly

- **Multi use** -Pumps air or any liquid through.Can be used to inflate toys and beach balls

- **Different Nozzles and lengths** -Complete with several adapters, lengths of hose to suit most purposes

Weakness

- **Need two hands to work-** could be tricky for children to use ***– this may not be good for my product***



Rotary Hand Pump 45 Gallon

Strengths

-Hydraulic hand pumps do not require power ***making good for my product***

-**Efficient** The flow rate is 24 litres per minute. ***making good for my product***

-Easy to operate hand-rotating operation ***making good for my product***

--**Adjustable height** through barrel screw coupling ***making good for my product***

Weakness

-High quality Made from metal, this water hand pump is built to last. Its sturdy construction ensures long-lasting performance, making it a reliable tool for various activities and recreational vehicle use. – making it an expensive product to buy use ***– this may not be good for my product***

The Hidom

Strengths

-**Long** -1.9m Aquarium Hand Syphon is fitted with a 120cm (4ft) flexible tube (Diameter 18mm) giving a total length of 1.9 meters . This can be especially useful and convenient when syphoning your fish tank- making good for my product . ***making good for my product***

-**One handed** – can be uses with only one hand. ***making good for my product***



Summary: Solar pumps only work when the sun is out – so not good for my product, the Whale and Rotary were great quality pumps but very expensive – so not good for my product The Siphon Petrol pump would not work in my product due to the central pump.
Therefore, I have decided to work with the Siphon aquarium pump.

Next Steps: I will now research into other accessories I could include on my product, such as solar panels and lights and SMART finishes

Mushroom – Solar / glowing Panels

William Howe

Intro: I will research and explore a variety of materials and accessory features that could be incorporated into my mushroom toy design.

Having looked at the water pumps, I now wanted to investigate the protentional of solar panels for electricity which would be needed if I went with the electric pump. In addition, I will look into under glow and lighting so the product can be used in the dark. For example, during star gazing events as discussed when first talking and interview my primary user, I have also attended one of these events.

I will next look into transparent, opaque materials that can allow light to be transferred through them. This will allow me to create a product that can protect the electronics inside whilst still giving out glow.

I will also look into the use of smart materials that can glow in the dark and change colours to children's touch to ensure the product is captivating and fun for the children. In addition, using a glow in the dark smart material would reduce the amount of electronics in the mushroom, making the mushroom, cheaper and easier to repair. However, then the water pump would have to be manual.

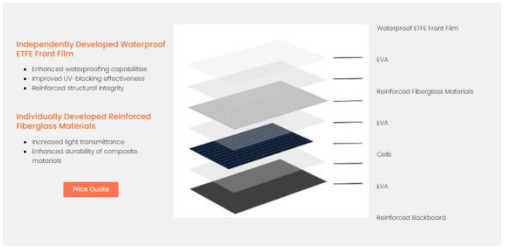
Solar Panel research:

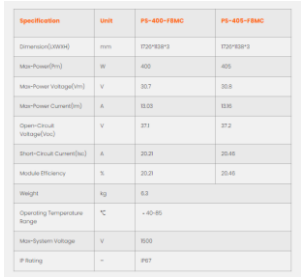
Rigid solar panels:
The Jackery Explorer 300 Plus, paired with the SolarSaga 40W Mini Solar Panel, offers a compact and efficient portable power for outdoor activities. It weighs around 3.75 kg and the Explorer 300 Plus features a 288Wh $LiFePO_4$ battery, providing reliable power for various devices (could be used to power a electric water pump. Its multiple output ports, including AC, USB-A, and USB-C, enable simultaneous charging of up to four devices. The included SolarSaga 40W Mini Solar Panel utilizes high-efficiency solar cells to maximize energy capture, allowing for sustainable and eco-friendly recharging of the power station. This combination allows for electricity to be easily available in the outdoors and the products are suitable for the outdoors. .



Jackery Explorer 300 Plus + SolarSaga Mini Solar Panel

Flexible solar panels:
The PURE Flexible Solar Panels are a innovative alternative to traditional rigid solar panels, thanks to their thin-film technology and use of lightweight, flexible materials like plastic or polymer substrates. These panels are ideal for curved surfaces such as my organic mushroom design, offering solutions where conventional solar panels that couldn't be attached easily to the design. They are perfect for curved objects and glass, as they can be easy attached by adhesive, or structural reinforcements. Additionally, they integrate seamlessly with waterproof membrane roofs such as TPO and PVC so can withstand the outdoor environment. With excellent durability and resistance to damage, PURE Flexible Solar Panels ensure reliable performance in outdoor conditions.





Transparent and Opaque polymers :

1. Polycarbonate
- **Properties:** Extremely strong, virtually unbreakable, UV-stable with coatings, and clear.
- **Best Uses:** Skylights, outdoor signs, greenhouses, and safety glazing.
- **Pros:** More impact-resistant than acrylic, can handle extreme weather.
- **Cons:** Typically more expensive than other materials and can discolour without UV protection.

2. Fiberglass Panels
- **Properties:** Translucent rather than fully transparent, lightweight, and durable.
- **Best Uses:** Greenhouses, roofing, and sheds.
- **Pros:** Lightweight and flexible, good light diffusion, and weather-resistant.
- **Cons:** Less visually clear than glass or plastics.

3. ETFE (Ethylene Tetrafluoroethylene)
- **Properties:** Transparent, lightweight, and resistant to extreme weather.
- **Best Uses:** Architectural applications like roofs, façades, and greenhouses.
- **Pros:** Self-cleaning, long lifespan, and excellent thermal insulation.
- **Cons:** Expensive and limited availability.

4. PVC (Clear Vinyl Sheets)
- **Properties:** Flexible, waterproof, and UV-stable with coatings.
- **Best Uses:** Outdoor curtains, tents, and temporary weather shields.
- **Pros:** Cost-effective, easy to cut, and lightweight.
- **Cons:** Can become brittle over time and less rigid than other materials.





Solar Mood Light

Photos from my product in my garden

The solar powered mood lights include a hidden solar panel which is charged by the sun through the product shell during the day.





Smart finishes :

Thermochromatic Pigments
- **Functionality:** Changes colour in response to temperature variations.
- **Applications:** Smart clothing, beverage containers, and temperature-sensitive coatings.
- **Advantages:** Visual indication of temperature, aesthetic appeal.
- **E.g.** Colour-changing mugs or car paint that shifts hue based on heat.



Phosphorescent Pigments
- **Functionality:** Absorbs light and glows in the dark after exposure to UV light.
- **Applications:** Emergency signs, safety equipment, decorative items, and outdoor lighting features.
- **Advantages:** Energy-efficient visibility in low-light conditions.
- **E.g.** Glow-in-the-dark paints or wall coatings.



Hydrophobic (Waterproof) Coatings
- **Functionality:** Repels water, keeping surfaces dry and clean.
- **Applications:** Clothing, outdoor gear, electronic devices, and architectural finishes.
- **Advantages:** Increases lifespan of materials, prevents water damage, and self-cleaning properties.
- **E.g.** Nano-coatings waterproof smartphone screens.



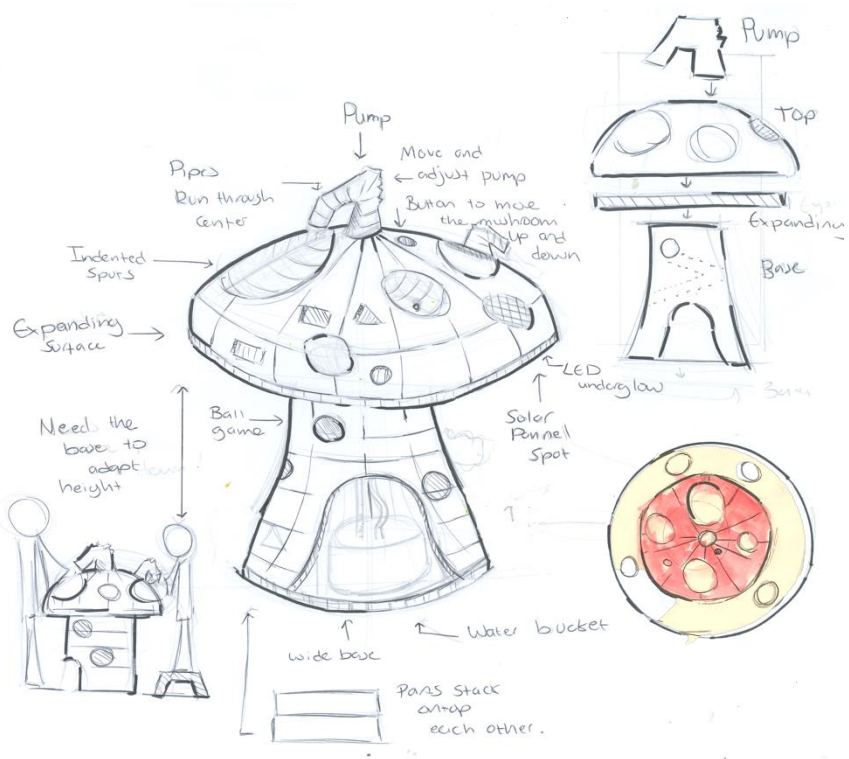
Photochromic Materials
- **Functionality:** Changes color in response to UV light.
- **Applications:** Transition lenses, smart fabrics, and automotive tints.
- **Advantages:** Adaptive functionality for light sensitivity and sun protection.
- **E.g. :** Sunglasses that darken in sunlight.



Summary: From conducting product research, I have identified I can use flexible solar panels which compliment the shape of my design however, they may cost more. In addition, I conducted product analysis on an outside glow in the dark mushroom and looked into further materials which are opaque and see through and smart finishes gain further knowledge on what I could build my mushroom out off.

Next Steps: I will next complete and conduct research and develop prototypes on my expanding work surface.

Expanding Surface Mechanism Iterations



William Howe

Mushroom – Expanding Work Surface Mechanism - Iteration 1

Intro: I will research into expanding work surfaces. After looking at my PUNs and talking to my primary users I need the make the product be able to expand or contract so it can be easily stored whilst allowing for a large number of chidren to play on the product. For this reason, i am going to look into expanding and collapsing mechanisms, to help me create and space saving work surface.

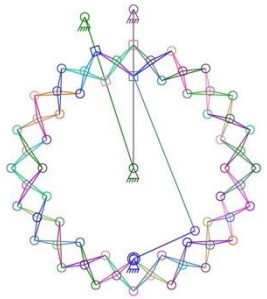
Hoberman Circle:

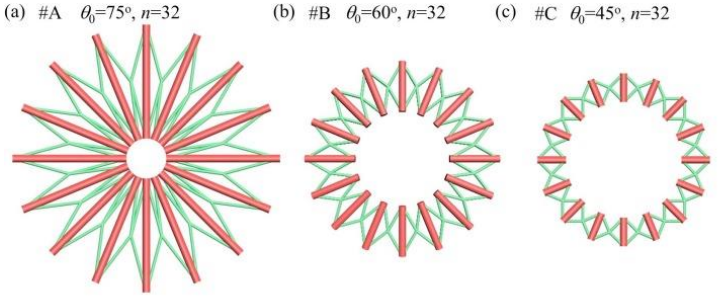
The Hoberman Circle is a mechanical structure which can expand and contract smooth and continuously. The interlinked joints allow the surface to grow in size while maintaining stability and form. In addition, the Hoberman circle is visually appealing with its interlocking design creating a modern, futuristic aesthetic, ideal for spaces where both function and design matter. The mechanical system is durable and efficient, distributing force evenly.

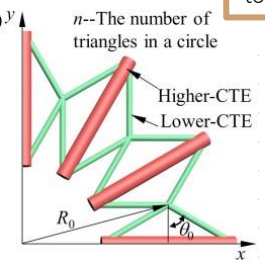




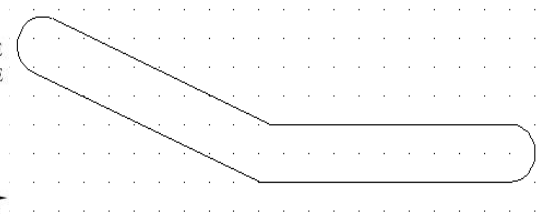




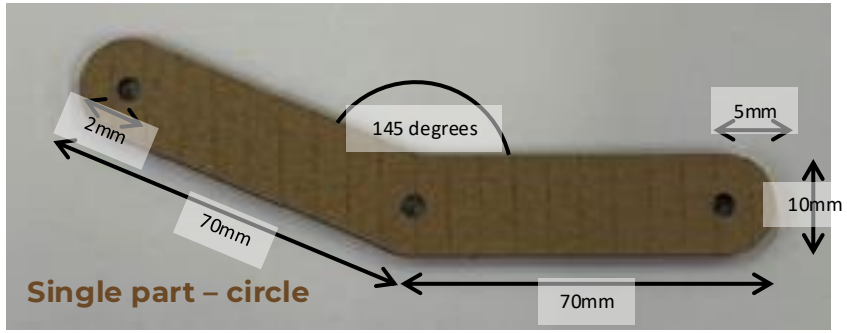


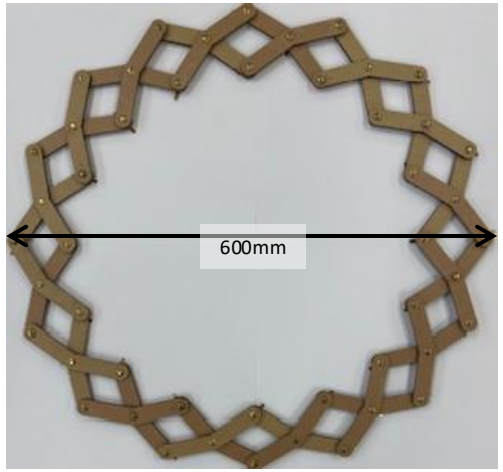


After researching about the Hoberman circle I took inspiration from the mechanism and recreated the design on 2D design. I then copied many of the segments over so I would have a large enough amount to create a circle which could expand and contract.



I next laser cut the single segments and assembled them using split pins as they allowed each segment to pivot in a certain angle and direction.



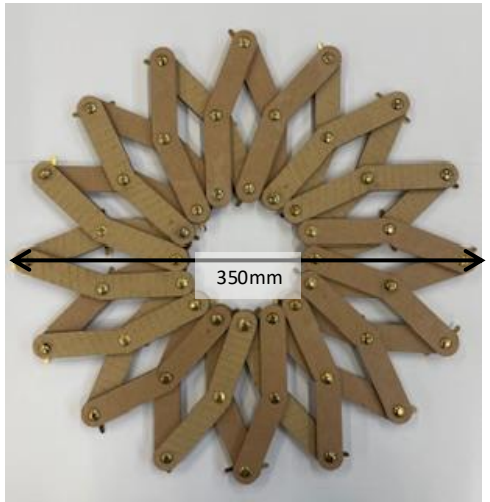




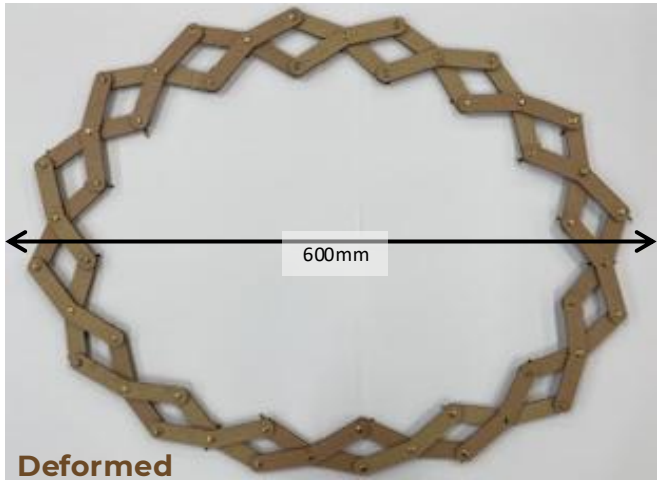
Video 63.1



Video 63.2



After opening and closing the model I identified that the model didn't retain the circular shape when opening and closing. Therefore, I will need to design a way to open and close the shape keeping a consistent circle. See videos 63.1 and 63.2



Good:

- The mechanism can open and close efficiently
- The mechanism increases its surface area dramatically
- There's a hole in the middle for water pipes and other run-through cables

Bad:

- The mechanism doesn't retain its shape when opening and closing
- Lots of moving parts that could be broken

Improvements:

- I need to create another mechanism or way to help retain the shape of the circle as it opens and closes, without impacting on on the increase in surface area

Next Steps:

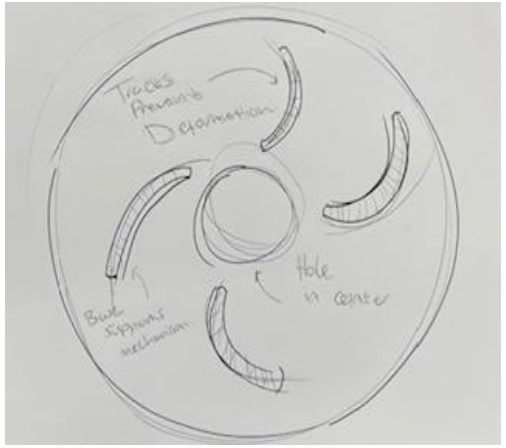
- I will investigate into designing and modeling another mechanism or way to help retain the shape of the circle as it opens and closes, without impacting on on the increase in surface area

William Howe

Mushroom – Expanding Work Surface - Iteration 2 (Hoberman's circle with tracks)

Intro: I will design and model another mechanism to allow for the expanding surface to retain the shape of the circle as it opens and closes, without impacting the increase in surface area

To keep the circle in shape when expanding and contracting I decided to first design a set of tracks for the parts to run along. This would allow me to pull / twist certain segments which are attacked to the track allowing for the circle to consistently open and close in shape.



I designed the track on 2D design and laser cut it out of 3mm cardboard.

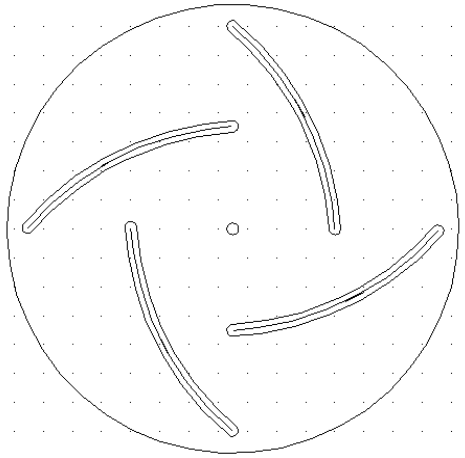


Video 64.1



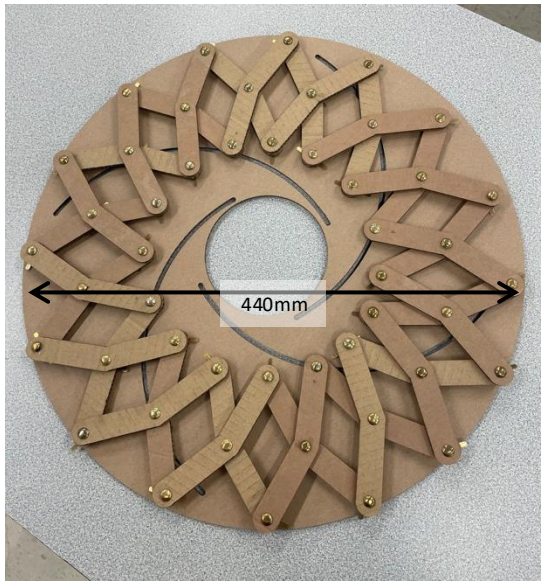
Video 64.2

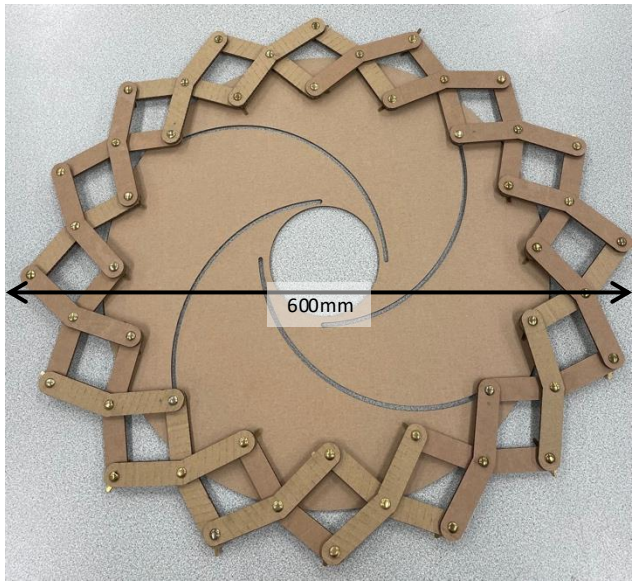
I experimented with both card and acrylic as the friction was a lot with the card, the acrylic was much smoother

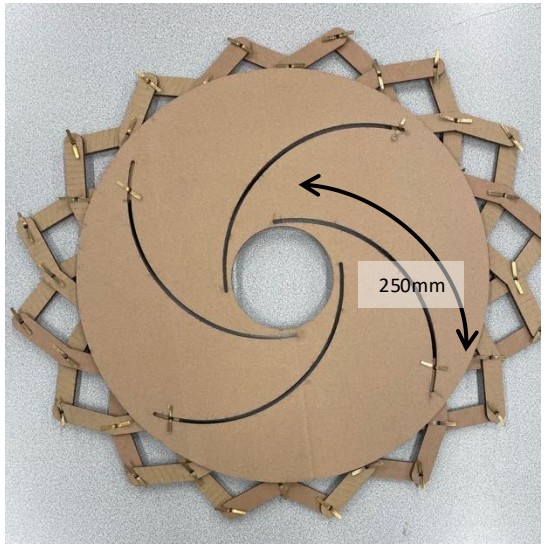


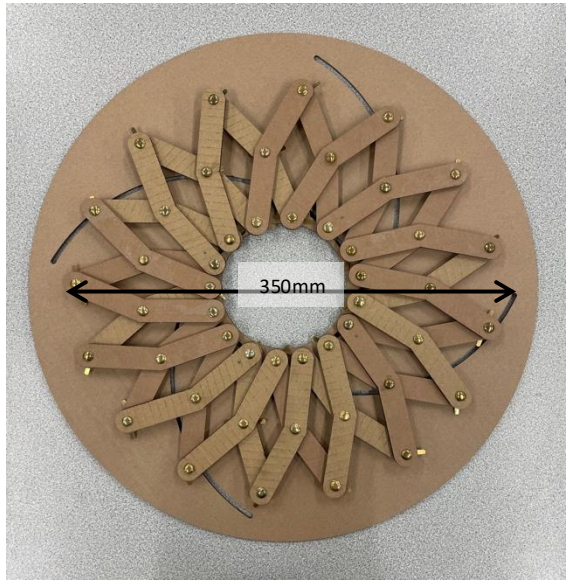


Video 64.3









I connected the tracks to the circle using 4 split pins. However, there was a lot of friction.

Good:

- The circle expands and contracts without deforming, meaning all parts open and close at the same time in uniform
- Simple improvement to fix the problem
- Doesn't affect the size of area, there is still a dramatic increase in area the tracks don't make it shorter.
- There's a hole in the middle for water pipes and other run-through cables

Bad:

- When expanding and contracting the circle there's high levels of friction making the product hard to open and close and time consuming. This may be due to the materials however, I think it's due to the tracks angle and many moving parts
- The base must be large which means there only a small amount of extra surface if it was to be covered by a base one top
- To open you must individually push each of the 4 points on the track, which makes it time consuming to open
- The tracks close to the inner hole cause weak structural integrity out of card they were flimsy
- The expanding surface has hole in the middle of it making it hard for children to play and use it.

Improvements:

- I could add washers or something between the carboard to reduce friction
- I could add another track on top which is stationary meaning when you spin the bottom track it opens the circle without manually pushing each of the 4 connections
- I could reduce the angle of the tracks which may also help reduce the friction and make it slide smoother.

Next Steps:

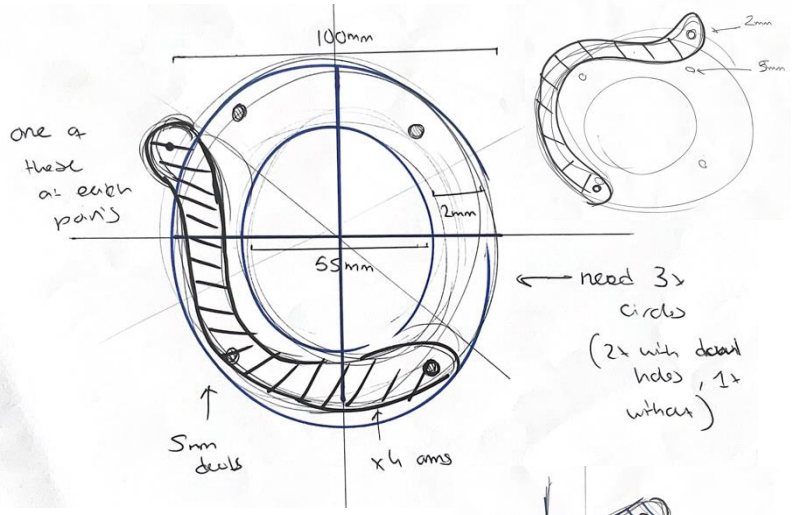
- I will investigate designing a new mechanism that has minimal friction, and no base plate so the area of the children's play space will be wider
- I will also design the mechanism to spin and open the whole circle in one continuous movement rather than manually pushing 4 points.

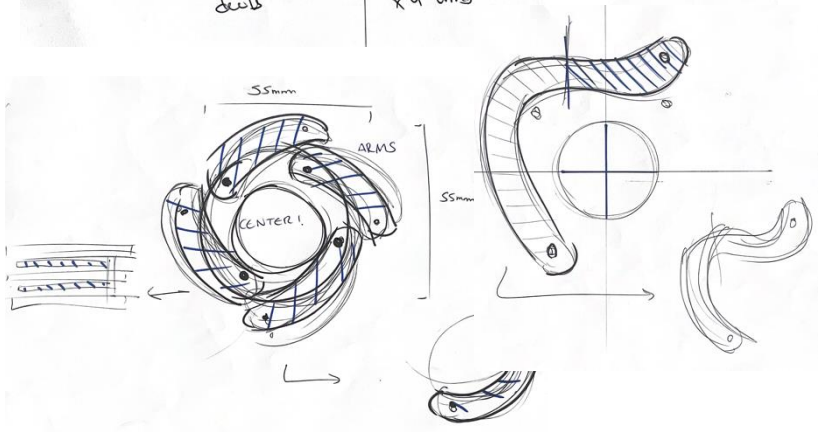
William Howe

Mushroom – Expanding Work Surface - Iteration 3 (Hoberman's circle with second mechanism)

Intro: I will investigate designing a new mechanism that has minimal friction, and no base plate so the area of the children's play space will be wider

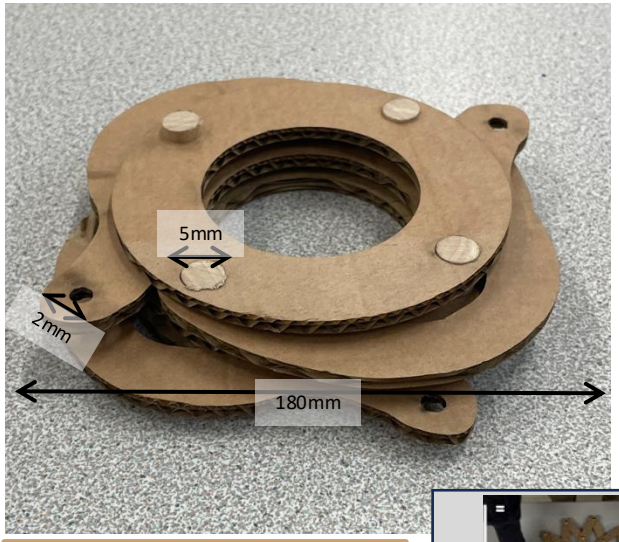
I designed a new inner mechanism to expand and contract the whole circle in one continuous movement. I created a quick sketch of the different parts and how it would layer together and connect to the larger circle.



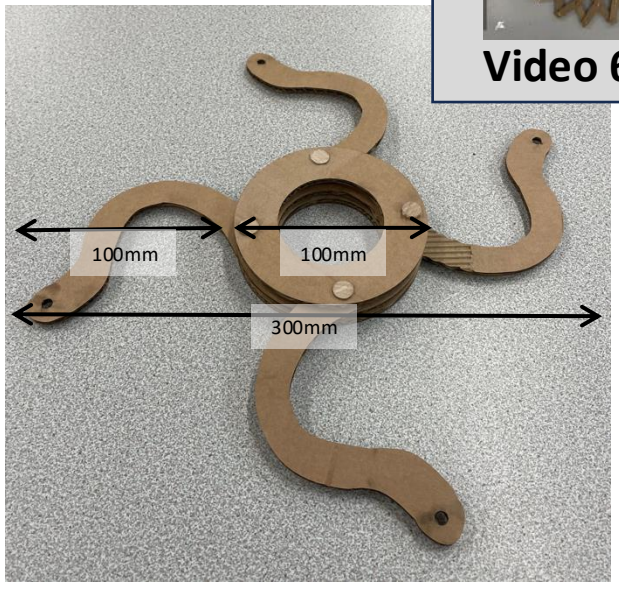


I designed the 7 parts on 2D design and laser cut it out of 3mm cardboard. I cut out 5-millimeter dowls using a coping saw.

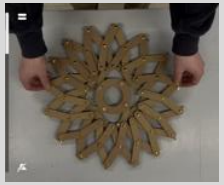
The second mechanism spun smoothly. Its four arms are designed to fit around the dowls holding the second mechanism together saving space meaning the circle and become very compact when contracted. When spun out the arms would extend until fully extended at the right angle. I need to design something so the arms do not over spin. In addition, at first the two mechanism didn't spin as effectively however, after adding washers to level the two mechanisms they device worked smoothly.



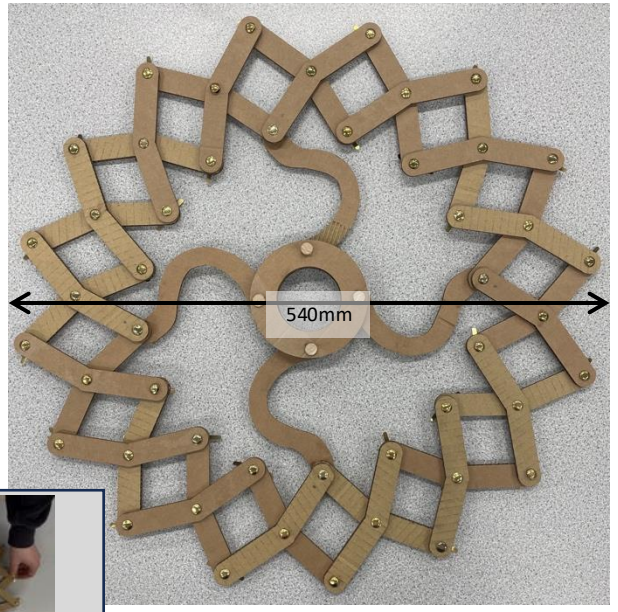
Compact / contract – arms fit around the dowl and in a circular shape to maximize space saved

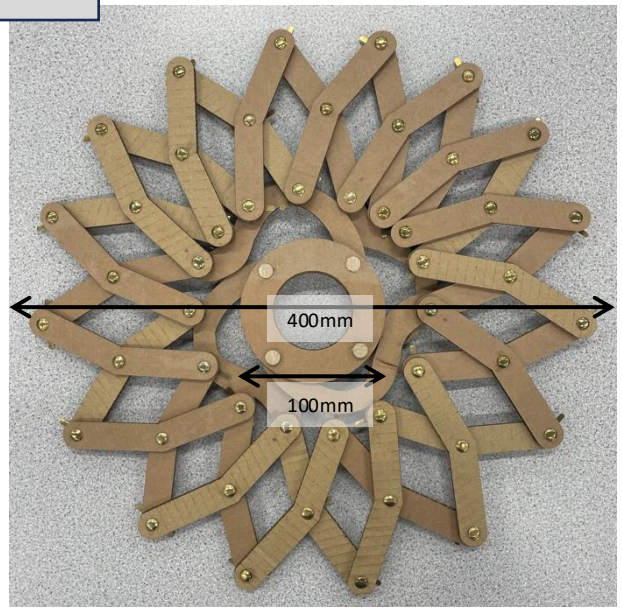


Extended – arms are spun till they reach the angle they furthest extended. Two mechanisms are joined by the four points of contact



Video 65.1





Good:

- The circle expands and contracts without deforming, meaning all parts open and close at the same time in uniform
- Doesn't affect the size of area, there is still a dramatic
- There's a hole in the middle for water pipes and other run-through cables
- Opens in one continuous movement
- Compact
- Minimal friction
- Only need to turn one point for the mechanism to spin.

Bad:

- There are lots of moving parts that could potentially become broken and due to a more complex design will be hard to fix.
- Hard to assemble, may increase manufacturing costs
- Only has four arms to support the weight of many children so may break or need extra supports
- Overcomplicate, there may be simpler ways to open and close a mechanism.
- Many points at which the mechanism could break as its structurally weaker with many pivot points

Improvements:

- Reduce the number of moving parts so there's less of a chance for weak points reducing the structural integrity.
- Add a cover over the top of the mechanism as wholes are in the way and prevent children form easily playing and drawing on the surface.

