Final Graduation Project

Oceanic Sustainability & Autism Project

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My aim for this project was to redesign a piece of furniture for children with autism, who may have difficulties taking in large amounts of external stimuli while at school, using recycled/remanufactured plastic collected from the ocean.

To do this I needed to analyse a specific target user by taking into account the different factors that may make autistic individuals uncomfortable while at school, Sensory design was imperative to accomplishing this goal, Because of this, I needed to take into account aspects like colour, smell, touch and hearing to find a way to best manage the stimuli.

I also needed to research and analyse specific examples of remanufactured plastic materials/products to determine a sufficient alternative towards the more conventional choices of plastic made furniture as well as to help reduce the amount of plastic in our oceans.

My reasoning for choosing this specific set of criteria is based on both personal experiences and a way of addressing large-scale environmental issues that pose very significant threats to our ecosystem.

The choice to base the context of the user and form of my design on children with autism was based on my own experience with the condition as a child, as well as a way to help those who may have to work around the symptoms such conditions can have on a young mind.

Alternatively, the choice to base the materials and the sustainability factor on the rising issue of plastic waste in the oceans was made to highlight the prominence such a practice is having on our world.

Through this project, I hope that I can come up with incentives to help promote the acquisition, recycling, and remanufacturing of plastic waste to help improve the conditions of our oceans.

2000 - Year of Birth

2011 - Year of Diagnosis

2021 - Present Day

Introspection:

“When I first found out I had Asperger’s Syndrome, I found that many of the characteristics which I exhibited up until that point started to make sense to me, why I was different, why I didn’t fit in, why I found some things in everyday life to be extremely difficult.”

“When it comes to the way I sense things, I’ve found that only a few things were noticeably different from the way I experienced them. My sense of smell, for example, has been impacted, though this may be due to nasal problems which I’ve had since a young age so I don’t count that as an implication of my autism,”

“Touching things has never really bothered me, when it comes to materials/surfaces/objects, I often find that I use this sense as a way of getting a first-hand experience of anything, and in my experience, I’ve never had any issues with physical textures against my skin, unless its mouldy food.“