Next Steps:

- I will investigate creating / designing a cover over the top of the mechanism as wholes are in the way and prevent children form easily playing and drawing on the surface.
- I will also develop the mechanism and reduce its complexity

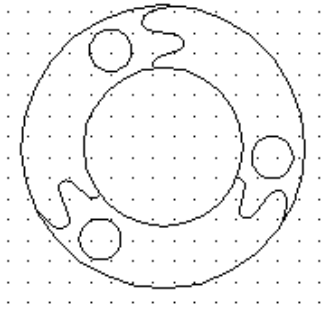
Mushroom – Expanding Work Surface Connections -Iteration 4

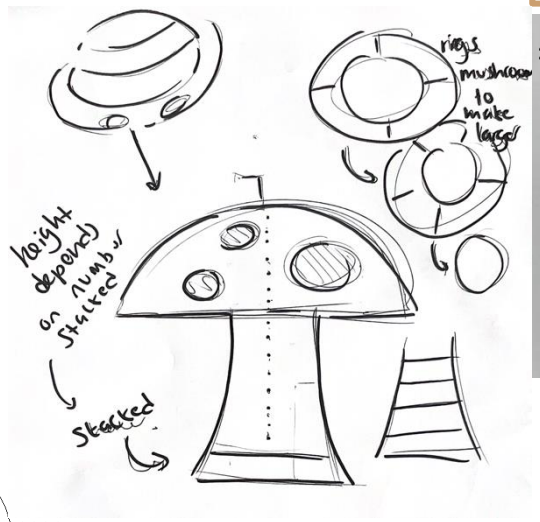
William Howe

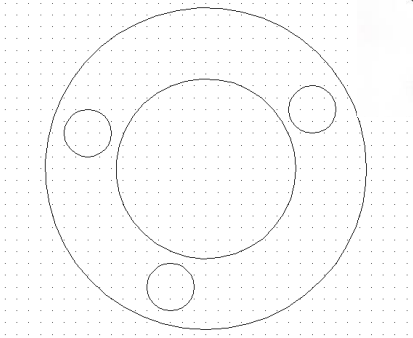
Intro: I will creating / design a cover over the top of the mechanism as wholes are in the way and prevent children form easily playing and drawing on the surface. I will investigate the joining of these pieces and protentional ways I could insert additional toys and accessories in such as buckets.

Following research on the full shape expanding circles (6-8 parts) I wanted to research into alternative ways in which I could create a user-ball smooth work surface. My initial thoughts were to create pieces which could be stored within the mushroom and overlay / put on top of the expanding mechanic to allow for a smooth and continuous play surface.

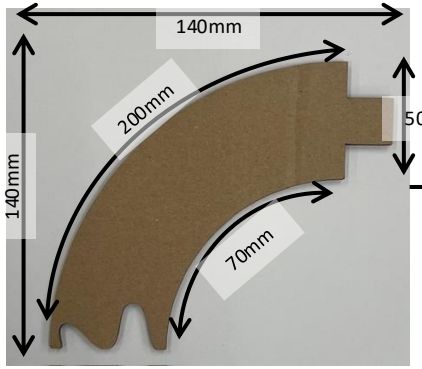
I first divided a circular design into four sections, as I believe this is the most efficient way to minimize the risk of losing pieces. Next, I explored different methods for connecting these sections. My goal was to create connections that were not only visually appealing to the user but also strong, durable, and capable of withstanding frequent use, particularly by children who would be assembling and playing with the pieces





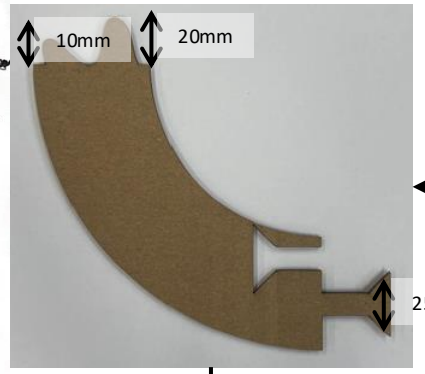


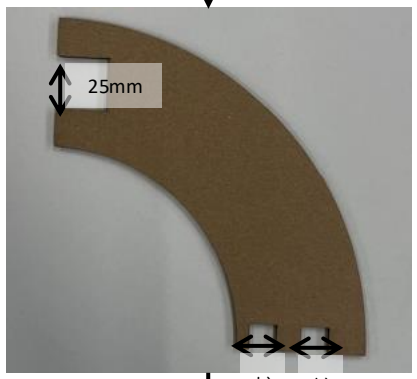
I used 2D design to create a quick design of the variety of connections and quickly cut them out with high accuracy allowing me to test my ideas.



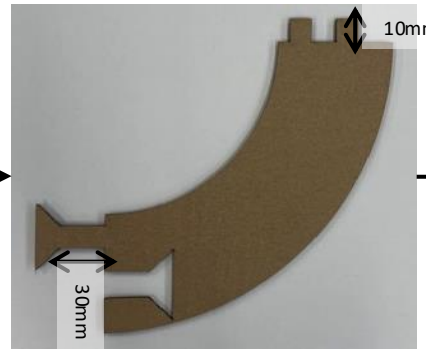
Single block – the connection was easy to line up and connect. However, it separated and came apart very easily meaning it could easily be pulled part when children are playing on it.

Wave connection – Aesthetically pleasing design, due to the different size waves it resulted in the two pieces being hard to separate. However, it was also hard to line up the pieces to get them to correctly connect together. In addition, due to the size of the wave there was limited material at each side causing the sides to snap and break.

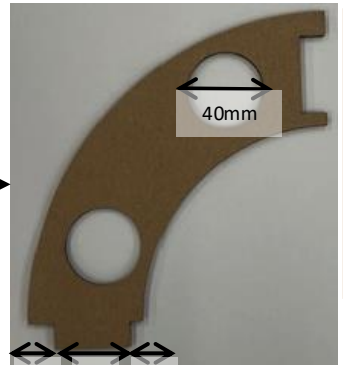




Double block – after my completion of the single block I wanted to test the strength of the two blocks, the connection was stronger. However, it lacked an aesthetically pleasing design. In addition, the pieces separated very easily.



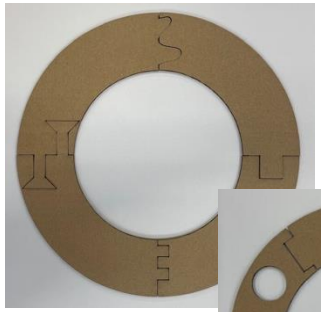
Triangular (train inspired linkage) – this connection has the strongest linkage and didn't separate easily compared to the other three designs which could easily be pulled apart. The connection looks aesthetically pleasing and has an interesting design however, due to the size of the linkage there was limited material at each side causing the sides to snap and break. In addition, this design would be hard for an adult to assemble due to the way to have to connect the pieces by fitting one piece over another.



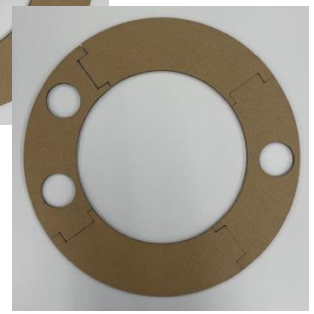
I added holes into the design to allow for bowls and buckets to be introduced and played with by the children. This can make the space more multifunctional as it can not be used for "messy mud activities" (one of my primary user comments on my interview with Sarah Morgan)







Example of a glue lid showing how a bowl could fit into the design.



The ring has a hole in the middle allowing for the central mushroom to go through.

Summary / next Steps :

- I like the design of this mushroom top. However, I think it would be hard to store, hard to secure easily to the mushroom and ,cumbersome to put on. Therefore, I will return to looking at mechanism which can open and close and will focus my development and research onto solid surfaces opening and closing with gaps / holes in the middle.

Mushroom – Expanding Work Surface Iteration 5 &6 (4 and 6 segment circle)

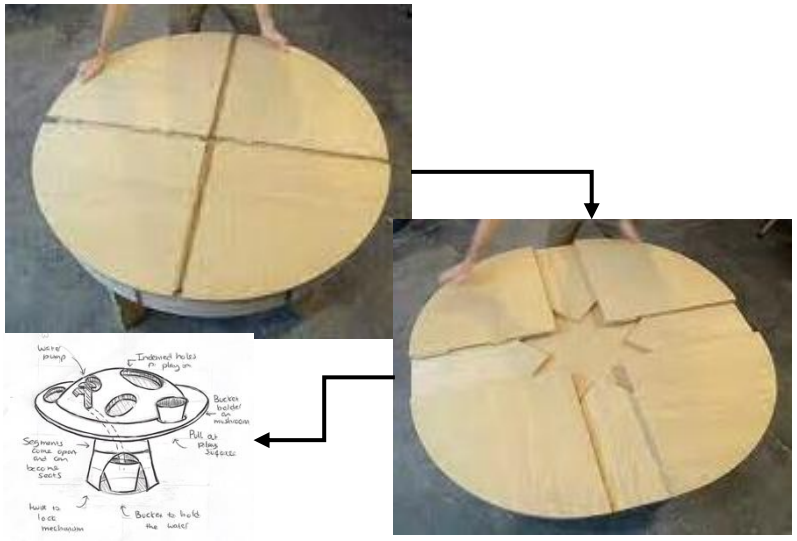
William Howe

Intro: I will research and design a work surface which complexity is reduced following my Hoberman circle inspired designs.

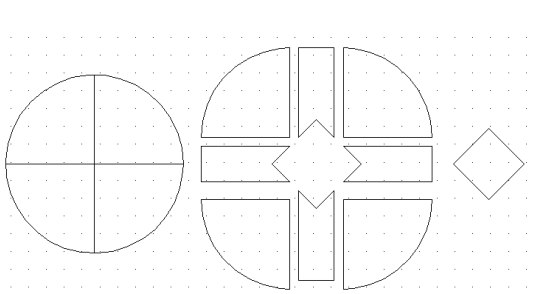
Following research on the Hoberman circle I identified that even though it allowed for easy gain in area by expanding and contracting, the surface was unusable due to small holes in-between each arm (part) of the mechanism. In addition, the mechanism was over complicated and would be hard to maintain in an outdoor forest school environment, and the many pivot points caused the area to lack strength and structural integrity for children to play on. Due to this I decided to conduct research into expanding and collapsible tables.

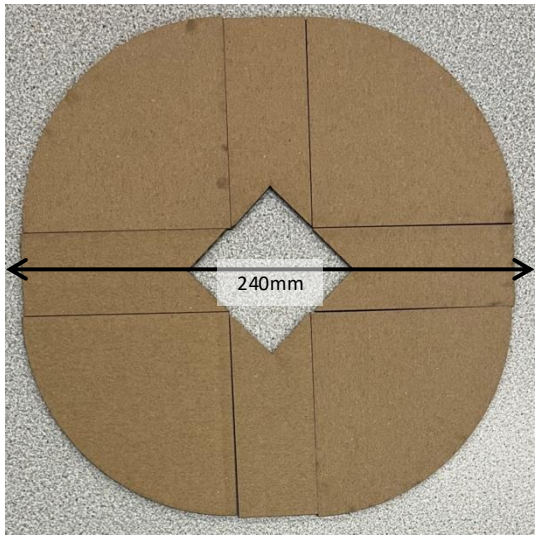
Expanding and collapsible circular table research:

Expanding circular tables are a versatile solution designed to accommodate varying numbers of people at one space. Typically, these tables have a central circular core with additional extensions that can be added to increase their size. The shape of an expanding circular table changes as the extensions are introduced. When the table is fully expanded, the core remains circular, but the extensions often create an oval shape. This allows the table to offer more seating space without losing the elegance of its round form. Some expanding designs feature a central mechanism that slides apart, with the additional extensions hidden within the table's structure, while others may require manual addition or removal of separate pieces. Taking inspiration from these existing products will allow me to create a flat play area with no holes in-between.

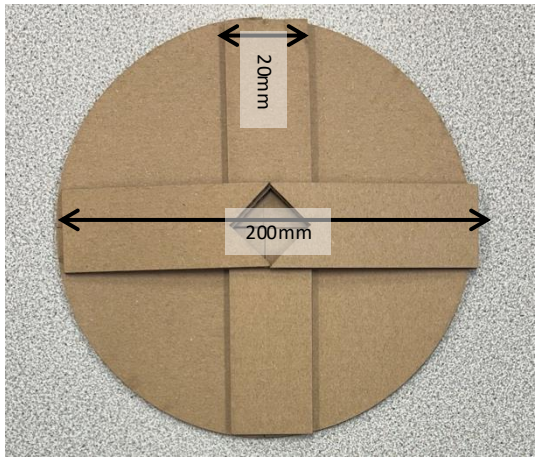


I used 2D design to create a quick design of the expanding circle to understand how I could make the parts and how It would collapse and function. I laser cut the design out to see how it would physically function, collapse and expand. I created a 4-part design and and 8-part design to see how the difference in size affects its ability to expand and contract.

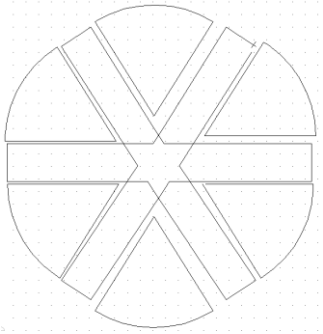


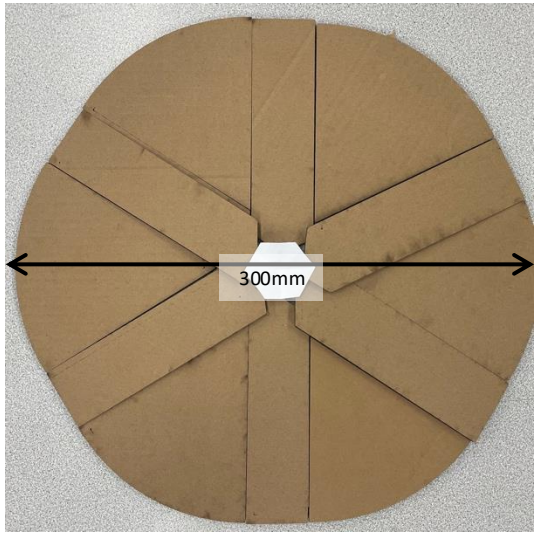


Mechanism (circle) expanded

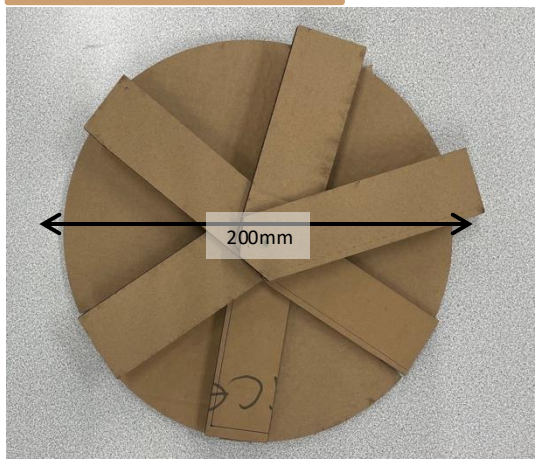


Mechanism (circle) contracted





Mechanism (circle) expanded



Mechanism (circle) contracted

Both designs could successfully expand and contract creating a large surface area with a central opening for pipes when expanded. However, when fully contracted, it leaves no space for the pipes. At this stage, I have not devised an automated way for the mechanism to open and close, so it would require manual assembly. The smooth continuous surface allows for a large area which the children can play on / do a variety of activities on.

Good:

- The circle maintains it space
- Increase the surface area of the mushroom
- Useable space for children to play and do activities on.
- Simple design so can be mended easily
- Hole in the middle for water pipes to run through when expanded.

Bad:

- When contracted there is no space for waterpipes to run-through
- When assembling you must individually assemble each part manually there no way to atomically open and close it in this design.
- Bulky and parts may be heavy to carry in a larger scale made of a different material
- No way of connecting the piece together they area just laying on the ground and not held together.

Improvements:

- I could try design a mechanism to help assist the expanding and contracting of the circle.
- I could add a curve to each corner of the inner circle meaning a water pipe could run through when contract.
- Need to find a way to assemble the parts together, I could conduct further research on existing products, dowls, hinges and flatpack furniture.

Next Steps:

- I will next design and find inspiration for a mechanism that can both expand and contract like the Hoberman's circle, more simplistic and has a flat work surface area for the children to use.



William Howe

Mushroom – Expanding Work Surface - Iteration 7 + Product Analysis

Intro: I will research into existing folding tables and take inspiration to help me further my design.

Liegnitz ring table research:

The Liegnitz extendable round ring table, designed in the 1920s by Josef Seiler, is a remarkable piece of furniture with a unique ability to increase its diameter. This is achieved through a clever mechanism: the frame is first lowered via a threaded adjustment. Once lowered, eight segments, seamlessly integrated around the table's edge, can be extended outward to enlarge the tabletop. The table rests on a square base and is constructed partly from solid oak and partly from oak veneer.







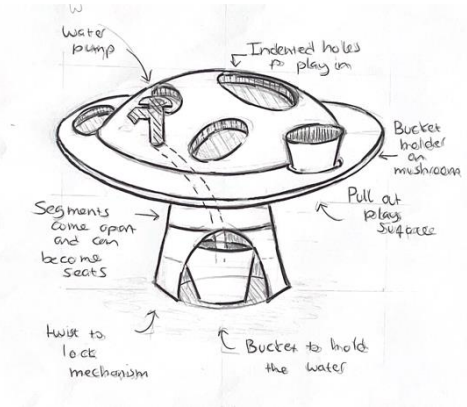
Lowers - leaves follow

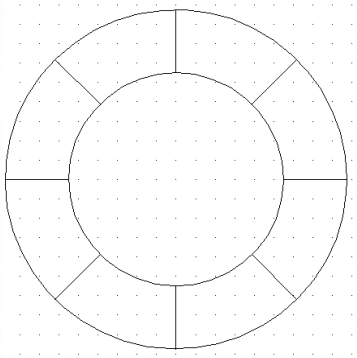


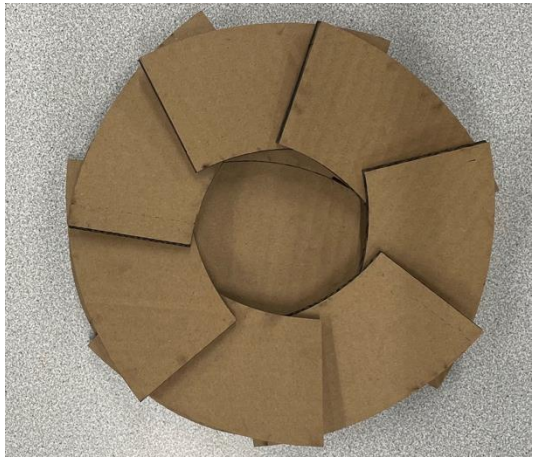


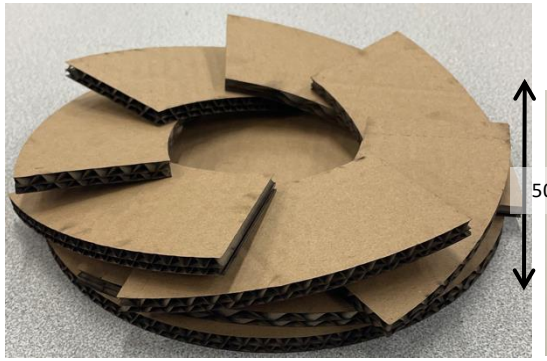
Eight segments come out and seamlessly integrate to the table

Following research on the Liegnitz ring table, I have created a design that can slide and contracted when closed and expand into a fully form circle when open. I will lazer the design to ensure the ring parts could fit onto the center of the circle when contracted to allow for a compact design.

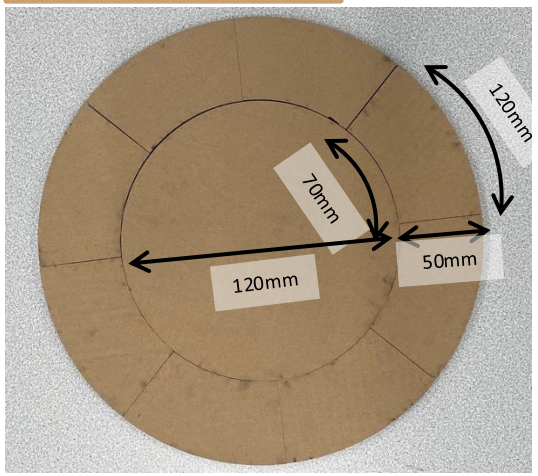






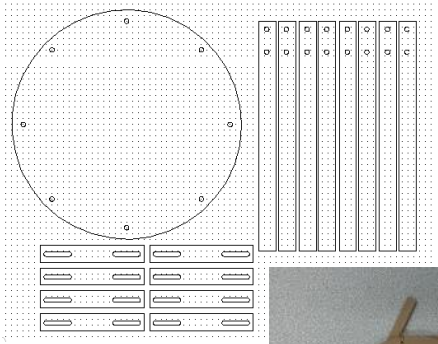


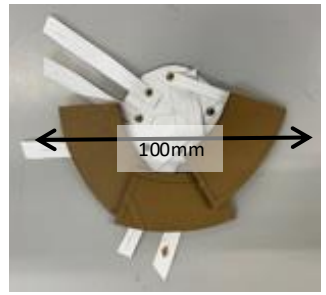
Mechanism (circle) contracted

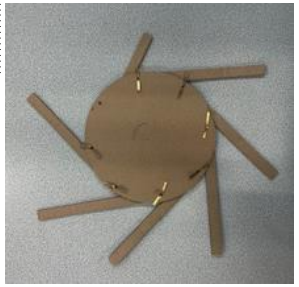


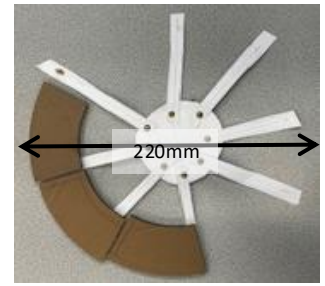
Mechanism (circle) expanded

The design can successfully fold up into a compact mechanism, However there is no hole for the water pipes to go through. In addition, when I was seeing how the mechanism contracted it hard and a slow tedious process to pile each of the outer circular parts onto of each other without it falling apart. The smooth continuous surface allows for a large area which the children can play on / do a variety of activities on. I will investigate the mechanism moving the Liegnitz ring table to understand how it opens and closes. I feel so far that this design / model has inspiration from the Hoberman's circle mechanism and the simplistic flat work surface area from my 4- and 8- part circle models / research.











Video 68.1



Video 68.2

Bad:
- When contracted there is no space for waterpipes to run-through
- Bulky and parts may be heavy to carry in a larger scale made of a different material
- Parts clash when closed
- Complex design, can't make the pieces open smoothly even with braces connecting neighbouring legs together.

Good:
- The circle maintains it space
- Increase the surface area of the mushroom
- Useable space for children to play and do activities on.

Improvements:
- I could try design the circular sections with a slight slant on the lip, so it make it easy for the parts to slide over each other and compact.

Next Steps:
- I will not be taking this forward due to its complexity.

Product, Component and Material research-

Intro: I am going conduct product research on an expanding table form Ikea, as this will allow me to see firsthand the mechanism used for an expanding table













Photos I took-Which shows the process in stages of the table being expanded and fixed into position





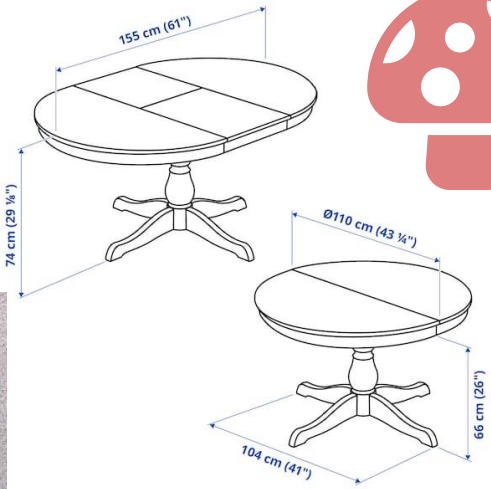





Photos I took I thought the groves which allowed the table to expand easily would be helpful with my own mechanism.

I had already tried something like this with my Iteration 1 expanding mechanism







Video 69.1

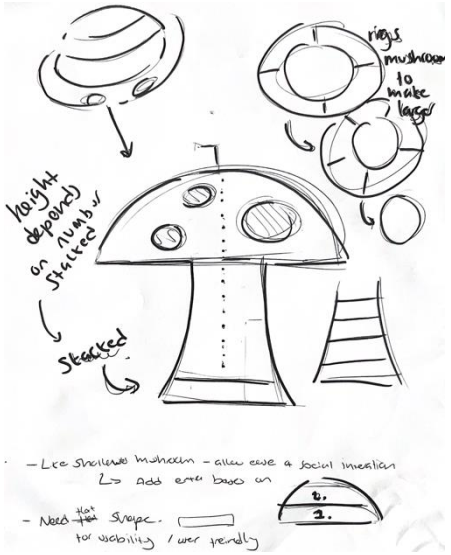
I took of opening the table

Review Quote

-Great table, looks beautiful in our dining room. I like that we can extend the table to accommodate extra guests. Easy to use and excellent quality
-Easy to extend from a four-seater to a six, with a very ingenious and hidden mechanism.
-Just what we were looking for, seats 4 and when extended 7 possible 8, so over all a winner

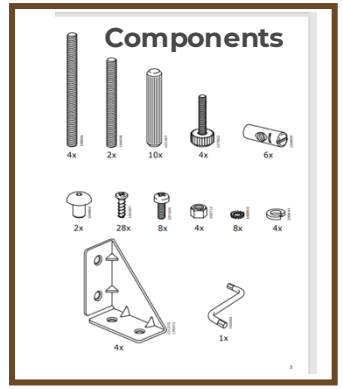
Features Product details

It's quick and easy to change the size of the table to suit your different needs. With the extra leaf stored under the table top you can extend the table to seat from 4 to 6 people.
Concealed locking function prevents gaps between top and leaf and keeps the extra leaf in place.
Can be easily extended by one person.
The extra leaf can be stored within easy reach under the table top.
The clear-lacquered surface is easy to wipe clean.
Designer Carina Beng



Material Table top/ Extension leaf:

Particleboard, Melamine foil, Acrylic paint, Plastic edging
Side rail/ Top rail/ Column:
Fibreboard, Acrylic paint
Bottom:
Particleboard, Acrylic paint, Plastic edging
Leg:
Solid wood, Acrylic paint
Care
Table
Wipe clean with a cloth dampened in a mild cleaner.
Wipe dry with a clean cloth



Weight & measurements
Max. length: 155 cm
Height: 74 cm
Diameter: 110 cm



Summary: I have conducted a product analysis and have been inspired by the simple slot design with dowls, allowing for smooth opening and closing of the table whilst limiting complexity.

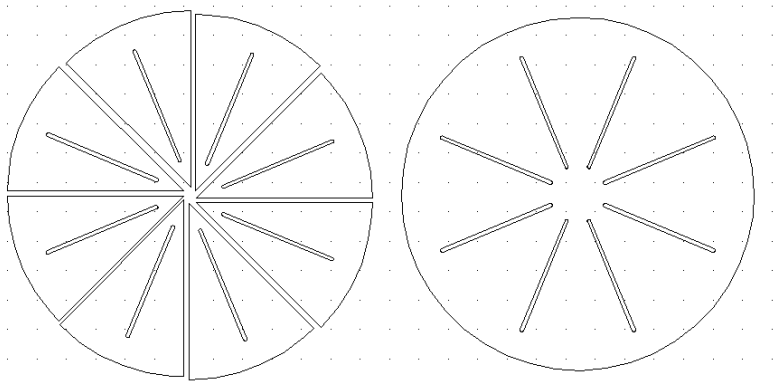
Next Steps: I will next design a simpler expanding and contracting mechanism following all the research I have conducted. I will try and minimize parts and ensure the work surface if smooth and flat so the children can easily play on it.

Mushroom – Expanding Work Surface Iteration 8 – **Chosen iteration**

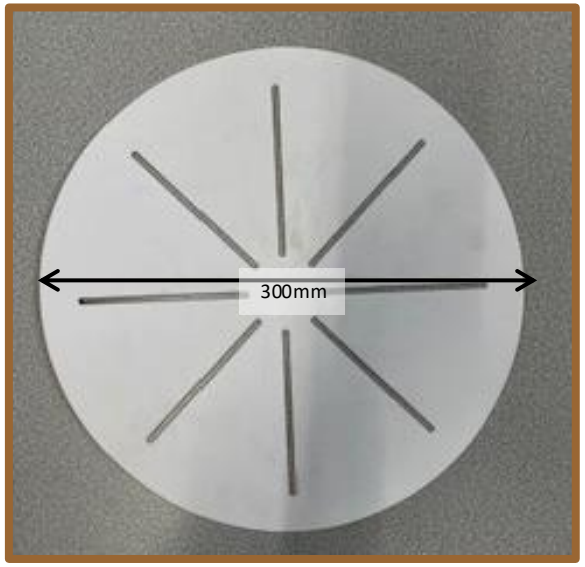
William Howe

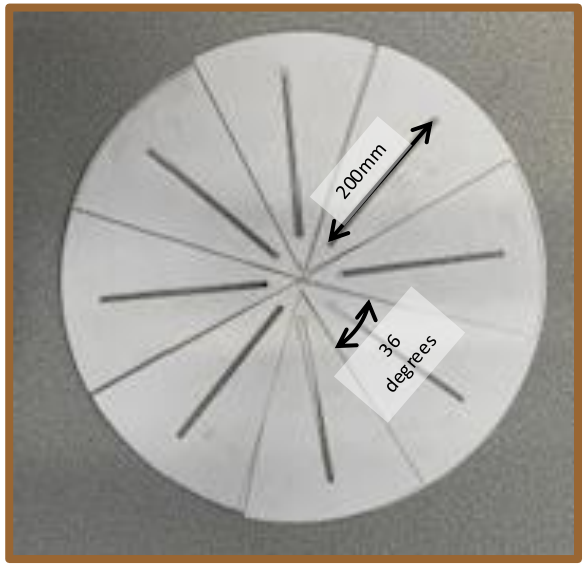
Intro: : I will design a simpler expanding and contracting mechanism following all the research I have conducted. I will try and minimize parts and ensure the work surface if smooth and flat so the children can easily play on it.

Following research on the Hoberman circle I identified that even though it allowed for an easy and continuous expansion of the surface it was too complex and tricky to get each part running together in unison. Due to this I refined the complexity by dividing a circle into 10 sections which could individually be used as sliding draws. This kept the mechanism simple whilst still achieve the same desired effect / extra space that I wanted to achieve. In addition, it meant the children could have as many draws open as they needed compared to the surface being out or in.

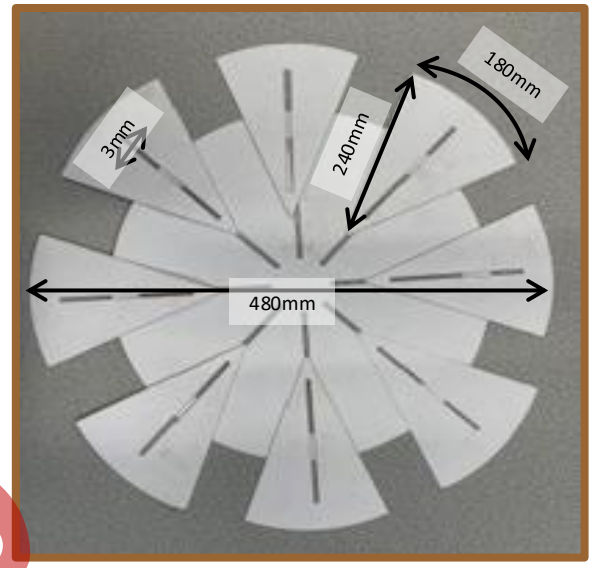


I used 2D design to create a quick design of the mechanism to understand how I could manufacture the parts, understand how It would collapse and perform its function. I lazer cut the design out of card to see how it would work and understand what improvements I have to make.

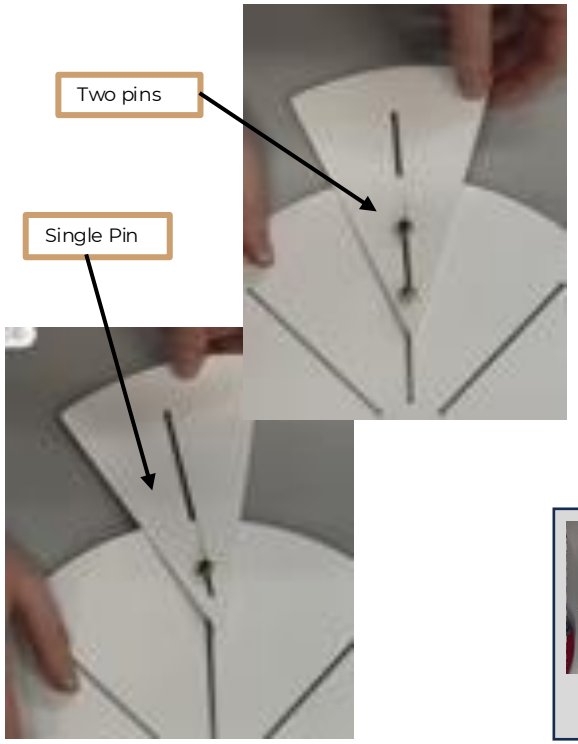




Mechanism (circle) contracted



Mechanism (circle) expanded



Only using a single pin to attach the drawer caused it to pivot around that point, meaning it wouldn't pull out in a straight, parallel motion, which would make it awkward and difficult for children to use. To solve this, I added a second pin in the runner, which ensured it pulled out in a straight, parallel motion rather than pivoting. This made the drawer much smoother and easier for me to use, therefore making it easier and more user friendly for the children which will use it.

Good:

- The mechanism increase the surface area of the mushroom
- Useable space for children to play and do activities on.
- Simple design so can be repaired easily
- Hole in the middle for water pipes to run through when expanded.
- The number of surfaces which are needed to be out is dependent on individual needs of the children.

Bad:

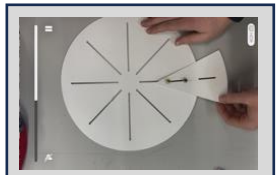
- When contracted there is no space for waterpipes to run-through
- When assembling you must individually assemble each part manually there no way to atomically open and close it in this design.
- Bulky and parts may be heavy to carry in a larger scale made of a different material
- No way of connecting the piece together they area just laying on the ground and not held together.

Improvements:

- I could try design a mechanism to help assist the expanding and contracting of the circle.
- I could add a curve to each corner of the inner circle meaning a water pipe could run through when contract.
- Need to find a way to assemble the parts together, I could conduct further research on existing products, dowls, hinges and flatpack furniture.

Next Steps:

- I will next design and research into the shape of the mushroom base.
- I will also research into an expanding mechanism I could use to adjust the height of the users therefore allowing a variety of children of different ages to use the product.

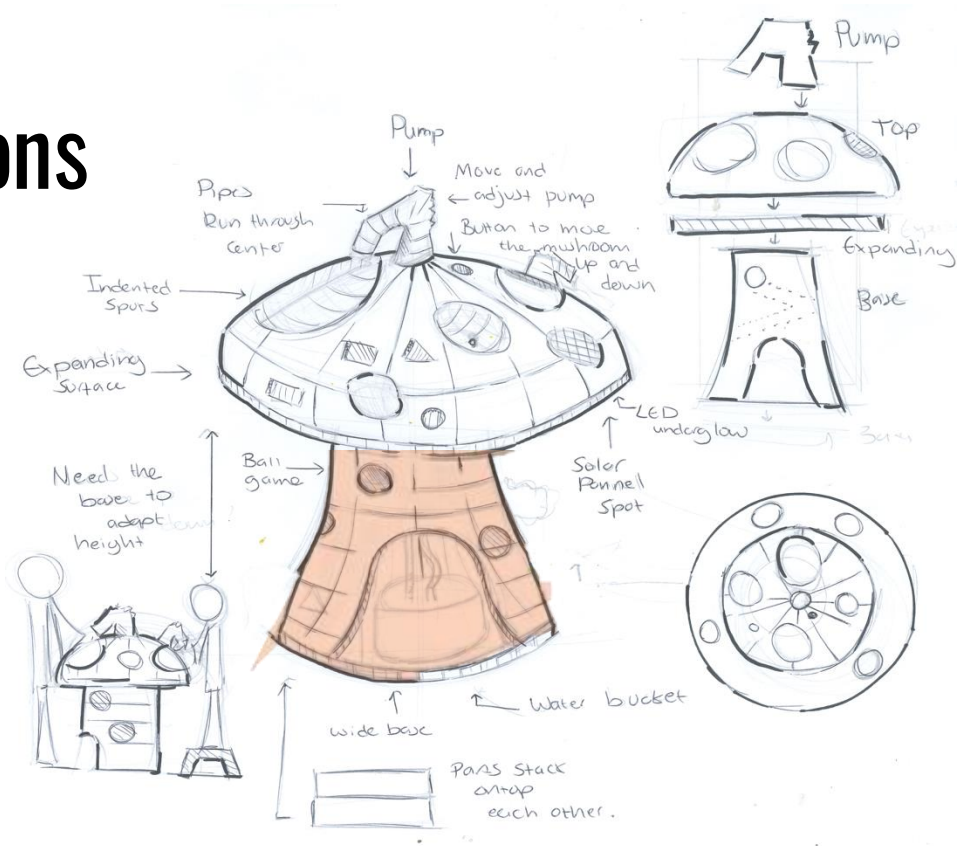


Video 70.1



Video 70.2

Base Design Iterations



Mushroom – Base- drawn ideas

William Howe

Intro: Taking inspiration my mood boards I will design and evaluate a variety I of mushroom stems.

Using my mood board, I sketched a variety of possible mushroom base designs.



















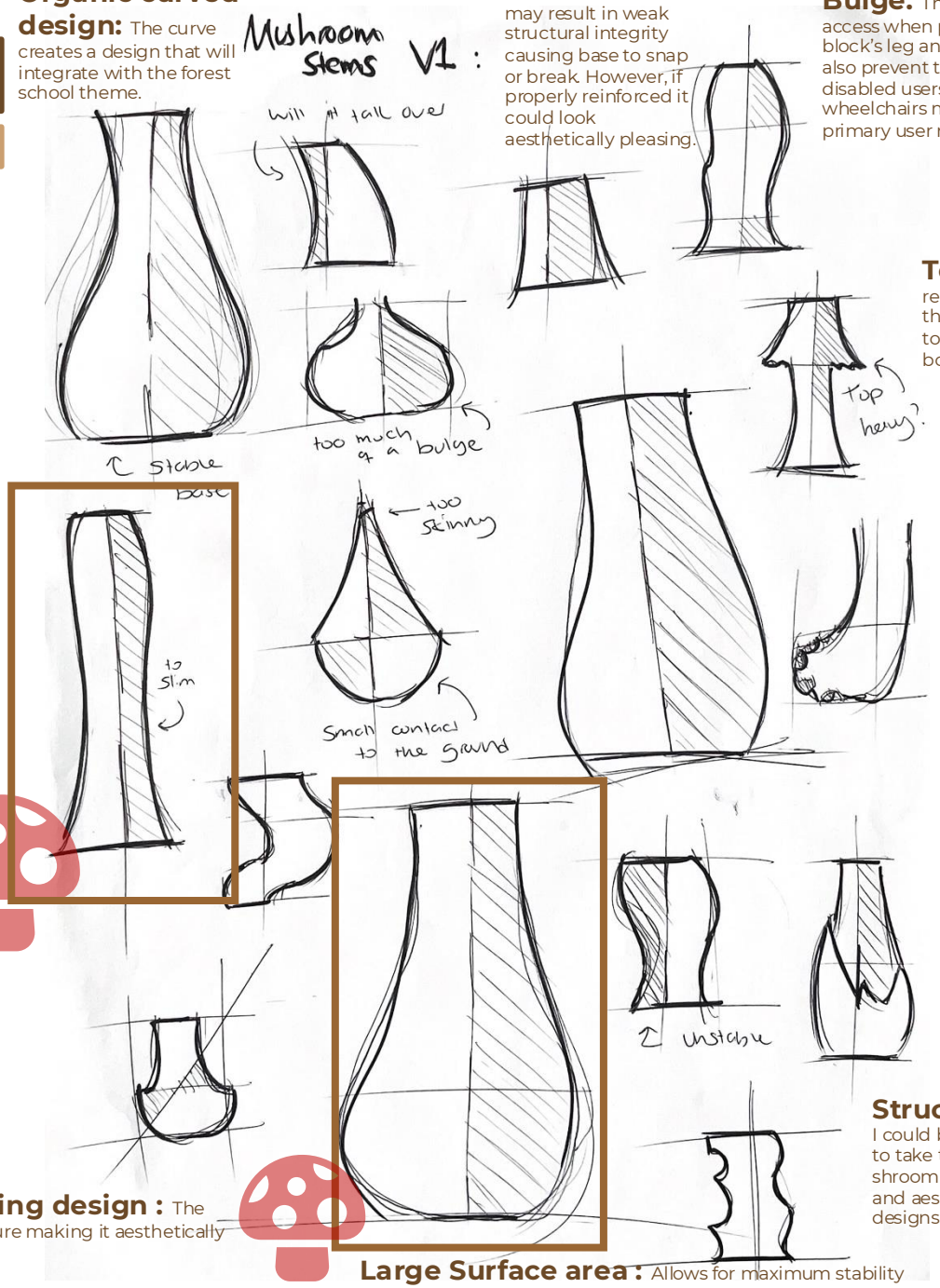
Too Slim: The base would be crushed by the weight of the shroom head on top. In addition, due to its slim design it has a poor SA meaning theirs a higher chance it will fall over, hurting a child.

Large stable base : Allows for maximum stability

Center of balance is off: The design would be hard to ensure that weight is maintained in the centre, especially if children are playing, they would cause the wight to be distrusted differently over the course of a play time.

Aesthetically intriguing design : The design mimics and flows like nature making it aesthetically pleasing and organic.

Organic curved design: The curve creates a design that will integrate with the forest school theme.



Arch: The arch may result in weak structural integrity causing base to snap or break. However, if properly reinforced it could look aesthetically pleasing.

Bulge: The bulge prevents easy access when playing this the toy as its block's leg and knee space. This would also prevent the toy being accessible to disabled users such a children in wheelchairs meaning it would not hit my primary user needs.

Top heavy: This would result in an unstable base, there is a greater mass at the top of the design than the bottom.

Counterweight: The design has a counterweight to allow the base to pultrude left of the design.

Rounded base: There is small contact to the ground meaning that it would likely topple or roll over making the structure unsafe.

Structural integrity: I could build a centre structure to take the weight of the top shroom head, then create fun and aesthetically pleasing designs around.

Large Surface area : Allows for maximum stability

Good:

- Organic shapes, make ensure the product will be aesthetically pleasing and will fit with the forest school theme.
- Some bases have a large base ensuring it is secure and won't topple over when children are playing on it.

Bad:

- Arches may result in weak structural integrity causing base to snap or break. However, if properly reinforced it could look aesthetically pleasing
- Some designs are top heavy which would result in the product being unstable

Improvements:

- I could try design the stem in a way to ensure a large surface area in the base and curve it towards to top to ensure there's enough space under for legs and knees if bent. I would also not include heavy curves as I feel it would make the base unstable and could potentially fall over.
- I could add a counterweight on the stems with a top heavy design.

Next Steps:

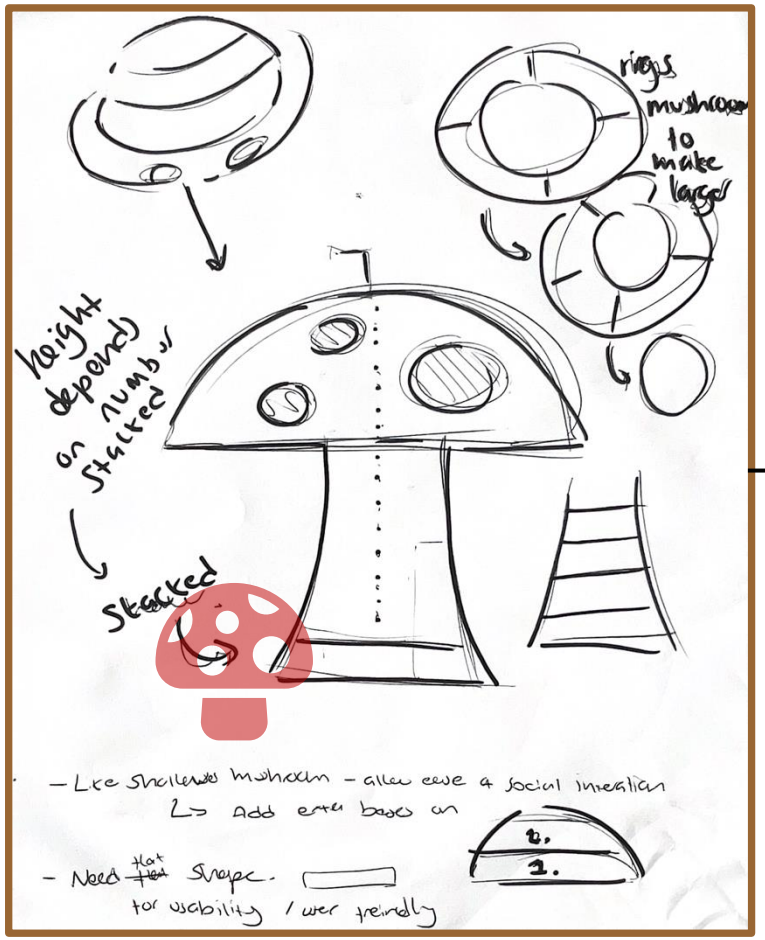
- I will next design a mushroom stem considering my improvements and will design and iterate a way to make my base extend up and down with great structural integrity and stability.

Mushroom – Base extension Stacking

William Howe

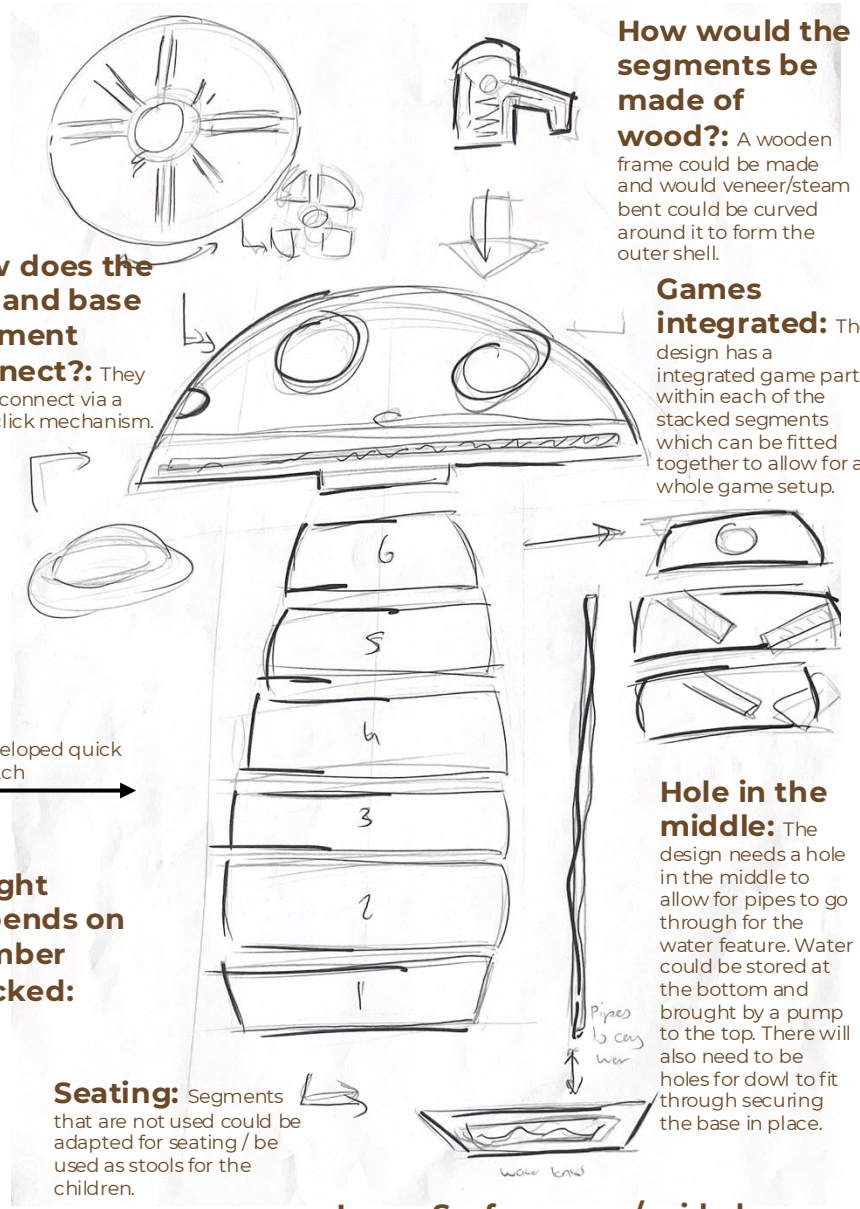
Intro: I will further develop the shape of the mushroom base and investigate a away of incorporating and an adjustable height mechanism into it

To fit my PUN on product/storage size and outline requirement of inclusivity, I have decided to add a feature into my design which would allow the height of the mushroom to change. This allows for a variety of users of a variety of age ranges (2-11 as required from interview) to use the product and further allows the product to be easily become compact allowing for easy storage. I first decided to develop a design that would allow the base to be stacked together, changing number of parts stacked on top of each other would change the height of the product.



I need to further develop the design as it will be hard to remove and add each stacked segment. This is because each time the product needs to be adapted the heavy mushroom head will have to be lifted and a dowl keeping each of the segments in place will have to be removed at the same time, then another person will have to fit the segment into its specific part of the base line it up with the dol allowing the part to be securely fixed and put back to place.

Developed quick sketch



How would the segments be made of wood?: A wooden frame could be made and would veneer/steam bent could be curved around it to form the outer shell.

How does the top and base segment connect?: They could connect via a twist click mechanism.

Games integrated: The design has a integrated game parts within each of the stacked segments which can be fitted together to allow for a whole game setup.

Height depends on number stacked:

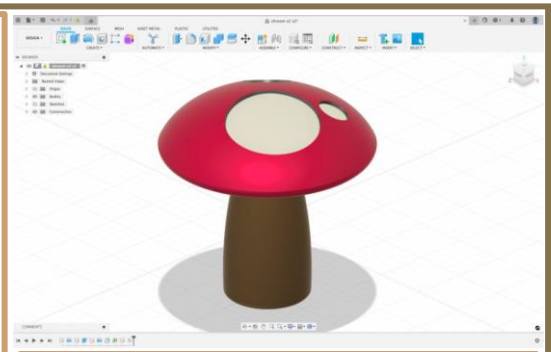
Hole in the middle: The design needs a hole in the middle to allow for pipes to go through for the water feature. Water could be stored at the bottom and brought by a pump to the top. There will also need to be holes for dowl to fit through securing the base in place.

Seating: Segments that are not used could be adapted for seating / be used as stools for the children.

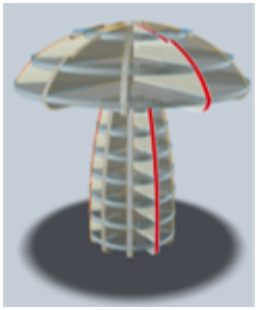
Large Surface area / wide base

: Allows for maximum stability

I decided to model a basic shape of my mushroom using CAD, I then spliced it using a Autodesk splicer to see how the mushroom could be made ensure good structural integrity. However, these designs wouldn't allow a space for the bucket or any other internal components such as a pump. I will next develop a frame (Skellington) in which could included other components such as electronics and a water pump.



Next Steps I such as a pump. I will next develop a frame (Skellington) in which could included other components such as electronics and a water pump.







Good:

- Hole in the middle for water pipes to run through when expanded.
- Stackable so pieces can be removed to change / adapt the height. In addition, stacks could be used as seats for the children.
- I design the stem in a way to ensure a large surface area in the base and curve it towards to top to ensure there's enough space under for legs and knees if bent.

Bad:

- Don't know how to connect the parts.
- Hard to adapt / adjust the height as you must lift every section above the place in which you want slip the section into including the mushroom top.
- Parts must go in a specific order to create the organic / smooth space.

Improvements:

- I could add a mechanism that lifts the mushroom up and down compared to have to remove / add sections
- They could connect with dowls to stop them slipping.

Next Steps:

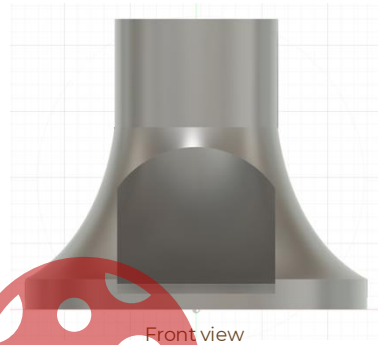
- I will next research and design an expanding mechanism which raises and lowers the mushroom. I will also further develop the mushroom shape. I like the shape of the first mushroom design compared to the second design as it has a larger base and curves towards the mushroom top. I think it looks more aesthetically pleasing

Mushroom – Manufacturing - Base external frame – Chosen idea

Intro: I will design and develop CAD drawings of the base based on my previous designs. I will also. Be making sure the design will be user friendly for wheelchairs users .

Following my research into extending base, I have decided to split the design into two parts. Part one is an external frame to make the product looks aesthetically pleasing and ensure stability. Part two is a spring mechanism that takes majority of the weight enabling the extension and contraction of the product.

Taking inspiration from my initial base designs I developed the design to ensure the base has the maximum SA on the floor, so It is effectively able to perform its function of stability. The sloping designs makes the base aesthetically pleasing and more organic looking without reducing to much leg and knee space underneath. There is an opening for a bucket to be placed allowing for water to be provided for to the hand pump which is on top. I first created a mode on fusion 360 to allow me to quickly and effectively develop my idea.



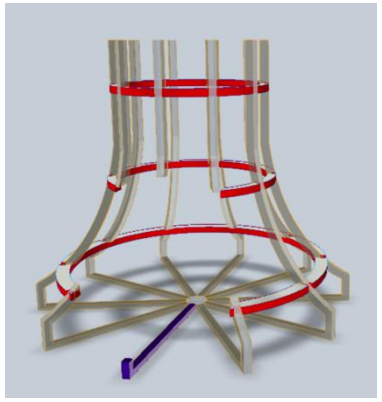
Front view



Top view

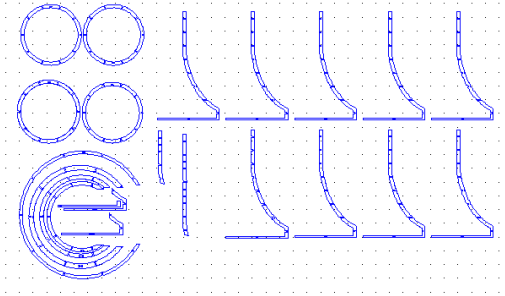


Side / angled view



Sliced fusion base

I sliced my fusion model, to create a skeletal frame on which I can cover in a sustainable material I looked at earlier such as Demin or Hesin.











Cap to base proportions

I used corrugated carboard to quickly prototype different sized mushroom heads, allowing me to identify which sized head base most suitable for the base.

Next Steps: I will take forward the smallest as I believe this is best proportioned to the base and ensure the maximum stability for the product. Despite being the smallest, it would still allow wheelchair usability.

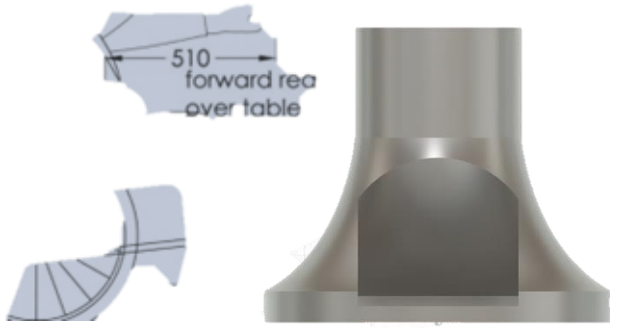






Inclusively – wheelchair access

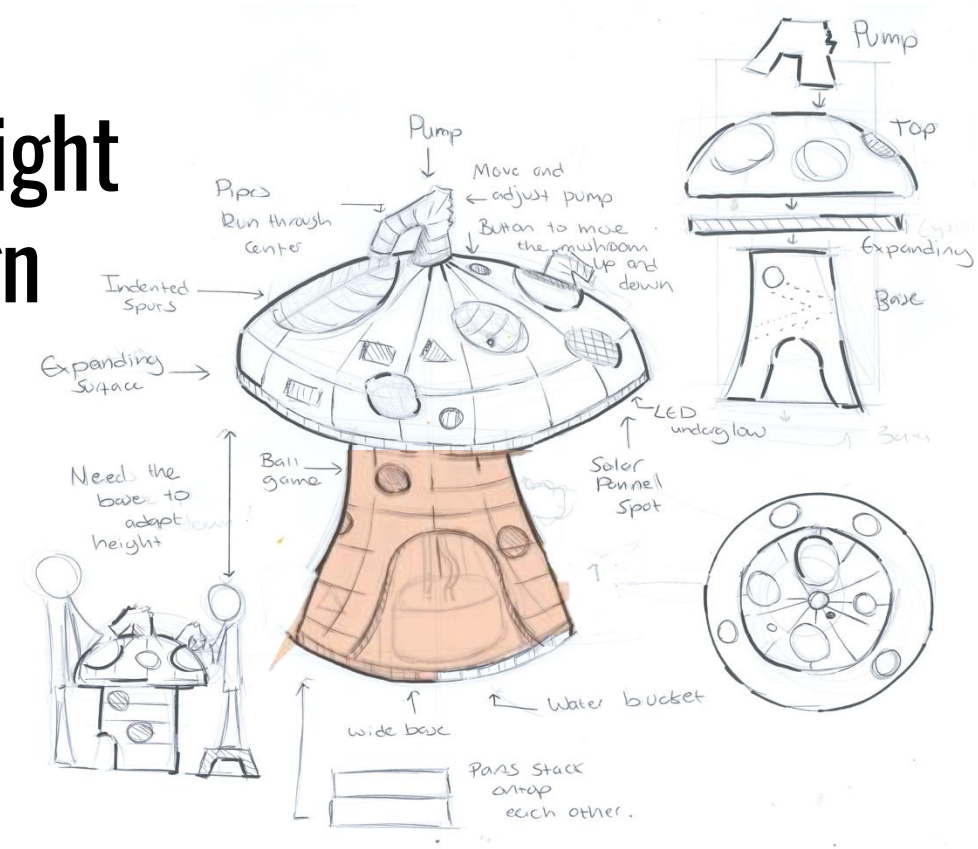
The concave design for the mushroom base allows for leg room under where the mushroom head would be situated. This allows for a variety of students including those with disabilities (such as those in a wheelchair's) to be able to use the product making it accessible to all users.



Next Steps:

- I will research into a variety of rising and lowering mechanises. I will look at their features, materials and components used in products that lower and raise. This will help me develop a greater understanding of how I can design my product have the ability to have an adjustable height. To help me do this I will initially visit Ikea and look and see how the products function in the real life.

Base Adjustable Height Mechanism Design Iterations



William Howe

Research - Ikea visit-Raising systems and mechanisms- Product, Material, Features and Component Research

1

Intro: I will research into a variety of Ikea products with rising mechanises. I will look at their features, materials and components used in the products. This will help me develop a greater understanding of how I can design my product have the ability to have an adjustable height. To help me do this I will visit Ikea and look at the products in the real. I wanted to look into products that raised and lowered

MÅLSKYTT / MITTBACK Desk



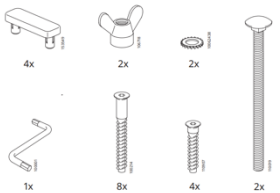


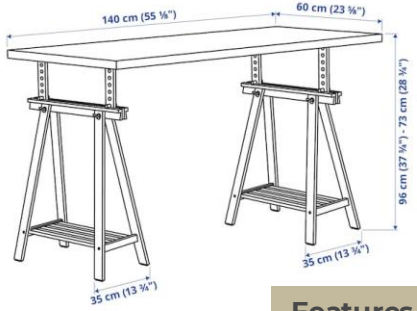
Material

Table top
Particleboard, Birch veneer, Clear acrylic lacquer, Paper foil, Birch veneer, Clear acrylic lacquer

Trestle
Solid birch,

Components





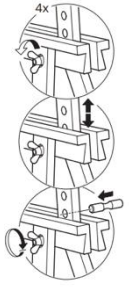


Size / Measurement

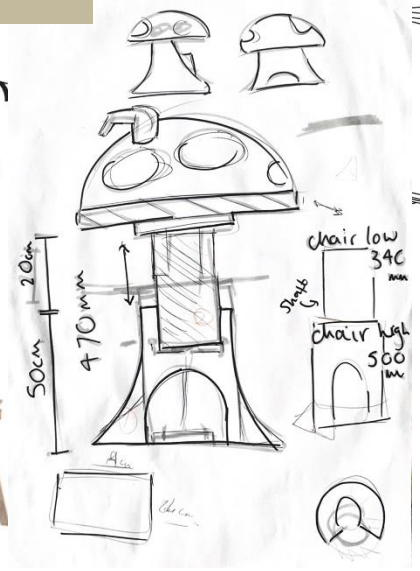
Length: 140 cm
Width: 60 cm
Max. height: 96 cm
Min. height: 73 cm











Features

The table top in birch veneer and trestles made of solid wood provide a stable and durable desk to work at.
MITTBACK trestle has a tilt function that helps you get the comfort you need to unleash your creativity when you work from home or enjoy a hobby.
You can choose a flat or tilted table top, which is good for writing, painting or drawing, by adjusting the trestle.
Plenty of room on the shelf under the trestle for your printer, books or papers. That keeps your table top clear so you have more room to work.



Video 76.1

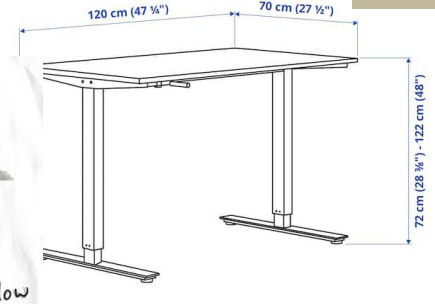
TROTTEN Desk sit/stand

Material

Table top
Particleboard, Melamine foil, Plastic edging
Underframe sit/stand f table top
Feet:
Steel, Steel, Epoxy/polyester powder coating
Midbeam/ Leg/ Side rail/ Crank:
Steel, Epoxy/polyester powder coating
Handle:
Reinforced polyamide plastic
Shaft:
Steel, Galvanized
Tube:
Aluminium
Care
Underframe sit/stand f table top
Wipe clean with a cloth dampened in a mild cleaner. Wipe dry with a clean cloth.

Safety

This desk has been tested for office use and meets the requirements for safety, durability and stability set forth in the following standards: EN 527-2:2002, -3:2003 and ANSI/BIFMA x5.5-2008.
This table top has been developed for public use and meets the requirements for safety, durability and stability set forth in the following standard: EN 15372 and ANSI/BIFMA X:5.5







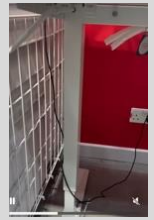


Review Quote 'Sturdy desk, easy to assemble (but I needed help at one stage, as the instructions suggest) and easy to use. The raise/lower mechanism feels reassuringly solid.'

Size / Measurement

Depth: 70 cm
Width: 120 cm
Max. height: 122 cm
Max. load: 50 kg
Min. height: 72 cm



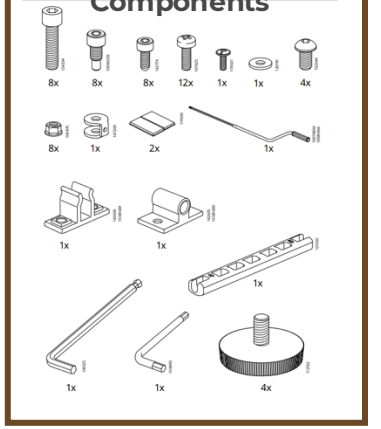


Video 76.2



Features

You can easily adjust the height of the desk between 70 and 120 cm by just cranking the handle and get the best position for both sitting and standing. Changing positions between sitting and standing helps you move your body so you both feel and work better.
Comfortable for left- and right-handers, as the crank handle can be mounted on the left or right side.
The crank handle slides in under the table top when not in use for a clean, uncluttered look.
Adjustable feet make the desk stand steady also on uneven floors.



Summary and Next: I found the **MÅLSKYTT / MITTBACK** Desk design hard / fiddly to use, I think it would be difficult to use especially with a weight mushroom top and the need to constantly and quickly adjust the height a variety of children

I liked the **TROTTEN** Desk as it easily moves up and down with the use of motors and move with substantial weight. However, the mechanism complex and may break in an outdoor environment. There also no electricity available this wouldn't work.

Next Steps: I will not include these within my design, as I don't think they are suited for the weight and forest school outdoor environment.

Research - Ikea visit-Raising systems and mechanisms- Product, Material, Features and Component Research 2

William Howe

Intro: I will research into a variety of Ikea products with rising mechanises. I will look at their features, materials and components used in the products. This will help me develop a greater understanding of how I can design my product have the ability to have an adjustable height. To help me do this I will visit Ikea and look at the products in the real.