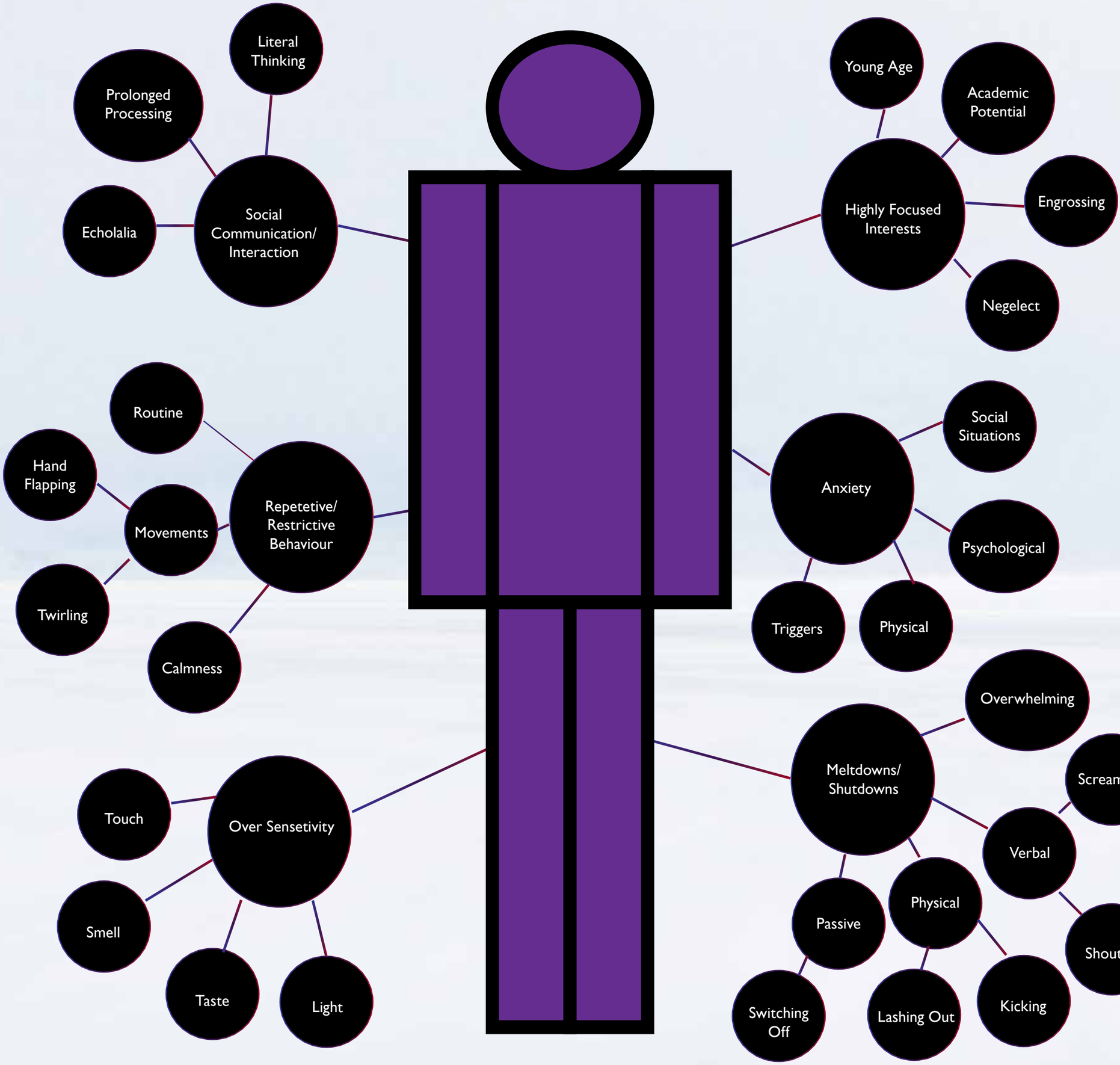
“When it comes to my sight, I’ve found that I’m not particularly fond of really bright colours, though I’m not sure if this has anything to do with my specific form of autism or is just a personal preference on my part. One issue that does make me feel oversensitive and anxious is when I’m looked at by a crowd of people, I’ve experienced this acutely whenever I’ve had to give public talks or presentations. During these situations, I lose all confidence and cannot find a suitable way to maintain eye contact with other people. I do not experience a meltdown per se, as I don’t shout or become aggressive, but I do find that this can lead me to shutdown and not function, depending on the variables.“

“Finally, in regards to my hearing I know from personal experience, that my senses are overwhelmed by large quantities of sound originating from various sources at one time. To minimise this type of audio exposure, I choose to relax in quiet locations or situate myself so that the audio is coming towards me from one, or minimal directions. When I’m looked at by many people at once, the focused attention makes me feel anxious and unsettled. When I find myself in these situations, the resulting anxiety and lack of confidence prevents my ability to maintain interpersonal skills, such as eye contact and I tend to ‘shutdown’ to protect myself from the excessive audio and sensory stimuli. Upon reflection, I’ve realised that the sounds around me have influenced me to make unconscious choices about seating arrangements, for example, I choose to sit at the end of a sofa to be isolated and secure from both the people around me and the sounds I’m exposed to; when in class, I choose to either sit at the back, or to the side of the room, to reduce the noise I am exposed to“.

- Nathan Spiers

Name: Nathan Dean Spiers
Nationality: English
Ethnicity: White
Gender: Male

Form of Autism: Aspergers Syndrome/ Level 1 Autism Spectrum Disorder
Characteristics: Limited Social Interactions, Sensory Differences (Auditory), Anxiety, Focused Interests, Repetitive Behaviour
Year of Diagnosis: 2011


Literal Thinking
Prolonged Processing
Echolalia
Social Communication/ Interaction
Young Age
Academic Potential
Highly Focused Interests
Engrossing
Negelect
Routine
Hand Flapping
Movements
Repetetive/ Restrictive Behaviour
Twirling
Calmness
Social Situations
Anxiety
Psychological
Triggers
Physical
Overwhelming
Meltdowns/ Shutdowns
Screaming
Verbal
Shouting
Passive
Physical
Switching Off
Lashing Out
Kicking
Touch
Over Sensetivity
Smell
Taste
Light

Even though the UK has several different institutes focused on nurturing and educating those with autism, around 71% of children with a diagnosis attend mainstream schools.