DALFRED BAR STOOL
Designer Sarah Fager

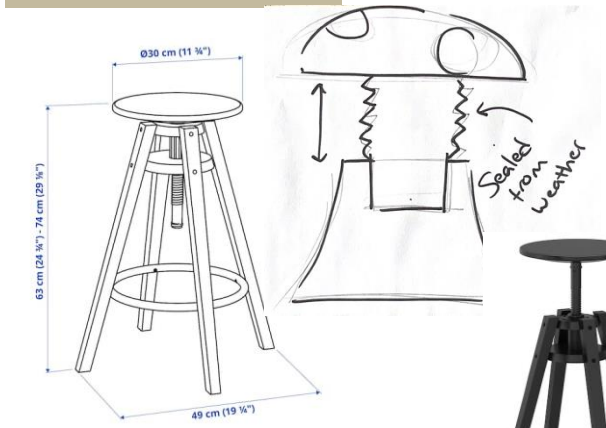


Material
Frame:
Solid birch, Adhesive, Acrylic paint
Footrest/ Mounting plate/ Tube:
Steel, Epoxy/polyester powder coating
Threaded column:
Steel, Polyamide plastic, Acetal plastic
Insert nut:
Polyamide plastic, Acetal plastic
Care
Wipe clean with a mild soapy solution.
Wipe dry with a clean cloth.
For increased stability, re-tighten the screws about two weeks after assembly and when necessary

Safety
This bar stool has been tested for home use and meets the requirements for durability and safety, set forth in the following standards: EN 12520 and EN 1022

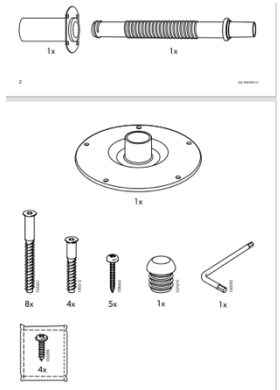
Size / Measurement
Tested for: 100 kg
Seat diameter: 30 cm
Width: 50 cm
Depth: 50 cm
Min. seat height: 63 cm
Max. seat height: 74 cm







Components



Review Quote 'Easy to assemble Brought two, the seat raise and lower function, spindle ideal'



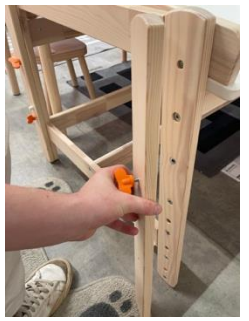
Video 77.1





FLISAT Children's desk
Designer S Fager/J Karlsson

Features
The desk can be adjusted to three different heights, so it can be used for homework or arts and crafts for many years.
The desktop can be tilted to help your child vary their work posture.
The groove prevents pens and other smaller items from falling down when the desktop is tilted.
Your child can keep drawing paper on hand at all times, as the desk has a holder dimensioned for MÅLA drawing paper roll.
If you need extra storage, you can add TROFAST storage boxes that fit the slats underneath the desk.

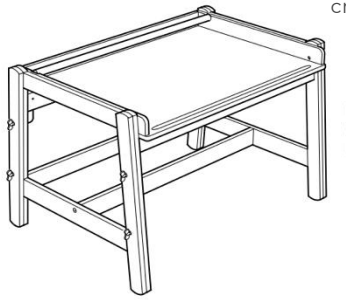








The desk has three heights: 53, 62 or 72 cm



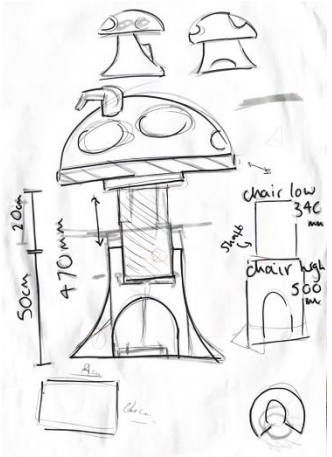
Review Quote
'We bought this for our daughter who has limited space in the box room and also has asd so struggles to remain seated. The sloping desk is perfect to help her be comfortable and the adjustable height will last her for years to come. It's a good desk top space as well so plenty of room to spread out. The paper bar at the back is genius and has helped us limit her to one roll a week! I managed to put it together by myself and it wasn't hard.'

Size / Measurement
Width: 92 cm
Depth: 67 cm
Min. height: 53 cm
Max. height: 72 cm

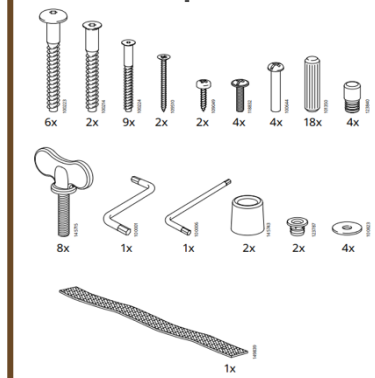




Material
Base:
Solid pine, Tinted clear acrylic lacquer
Top panel:
Fiberboard, Acrylic paint
Care
Wipe clean with a cloth dampened in a mild cleaner.
Wipe dry with a clean cloth.



Components



Summary and Next: I liked how the mechanism of the **DALFRED** BAR STOOL is simple and accessible to use. It allows the product to move up and down with significant weight on it. Due to the simple mechanism being simple it means it is less likely to break in an outdoor environment.

I found the **FLISAT** Desk design hard / fiddly to use, I think it would be difficult to use especially with a weight mushroom top and the need to constantly and quickly adjust the height a variety of children

Next Steps: I will not include these within my design, as I don't think they are suited for the weight and forest school outdoor environment.

Research - Ikea visit-Raising systems and mechanisms- Product, Material, Features and Component Research 3

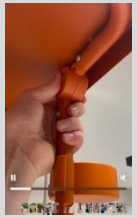
William Howe

Intro: I will research into a variety of Ikea products with rising mechanises. I will look at their features, materials and components used in the products. This will help me develop a greater understanding of how I can design my product have the ability to have an adjustable height. To help me do this I will visit Ikea and look at the products in the real.

BJÖRKÅSEN Laptop stand
Designer Shawn Sowers

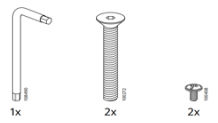






Video 78.1

Features
A flexible and versatile solution that you can use throughout the home and for many different activities.
It's easy to tilt the top and adjust the height of BJÖRKÅSEN laptop stand to enjoy a working position that is comfortable for you.
Easy to fold so it takes up less storage space – just tilt the top.
Clip the included cup holder to the underframe to always have coffee and other beverages nearby.

Components


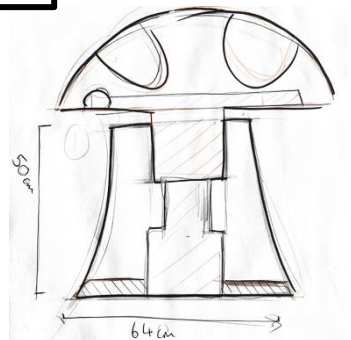
Height: 65 cm
Min. height: 60 cm
Max. height: 70 cm
Depth: 35 cm



Material
Table top/ Supporting rail/ Inner tube/ Outer tube/ Base:
Steel, Epoxy/polyester powder coating
Hinge:
Reinforced polyamide plastic, Acetal plastic
Cover cap/ Foot:
Reinforced polyamide plastic
Holder:
Polypropylene plastic
Bushing/ Tube cap:
Acetal plastic
Care
Wipe clean with a cloth dampened in a mild cleaner.
Wipe dry with a clean cloth.
For increased stability, re-tighten the screws about two weeks after assembly and when necessary.

Review Quote
'Pros - metal - pretty easy to set up (rookie) - 2 adjustable heights - cup holder (stable)and cup (stable) holder - foldable Cons - Tilt adjustment requires two people by of the mechanism/ design, which is not disability friendly & I struggled - Side edges are too low/ table top surface too smooth, so Laptop/ devices tend to slide off when at a tilt - Stand takes up space when folded away- would've loved if more compact. Has not been easy for me to use due to issues with dexterity but its a nice item otherwise'





Size / Measurement
Max. load: 10 kg
Height: 65 cm
Max. height: 70 cm
Min. height: 60 cm
Width: 46 cm
Depth: 35 cm

Features
Dual-motor desk with sturdy construction and high weight capacity – a good choice to secure a smooth transition between sitting and standing positions.
Changing positions between sitting and standing helps you move your body so you both feel and work better.
You can adjust the height of the table top electrically from 70 to 117 cm to ensure an ergonomic working position.
It's easy to keep your desk neat and tidy with the cable management net under the table top



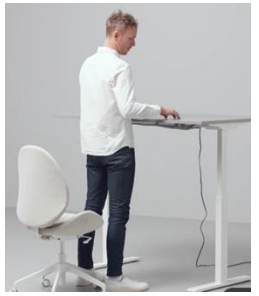
Video 78.2

Review Quote
'It is not a noisy movement when going up or down and seems stable at fully height, or at the height I use when standing.'

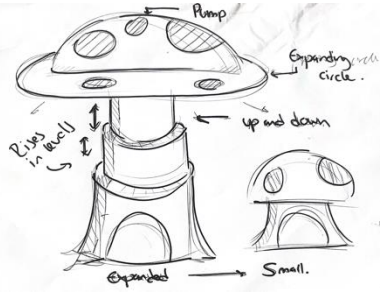
RODULF
Desk sit/stand



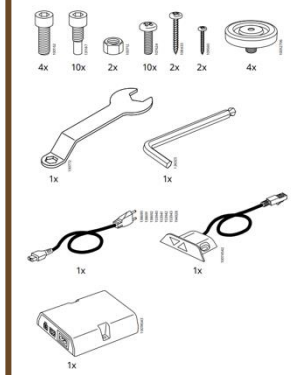




Safety
This desk has been tested for office use and meets the requirements for durability and stability set forth in the following standards: EN 527-2 and ANSI/BIFMA X5.5.

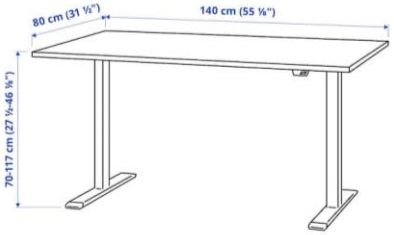


Material
Table top
Particle- and fibreboard with honeycomb paper filling (100% recycled paper), Acrylic paint, Plastic edging
Underframe sit/stand table top Crossbar/ Support/ Column/ Foot/ Housing/ Washer:
Steel, Epoxy/polyester powder coating
Cable management:
70% rubber, 30% polyester
Total composition:
100% polyester
Care
Desk sit/stand
Wipe clean with a mild soapy solution.
Wipe dry with a clean cloth.
Table top/underframe sit/stand table top
Check regularly that all assembly fastenings are properly tightened and retighten when necessary.

Components


Size / Measurement
Length: 140 cm
Width: 80 cm
Min. height: 70 cm
Max. height: 117 cm
Max. load: 70 kg





Summary and Next: I found the **BJÖRKÅSEN** Desk design hard / fiddly to use, I think it would be difficult to use especially with a weight mushroom top and the need to constantly and quickly adjust the height a variety of children

I liked the **TROTTEN** Desk twisting handle of as it allowed me to easily move the desk and up and down easily in one motion action (didn't need to adjust part by part) . However, the mechanism complex. And may break in an outdoor environment.

Next Steps: I will not include these within my design, as I don't think they are suited for the weight and forest school outdoor environment.

Product, Component and Material research- Telescopic Stool

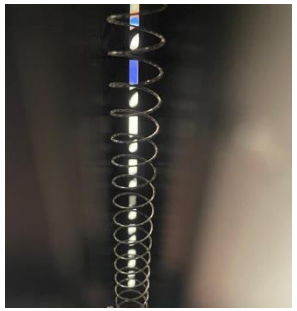
Intro: I am going to evaluate the telescopic stool to understand the advantages, disadvantages and key features, to see if the product is a suitable mechanism for me to use.

Features

- Compact and Lightweight:
- **Weighs** only 1kg with a 25cm diameter, making it easy to carry and store with an adjustable strap for convenience.
- **Adjustable Height**: Offers 12 height settings from 6cm to 46cm, accommodating both adults and children for various uses.
- **Stability and Safety**: Made from **high-strength PA66 plastic** with a non-slip base and cylindrical structure for secure and stable seating; supports up to 180 kg.
- **Easy to Fold** and Secure: Features a quick-lock mechanism for effortless opening and closing, with snap joints to prevent accidental opening.
- **SECURE LOCKING:** Its innovative locking clasp system ensures smooth opening and closing, locking securely with snap joints to prevent accidental unfolding
- **Versatile Usage:** Perfect for outdoor activities like camping and beach trips, as well as indoor use in kitchens, bedrooms, and bathrooms.
- **Durable Design:** Built with a hard shell for long-lasting durability, making it an essential tool for both adults and children.
- **Easy to carry** with its adjustable strap
- Ideal for both outdoor adventures and indoor use, this versatile stool is perfect for camping, the beach, or any room in your home.
- **Priced at £15.99**







Material Nylon(PA66) –Stool plastic

Advantage:
1.Strength is higher than all polyamide varieties
2.It has higher yield strength and rigidity than nylon 6 and nylon 610
3.High strength, toughness, rigidity and low friction coefficient in a wide temperature range
4.Resistant to oil and many chemical reagents and solvents
5.Good wear resistance

Disadvantage:
1.High hygroscopicity
2.The impact strength is reduced in a dry environment
3.The forming process is not easy to control

Product depth	60mm
Product height	450mm
Product weight	1060g
Product width	250mm

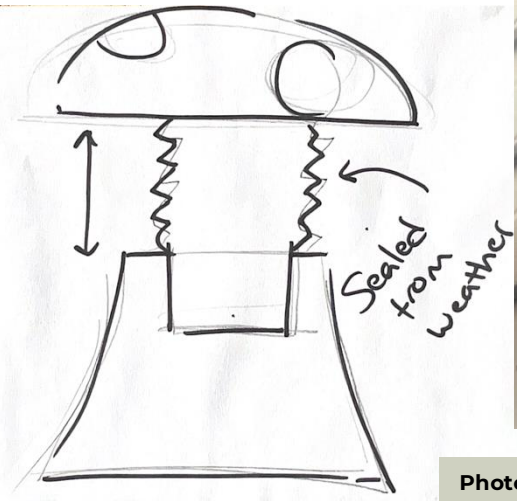




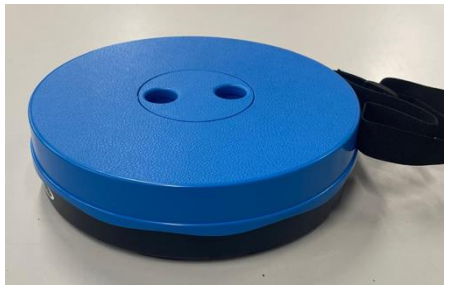














Photos I took- Collapsing mechanism / inner spring to help expand the product / Product folded up from top view / Product folded us from bottom view.



Video 79.1
of product being expanded

Summary: I liked how the telescopic stool was compact and lightweight, whilst still having good structural integrity which could hold a large amount of weight just like the mushroom top. However, due to a mushroom cap being in on top it would be hard / inaccessible to turn and use. In addition, it would require someone to lift / take the weight of the heavy mushroom top to raise the product, which may be difficult if there are no/ minimal adults to lift when the children want the height to be changed.

Next Steps: I will not include this within my design, as I don't think they are suited for the weight, and are not easy to use / adjust the mushroom height.

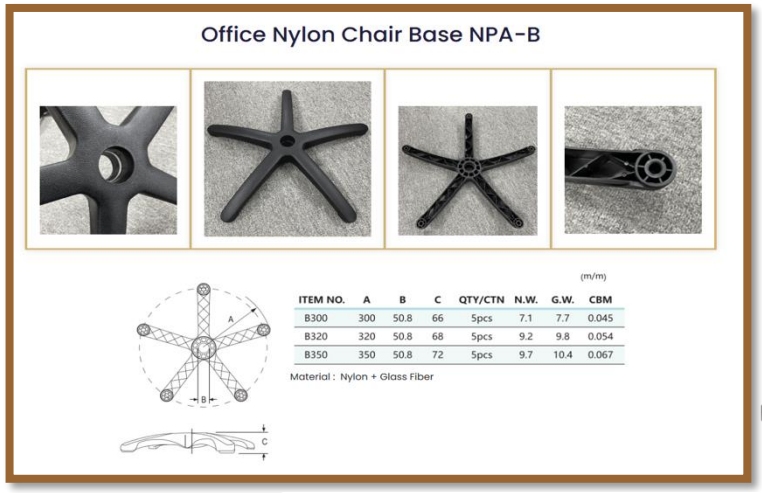
Product, Component and Material research- Office Chair

Intro: I am going to research into the mechanism which raises and lowers chairs, to identify if this is a possible mechanism I could include within my project.

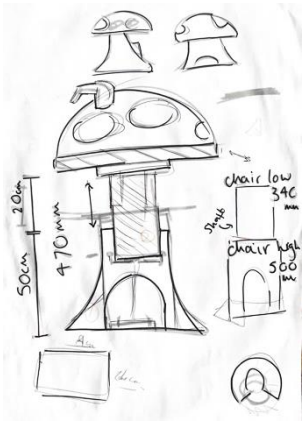














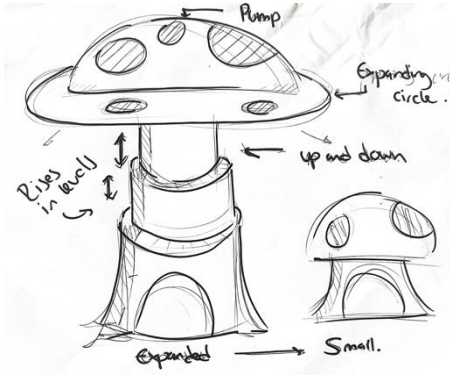
Gas height adjustment

Feature.

- Versatile armrest options: no arms, fixed arms, or adjustable arms
- Standard **tilt lock mechanism**
- Height **adjustable backrest**
- High back 1 lever fabric operator chair
- Contoured back rest with posture curved seat and waterfall front
- Fitted with an under-seat skirt
- **Gas height adjustment via heavy duty gas lift**
- Black nylon 5 star base with easy glide castors

Safety

- Built **to BS EN 1335 standards, foam & fabric** that complies with **BS5852 Level 0, 1, & 5 and EN-BS 1021 Part 1 & 2 Standards**
- **CMHR fire retardant foams meet BS5852 Level 0,1,& 5 standards and fabrics EN-BS 1021 Part 1 & 2**



Material

Chair Bases, chair cylinders and the chair tilt mechanisms.are made of nylon.

Nylon(PA66)

Usually marked below the regular chair bases.

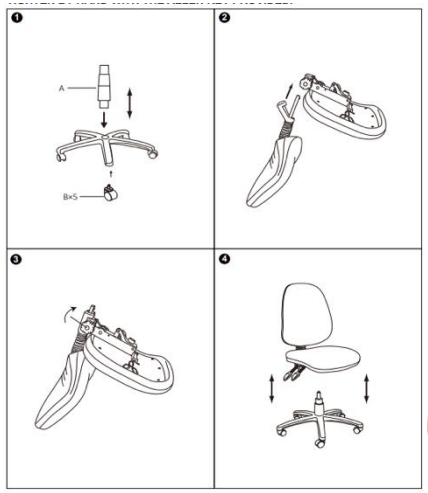
Advantage:

1.Strength is higher than all polyamide varieties
2.It has higher yield strength and rigidity than nylon 6 and nylon 610
3.High strength, toughness, rigidity and low friction coefficient in a wide temperature range
4.Resistant to oil and many chemical reagents and solvents
5.Good wear resistance

Disadvantage:

1.High hygroscopicity
2.The impact strength is reduced in a dry environment
3.The forming process is not easy to control

The production method: *injection molding.*



Measurements

- Seat width: 48cm
- Seat depth: 44cm
- Seat height: 45-55cm
- Back width: 44cm
- Back height: 52cm
- Weight capacity: 154kg





Seat and stand fixing
Height adjustable mechanism



Tilt lock mechanism
Height adjustable backrest



Gas height adjustment
via heavy duty gas lift



Video 80.1
Raising mechanism

Summary: I liked how the chair could be easily raised and lowered by the mechanism. In addition, I liked how it could take a significant amount of height and still raise, meaning it could take the heavy weight of my mushroom head. The mechanism was also durable and hardwearing due to being a sealed unit with a protective cover, this means it would most likely survive / withstand and outdoor environment.

Next Steps: I will include this within my design as it is easily adjustable can take and move under a heavy weight and is durable so it will withstand the outdoor environment.

Customer Reviews

- *Comfortable and easy to move around.*
- *Really good quality chair, easy to assemble, excellent value for money.*
- *A brilliant value for money adjustable office chair which is also very comfortable!*

Research - Outline requirements V2

William Howe

Intro: I indent to use my research to help me identify some key requirements that my product should include. Having identified a number of outline requirements I then select 10 which I will consider to be my PUNs (primary user needs) these PUNs should be meat throughout my design process. Having completed further reach I have undated my requirements

No.	Topic.	PUNs	Requirements	Justification.	Stakeholders	Priority? H/M/L
1	**Colour.**		The colour must be **sympathetic to the surroundings** and include **colours inspired by nature.**	Through my mood boards and interviews and questionnaires I know my product should be **natural / sympathetic colours** this is so the product will complement the nature around without obstructing the surroundings.	Primary users – Children Secondary users - Sarah and Nick mace Designer	**M**
2	**Shape.**	2	The product should have **aspects of nature and biomimicry in its design.**	Through my mood boards and interviews and questionnaires I know my product should be **natural or a sympathetic shape** this is so the product will complement the nature around without obstructing the surroundings	Designer Manufacture Primary user – Children	**H**
3	**Product Size. / Storage**	3	The product must be able to **fit into a shed or shipping container** when being stored. In addition, the product needs to fit into the pre-existing play space / forest school.	After conducting an interview on share and Mrs Mace the product would need to be stored in a shed or shipping container, therefore it needs to be able to fit through the doors. I need to Research **Size of door frame or sheds / container ships** to allow the product to be stored over winter.	Delivery company Secondary users – Sarah and Nicki Mace (when they move the product) Manufactures Primary users children	**H**
4	**Component size**		The components should **not be small enough to swallow or digest**, however cannot be so big that children cannot use them.	Through my observations., which include my own younger cousins I have discovered that young children (6months – 4) like to mouth and eat toys / components, therefore the components must be large enough that children do not digest them. I have also conducted **Anthropometric data of children 6months – 13 years old research**	Primary users Manufactures Designers	
5	**Weight.**		The product needs to **light enough to be carried by two adults** without them harming themselves, but heavy enough so the product is stable when in use and during poor weather conditions (Wind)	Through my observations at the forest school during my volunteering work, during packing away of equipment two adults would carry the equipment to the storage facility (tipi). This means the product must be light enough for two adults to carry and move. I have also conduct further research o**f accepted weights for adults to carry**.	Secondary users Delivery Companies	**L**
6	**Structural integrity**		The product should be designed so it is **stable when in use / windy weather conditions**, so the product does not topple over and harm the children or get damaged.	Through my interviews and questionnaire, I have identified that my primary users enjoy climbing on the toys, in addition, through my observations many children thrown and play roughly with toys. This means the product must have a stable base and good structural integrity so when climbing the product does not fall over (even in windy conditions) and if dropped the product wont break. Through modelling I will ensure structural integrity by making the base of the product very wide	Primary users Secondary users Designer	
7	**Style/Theme.**		The theme should **represent nature for example, forest / wooden fauna and flora.** In addition, elements of biomimicry.	I found out through talking with parents that they would like the theme of the product to include aspects of nature around. Through my mood boards and interviews and questionnaires I know my product should be **natural / sympathetic colours** this is so the product will complement the nature around without obstructing the surroundings.	Primary users – Children Secondary users - Sarah and Nicki mace Designer	**H**
8	**Ergonomics**	5	The product should be designed so the **primary user understands the affordance with the product**	Through my questionnaires I have found out that the product needs to be designed for children from 6months – 13 years, this means the product must be interfaceable and useable (understand how to play with the product) for a variety of ages. I have also conducted Anthropometric data of children 6months – 13 years old research	Primary user Designer	
9	**Anthropometrics for primary users**	4	The product must be able to be **accessible and easy to use by all users**	Through my questionnaires I have found out that the product needs to be designed for children from 6months – 13 years, this means the product should be assessable to a variety of ages and children of different sizes. . I have also conducted Anthropometric data of children 6months – 13 years old research	Primary users	
10	**Inclusivity**	**6**	**The product must be accessible to children with disabilities, these could include, sight, mobility and dexterity**	Through my questionnaire and interviews with Sarah and Mrs Mace I have I identified that they cater for special needs, this means I must design a product that is accessible to all children with sight, mobility and dexterity disabilities. I have also complete further research on wheelchair hights	**Designer**	**M**

Research - Outline requirements V3

William Howe

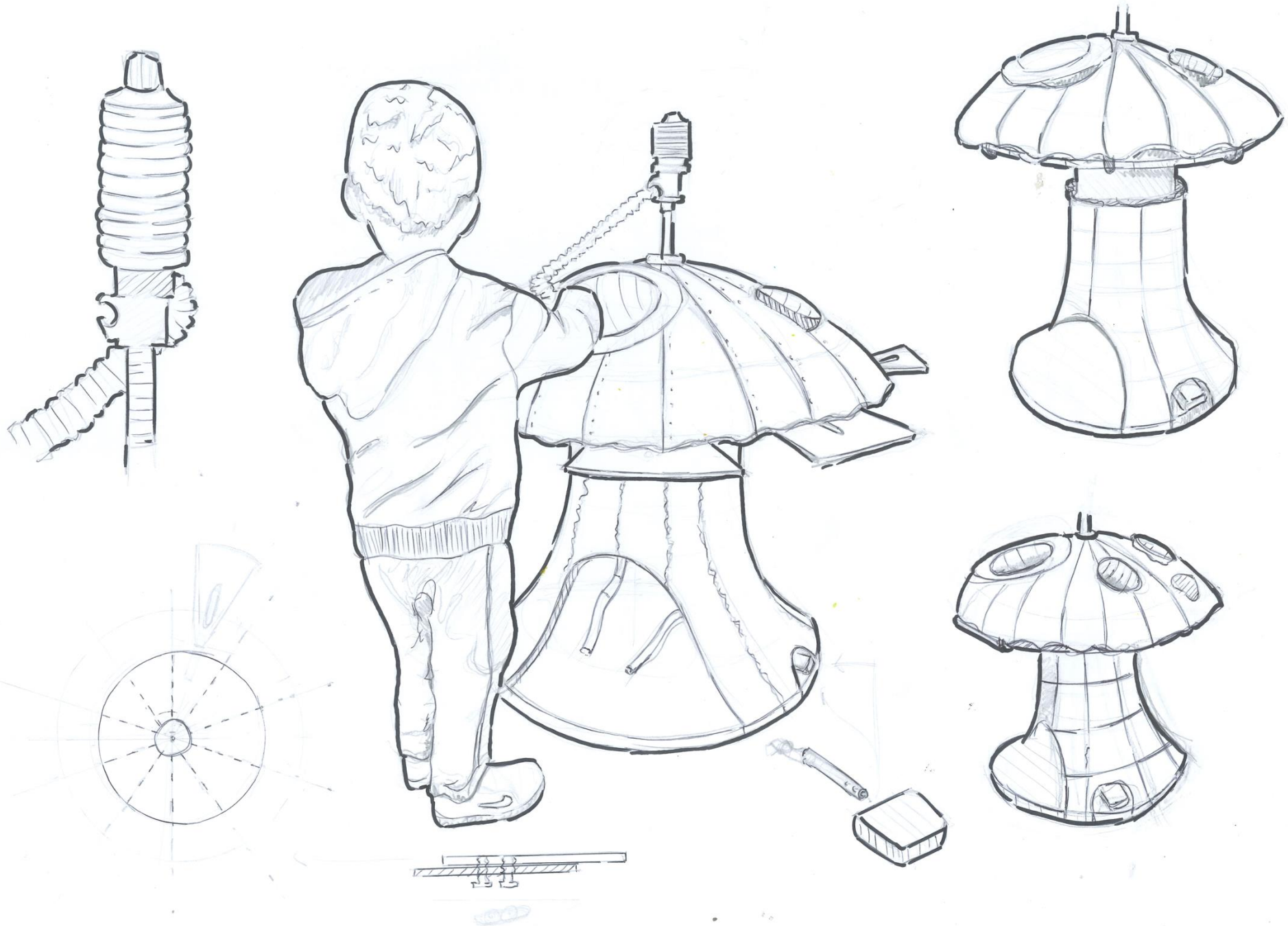
Intro: I indent to use my research to help me identify some key requirements that my product should include. Having identified a number of outline requirements I will then select 10 which I will consider to be my PUNs (primary user needs) these PUNs should be met throughout my design process.

No.	**Topic.**	PUNs	Requirements	Justification.	Stakeholders	Priority? H/M/L
11	Aesthetics	7	The product must be **aesthetically pleasing to my primary user and look sympathetic to its environment**	Through my mood boards and interviews and questionnaires I know my product should be **natural / sympathetic colours** this is so the product will complement the nature around without obstructing the surroundings.	Designer Primary users Secondary users	
12	Materials.	3	The product must be sourced by a **sustainable source**	Through my interviews I have identified that sustainability is a core aspect of the forest schools. This is due to them upcycling and recycling many products, furthermore they want to teach children the importance of the environment and sustainability (sourcing). Through completing some material testing of readily available recycled fabrics, I will include these in the design.	Manufacture Producer of material source Environment agency Legislation Sustainability Disposal companies	
13	Finish.		The finish of the product needs to be **weatherproof and nontoxic** to my primary user	Via my interviews I have identified that the product will be used in all weather conditions, therefore the product must have a weatherproof finish to enhance and protect it. IN addition, through my observations I have discovered that young children (6months – 4) like to mouth and eat toys / products, this means the product will need to be nontoxic, so If a child swallows the product they are not harmed by toxic chemicals. I have completed research into finishes and legalisations regarding children's play equipment	Manufacture Environment agency Legislation Sustainability Disposal companies	
14	Product life cycle assessment		The product must last for a long time, sourced sustainably, well made and have the ability to adapt to the different primary user needs . When it comes to the end of its cycle is should be easily dismantled so it can be recycled	Through my and interviews I have identified that sustainability is a core aspect of the forest schools, this means the product should be sourced sustainably and must be easily dismantlable so the product can be recycled at the end of its life.	All stakeholders involved in the products life	**L**
15	Safety.	1	The structure must have **smooth edges** and designed for both children to play with / on, and for Adults to carry minimising injury	Through my observations I have discovered that young children (6months – 4) like to mouth and eat toys / products, this means the product will need to be nontoxic, so If a child swallows the product they are not harmed by toxic chemicals. In addition, the product must be ergonomically designed (smooth edges) so when the primary user interfaces with the product they do not get hurt / harmed .I have completed research onto children's outdoor play equipment and their legislations	Legislation Designer Manufacture Primary users Secondary Users	**H**
16	Function	10	The function of the product is to **encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.**	After speaking to the parents and via my interviews and questionaries I have identified that the product will need to encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.	Primary user	**H**
17	Manufacturing Cost	8	The product should where possible use **standard components and minimal manufacturing process**.	Through my interviews I have found that the forest schools have a tight budget due to limited funds, this means I need to create an affordable product and reduce costs where I can without compromising the product. I have completed research into **relevant components such as water pumps, LEDs, solar packs and glow in the dark material**	Sustainable product source Manufacture	**M**
18	Maintenance	9	The product must be easy to **repaired, clean and maintain** when in use.	Through my interviews I have found that the forest schools have a tight budget due to limited funds, this means I need to create an affordable product that can easily be maintained and repaired to prolong the life of the product. In addition, through my interviews I have identified that they will be used outdoors in all conditions so must be easy to clean and maintain, so they are safe to use.	Secondary User Manufacture Designer	**H**

Summary and Next Steps :

I have identified all the outline requirements that my product should include, by using primary and secondary data that I have collected. I have next identified 10 PUNS that should be met through the design process. I will next complete intal concept sketches to generate ideas for my designs.





Proposed Final Design 1

William Howe

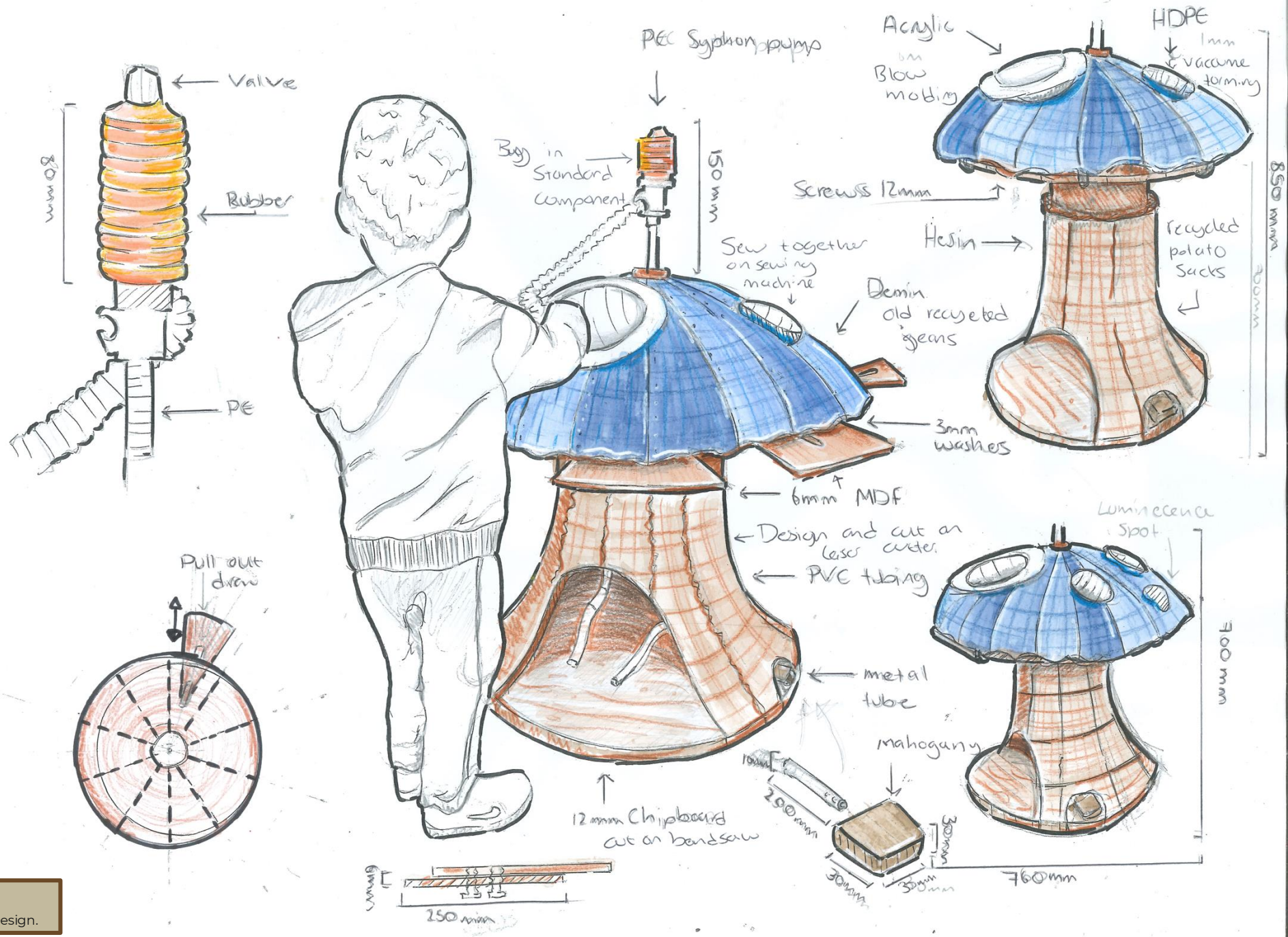
Intro: Having completed further research and modeling, I have developed my final design.

Primary User Comments :

Sarah likes the how sustainable and ecofriendly the product is and the way that cost's can be kept down by recycling materials found in and around the home

Niki Mace likes how the product can adapt and change to fit a variety of users. She likes how the product is easy to clean due to the PVC piping and smooth surfaces She believes that the segments of the product could meet the needs of the whole class if they had 3 mushrooms.

Puns	Topic.	Requirements
1	**Safety.**	Smooth edges, meet British standards and safety legislation
2	**Shape.**	Aspects of nature and biomimicry in its design.
3	**Product Size. / Storage**	Fit into a shed or shipping container when being stored.
4	**Anthropometrics for primary users**	Aaccessible and easy to use by all users
5	**Ergonomics**	Primary user understands the affordance with the product
6	**Inclusivity**	Accessible to children with disabilities, these could include, sight, mobility and dexterity
7	**Aesthetics**	Aesthetically pleasing to my primary user and look sympathetic to its environment
8	**Manufacturing Cost**	Use standard components and minimal manufacturing process.
9	**Maintenance**	Repaired, clean and maintain
10	**Function**	Encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.

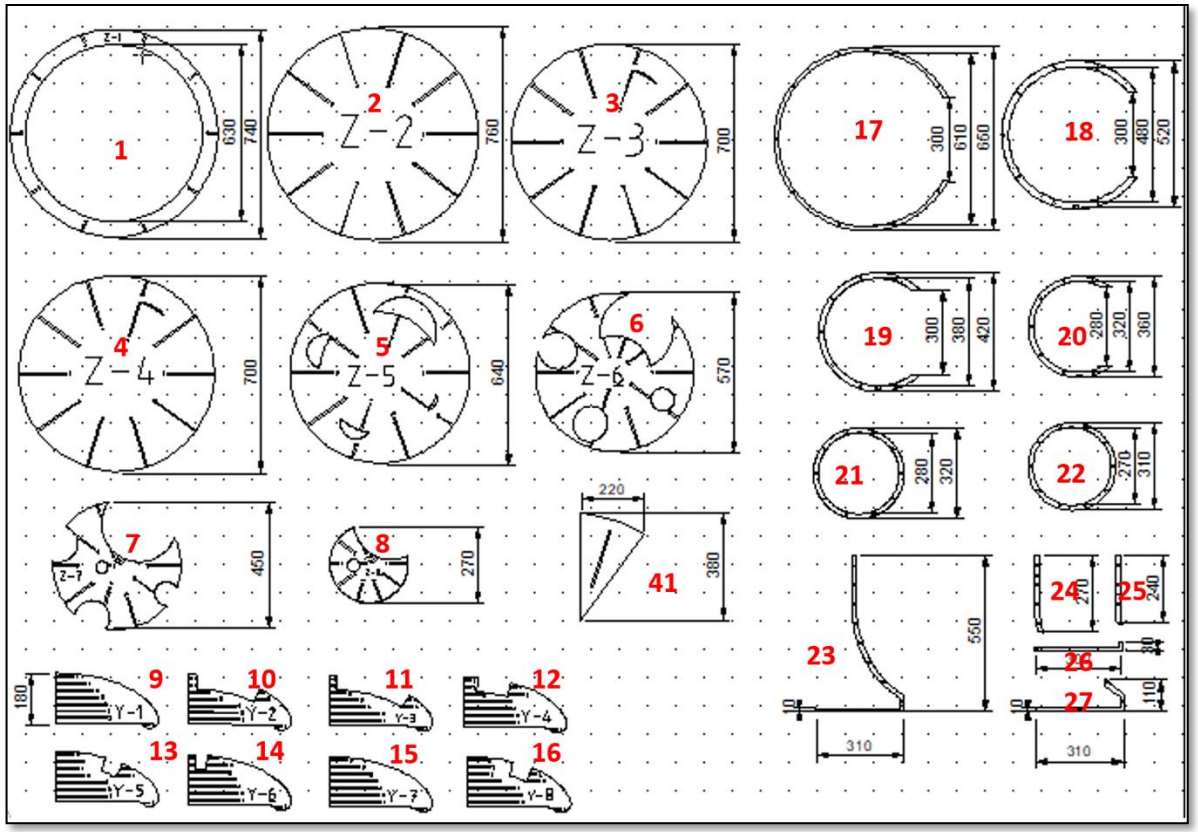


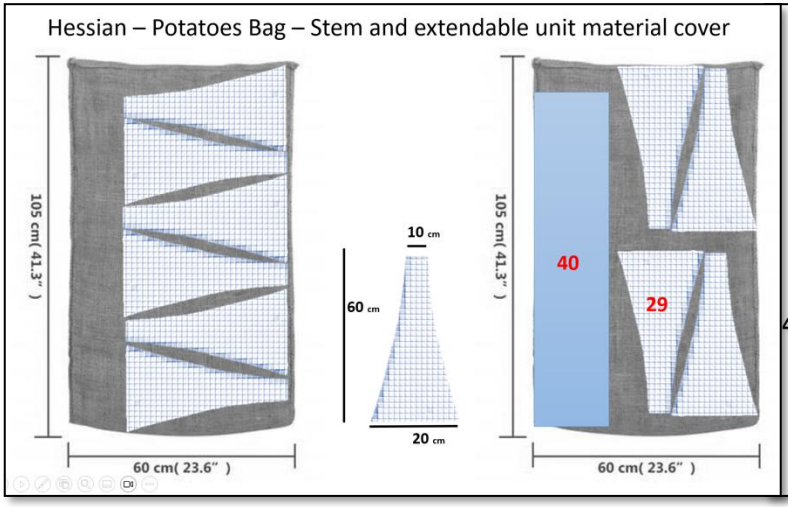
Summary/Next Steps:

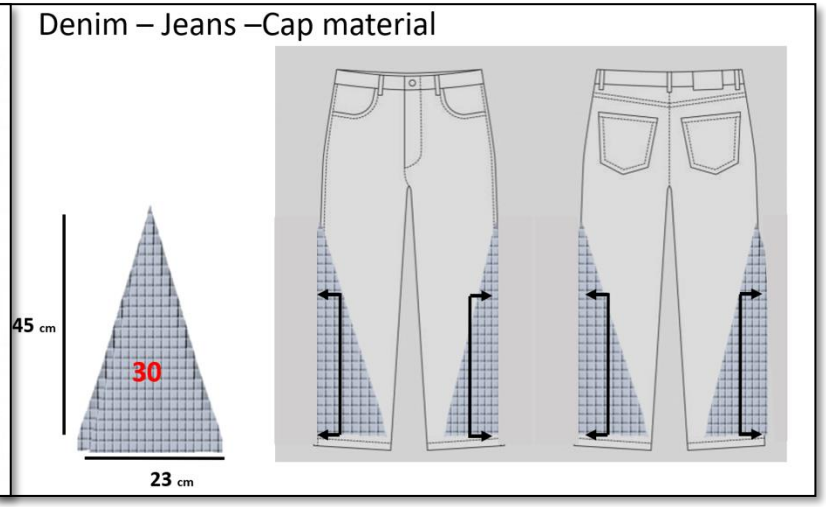
- I am going to design and manufacture my product firstly in 2D Design.

Technical Specification and Parts list

William Howe



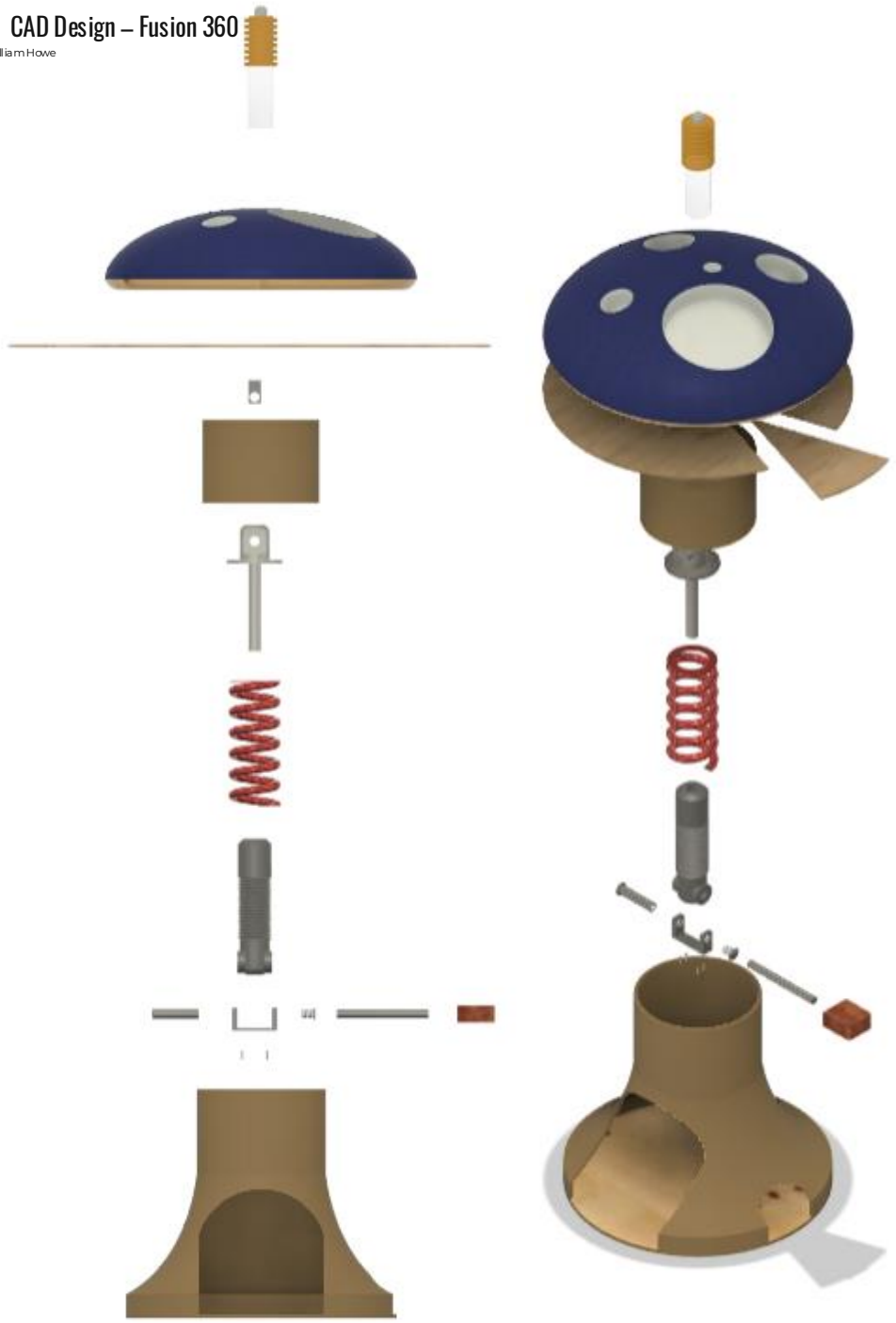


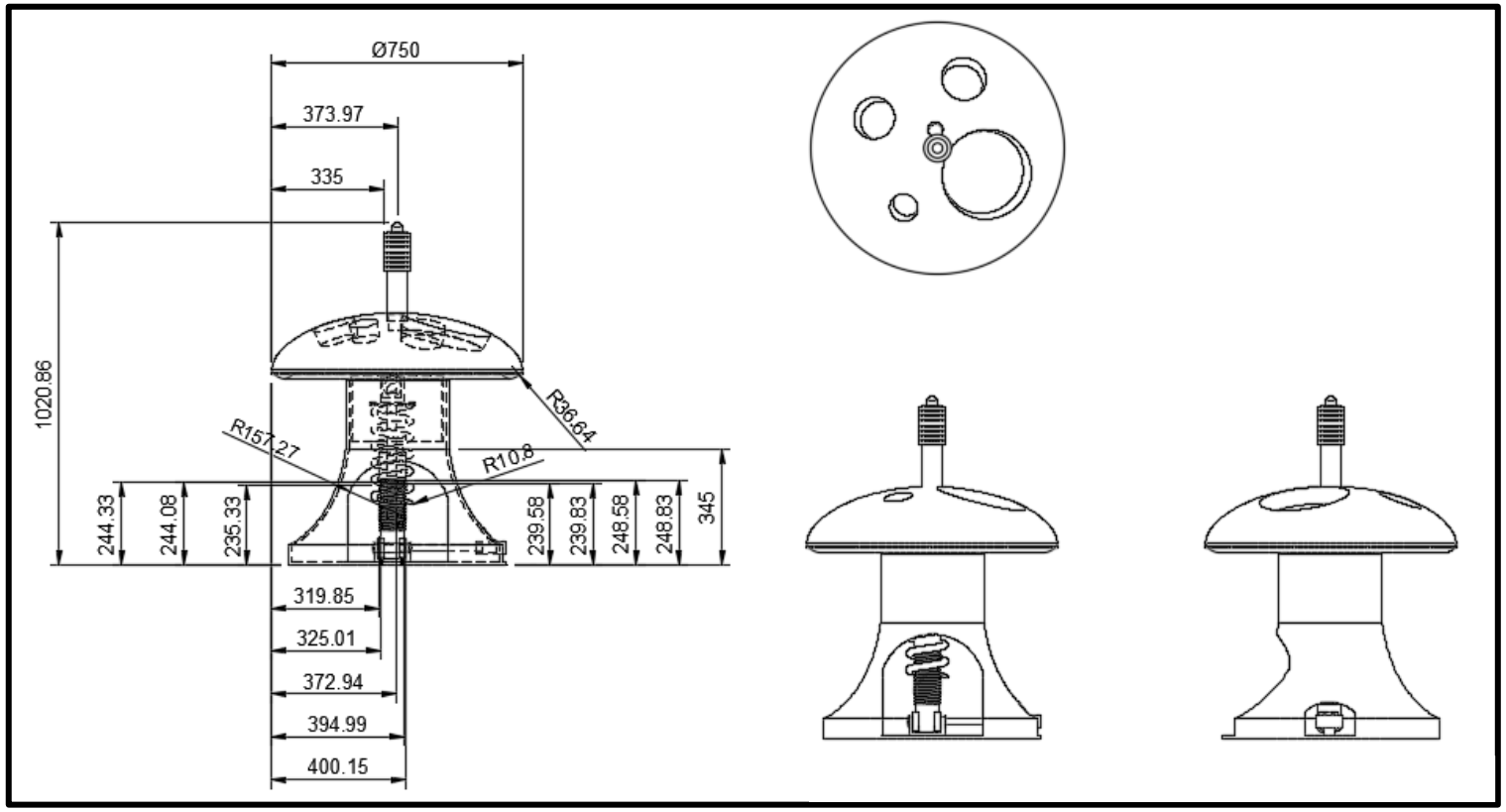


Part No	Part	Material	Quantity
1.-21	Mushroom cap	6mm MDF	X1
22	Mushroom base	6mm MDF	X3
23	Mushroom base	6mm MDF	X7
24	Mushroom base	6mmMDF	X2
25	Mushroom base	6mm MDF	X1
26	Mushroom base	6mm MDF	X2
27	Mushroom base	6mm MDF	X2
28	Base	15mm chipboard	X1
29	Mushroom base cover	Hessian	X10
30.	Mushroom cap cover	Denim	X10
31.	Sink bowl	3mm Acrylic White	X1
32	Small bowl	1mm HDPE White	X2
33	Mini bowl	1mm HDPE White	X1
34	Glow in the dark spots	Phosphorescent paper	X3
35	Pump	Standard brought in component	X1
36.	Rising mechanism	Upcycled office chair	X1
37.	Nuts and bolts		x4
38	Inner mushroom base discs	6mm MDF	X2
39	Inner mushroom base support	Pine	x4
40	Inner mushroom base cover	Hessian	x1
41	Mushroom surface extension	6mm MDF	x10
42	Mushroom surface extension screw and washers	12mm screws and 5 mm washers	x32
43	Metal pipe	8mm	x1
44	Paddle	Pine	x1
45	Plastic pipe attached to pipe	PVC transparent 12mm x 1000mm	x1
46	Plastic pipe for sink drainage	PVC transparent 6mm x 1000mm	x1

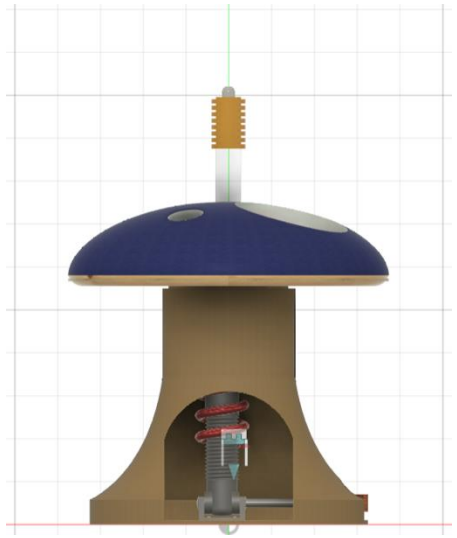
CAD Design – Fusion 360

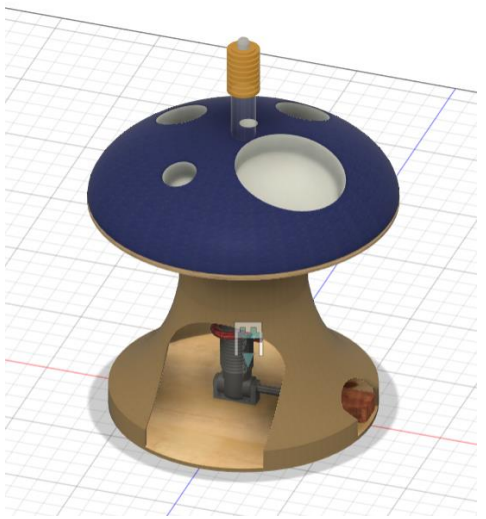
William Howe











Risk Assessment

Machine/Tool / Equipment	Hazard	Level of Risk	Risk	Safety precautions	Specific safety considerations for my project	Training required	Reason for use – Part of model
2d Design Computer		Low					1-27,38,41 Used to design main frame
Laser cutter	- Equipment fully enclosed - Fire to material	Medium	- Toxic fumes can be released when cutting - Minor fire can occur	- Ensure machine guard is closed before operating - Ensure level of lazer is the correct height to minimise fires and burns. - Turn off when not in use		- Training given by teacher - Staff present when equipment in use	1-27,38,41 Used to cut out main frame
Hand tools **-Craft knife** **-Fabric scissor** **-Staple gun** **-Chisel** **-Coping saw** **-Tenon saw**	- Minor injuries	Medium	- Minor injuries can occur from blades and sharp edges. - Slippage of blade resulting in cuts	- Ensure blade is sharp - Do not use if broken - Store correctly - Cut away from yourself - Give distance way from others	- Using a coping saw and chisel to removed material from the 3D mushroom requires a high level of accuracy and health and safety considerations	- Skills and knowledge developed from y7 and thought my school career	1-46 Used through out all of making
Handle tools **-Hammer,** **-Mallet**	- Minor injuries	Medium	- Injuries to bone, muscle and tissue could occur during use. - Slippage or missing target area could result in human injury	- Take time to line up hit to ensure accuracy - Make sure product is stable before hitting.	- I will use this equipment to bring together my lazer cut pieces to ensure the product is secure – as these are large pieces of MDF I have to mindful of those also in the workshop.	- Skills and knowledge developed from y7 and thought my school career	1-27,38,41 Used to help construct main frame
Bandsaw	- Dust exhaled - Blade causing major cuts - Material flying off machinery - Hair and clothing caught in mechanism	High	- Serious injuries if there is contact with moving parts such as the blade.	- Ensure extraction fan is set up - Suitable height for the guard - Guard is inspected and correctly fitted to ensure it doesn't move up of down - Space around the machine to reduce the risk of injury to others and myself - Do not move my hand in a 100mm radius near the blade, use a wood pusher to move wood close to the blade.	- I am using large pieces of wood so I need to ensure that the base of the saw is large enough to securely hold the wood with my assistance so there is less chance of me dropping or slipping with the wood that could result in injury.	- Training given by teacher - Staff present when equipment in use	1-28, Used to reline fittings and hole cut on the Lazer cutter, as Lazer cutter not all 100% accurate 31-33 Used to cut out plastic for bowls Used through of minor cutting
Welding (mick)	- Serious injury to body and eyes - Burns	High	- Heat from welding can cause serious burns - Intense light can cause eye damage - Fumes can lead to respiratory problems - Fire hazards due to many sparks	- Ensure extraction fan is set up for good ventilation. - Use a welding mask to protect eyes form the intense light. - There's a curtain to pull around to prevent sparks from hitting others - Inspect material before use	I will have to be careful when welding as my surface will not be flat and I will be welding small nuts onto it.	- Training given by teacher - Staff present when equipment in use	36 Used to attach raising mechanises to nuts

Risk Assessment

Machine/Tool/ Equipment	Hazard	Level of Risk	Risk	Safety precautions	Specific safety considerations for my project	Training required	Reason for use – Part of model
Angle grinder	- Serious injury to body and eyes - Burns	High	- Parts of the material could fly at me with high speed due to its high speed rotation. - Lose hair or items of clothing could get caught the machine. - Tool could cause serious cuts - Burns from sparks	- Wear glasses to protect my eyes from flying debris and sparks . - Hair and clothing tied back - Turn of before adjusting angle - Remove excess tools and debris to reduce hazard - Ensure workpiece is properly secured and the grinding blade is securely attached. - Proper grinding posture to avoid kick back.	I will wear PPE and a lab coat to protect my eye and body from sparks and the nose of the machine. I will ensure there is a large area around me to minimise risks.	- Training given by teacher - Staff present when equipment in use	36 To remove legs off chairs
Oven	-Burns to material -Burns to user	High	- The Heating component gets very hot, likewise the plastic.	- Check the equipment is not damaged - Don't touch the hot plastic with bare hands, if I need to move the plastic, I will touch it with heat resistant gloves. - Wear a lab coat to reduce exposed skin that could get easily burnt.	- Wear heat resistive gloves when using and moving the plastic to another machine ensure I don't burn myself	- Skills and knowledge developed from y7 and thought my school career. - Teacher present and ensuring safety procedures were adhered to.	31-33 To heat polymer before shaping
Vacuum forming	-Burns to material -Burns to user	Medium	-The Heating component gets very hot, likewise the plastic.	- Check the equipment is not damaged - Always watch when in use - Don't touch hot plastic when it heats up - Read instructions for optimum time material should be heated.	- Due to the shape of my mould, it may be hard for all the HIPS to go into place, for this reason I should use a piece of wood or heat-resistant gloves to ensure I don't burn myself.	- Skills and knowledge developed from y7 and thought my school career	32,33 Shaping polymer into bowl shape
Blow moulding	-Burns to material -Burns to user	Medium	- Use of hot plastic - Plastic may burst if to much air it blowed in	- Check the equipment is not damaged - Always watch when in use to ensure right amount of air is pumped in - Read instructions for optimum time material should be heated to ensure it easily blows and wont cool to quickly.	- Wear heat resistive gloves when using the plastic to ensure I don't burn myself. - Wear safety googles to prevent plastic getting into the eye if it bursts	- Refresher course given by a trained teacher. - Teacher present and ensuring safety procedures were adhered to.	31 Shaping polymer into bowl shape

Risk Assessment

Machine/Tool/ Equipment	Hazard	Level of Risk	Risk	Safety precautions	Specific safety considerations for my project	Training required	Reason for use – Part of model
Belt sander	-Sand myself (removal of skin) -Parts can fly of -Dust inhaled - Hair and clothing caught in mechanism	Low	- Fast moving sand / abrasive paper could remove my skin or I could get my clothes stuck in the machine. - I could inhale dust causing me respiratory problems - Parts of the material could fly at me with high speed.	- Wear glasses to prevent dust being caught in my eyes and protect my eyes from flying debris. - Wear a mask to prevent dust being inhaled. - Keep hands away from the machine and push with wood when sanding close.	I will need to wear a mask when sanding foam as it releases small particles into the air. And I will wear glasses when sanding MDF to prevent flying into my eye.	Skills and knowledge developed from y7 and thought my school career.	1-27,38,41 Used through out all of making
Metal Lathe	-Cuts from tolls - Cuts from flying debris including possible eye injuries - Hair and clothing caught in mechanism	Medium	- Parts of the material could fly at me with high speed due to its high speed rotation. - Lose hair or items of clothing could get caught the machine. - Sharp tools could cause cuts.	- Wear glasses to prevent dust being caught in my eyes and protect my eyes from flying debris. - Hair and clothing tied back - Turn of before adjusting the lathe - Remove excess tools and debris to reduce hazard - Use guards to prevent contact with moving parts. - Ensure workpiece is properly secured.	I will need to wear PPE such as googles to protect my eyes from flying debris. I will also ensure my clothes are tied back and I will check the lathe and inspect tools before using. I will wear a mask when lathing foam to prevent me from inhaling the micro particles.	- Refresher course given by a trained teacher. - Teacher present and ensuring safety procedures were adhered to.	33 Used to shape Styrofoam Into a mini dome for Mimi bowl
Wood Lathe	-Cuts from tolls - Cuts from flying debris including possible eye injuries - Hair and clothing caught in mechanism	Medium	- Parts of the material could fly at me with high speed due to its high speed rotation. - Lose hair or items of clothing could get caught the machine. - Sharp tools could cause cuts.	- Wear glasses to prevent dust being caught in my eyes and protect my eyes from flying debris. - Hair and clothing tied back - Turn of before adjusting the lathe - Remove excess tools and debris to reduce hazard - Use guards to prevent contact with moving parts. - Ensure workpiece is properly secured.	I will need to wear PPE such as googles to protect my eyes from flying debris. I will also ensure my clothes are tied back and I will check the lathe and inspect tools before using. I will wear a lab????? coat and use the guard to provide more saftye from flying metal debris.	- Refresher course given by a trained teacher. - Teacher present and ensuring safety procedures were adhered to.	39 Used to shape pine for Inner support

Risk Assessment

Machine/Tool/ Equipment	Hazard	Level of Risk	Risk	Safety precautions	Specific safety considerations for my project	Training required	Reason for use – Part of model
Pillar drill	-Cuts from drill bit - Cuts from flying debris including possible eye injuries - Hair and clothing caught in mechanism	Medium	- Hand injuries from spinning chuck or drill piece - Injury if work not clammed properly - Injury if cloths or lanyard stuck in the drill	- Correct guard height - Guard regularly inspected - Sufficient space around the machine		Skills and knowledge developed from y7 and thought my school career	Used though out making
Electric hand drill	-Cuts from drill bit - Cuts from flying debris including possible eye injuries - Hair and clothing caught in mechanism	Medium	- Hand injuries from spinning chuck or drill piece - Injury if cloths or lanyard stuck in the drill - Drill may slip on angled / uneven surface	- Sufficient space around the machine - Ensure the drill piece is sharp for maintains better grip on the surface to prevent slipping.		Refresher course given by Textiles teacher. As not used since Y10.	Used though out making
Sewing machine	-Cuts - Hair and clothing caught in mechanism	Low	- Loose clothing can be caught in mechanism - Cuts and from Needle	- Check machine is off when setting up. - Check settings are correct - Keep fingers and looses clothing from pressure foot /needle - Turn off when not in use	- As sewing on Denim and over thick industrially made seams. Sew with additional caution.	- Refresher course given by Textiles teacher. As not used since Y9. - Teacher present and ensuring safety procedures were adhered to.	29.30 Shell cover of Mushroom Cap - sewing together denim pattern pieces
Iron	-Burns to user -Burns to material	Medium	- The Iron gets very hot when on,	- Always leave the iron upright and not face down on ironing board - Keep hands away from metal base - Turn off when not in use		-Refresher course given by Textiles teacher. As not used since Y9. -Teacher present and ensuring safety procedures were adhered to.	29,30 Shell cover of Mushroom Cap - Removing creases from denim pattern pieces and smoothing out seams.
Heat gun	- Burns	Medium	- The Heating component gets very hot - Melted plastic can be become very hot and vicious	- Check the equipment is not damaged - Don't touch the hot plastic or heat gun with bare hands, if I need to move the plastic, I will touch it with heat resistant gloves. - Wear a lab coat to reduce exposed skin that could get easily burnt	Due to the pipe being circular it may be hard to keep stable when heating and may role away or move causing me to burn myself. I could always clamp this pipe in place to reduce movement.	Training given by teacher	To join PP pipes together

Risk Assessment

Intro: CLEAPSS (Chemicals, Laboratory and Practical Safety Service) provides model risk assessments (MRAs) for practical activities in design and technology (D&T) and art & design, helping schools ensure safe and effective learning environments.

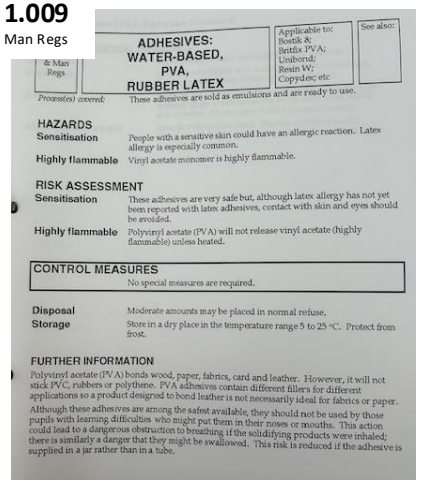
This is what my school uses to ensure the safety of all in the workshops, these posters are displayed around the workshop next to the tools and equipment. When undertaking practical work I ensure I was aware of the hazards and had read the risk assessment and adhered to the control measures.