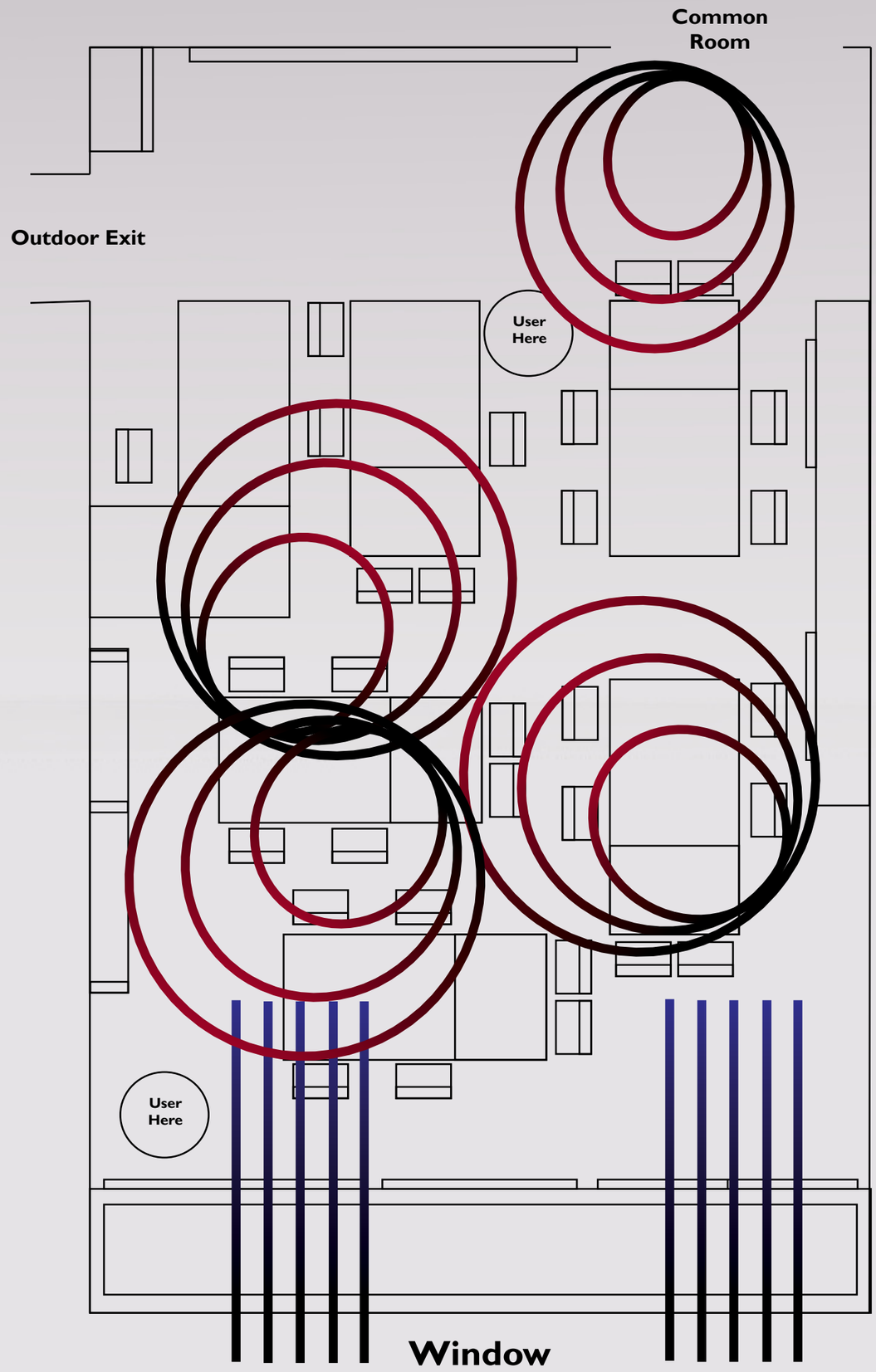
Because of this most schools often enlist the help of qualified counsellors to assist with the education and development of those who need the extra assistance.