General Safety and emergency procedures





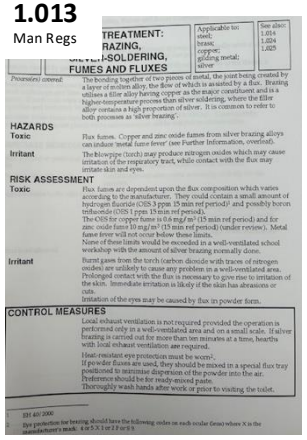
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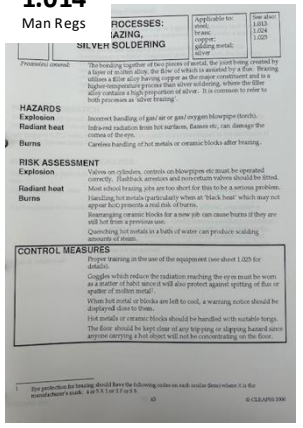


CLEAPSS information for metal work

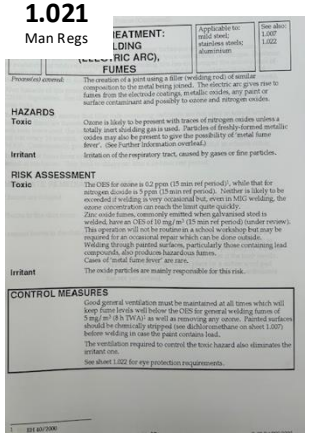
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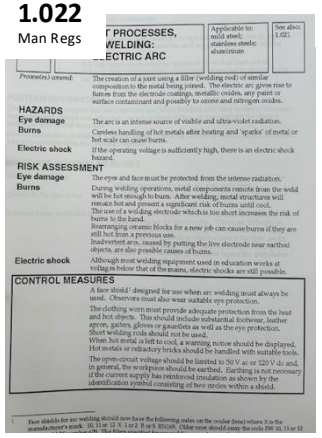
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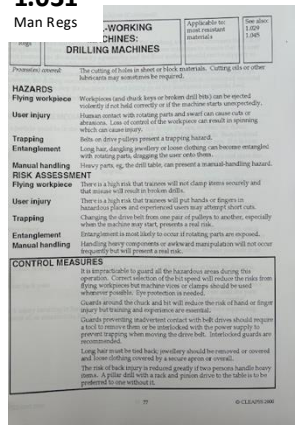
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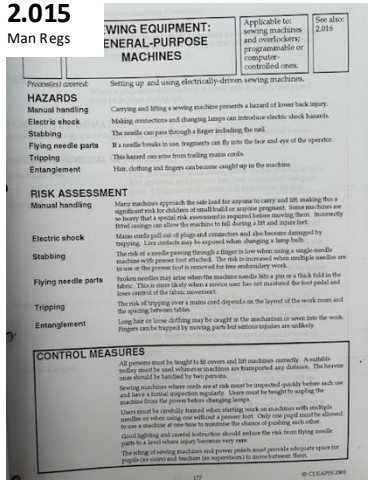




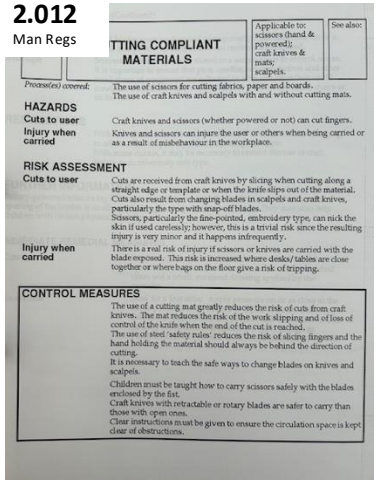


CLEAPSS information for fabric and textiles work

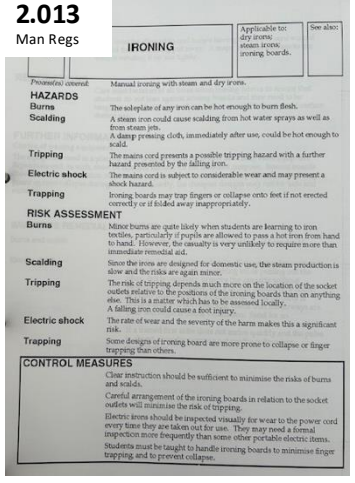
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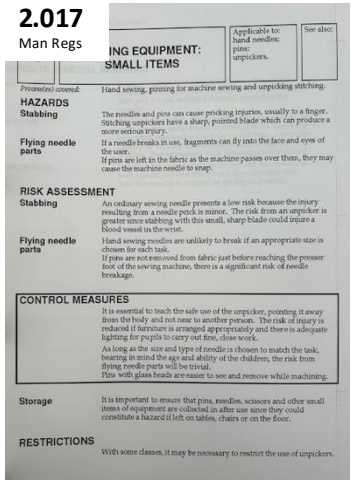
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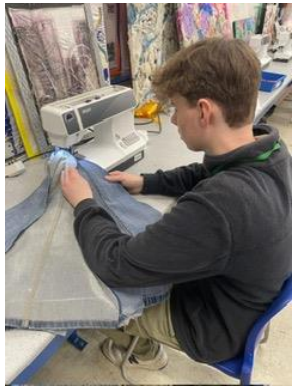


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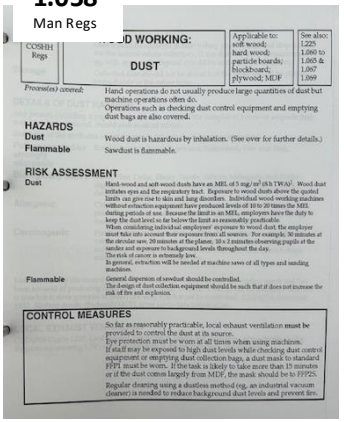




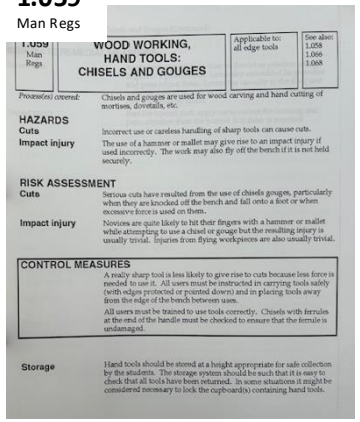
Risk Assessment

CLEAPSS information for wood work

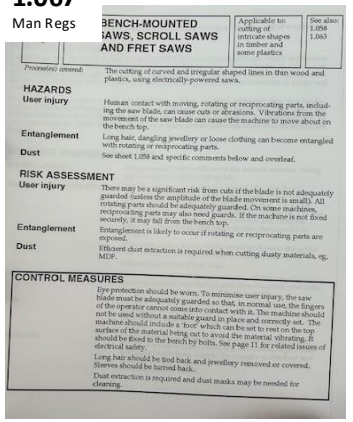
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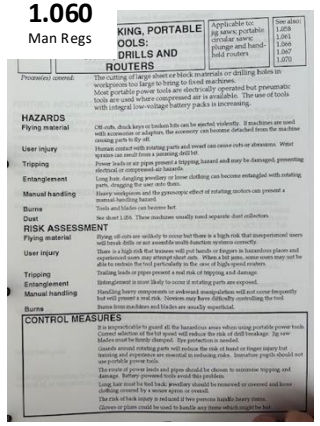
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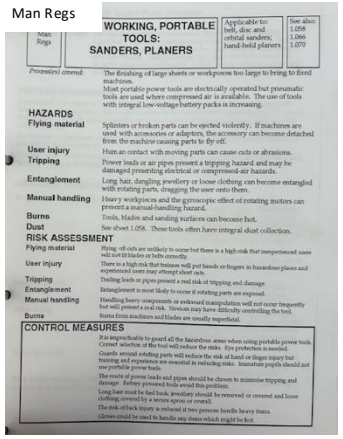


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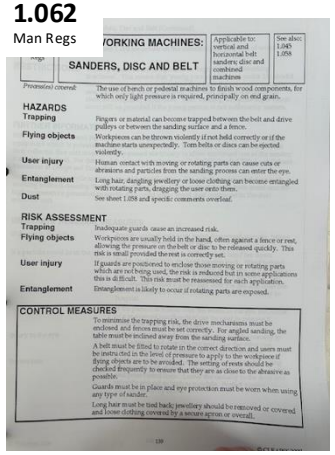




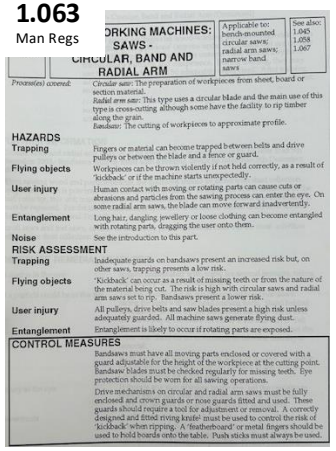
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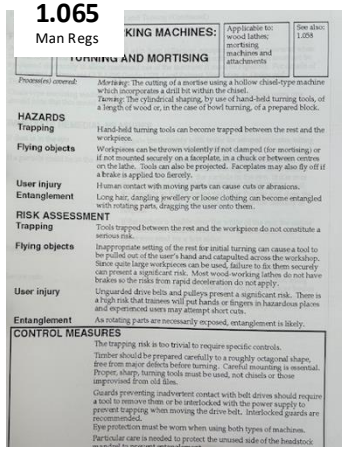
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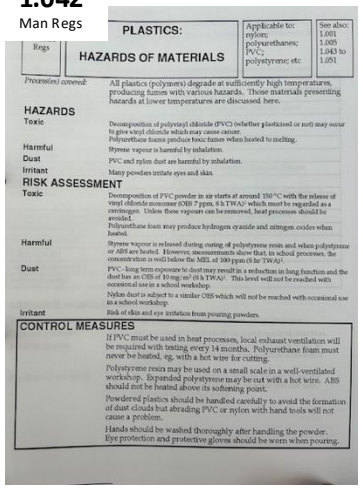




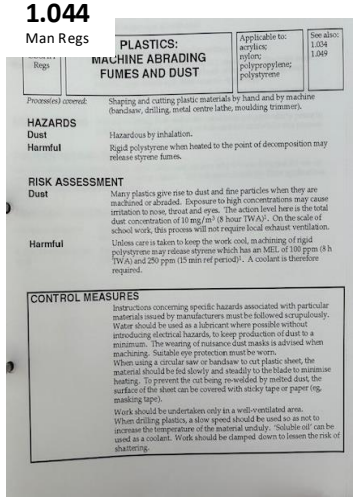


CLEAPSS information for plastic work

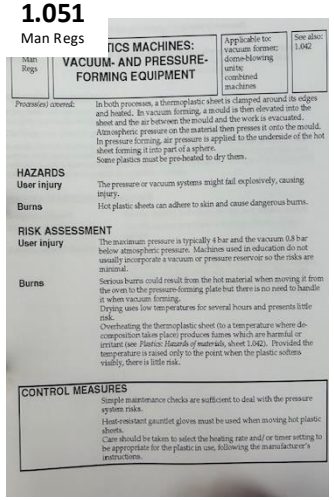
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Planning

Description of making stage	Machine/Tool / Equipment	Material and quantity	Time	Risk assessment	Quality control Check	Tolerance	Consistency control (Jig/ Template/ Former)
1. Draw each section on CAD (2D design), (Base and CAP)	2D design on a computer	NA	10 hours	See risk assessment sheet for 2D design	Check all finger joints are correct size and join in the correct places. Ensure joints are also all correct with the depth of the board I will be cutting it from (6mm MDF) This can be done by laser cutting a test model out of some scrap cardboard at smaller sizes.	± 0.01mm	
2. Laser cut the sections (as seen in technical specification)	Laser cutter	- 1 Sheet 6mm of MDF 1220 x 2440mm	12 hours	See risk assessment sheet for Lazer design	Ensure the laser cutter is set to the correct power and speed for the materials being used. The height of the laser must also be correct to ensure a clean cut is achieved. Also check that the lens is clear and make sure the size of the pieces cut can fit onto the sheet / laser cutter correctly.	± 0.1mm	Templates are designed on 2d Design
3. Sand down any edges to ensure smooth fit when putting together.	Belt Sander	NA	1.5 hours	See risk assessment sheet for Belt Sander	Ensure all excess material on MDF is removed.	± 2mm	Use a template to ensure all pieces were sanded to the same same and had the right 5mm gap so can easily slide together allowing for a tight fit.
4. Slot together combining the pieces to create a frame. Glue.	Mallet	NA	45 mins	See risk assessment sheet for Hand tools	Make sure all parts are lined up and hit into the with the right depth. Check for imperfections and dents in the wood.	NA	Ensure all points line up, use a template to line points up
5. Make a former	Lathe	- Styrofoam - 100mm by 100m block	30 mins	See risk assessment sheet for Lathe	Check that the lathe is running at correct speed. Ensure that the lathe is aligned, and tools are sharp to allow for correct cutting dimensions	± 1mm	Use a template and ruler to ensure that the diameter of the top ring, bottom ring and the height is correct.
6. Vacuum form the mushroom spot	Vacuum former	- Two (1mm HDPE sheets 200mm by 100mm sheets	10 mins	See risk assessment sheet for Vacuum Former	Make sure that material is heated to the correct temperature to allow the plastic to evenly cover the mold and achieve a uniform finish	NA	Use a thermometer to ensure heating component is correct. And use a mold to ensure the plastic is even formed into desired shape and size.
7. Use a gerbil machine to remove excess plastic material	Gerbil machine	NA	5 mins	See risk assessment for Gerbil Machine	Essure that the friction blade is the right height allowing me to remove the excess plastic at the right height.	± 1mm	Use the template to ensure its cut to a right height.
8. Heat acrylic in an oven to make malleable	- Oven	- 3mm Acrylic sheet (200mm by 200mm)	7 minutes	See risk assessment sheet for Oven	Make sure the oven is set to the correct temperature, and ensure the temperature is constant before putting in acrylic sheet. Ensure the plastic is left in the oven for the correct amount of time.	NA	Let the oven reach its required temperature(light will go off) and ensure the temperature remains constant at that temperature for at least 2 minutes before putting in the plastic.
9. Blow mould malleable white acrylic to form the larger spot	- Blow Moulder	- 3mm Acrylic sheet (200mm by 200mm)	2 minutes	See risk assessment sheet for Blow Moulder	Make sure that material is heated to the correct temperature to allow the plastic moulded into the correct shape by the use of air. Make sure there are no cracks in the plastic once cooled	NA	Use the correct mold and height gauge to ensure accuracy and consistency of the mushroom shape and size.
10. Set spots into the mushroom frame	- Chisel - Coping saw	NA	25 minutes	See risk assessment sheet for Hand Tools	Ensure the parts have a tight fit to ensure there are no gaps left between the spots and the frame	NA	When setting the spots in place I can use a no go no gauge to ensure the spot is centred. When glueing the parts together, I used clamps in order to keep the parts in the right positions.

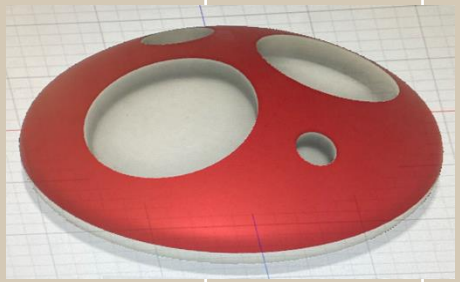
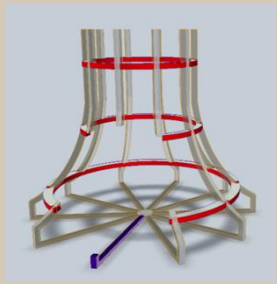
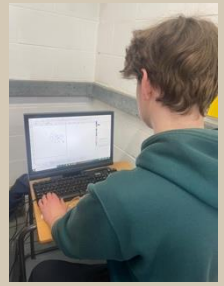
Planning

Description of making stage	Machine/Tool/ Equipment	Material and quantity	Time	Risk assessment	Quality control Check	Tolerance	Consistency control (Jig/ Template/ Former)
11. Drill thought the top of the mushroom to allow for space for a pump and pipe	- Hand Drill	Source / buy a pump	10 minutes	See risk assessment sheet for Hand Drill.	Use a ruler to measure the correct distances for the holes to be drilled. This will make sure they are in the correct place. Drilling pilot holes before allow for the holes to be drilled in the correct place and make drilling them easier. I will use a step drill to ensure I drill to the correct size of the pipe.	± 2mm	Use a jig to drill holes ensuring that they are correctly spaced. I will use a no go no gauge to ensure that the hole drilled is the correct size.
12. Drill and attach a water removal tube large spot	- Hand Drill	- 5mm clear PVC tube	5 minuets	See risk assessment sheet for Hand Drill.	Use a ruler to measure the correct distances for the holes to be drilled. This will make sure they are in the correct place. I will also need to use a smaller drill bit to ensure accuracy is maintained when drilling a pilot hole. I will also need to use clamps to stop the spot from moving out of place.	± 1mm	I will use a jig to drill holes ensuring that they are correctly spaced. I will use a no go no gauge to ensure that the hole drilled is the correct size.
13. Make pattern piece for mushroom top	- Pencil	- Dot and Cross Paper	10 mins	See risk assessment sheet for Hand tools.	Make a template out of Dot and Cross paper. Check it fits the frame with a seam allowance,	± 10mm	I will make a paper pattern which I will fold in half to ensure it is symmetrical. I will check the seam allowance is added to the pattern piece.
14. Cut and sew Demin together	- Pins - Fabric scissors - Sewing machine	- Demin Jeans 5 pairs - Source old Jeans	50 mins	See risk assessment sheet for Hand Tools and Sewing Machine.	Use pins to ensure the pattern piece does not move when cutting out the denim. I will check the setting of the sewing machine before I start sewing. I will check the stitching is unformed	±5mm	I will uses the paper pattern to ensure consistency in pattern pieces
15. Attach and cover Demin in PVA glue	- Stable gun - Paint brush and bucket	- PVC glue 0.2 litres - 40 staples	30 minuets	See risk assessment sheet for Hand tools.	I will check the seams line up with the frame before I attach the denim	NA	NA
16. Remove wheels from chair base legs	- Hammer	- Old office chair - Source an old office chair	10 minuets	See risk assessment sheet for Hand Tools.	I will check all components been removed	NA	NA
17. Angle grind to remove legs	- Angle Grinder	NA	30 minuets	See risk assessment sheet for Angle Grinder	Ensure the the angle grinders blade is properly attached and is not to wear down / doesn't need a new blade to ensure cuts area accurate and precise. I will use a sharpy to mark where I need to cut so it doesn't come off easily from the metal. Cut slowly to ensure all cuts are level.	± 5mm	Use a template to mark where to cut accurately.
18. Weld nuts onto chair base to allow for the attachment	- MIG welding torch	- 3x iron nuts and bolts	30 minuets	See risk assessment sheet for Welding	Produce a test weld to practice how the nuts will be connected onto the chair extendable mechanism. Ensure that the welds are smooth continuous and don't have gaps which could lead to protentional weakness.	± 2.5mm	Use a jig to accurately space the nuts that will be welded to the base of the mechanism
19. Make a base out of wood	- Band saw - Belt Sander	- 30mm MDF - 1x A1 sheet	45 minuets	See risk assessment sheet for band saw	I will produce a carboard cut out first to ensure accuracy. Make sure that the bandsaw's blade is sharp and has the proper alignment and tension for accurate cuts. Ensure all excess material is removed when sanding. Check for splits in the wood. Ensure the worktable is level and firmly secure.	± 2mm	Use a template to ensure the curricular base is the right size with correctly spaced notches to allow for the base to connect to the MDF frame.

Planning

Description of making stage	Machine/Tool/ Equipment	Material and quantity	Time	Risk assessment	Quality control Check	Tolerance	Consistency control (Jig/ Template/ Former)
20. Attach the raising mechanism and frame to the base	- Hand Drill	- Screws - 10 screws	30 minuets	See risk assessment sheet for Hand Tools.	Mark wood before cutting with a pencil to ensure all screws are evenly spaced and in the correct positions.	± 2mm	Use a template to accurately mark the wood.
21. Make expanding surface mechanism	- Lazer cutter - Coping saw - Hand drill	- 6mm MDF - 1x A1 sheet - 1x 2000mm Dowl		See risk assessment sheet for Hand Tools and Lazer Cutter.	Make a paper and carboard version of the mechanism beforehand to ensure all the parts work and move in unison	± 0.1mm	Use a template to accurately mark the wood when cutting dowls. Use a jig when cutting with a coping saw and drilling with a hand drill.
22. Attach base, mechanism and top together.	- Hand Drill	- Screws - X10	20 minuets	See risk assessment for Hand Tools	Mark wood before cutting with a pencil to ensure all screws are evenly spaced and in the correct positions	± 2mm	Use a template to accurately mark the wood when cutting dowls. Use a jig when cutting with a coping saw and drilling with a hand drill.
23. Cut out hessian pieces to cover base of the mushroom	- Dot and Cross Paper - Pins - Fabric scissors	- Hessian sacks - Source old potato sacks	30 mins	See risk assessment for Hand Tools	Ensure all pattern pieces are cut in the same direction, use Pins to help consistency.	± 10mm	Make and use Paper pattern piece to ensure all hessian pieces are the same
24. Cover base in hessian and use PVA glue to make water resistant	- Stable gun - Paint brush and bucket	- Hessen - PVA glue	50 mins	See risk assessment for Hand Tools	Are all pattern pieces glues on equally and positioned correctly	NA	NA
25. Install solar panels with LEDs	- Soldering Iron	- Solder - LEDs - Solar Pannels - Source solar panels and LEDs	1 hour	See risk assessment for Hand Tools	Do the LED work Are all the connections soldered correctly	NA	Use a template to accurately mark out where the LEDs and solar panel should go

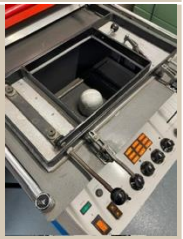
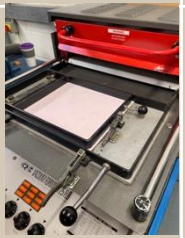
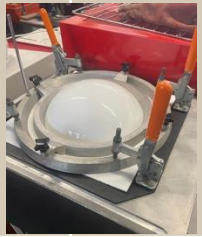
Prototype process of making:

Stage	What I'm doing	Tools and equipment	Materials required	Time	Health and safety	Quality Checks	Details of process
1.	I used CAD to design the frame / Skellington of my mushroom and cut out the pieces accurately on the laser cutter.	• Fusion 360 • Splicer • 2D Design • Laser Cutter	- 6mm MDF	13 hours	See risk assessment for 2D design, Lazer Cutter.	See Planning	- I used Fusion 360 to model the mushroom top and base of my design in CAD, ensuring the correct dimensions and shape were accurate. Afterward, I exported the Fusion file as an STL to splice my design into laser-cuttable parts. Then, I converted the file into a DXF format for use in 2D design, which allowed me to make additional changes and adjustments. - I was then able to laser cut the different parts in 6mm MDF using an application called laserworks. Before cutting I ensured that the power and speed were set to the right level of settings to provide an even and clean cut. I also adjusted the height of the laser cutting bench to further ensure the height of the laser was optimum. - This material was chosen as it was relatively cheap to reduce costs, sustainable and provides strength and good visual aesthetics.
	      						
2.	I used a variety of techniques to sand and modify parts so they would accurately fit. And test assembled my product.	• Belt sander • Abrasive paper • File • Band saw	• NA	3 hours	See risk assessment for Belt sander, Hand tools and Band Saw.	See Planning	- Due to the laser cutters lens being damaged not all the parts cut through fully. Due to I had to cut parts twice, use abrasive paper and a belt sander to remove excess material and release the parts that weren't cut fully through ***(Changes from Planning)*** . I then further sanded the parts to ensure that the tolerance between the gaps was accurate so it would allow me to easily join the parts together. In addition, to remove larger pieces I used the bandsaw as it ensured higher levels of accuracy than a coping or tenon saw, also I had to cut deep into the MDF and a coping or tenon saw would have been obstructed as the head of the bade would have got stuck at the top entrance. ***(Changes from Planning)*** - I then assembled the parts to test that product fits together and find area which needed more sanding to allow for a smooth fit with parts fitting flush.
							

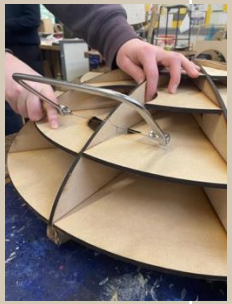
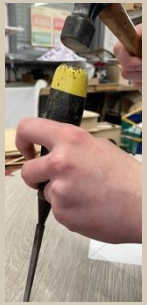
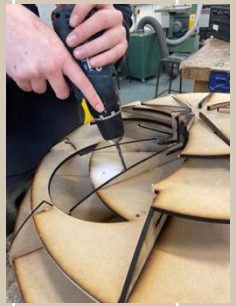
Prototype process of making:

Stage	What I'm doing	Tools and equipment	Materials required	Time	Health and safety	Quality Checks	Details of process
3.	I glued my manufacture pieces together assembling the product. I used a mallet to ensure all parts accurately and snugly fit making the product.	• Mallet • PVA glue • Clamps	• NA	1 hour	See risk assessment for Hand tools	See Planning	- I started by assembling the base frame. I place PVA glue on each joint, lined each section together and used a mallet to combine the pieces. Most joints fit tightly together however, 1 or two joints didn't fit correctly so I had to use a clamp to hold them together so they would glue in place. ***(Changes from Planning)*** - I ensured and checked that there were no gaps between any of the joints. - The mallet allowed me to easily assemble the product making it flush and secure.
	      						
4.	I used a lathe to create a former / mold the smallest of my mushroom spots as blow molding and press forming couldn't make a spot small enough	• Rule • Calipers • Band Saw • Lathe	- Styrofoam - 100mm by 100m block	15 minuets	See risk assessment for Hand tools, Band saw and Lathe (wood)	See Planning	- To create the small spot, I initially took the diameter of the largest and smallest part of the hole using a ruler and double check using a caliper to ensure accuracy. - Using these measurements, I used the bandsaw to cut a block of foam 10cm by 10cm by 10cm. I then stuck this foam block onto lathe chuck by using double sided sticky tape. - I used the lathe and tools to turn the foam into the desired shape. At regular intervals I used calipers to check my dimensions to ensure I was precises.
	    						

Prototype process of making:

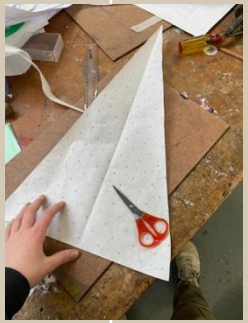
Stage	What I'm doing	Tools and equipment	Materials required	Time	Health and safety	Quality Checks	Details of process
5.	I used a vacuum former to mold a spot that I had previously created out of HDPE and then removed excess material with the Gerbil machine making the component.	• Vacuum former • Gerbil machine	• Two (1mm HDPE sheets 200mm by 100mm sheets	15 minuets	See risk assessment for Vacuum former and heat gun .	See Planning	- Using my mold which I lathed, I covered it in masking tape to prevent it deforming under the hot plastic of the vacuum former. - I then used a vacuum former to heat up 1mm HDPE sheet and form the shape of the mold. I did this by raising the mold which was underneath the hot plastic and turn on the vacuum causing the plastic to suck and form around it then releasing the vacuum once the HDPE had been cooled. - Once formed I used a Gerbil machine to remove excess material by friction leaving the shell / spot of the mushroom. - Due to two mushroom spots being the same size which was relatively larger than the small spot, I was able to find a glass bowl that was the perfect fit. By repeating the same steps of vacuum forming I used it as a mold to create the two medium size spots.
	     						
6.	I used a bandsaw to cut an acrylic sheet which I then heated in an oven and blow molded to create a large spot	• Bandsaw • Oven • Heat restive gloves • Former / mold • Blow molder • Pillar drill • File • Heat gun	• 3mm Acrylic sheet (200mm by 200mm)	7 minuets	See risk assessment for Band Saw, Oven, Blow molder, Pillar Drill, Hand tools and heat gun.	See Planning	- Using a bandsaw, I cut a large 3mm Acrylic sheet into a smaller sheet (200mm by 200mm). - I then heated this sheet in a oven for 5 minuets until the acrylic was bendable / moldable. I let the oven reach its required temperature and ensure the temperature remains constant at that temperature for at least 2 minutes before putting in the plastic to ensure the temperature was correct. - Once mouldable I moved the acrylic sheet from the oven to the blow moulder using heat resistive gloves. I clamped a mold over the hot acrylic on the blow moulder and blow air into it from underneath. Using the height gauge and the mold I accurately formed a spot that could fit into its required space on the mushrooms top frame. I left the acrylic to cool then detached it form the former. - I needed to remove the excess material, so I used a band saw to cut majority of the material of then sanded down the spot to allow for a circular chape. I used a template I had made of paper and whiteboard to ensure it was circular. - I used a pillar drill to insert a drainage hole into the large mushroom where water will be used. I used a file to sand down the hole and used a heat gun to connect the PVC piping to the bowl
	        						

Prototype process of making:

Stage	What I'm doing	Tools and equipment	Materials required	Time	Health and safety	Quality Checks	Details of process
7.	I used a variety of tools to create holes where I will set the mushroom spots. I had to do this due to some inaccuracies in the laser cutter	• Pencil • Drill • Chisel • Coping saw	• NA	45 minuets	See risk assessment for hand tools	See Planning	- Due to the laser cut MDF pieces of the mushroom top being cut at a slight angle I meant that the mushroom spot no longer perfectly fit into their spaces. ***(Changes from Planning)*** - For this reason, I marked the area preventing each spot to sit accurately using a pencil. I then used a drill, chisel and coping saw to remove excess material lowing the spots to fit into place. ***(Changes from Planning)***
	    						
8.	I drilled and assembled my pump mechanism within my mushroom	• Pencil • Pillar drill • Hand drill (step drill piece) • No go no gauge • Heat gun	• NA	30 minuets	See risk assessment for hand drill, pillar drill and heat gun.	See Planning	- Started by marking out the center of the top of the mushroom using a pencil, this allowed me to see where I could put the pump. I designed the mushroom head in a why which allowed for a gap through the center large enough for the pump to be pushed through. - Drilling pilot holes before allow me to drill the accurate. I will use a step drill to ensure I drill to the correct size of the pipe. After the hole was drilled, I used a no go no gauge to ensure that the hole drilled is the correct size. Due to the cone shape of the step drill not reaching very far into the model, it meant that I had hand turn a larger drill piece (by hand as it was to large for a hand drill) which could go through the whole mushroom top section to allow for the pump to easily go through. ***(Changes from Planning)*** - After the pump was pushed through, I used a heat gun to connect the PVC tubing to the pump allowing water to be drawn from the bottom of the mushroom.
	  						

Prototype process of making:

Stage	What I'm doing	Tools and equipment	Materials required	Time	Health and safety	Quality Checks	Details of process
9.	I created a cover for my mushroom top out of recycled fabric.	• Pencil • Ruler • Pins • Fabric scissors • Sewing machine • De seamer • Staple gun • PVA glue • Paint brush	• Dot and cross paper (700mm by 700mm sheet • Thread • Demin (4x jeans) • Glow in the dark paper	1.2 hours	See risk assessment for Sewing Machine, Hand Tools, Staple Gun and Iron	See Planning	- I started by making a template out of Dot and Cross. I made the template by using a pencil and drawing to make a pattern which I will fold in half to ensure it is symmetrical. I will check the seam allowance is added to the pattern piece. - To ensure my product was sustainable I decide to use Demin from old jeans to do this I used scissors and a ???de seamer to undo stiches from the jeans to allow for me to use the large amounts of Demin fabric? - I then pinned the template onto the Demin jean carcass and drew around it using a coloured pencil, then cutting the Demin to shape leaving 50mm of tolerance either side of the pattern. I used pins to ensure the pattern piece does not move when cutting out the denim. Due to the thickness of the Demin it was hard to cut uniform pieces. - I next use a sewing machine to sew each of the 10 mushroom segments together to create the dome. I checked that the setting of the sewing machine was correct for the thick material of Demin before I start sewing. - I cut out a hole in the top of the Demin dome and 4 holes for the spots using fabric scissors and sticked a seam on the outside to avoid fraying and provide extra structural integrity. I also adjusted some of the seams to ensure that it fit the MDF frame correctly and looked even and uniform. - I stretched the Demin dome cover over the top of the mushroom tightly and stabled it under the base to ensure it was strongly fitted. - I attached all the bowls to the base - I cut out photochromic/ glow in the dark circles and attached to the denim ***(Changes from Planning)*** - Finally, using PVA glue and a paintbrush I covered the Demin, to create a strong and durable cover that is inexpensive yet will survive the elements









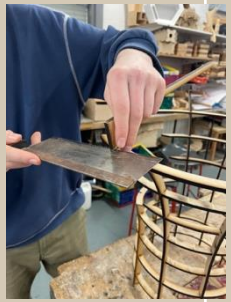
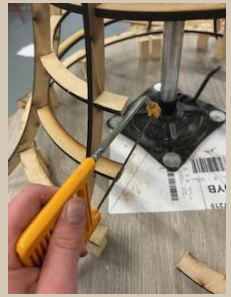








Prototype process of making:

Stage	What I'm doing	Tools and equipment	Materials required	Time	Health and safety	Quality Checks	Details of process
10.	Due to the structural integrity of the base, I needed to further support it. I created supports and adapted / changed the base.	• Tennon saw • Abrasive paper • Lazer cutter • Table saw • Bandsaw • Chisel • PVA glue • Clamps • Hand drill	• Pine (16x wood stops 50mm by 20mm by 20mm	45 minuets	See risk assessment for Hand Tools, Hand Drill, Table Saw, Band Saw and lazer cutter	See Planning	- Although I had thought the base was strong and could maintain a supportive structure, I was wrong, and the bottom legs started to collapse. Due to this I removed the end of the collapsing legs using a tenon saw to cut them at a 90-degree angle to allow for maximum surface area in contact with a surface when placed on it and sanded them down using abrasive paper to allow for a smooth finish. ***(Changes from Planning)*** - Once the legs were cut I found a old piece of hardboard which I used a template made on the lazer cutter of the base of the mushroom to mark around. I then used the mushroom as base frame as a template where I could cut and chisel holes to build the new more structural integral base. ***(Changes from Planning)*** - Due to this I cut a solid base of recycled 150mm hardboard covered in a vinyl using a table saw. I produced a carboard cut out first to ensure accuracy. I used a bandsaw to cut smaller diverts in which the frame would slot into and used a chisel to ensure they were the right / correct fit. ***(Changes from Planning)*** - Using PVA glue and clamps I assembled the base to the hardboard circle. I added, supports using wood dowls glue and screws to support the structure further. ***(Changes from Planning)*** - In addition, due to limited support at the edge of the shell I needed to remove excess material using a small coping saw as it allowed me to be more accurate. ***(Changes from Planning)***
	     						

Prototype process of making:

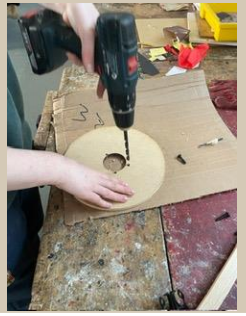
Stage	What I'm doing	Tools and equipment	Materials required	Time	Health and safety	Quality Checks	Details of process
11.	I used a variety of techniques such a welding and angle grinding to combine a variety of different components to create my rising and lowering mushroom mechanism.	• Hammer • Angle grinder • MIG welder • Pillar Drill • Hand drill • Screwdriver	• Metal chair compressio n… • Metal nuts and bolts 3x • 6mm MDF • Paint (orange)	1 hour	See risk assessment for Angle grinder, MIG Welder, Pillar Drill, Hand drill and Screwdriver.	See Planning	- To make the up and down mechanism I decided to use a chair Compression unit, which allow chairs to rise and lower. - I firstly removed the wheels of the chair using a hammer nocking the fittings out of place. I was planning on using the legs to support the project however realized if I flipped the mechanism upside down, I could use top as a solid base to screw into the hardboard base and the release mechanism as a foot pedal. ***(Changes from Planning)*** However, due to the mechanism being upside down the legs were obstructing the movement as they would not fit through the top entrance of the base frame. - To fix this I used a sharpie to mark the length at which I would cut the legs off (500mm as this allowed for and large enough surface area for the mushroom top to be placed on whilst allowing the mechanisms to not be obstructed and work). I used an angle grinder to remove the metal legs and sanded them down after to ensure / maximize safety due to the sharp edges. - I next needed a way to secure the top of the mushroom onto the base to do this I used nuts which were held I with blue tack (to stop them from falling off whilst welding) and welded them using a MIG welder ensuring all joints were strong and durable to hold the weight of the top above - Once the nuts where fitted I covered them in orange paint allowing me identify where I need to drill holes into on the 6mm MDF - I finally used a pillar drill to create the holes in in the wood where it was marked. After being drilled I screwed the screws through the wood to the nuts that were welded on securing the metal in place. I used a screwdriver to do this.














Prototype process of making:

Stage	What I'm doing	Tools and equipment	Materials required	Time	Health and safety	Quality Checks	Details of process
13.	I assembled every mechanism and part I had made finishing the mushroom in a hessian cover.	• Hand Drill • Stapler • Fabric scissors • Screw driver • PVA glue • Paint brush	• Hessian (2x Potato sacks)	1 hour	See risk assessment for Sewing Machine, Hand Tools, Staple Gun and Iron	See Planning	- I assembled the top, base, raising and lowering mechanism and the expandable mechanism using screws nut and bolts. - I made a pattern piece out of Dot and Cross. I made the template by using a pencil and drawing to make a pattern which I will fold in half to ensure it is symmetrical. - To ensure my product was sustainable I decide to use hessian from old potato sacks to do this I used scissors and to disassemble the sacks leaving me with large sheets of hessian. - I then pinned the template onto the hessian and drew around it using a coloured pencil, then cutting the Demin to shape leaving 15mm of tolerance either side of the pattern. I used pins to ensure the pattern piece does not move when cutting out the denim. - I then attached hessian using PVA glue and a stable gun to the frame of the product finishing it. - Used scissors to to trim and finish the external cover.
	          						
12.	I am assembling the expanding surface mechanism. Then attached the cap, mechanise and base together and inserted the pump	• Hand Drill		1hour		See Planning	- Using the laser cut pull out draw parts that I had cut and sanded in stage 1 / 2. I positioned the pieces and attached them using 12mm screws and washers to allow easy of movement when they are being pulled out. I had planned previously to use dowl however I used screws. ***(Changes from Planning)*** - I then attached the mushroom top and base together using screws and feed the water pump pipe through holes I had previously made. - I didn't add solar panels ***(Changes from Planning)***
	   						

Photos and Videos of the Final Product

Intro: I have included some photos and videos of my final product. These were taken at Warlingham Forest School, Hamsey Green Primary School and at my cousin's garden when they tested my product.

The product in the garden of my cousins









Warlingham Forest School





Video 104.1

360 video





Video 104.2 & 104.3

Pump & raising mechanism

The Forest School at Hamsey Green Primary School





Evaluation of Outline requirements V3

William Howe

Intro: I will now evaluate my product against my Outline requirements to see whether it meets my primary user and stakeholders needs

No.	Topic.	PUNs	Requirements	Justification.	Stakeholders	Priority? H/M/L	Evaluation of Outline Requirement against the Final product
1	**Colour.**		The colour must be **sympathetic to the surroundings** and include **colours inspired by nature.**	Through my mood boards and interviews and questionnaires I know my product should be **natural / sympathetic colours** this is so the product will complement the nature around without obstructing the surroundings.	Primary users – Children Secondary users - Sarah and Nick mace Designer	M	**Yes, they are muted colors. However, I did use Demin which was a blue and this is not usually seen in nature.**
2	**Shape.**	2	The product should have **aspects of nature and biomimicry in its design.**	Through my mood boards and interviews and questionnaires I know my product should be **natural or a sympathetic shape** this is so the product will complement the nature around without obstructing the surroundings	Designer Manufacture Primary user – Children	H	**Yes, I have met this because the product is inspired by organic mushroom shapes.**
3	**Product Size. / Storage**	3	The product must be able to **fit into a shed or shipping container** when being stored. In addition, the product needs to fit into the pre-existing play space / forest school.	After conducting an interview on share and Mrs Mace the product would need to be stored in a shed or shipping container, therefore it needs to be able to fit through the doors.	Delivery company Secondary users – Sarah and Nicki Mace (when they move the product) Manufactures Primary users children	H	**No, however when it would be manufactured, I should design it so that the top could be removable.**
4	**Component size**		The components should **not be small enough to swallow or digest**, however cannot be so big that children cannot use them.	Through my observations., which include my own younger cousins I have discovered that young children (6months – 4) like to mouth and eat toys / components, therefore the components must be large enough that children do not digest them. I have also conducted **Anthropometric data of children 6months – 13 years old research**	Primary users Manufactures Designers		**Yes, there are no small components**
5	**Weight.**		The product needs to **light enough to be carried by two adults** without them harming themselves, but heavy enough so the product is stable when in use and during poor weather conditions (Wind)	Through my observations at the forest school during my volunteering work, during packing away of equipment two adults would carry the equipment to the storage facility (tipi). This means the product must be light enough for two adults to carry and move. I have also conduct further research o**f accepted weights for adults to carry.**	Secondary users Delivery Companies	L	**Yes, two adults can carry and move it. However, it is a bulky design so not easy to move.**
6	**Structural integrity**		The product should be designed so it is **stable when in use / windy weather conditions**, so the product does not topple over and harm the children or get damaged.	Through my interviews and questionnaire, I have identified that my primary users enjoy climbing on the toys, in addition, through my observations many children thrown and play roughly with toys. This means the product must have a stable base and good structural integrity so when climbing the product does not fall over (even in windy conditions) and if dropped the product wont break.	Primary users Secondary users Designer		**Yes, due to the large base it has a large SA, therefore a lot of mushroom is in contact with the ground making it stable. In addition, the heavy top of the mushroom helps to keep the base down on the floor.**
7	**Style/Theme.**		The theme should **represent nature for example, forest / wooden fauna and flora.** In addition, elements of biomimicry.	I found out through talking with parents that they would like the theme of the product to include aspects of nature around. Through my mood boards and interviews and questionnaires I know my product should be **natural / sympathetic colours** this is so the product will complement the nature around without obstructing the surroundings.	Primary users – Children Secondary users - Sarah and Nicki mace Designer	H	**Yes, I have met this because the product is inspired by organic mushroom shapes.**
8	**Ergonomics**	5	The product should be designed so the **primary user understands the affordance with the product**	Through my questionnaires I have found out that the product needs to be designed for children from 6months – 13 years, this means the product must be interfaceable and useable (understand how to play with the product) for a variety of ages. I have also conducted Anthropometric data of children 6months – 13 years old research	Primary user Designer		**The product is designed with ergonomics in mind for example, its easy to use by all users as it has a mechanism that can change the height of the product to fit a large variety of ages. The pullout draws have a lip which allows them to be easily pulled out. In addition, when children were using it, they understood how it worked e.g. understood to put water in the spots / use the pumps.**
9	**Anthropometrics for primary users**	4	The product must be able to be **accessible and easy to use by all users**	Through my questionnaires I have found out that the product needs to be designed for children from 6months – 13 years, this means the product should be assessable to a variety of ages and children of different sizes. . I have also conducted Anthropometric data of children 6months – 13 years old research	Primary users		**Yes, the product is accessible and easy to use by all users as it has a mechanism that can change the height of the product to fit a large variety of ages. In addition, due to the curve it allows students in wheelchairs to fit their legs under the surface so they can easily play with it. The pull of expanding surface also makes the product easy to use for a variety of tasks. The main negative is the pump is hard to use and may be out of reach for some children.**
10	**Inclusivity**	6	**The product must be accessible to children with disabilities, these could include, sight, mobility and dexterity**	Through my questionnaire and interviews with Sarah and Mrs Mace I have I identified that they cater for special needs, this means I must design a product that is accessible to all children with sight, mobility and dexterity disabilities. I	**Designer**	**M**	**Yes, the product is accessible and easy to use by all users as it has a mechanism that can change the height of the product to fit a large variety of ages. In addition, due to the curve it allows students in**

Evaluation of Outline requirements V3

William Howe

No.	Topic.	PUNs	Requirements	Justification.	Stakeholders	Priority ? H/M/L	
11	**Aesthetics**	7	The product must be **aesthetically pleasing to my primary user and look sympathetic to its environment**	Through my mood boards and interviews and questionnaires I know my product should be **natural / sympathetic colours** this is so the product will complement the nature around without obstructing the surroundings.	Designer Primary users Secondary users		**Yes, I have met this because the product is inspired by an organic mushroom, they are muted colors, meaning the product is sympathetic to its environment.**
12	**Materials.**	3	The product must be sourced by a **sustainable source**	Through my interviews I have identified that sustainability is a core aspect of the forest schools. This is due to them upcycling and recycling many products, furthermore they want to teach children the importance of the environment and sustainability (sourcing). Through completing some material testing of readily available recycled fabrics, I will include these in the design.	Manufacture Producer of material source Environment agency Legislation Sustainability Disposal companies		**Yes, I have used sustainable materials, as most of my product is made 6mm MDF. In addition, I have used recycled Hesin, Demin and 12 mm chipboard.**
13	**Finish.**		The finish of the product needs to be **weatherproof and nontoxic** to my primary user	Via my interviews I have identified that the product will be used in all weather conditions, therefore the product must have a weatherproof finish to enhance and protect it. IN addition, through my observations I have discovered that young children (6months – 4) like to mouth and eat toys / products, this means the product will need to be nontoxic, so If a child swallows the product they are not harmed by toxic chemicals. I have completed research into finishes and legalisations regarding children's play equipment	Manufacture Environment agency Legislation Sustainability Disposal companies		**Yes, I gave it a coating of PVA which has weatherproofed it / made it waterproof.**
14	**Product life cycle assessment**		The product must last for a long time, sourced sustainably, well made and have the ability to adapt to the different primary user needs . When it comes to the end of its cycle is should be easily dismantled so it can be recycled	Through my and interviews I have identified that sustainability is a core aspect of the forest schools, this means the product should be sourced sustainably and must be easily dismantlable so the product can be recycled at the end of its life.	All stakeholders involved in the products life	L	**I considered the LCA throughout the building of my product.**
15	**Safety.**	1	The structure must have **smooth edges** and designed for both children to play with / on, and for Adults to carry minimising injury	Through my observations I have discovered that young children (6months – 4) like to mouth and eat toys / products, this means the product will need to be nontoxic, so If a child swallows the product they are not harmed by toxic chemicals. In addition, the product must be ergonomically designed (smooth edges) so when the primary user interfaces with the product they do not get hurt / harmed .I have completed research onto children's outdoor play equipment and their legislations	Legislation Designer Manufacture Primary users Secondary Users	H	**Yes, its safe due to the large base it has a large SA, therefore a lot of mushroom is in contact with the ground making it stable. In addition, the heavy top of the mushroom helps to keep the base down on the floor. All surfaces are smooth / curved on the mushroom.**
16	**Function**	10	The function of the product is to **encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.**	After speaking to the parents and via my interviews and questionaries I have identified that the product will need to encourage children to enjoy the outdoors whilst developing social, verbal, fine motor skills and help helping with their wellbeing.	Primary user	H	**Yes, this has been proven throughout my evaluation at the forest school and by my cousins.**
17	**Manufacturing Cost**	8	The product should where possible use **standard components and minimal manufacturing process**.	Through my interviews I have found that the forest schools have a tight budget due to limited funds, this means I need to create an affordable product and reduce costs where I can without compromising the product. I have completed research into relevant components such as water pumps, LEDs, solar packs and glow in the dark material	Sustainable product source Manufacture	M	**I included a standard pump and chair expanding mechanism which would have kept costs down (£8.99 for both components).**
18	**Maintenance**	9	The product must be easy to **repaired, clean and maintain** when in use.	Through my interviews I have found that the forest schools have a tight budget due to limited funds, this means I need to create an affordable product that can easily be maintained and repaired to prolong the life of the product. In addition, through my interviews I have identified that they will be used outdoors in all conditions so must be easy to clean and maintain, so they are safe to use.	Secondary User Manufacture Designer	**H**	**Yes, the PVA finish means the product is easily cleanable**

Summary and Next Steps :

I have identified all the outline requirements that my product.

Evaluation -Warlingham Forest Schoolers

William Howe

Intro: I visited **Warlingham Forest Schoolers** and interviewed **Sarah Morgan**, Sarah had been on of my original Primary Users who I had given me feedback throughout my project. I asked if I could bring the product to a Forest school session and observe the children playing on it. Iat one time 8 children were playing together on the product, sharing and having fun. Unfortunately, I was only permitted to take photos of 4 of children, two parents kindly also gave me feedback from a parent perspective . The Children I observed were all Pre school children, age 4 and under









Reflection on observations :

Strengths
- Children love to play with water
- They liked drawing on the fluorescence spots, with a UV pen
- Liked how they could spin and rotate the mushroom head
- They enjoyed putting mud and toys within the spots /bowls
- The large surface area of the expanding surface allowed them to further play on the spots like racing cars on them
- The adjustable height allowed it to fit a variety of children.

Weaknesses
- Pump was hard for them to use
- They found the draws hard to use
- Bigger bowls would have made it easier to play with water and other materials (e.g. mud)
- The pump was hard to reach as it was centred in the middle

My response
- I could change the pump to one which doesn't require stronger developed hand muscles.
- I could move the pump closer to the edge so its easier for the children to use or tilt the pump.
- I could add a ribbon / string / notch onto the pull out draws to make it easier for the children to pull out the draw.
- I could add a bigger bowl.



Video 107.1
My observations

Reflection on feedback from parents :

Strengths
- Fun and exciting to look at, fits the forest school theme, The adjustable height allowed it to fit a variety of children.
- 10 children could stand round it at one time but have their own space too.

Weaknesses
- Pump was hard for them to use
- Bigger bowls would have made it easier to play with water and other materials (e.g. mud)

My response
- I could change the pump to one which doesn't require stronger developed hand muscles.
- I could add a bigger bowl.





Quotes from Parents
Mike *'Most of the forest school equipment was fun to play with but lacked the inspirations of nature not like your mushroom',*
Emma *'Out of all the outdoors large play toys this was the most fun. I have only seen nature inspire equipment at National Trust gardens, but they were not so interactive as this product '*

Summary:
Children feedback they enjoyed playing with water, drawing with a UV pen, spinning the mushroom head, and using the large surface area for imaginative play. The adjustable height suited different ages. However, they found the pump and drawers difficult to use, and larger bowls would have made water and mud play easier.
Parents feedback they thought the product shape was really fun, and it was really good how it could help children play together but also have their own space
Next Steps: I will next right up an evaluation from one of my primary users Sarah Morgan.

Evaluation -Warlingham Forest School

William Howe

Intro: I visited **Warlingham Forest Schoolers** and interviewed **Sarah Morgan**, Sarah had been on of my original Primary Users who I had given me feedback throughout my project. I asked if I could bring the product to a Forest school session and observe the children playing on it. Iat one time 8 children were playing together on the product, sharing and having fun. After the children had a play on the product, and I had given a run-through of the product to sarah we interviewed her on the strengths and weakness of the product.











Video 108.1

Strengths and Weakness interview

Reflection on interview :

Sarah was very complimentary about the product below are the key strengths and weaknesses she talked about in the interview

Strengths

- Different compartments and bowls, allow for children to filling transport and emptying things in and out keeping them entertained.
- Surprise / secret / hidden draws, keep the mushroom entertaining.
- Children love the different textures; she was referring to the Denim and Hessian
- Water play is popular, and the product is versatile with mud / sand
- The height adjust so it can be used and to adapt to the height of a variety of users, including wheelchair users. The forest school caters for Pre school children and Primary school children
- Large number of children can use the product.
- Low cost due to it being recycled.
- Very stable and safe product to use as it had a low centre of gravity and large base, so if lots of children are gathered around one side it would not fall apart

Weaknesses

- Pump needs to be easier for the children to use, hand muscles are not strong / develop enough to use it.
- It could be difficult to store as the cap is hard to remove.

My response

- I could change the pump to one which doesn't require stronger developed hand muscles.
- I could move the pump closer to the edge so its easier for the children to use or tilt the pump.
- I could make the cap the more easily detachable

Quotes from Sarah

'Water play is always popular, and the product is versatile with not only the children having fun with water, but possibly mudand sand too'

'It was lovely watching so many children play together'

'Surprise, secret, hidden draws, keep the mushroom entertaining'









Summary:
Sarahs feedback was very complimentary about the product she helped highlight some key strengths and weaknesses which can help me adapt my product when making modifications
Next Steps: I will next evaluate my product with Amy and her children, who are a range of ages and have helped me throughout my product giving me feedback and helping me with my movement study research .

Evaluation -Amy and her children Zac age 8, Millie age 5 and Jasper age 2

William Howe

Intro: I asked Amy and her children, who are a range of ages and have helped me throughout my project giving me feedback and helping me with my movement study research to come and evaluate my product















Video 109.2
My observations



Video 109.1
My observations

Reflection on feedback from Zac, Millie and Jasper :

Strengths

- Millie was in hysterics with the water, she enjoyed squirting her younger brother and me with the water pump.
- Millie thought the pull-out surface would be great for making mud pies and food for her dolls
- She also thought the small bowls would be good for collecting leaving and fur cones
- Zac loved the mechanism of it going up and down and thought it was really exciting the bottom bucket connected to the bowl.
- Jasper just loved playing with the pipes and the way the mushroom span.
- They also really enjoyed playing together which was quite unique as often, as often one takes ownership the toy whereas this product kept them all very entertained.

Quotes from Zac
'I loved the way it goes up and down'
'It is cool how the water goes from the bottom bucket to the bowl., I know my little brother loves water play'

Weaknesses

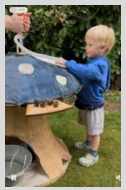
- Jasper couldn't reach the pump, he also didn't like it when Millie was moving the mushroom head in a different direction
- The bowls were small, and the water kept splashing out, the drainage hole was slow, meaning water spilled over.

How could it be improved?

- I could change the pump to one which doesn't require stronger developed hand muscles.
- I could add a bigger bowl.

Quotes from Millie
'The water was so much fun I loved squirting Jazzie (younger brother) and Will (me) with the water pump.'
'I love the little tables (pull out surface)they would be great for making mud pies and making food for my dolls'





Video 109.3
My observations

Summary: All three children had a wonderful time playing together, there was enough space for them to play along side each other, whilst giving them space to do their own thing. The product has lots of entertainment, the water feature was a major success. They were all very sad when they had to go home.
Next Steps: I think the bowl could definitely be bigger , I also think is there a real need for the 3 smaller bowls ? The pump again was an issue as they younger children found it hard to use

Evaluation -Amy and her children Zac age 8, Millie age 5 and Jasper age 2

William Howe

Intro: I asked Amy and her children, who are a range of ages and have helped me throughout my project giving me feedback and helping me with my movement study research to come and evaluate my product








Reflection on my observations :

Strengths
- Children love to play with water
- They liked drawing on the fluorescence spots, with a UV pen
- Liked how they could spin and rotate the mushroom head
- They enjoyed putting mud and toys within the spots
- The large surface area of the expanding surface allowed them to further play on the spots like racing cars on them
- The adjustable height allowed it to fit a variety of children
- The product could easily support 3 children..

Weaknesses
- Pump was hard for them to use
- They found the draws hard to use
- Bigger bowls would have made it easier to play with water and other materials (e.g. mud)
- The pump was hard to reach as it was centred in the middle

My response
- I could change the pump to one which doesn't require stronger developed hand muscles.
- I could move the pump closer to the edge so its easier for the children to use or tilt the pump.
- I could add a ribbon / string / notch onto the pull out draws to make it easier for the children to pull out the draw.
- I could add a bigger bowl.



Video 110.1
my observations



Video 110.2
my observations



Video 110.3
my observations



Video 110.4
my observations








Quotes from Amy:
'The adjustable height allowed it to fit a variety of children, this is great as my children range in ages – its like the IKEA kitchen' .
'All my children could stand round it at one time., and their friends too when they come for a play date'
' All Children love water play!!!'




Videos 110.5 & 110.6
Strengths & weakness interview



Reflection on interview feedback from parents – Amy :

Strengths
- Fun and exciting to look at, fits the forest school theme
- The adjustable height allowed it to fit a variety of children.
- All the children could stand round it at one time.
- Love the spinning feature
- Children love water play
- Glow in the dark lights make it lighter on a dark day and are fun for the kids to write on.
- And the incorporation of nature through makes the product exciting for children.

Weaknesses
- Pump was hard for them to use
- Way to faster drain the water out the large mushroom as the water only drained slowly.
- Takes a long time for the water to reach the top of the mushroom from the pump.
- Extend surface further / larger surface for outdoor play
- Bigger bowls would have made it easier to play with water and other materials (e.g. mud)

My response
- I could change the pump to one which doesn't require stronger developed hand muscles.
- I could add a bigger bowl.
- I could add a larger drainage hole to allow for water to escape more easily
- I could elongate the expanding surface pieces to make them extended further.

Summary: Amy loved the product, things she suggested were
- I could change the pump to one which doesn't require stronger developed hand muscles.
- I could add a bigger bowl.
- I could add a larger drainage hole to allow for water to escape more easily
- I could elongate the expanding surface pieces to make them extended further.

Next Steps: I will take for ward Amy suggestions and my thoughts from observing the children using the product, to help me make modifications

Evaluation - Mrs Mace Head Teacher – Hamsey Green School and Acorns Nursey

William Howe

Intro: I met with Mrs Mace and four Year 2 students, Ben, Eddy, Josh and Lizzy. I firstly explained to the students about my project and showed them the different features of the Mushroom, I then observed them playing with it , and then finally I asked Mrs Mace for some feedback.. I conducted this feedback in the Forest school where I had designed the product for .













Reflection on feedback from : Ben, Eddy, Josh and Lizzy.

Strengths

- The Year 2 students were amazed with the product, and thought it was such fun and cool to look at..
- The Year 2 students really enjoyed playing with the water pump, they worked as a team to use it as they found if hard individually to use, this was lovely to see them working as a team.
- They were intrigued with the height adjustment mechanism and peddle and thought it was great fun how it went up and down.
- The pull-out surfaces were a great success; they uses them to place leaves and twigs on.
- They enjoyed placing other bits they found on the floor, fur cones etc in the mini blows.
- They enjoyed rotating the mushroom and worked as a team.
- The pump was a great height for them all to reach

Quotes from Ben

''It is soooooooo cool I love the pump and water its sooo fun'

Weaknesses

- The pump was hard to use
- The bowls were small, and the water kept splashing out, the drainage hole was slow, meaning water spilled over.
- The pull-out surfaces were trick to pull out and some got a little stuck

Quotes from Eddy

'The up and down bit is great'

How could it be improved?

- I could change the pump to one which doesn't require stronger developed hand muscles.
- I could add a bigger bowl.
- I could add a hole to the pull-out surfaces to help small fingers pull them out.

Quotes from Lizzy

'I like the little secret shelves, but they were a bit hard to pull out '



Video 111.1

my observations



Video 111.2

my observations



Video 111.3

my observations



Video 111.4

my observation

Quotes from Josh

'I wish this was here all the time – it's the best!!'



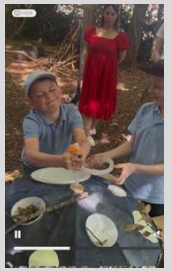





Hamsey Green Primary School

Acorns Nursery





Video 111.5

My observations

Next Steps: I will next reflect on Mrs Mace's interview, and take these reflections from the children with hers to help me modify my product

William Howe

Evaluation - Mrs Mace Head Teacher – Hamsey Green School and Acorns Nursey

Intro: I met with Mrs Mace and four Year 2 students, Ben, Eddy, Josh and Lizzy. I firstly explained to the students about my project and showed them the different features of the Mushroom, I then observed them playing with it , and then finally I asked Mrs Mace for some feedback.. I conducted this feedback in the Forest school where I had designed the product for .

Reflection on my observations :

Strengths
- Children love to play with water
- Liked how they could spin and rotate the mushroom head
- They enjoyed putting leaves and other natural bits in the spots /bowls
- The large surface area of the expanding surface allowed them to further play on and explore nature further
- The adjustable height allowed it to fit a variety of children.

Weaknesses
- Pump was hard for them to use
- They found the draws hard to use
- Bigger bowls would have made it easier to play with water and other materials (e.g. mud)
- The pump was hard to reach as it was centred in the middle

My response
- I could change the pump to one which doesn't require stronger developed hand muscles.
- I could move the pump closer to the edge so its easier for the children to use or tilt the pump.
- I could add a ribbon / string / notch onto the pull out draws to make it easier for the children to pull out the draw.
- I could add a bigger bowl.








Quotes from Mrs Mace

'The way you have designed it for a wheelchair too is wonderful – its so inclusive.




Quotes from Mrs Mace

'The product is really lovely, I love the way it's shaped as a mushroom, its so right for a Forest School'

'Its wonderful seeing your designs develop from your first thoughts, and how they have included all my feedback'

'Look at the students faces they love it! '

Quotes from Mrs Mace

'The water feature would be great when cooking out here'

'Its great how you can have 10 children working together at one time, maybe you could design three different sizes, it would look lovely here in our Forest School and would mean we could cater for a whole class at one time.'

Quotes from Mrs Mace

"Its brilliant how you have tired to keep down the costs for schools by making it flat pack, then the schools uses their own recycled clothing's to cover it – its genius!'







Quotes from Mrs Mace

'The glow in the dark spots makes it fun all year round and at nighttime too






Video 112.1
product strengths interview



Video 112.2
product strengths interview



Video 112.3
product weakness interview

Next Steps: I will take forward Mrs Mace's reflections to help me make possible future modifications

William Howe

Evaluation - Mrs Mace Head Teacher – Hamsey Green School and Acorns Nursey

Intro: Below I have summarised Mrs Maces interview and feedback

Reflection from Mrs Mace :

Mrs Mace was very complimentary about the product below are the key strengths and weaknesses she feedback to me

Strengths

- Beautiful design really reflects the outdoors, So different to other forest school products
- Water play is popular, and the product is versatile with mud / sand - Especially for the younger children and those who attend Acorns Nursey
- Different compartments and bowls, allow for children to filling transport and emptying things in and out keeping them entertained. Especially the younger children and those who attend Acorns Nursey
- Pull put Shelves / table really useful as more likely to keep clean – great for cooking on to with the use and availability of the water on tap.
- Children love the different textures; she was referring to the Denim and Hessian and so sustainable
- The height adjust so it can be used and to adapt to the height of a variety of users, including wheelchair users. Hamsey Green school also has Acorns Nursery attached to it – children for 2years old
- Large number of children can use the product.
- Low cost due to it being recycled.
- Very stable and safe product to use as it had a low centre of gravity and large base, so if lots of children are gathered around one side it would not fall apart
- Really inclusive with the ability for children in wheelchairs to join in

Weaknesses

- Pump needs to be easier for the children to use, hand muscles are not strong / develop enough to use it.
- It could be difficult to store as the cap is hard to remove.- not easy to get into the Shed.
- Shelves / Table tops look hard to pull out.
- Smaller Bowls hard to empty and clean

My response

- I could change the pump to one which doesn't require stronger developed hand muscles.
- I could move the pump closer to the edge so its easier for the children to use or tilt the pump.
- I could make the cap the more easily detachable
- I could attach or include a hole in the shelve to make it easier to use.

Next Steps: I will take forward Mrs Mace's suggestions, to help me make possible modifications

Final Evaluation which includes a combination of feedback from my three primary user:

Final Evaluation which includes a combination of feedback from my three primary user:

This feedback has come from a variety of stakeholders; Sarah who runs the forest school, Niki Mace headteacher of a primary school / nursey and Amy who is a parent of three children. I have also included feedback from the children and from my own observations.

Strengths

1.The product was developed with a strong focus on meeting the needs of children in forest school settings. This ensured that the product was easy to use, engaging, and adaptable to various developmental stages, promoting better learning and play experiences.
2.Water play element: The addition of water play encouraged **sensory, exploratory**, and **social** play. By using natural materials like mud and leaves, it not only kept children engaged but also helped them learn about the environment and develop fine motor skills through hands-on activities.
3.Interactive features: Children loved the spinning mushroom cap and UV-reactive glowing spots. These features increased **visual interest** and engagement, especially in lower light conditions, making the product more fun and appealing during different times of the day.
4.Social development: The design allowed multiple children to play together at the same time without issues of ownership or exclusion. This promoted **cooperative play**, where children worked together and shared their space, which is essential for building social skills in a forest school environment.
5.Inclusive design: The adjustable height feature allowed the product to be used by children of various ages, and even **wheelchair users**, by ensuring it could be modified to accommodate different heights. This made the product accessible to a wider group of children, ensuring no one was excluded.
6.Safety and stability: The wide base and low centre of gravity made the product very stable, reducing the risk of it tipping over, even when several children gathered around one side. Additionally, the mushroom was **cured** to ensure it was less likely to cause injuries, making it safer for young users.
7.Sustainable materials: The use of recycled **denim** and **hessian** provided different textures for the children to explore. Not only did this contribute to the **ethical** and **environmental** aspects of the design, but it also encouraged children to appreciate sustainable practices and understand the importance of reusing materials.
8.Glow-in-the-dark and tactile elements: The UV-reactive spots and tactile surfaces helped make the product more engaging in low-light environments, enhancing the **sensory experience** and making it accessible at all hours of the day, particularly important in forest school settings that operate in different lighting conditions.
9.Pull-out drawers and secret compartments: These hidden elements encouraged **creativity** and **engagement** by providing opportunities for children to discover and store various materials. This surprise element also enhanced their play experience and promoted problem-solving.
10.Low cost: The use of **recycled** and **sustainable materials** made the product more affordable, which is important for forest schools that often operate with limited budgets. It also aligned with **moral** and **ethical considerations**, as it minimized waste and supported eco-friendly practices.
11.Maintenance: The use of **durable materials** and **precise laser cutting** meant the product could withstand the rough outdoor conditions typical in forest schools. The product was designed to be long-lasting, reducing the need for frequent repairs or replacements, and contributing to its overall sustainability.

Weaknesses

1.The water pump was challenging for young children to operate due to limited hand strength. It was also positioned too centrally, making it difficult for smaller children or those in wheelchairs to reach. Moving it closer to the edge and making it easier to use would improve **user-centred design** and **inclusive access** for all children.
2.Small bowls and slow drainage: The bowls used for water play were too small, which led to frequent **water spillage**. This not only created a mess but also made the product harder to maintain and clean. A larger bowl with a faster drainage system would improve usability and **user experience**, ensuring children could play without the frustration of overflowing water.
3.Stiff pull-out drawers: The pull-out drawers were difficult for children to use, particularly with wet or muddy hands. This limited their practical use in an outdoor environment. Modifying the mechanism to make the drawers easier to slide open and close would make them more functional and user-friendly.
4.Mushroom cap difficult to remove: The mushroom cap was challenging to detach, making storage and transportation difficult. If the cap could be designed to be easily removable, it would make the product more portable and easier to store in tight spaces, improving **practicality**.
5.Slow water travel: Water took too long to travel from the pump to the top of the mushroom, which affected the play experience. A more efficient water transfer system would enhance the overall play experience, ensuring the children's time with the product is satisfying and fun.
6.Small drainage hole: The drainage hole was too small, causing water to spill over the sides during group play, leading to a messy environment. Enlarging the drainage hole would improve the product's functionality, reducing the amount of water spillage and simplifying cleanup.
7.Limited accessibility to features: Some features, like the pump and drawers, were hard to reach or use for some children, which could exclude those with physical disabilities. Ensuring that all features are easily accessible for a wider range of abilities would address **inclusive design** and ensure the product is more ethical in terms of equal access to all children.
8.Limited surface area: The play surface could be larger to accommodate more children and activities at once. Expanding the surface area would help support group play and outdoor learning, making the product providing more versatile and better suited to the **forest school environment**.
9.Drawer/ Shelves ease of pulling out. The Shelve unit requires a way of making it more user friendly when pulling it out, this could be achieved by adding a hole or a component to pull it out with

Possible Basic Key Modifications

1.Move pump closer to the edge for easier access.
2.Replace current pump with a circular hand pump for simpler and easier use.
3.Make mushroom head removable for easier storage and transport.
4.Use larger recycled aluminium bowls to improve water/mud play (batch manufacturing).
5.Replace height mechanism with stackable blocks to reduce parts and cost (mass manufacturing)
6.Attach or include a hole in the shelve to make it easier to use.

Feasibility and commercial viability

William Howe

Intro: Having identified IKEA as a potential company and client for my product, I will produce a page for their website where the product would be marketed on. I will also be considering the Price, Promotion, Place, People, LCA and Production Process of the product if it was to go into manufacture

Product :

The product is a sustainably designed mushroom-themed toy created specifically for forest school environments and outdoor learning. It encourages imaginative, sensory, and exploratory play for young children. The product includes a range of interactive features: a manual water pump, a pull-off expanding surface for tactile and messy play, drainage holes to allow for water flow and experimentation, and a rising-and-falling mechanism that supports ergonomic use by a variety of users—considering both anthropometrics and inclusivity in its design. The structure is built from recycled chipboard and MDF, giving it strength while maintaining environmental responsibility. Fabrics such as denim and hessian have been used for detailing, chosen not only for their texture and durability but also because they are materials commonly found in the home and can be easily recycled or repurposed. The product is designed to be both engaging and environmentally conscious, supporting hands-on outdoor learning through sustainable play.

Price :

After researching similar educational and sustainable play products, the mushroom is priced at approximately £65, which fits well within the typical price range for high-quality, eco-conscious toys. The estimated production cost per unit is around £20–£25, factoring in materials such as a few sheets of recycled MDF and chipboard, repurposed denim and hessian, a £7 manual water pump, and essential components like bowls, nuts, and screws. To keep costs down, I would develop the toy to have three different height settings, replacing the more complex rising-and-falling mechanism. Since the product is designed to be flat-packed, this helps reduce packaging and shipping costs, further increasing efficiency and profitability. However, it's important to note that manufacturing overheads (such as labor, equipment use, and factory maintenance) would reduce the overall profit margin. Based on these estimates, the product could generate a profit margin of approximately £30–£35 per unit, making it commercially viable while still accessible to customers.

Promotion :

The promotion of the mushroom would focus on its sustainable materials and educational value. Marketing campaigns would highlight the toy's eco-friendly construction (recycled denim, hessian, and MDF) and its benefits for outdoor play and STEM learning. Social media promotions on platforms like Instagram and Pinterest would showcase the toy in action, with influencer partnerships to reach eco-conscious parents and educators. A summer sale promotion could offer a limited-time discount, driving interest and creating urgency. In-store displays at retailers like IKEA would feature the toy in toy sections, and special offers, such as bundling with forest school resources, would further encourage purchases. The product could also be featured on the front page of relevant websites or catalogues to boost visibility.

Place :

The mushroom would be sold exclusively through IKEA, both in-store and online. This ensures the product reaches a wide audience of eco-conscious families and educators who trust IKEA for sustainable, quality products. In-store displays would feature the toy in the toy sections, highlighting its educational and environmental benefits. The online platform would offer easy access to the product, allowing customers to purchase directly from IKEA's website. This focused distribution strategy through IKEA ensures maximum visibility, accessibility, and alignment with the brand's sustainability.

People :

The mushroom targets eco-conscious parents, educators, and forest schools. Parents seeking sustainable, educational toys for their children will be a key audience, along with educators and forest schools looking for hands-on, sensory play options. The toy's use of recycled materials like denim, hessian, and MDF will also appeal to those prioritizing environmentally friendly products

Potential customer

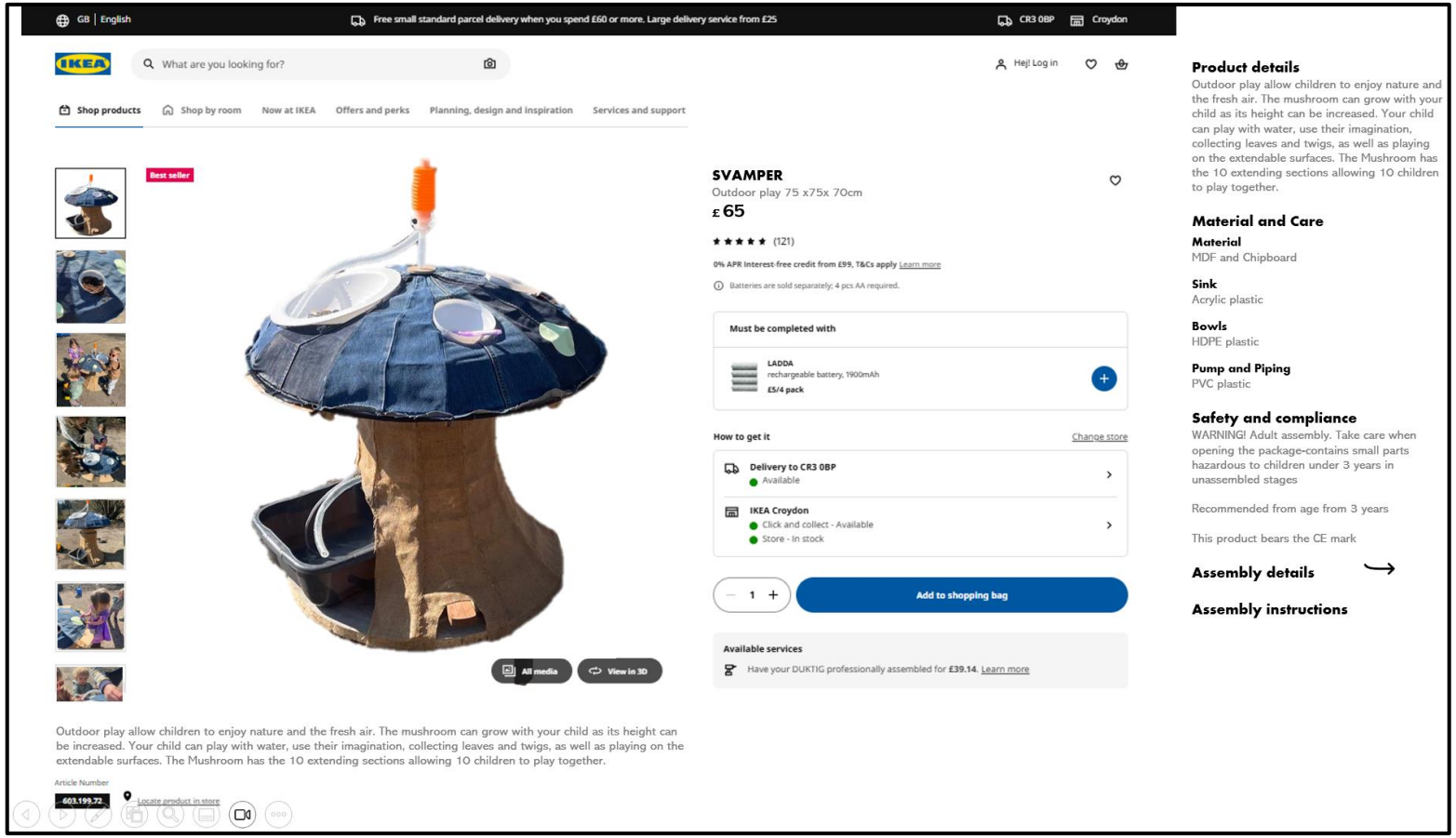
At IKEA, they share Let's Go Zero's belief that children are the most important people in the world and that schools can play a vital role
in educating future generations to make sustainable, healthy choices in their lifestyles

In line with our ambition of helping the many people live better everyday lives within the limits of the planet, IKEA can inspire and enable healthy and sustainable living in a way that is affordable, convenient and accessible to everyone – not just within the four walls of our homes, but also in all those places that represent an extension of our houses, including neighbourhoods, communities, and now schools.

Let's Go Zero: helping schools tackle climate change - IKEA

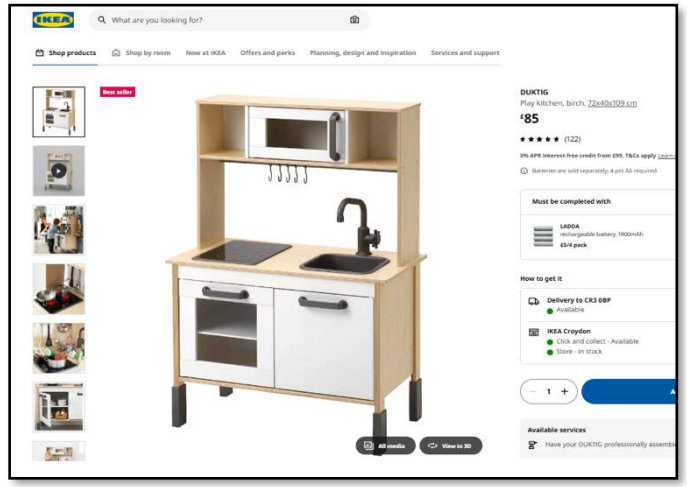
LCA:

The mushroom toy is made from sustainable materials like recycled denim, hessian, MDF, and chipboard, reducing the need for virgin resources. Its flat-pack design lowers shipping emissions and packaging waste. The toy is durable for long-term use, promoting outdoor play and reducing the need for replacements. At the end of its life, the materials can be recycled or repurposed, minimizing waste and supporting sustainability.



Production/ manufacturing Process :

For mass manufacture, the mushroom top and base would be designed using industrial CAD software like SolidWorks or Rhino, optimized for CNC cutting. Parts would be cut from plywood or MDF in bulk using CNC routers. Knock-down fittings such as cam locks, dowels, and screws would be built into the design to allow flat-pack shipping and easy customer self-assembly, following an IKEA-style model. Instead of a complex internal mechanism, height adjustment would be achieved by stacking or removing wooden blocks that slot securely into place. Vacuum forming molds would be made from durable plastic to mass-produce the plastic mushroom spots quickly and consistently. Fabric parts like denim and hessian would be machine-cut and stitched using industrial sewing equipment. Waterproof coatings would be applied using automated spraying systems to protect the materials for outdoor use. Assembly would be streamlined using production jigs and fixtures, ensuring consistent build quality and allowing quick final assembly at the factory or by the customer.



Branding /Product name named the product SVAMPER which is the Swedish name for a mushroom

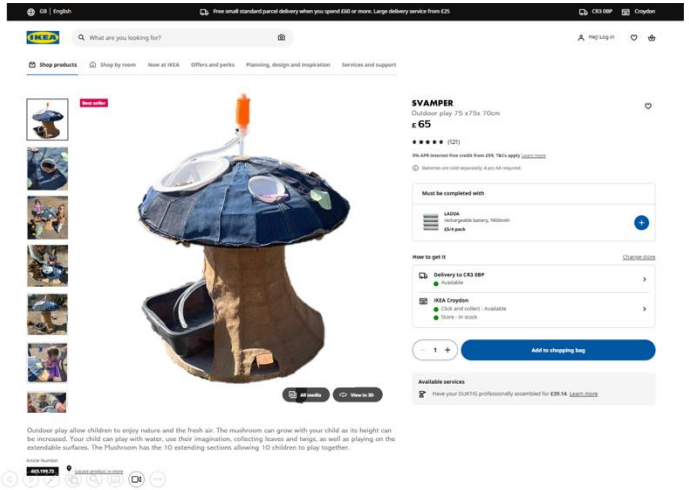
IKEA's iconic children's kitchen – is a similar product as mine It grows with the child. The height of the legs can be adjusted to 3 positions.it encourages role play which helps children to develop social skills by imitating grown-ups and inventing their own roles. ***Designer*** *Mikael Warnhammar* ***Prices at £85***

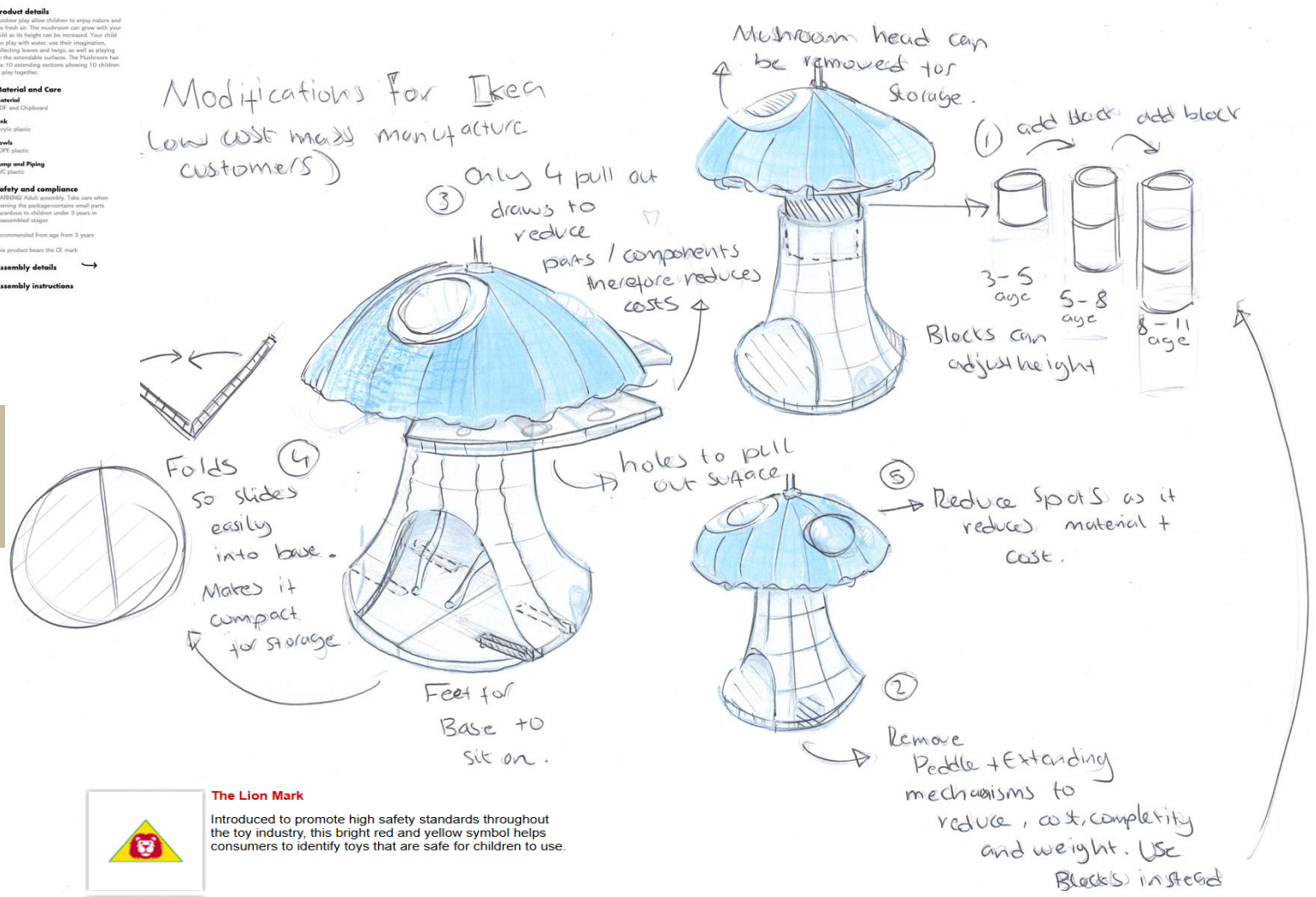
Feasibility and commercial viability

William Howe

Intro: **Having identified IKEA as a potential company and client for my product, I have produced a page for their website where the product would be marketed on. I have also outlined some possible changes to my product to make it more efficient both for manufacturing, and more inline with products sold within IKEA.**

Modification for IKEA product, the product would be designed for family use with a life expectancy of around 5 years, it would be designed to bought inside during extreme weather conditions





Mass production -the product could be easily adapted for mass production, when designing for mass production the manufacture may reduce the number of parts, components and processes in order to reduce outgoings and maximise profit. With some changes my product would be suitable for mass production and to be sold in Ikea.

Below are some of the changes that could be considered if the product went into mass manufacturing) :

1. I would design the mushroom cap so it can be removed; this allows the product to be easily disassembled so can be easily stored.

2. I would use blocks to adjust the height; this removes the mechanism that was here previously reducing costs. Adjusting the number of blocks easily and quickly changes the height of the product.

3. I would remove pedal the pedal, this means there are less parts that could be broken. In addition, it is not necessary as the mechanism is being replaced with adjustable blocks.

4. I would reduce the spots as this would reduce material quantity and costs, this therefore will make the product easier to manufacture and reduce costs as less parts are needed to be made.

5. I would only have 4 pull out draws to reduce parts / components reducing costs and complexity of manufacturing the product.

6. I would design the base so it can fold so will easily slide into the frame. Makes it compact for storage and reduces space when it is transported (flat packed form).

7. I would add feet to form a skeleton on which the folding base can sit and be attached to.

The Lion Mark

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CE Mark

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British Standards Kitemark

Awarded by the British Standards Institution, the Kitemark symbol is considered a sign of reliability and safety - and can be found on all kinds of products, services and processes as well as some toys and outdoor play equipment.

Toy Safety symbols to be shown on my product :

Feasibility and commercial viability

William Howe

Intro: Having identified the National Trust as a potential company and client for my product, I will produce a page for their website where the product would be shared with genal public. I will also be considering the Price, Promotion, Place, People, LCA and Production Process of the product if it was to go into manufacture

Potential customer

The National Trust is a UK-based conservation charity and membership organization, the largest in Europe, dedicated to protecting and preserving historic places, natural beauty, and cultural heritage for the benefit of the nation and future generations.

In resent years they had invested largely in children's activities and play areas. Making the day out at one of their locations a very happy and pleasurable experience for the whole family.

Splashing through streams, clambering around tree houses and building a woodland den – there's nothing quite like playing outdoors

Best natural play areas | National ...

Product :

The mushroom toy designed for the National Trust is a high-quality, bespoke forest school product designed to support imaginative, outdoor play and hands-on learning. It is constructed from durable marine-grade plywood with a resin coating for enhanced weather resistance, ensuring a lifespan of over 10 years in outdoor environments. Sustainable materials like recycled denim and hessian, often repurposed from household waste, add a tactile, eco-friendly finish. The toy features a manual water pump, holes with built-in drainage, and an adjustable height mechanism, allowing the surface to rise and fall to suit different users—supporting ergonomic use through anthropometric considerations. The design also encourages messy, sensory play and is flat-packed for efficient transportation and storage. Built for forest schools and eco-conscious organisations embracing sustainability, durability, and interactivity in a long-lasting, engaging product.

Price :

The mushroom toy designed for the National Trust would be priced at around £500, reflecting its high-quality materials, bespoke craftsmanship, and long-lasting design. The use of marine-grade plywood, a resin coating, and upgraded components significantly increases durability, making it a long-term investment for forest schools and other organisations. The estimated production cost per unit is around £250, taking into account material costs, labour, and enhanced finishes. While the profit per unit would be reduced slightly by higher manufacturing overheads and more detailed construction, it would still achieve a solid margin of around £250 per unit. This pricing also reflects the product's unique selling points—its lifespan of over 10 years, eco-conscious materials, and educational value—offering excellent value over time.

Promotion :

The mushroom toy would be promoted through trade websites and procurement platforms used by organisations such as forest schools, outdoor education centres, conservation groups, and environmental attractions like the National Trust or Eden Project. It would be listed in educational and sustainability-focused product catalogues, where buyers seek durable, long-lasting resources for outdoor learning. Promotion would focus on the toy's lifespan, robust materials, and interactive features, supported by detailed specifications and imagery. It could also feature in seasonal campaigns, sustainability round-ups, and at education or environmental trade shows.

Place :

The mushroom toy would be sold through specialist trade channels catering to educational institutions, forest schools, outdoor learning centres, and environmental organisations. It would be available on procurement platforms used by organisations such as the National Trust, the Eden Project, and similar bodies. In addition to online listings, the product would also be physically showcased at trade shows focused on education, sustainability, and outdoor learning, allowing buyers to see the quality and function in person.

LCA:

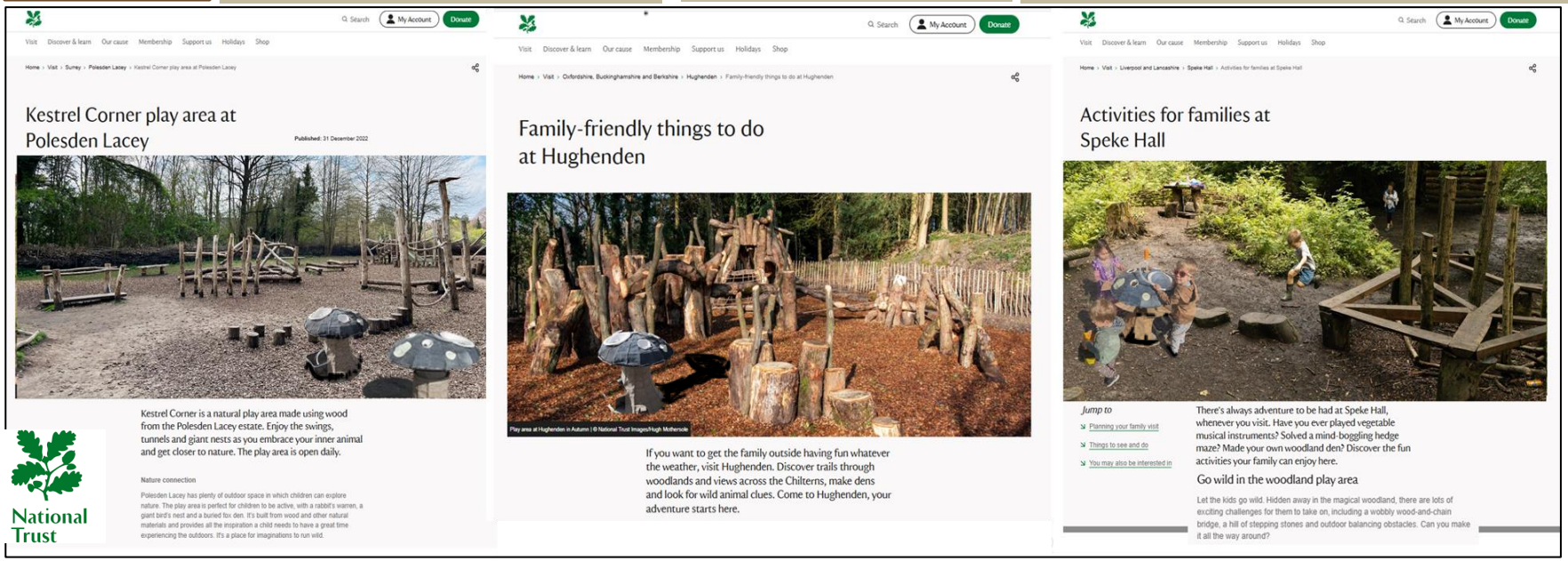
The mushroom toy is designed with sustainability at its core, using marine-grade plywood, recycled denim, and hessian. The materials are sourced responsibly, with the plywood coming from sustainable forests. The toy is handcrafted in a facility that prioritizes energy efficiency and waste reduction. It is flat-packed to minimize transport emissions and packaging waste. Built to last over 10 years, the toy's durability reduces the need for frequent replacements. At the end of its life, the materials are recyclable or biodegradable, contributing to a circular economy. The toy's long lifespan and eco-friendly materials ensure minimal environmental impact from production to disposal.

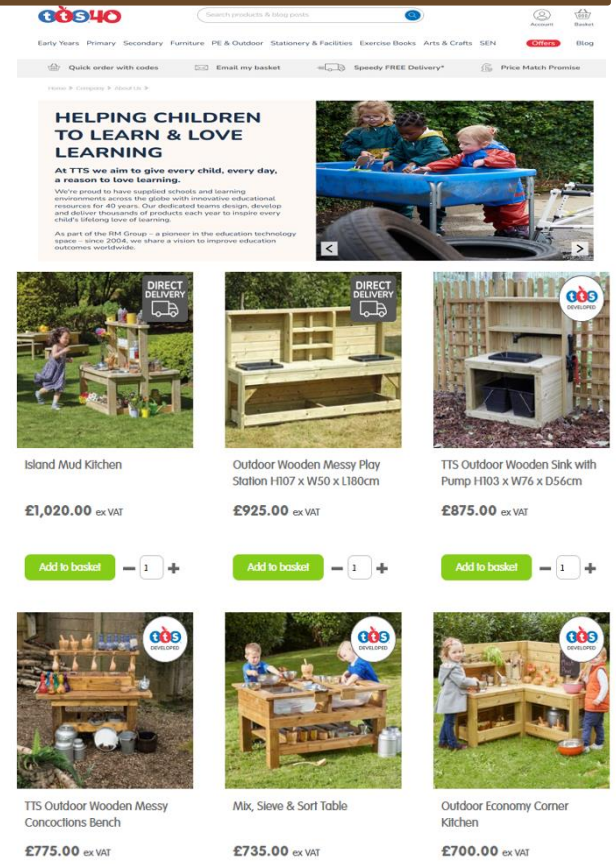
People :

This product is aimed at organisations and institutions that promote outdoor learning and sustainability—such as forest schools, nature reserves, educational centres, and environmental charities. It also targets families who value long-lasting, eco-conscious play equipment. Buyers are typically educators, procurement managers, and program leaders looking for engaging, durable, and ethically made products that support learning through play in natural environments.

Production/ manufacturing Process :

For batch production, the design would use marine ply for the base and frame, ensuring durability and resistance to outdoor conditions. The aluminium bowls would be made through metal stamping, where aluminium sheets are pressed into moulds to create the desired bowl shapes, followed by anodising for corrosion resistance. The expanding mechanism would be welded using steel components, creating a strong, adjustable structure for height customisation. To manage water drainage, a soak-away system would be integrated by placing a concrete base with a steel cover beneath the unit. This would help direct excess water away from the mushroom, ensuring proper drainage and minimising water retention. The assembly process would involve precise cuts made by CNC machines, and components would be welded or screwed together to form the final product, emphasising a robust design with easy assembly. The focus would be on batch production efficiency, with an emphasis on quality, durability, and minimal need for complex disassembly.





TTS is a company who sells similar products to mine, I could potentially sell mine through this company. I was also able to see what the prices were of similar quality products were being marketed at. Products range from £500-£1000

WILD SAPLING
SUSTAINABLE TOYS

Children who grow better in the outdoors

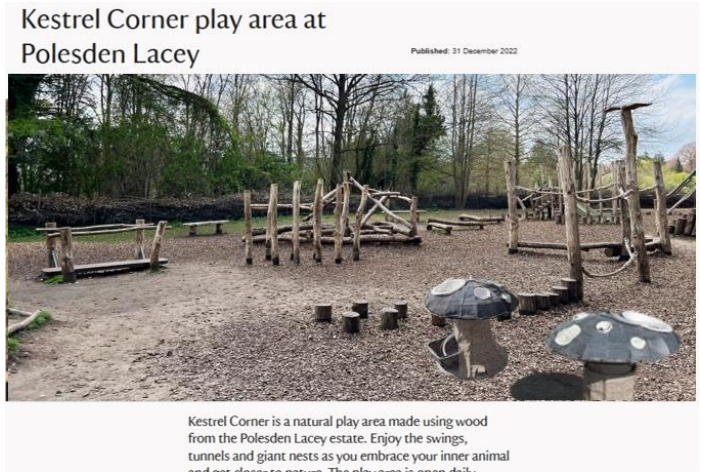
Company Logo

The **Wild Sapling** logo represents the children who use the product—growing, curious, and closely connected to nature. Its simple, leaf-based design is easy for children to recognise and feel at ease with, while the green colours reflect the calm, outdoor spaces where they learn and play.

Feasibility and commercial viability

William Howe

Modification for a National Trust product, the product would be designed to be permanently outdoors for approximately 10 years



Kestrel Corner play area at Polesden Lacey

Published: 31 December 2022

Kestrel Corner is a natural play area made using wood from the Polesden Lacey estate. Enjoy the swings, tunnels and giant nests as you embrace your inner animal

Intro: Having identified the National Trust as a potential company and client for my product to be designed for. I have produced a page for their website where the product could be seen in use, as a way to entice parents to visit their places of interest. I have also outlined some possible changes to my product to make it more appropriate for the end use when the Natation Trust buy in my product.

Batch production -the product could be easily adapted for batch production, when designing for batch production the manufacture may reduce the number of parts, components and processes but it would be important to ensure the product maintains its quality and unique functions. With some changes my product would be suitable for batch production and to be sold to company's and organisations such as then National Trust. Below are some of the changes that could be considered if the product went into batch manufacturing :

Below are some of the changes that could be considered if the product went into batch manufacturing :

1. I would make the draws stay out permanently otherwise they would seize shut and eventually not move, as the product is in the outdoor environment all the time.

2. I would provide a Resin coating to be used for enhanced protection, thus ensuring the longevity of the product.

3. I would make the base a sealed unit for protection, to ensures that dirt / mud and weathering doesn't affect the mechanism so it can adjust in height smoothly for a long time.

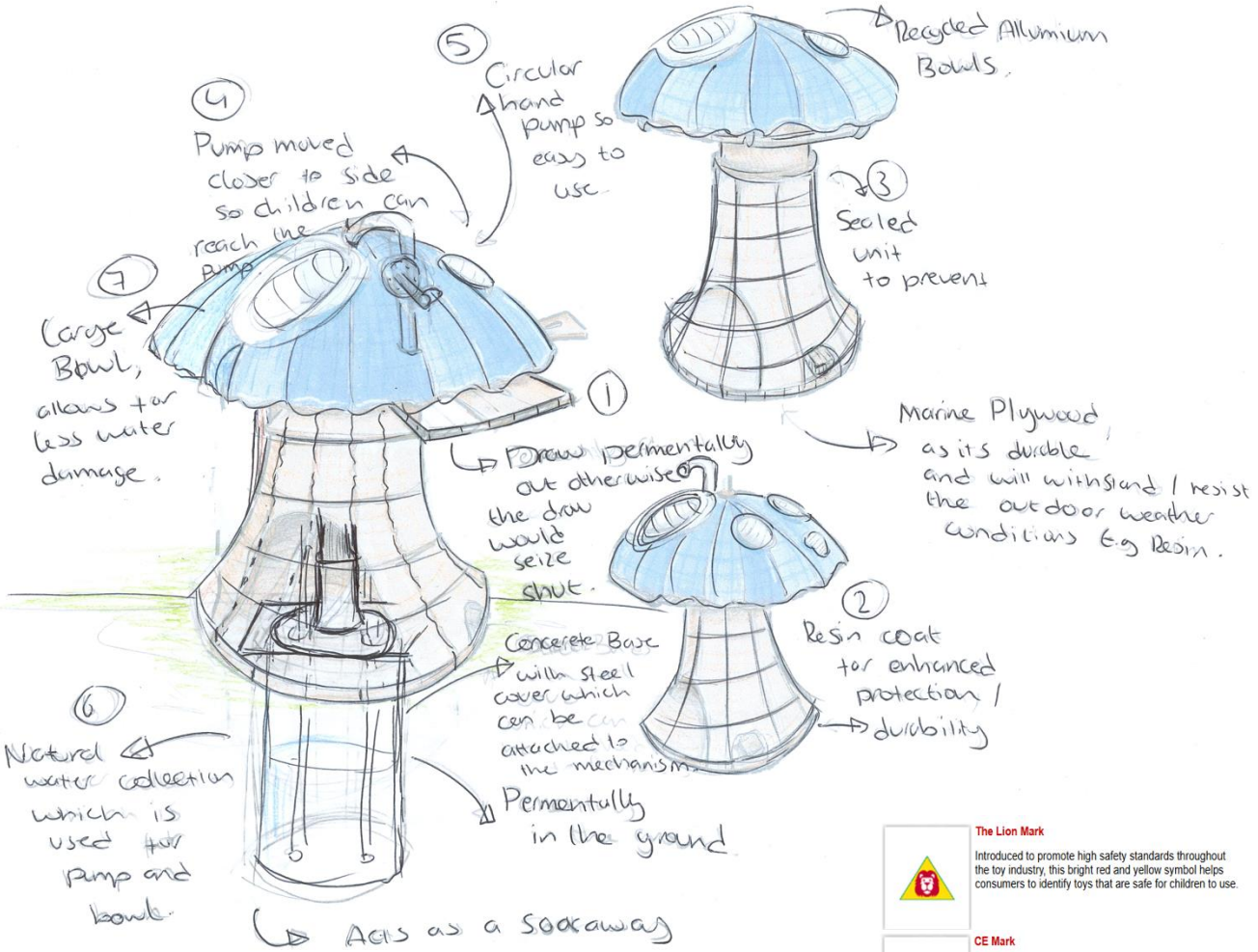
4. I would make the main frame out of Marine ply, providing the product a more durable and long-lasting frame making it more resistant to the outdoor weather conditions .

5. I would move the Pump closer to their side so the children can reach the pump more easily.

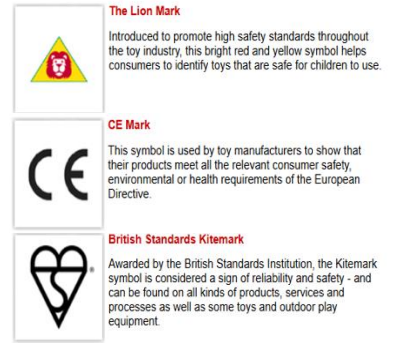
6. I would buy in a more expensive pump with a Circular hand mechanism, so it is easy to use

7. I would suggest a Natural water collection which could be used for the pump (And. acts as a soak-away. With Concrete base and steel cover which can be attached to the mechanism. As the product is permanently in the ground) – this would be an extra cost.

8. I would buy in a Recycled aluminium bowls, to increase longevity this would also be ,larger in size.



Toy Safety symbols to be shown on my product :



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