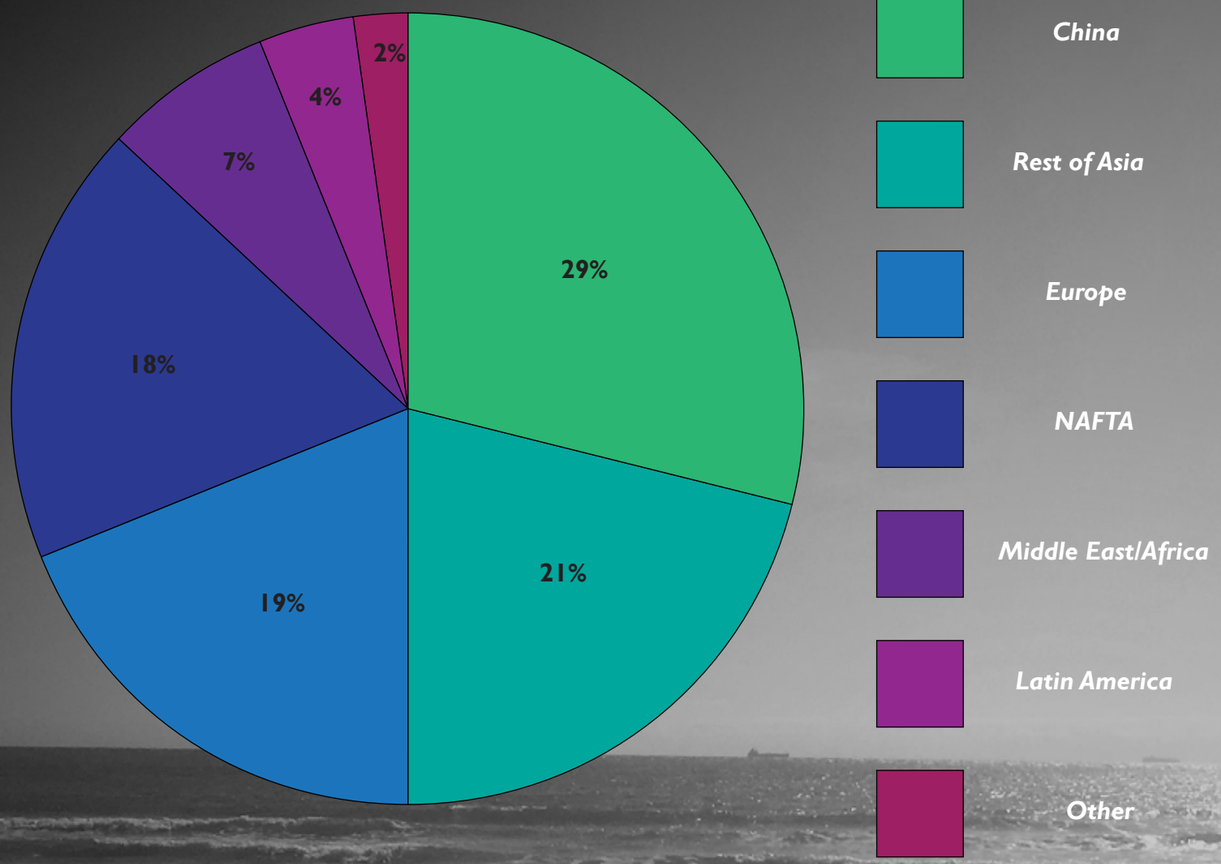
This is mainly because there are no regulations in place to ensure that teachers are educated about teaching those with Autism.

Common issues for children with autism whilst at school include, but are not limited to, bullying, expulsion, exclusion and on occasion, ignorance from those who are not able to comprehend the specialist needs for those with autistic tendences.

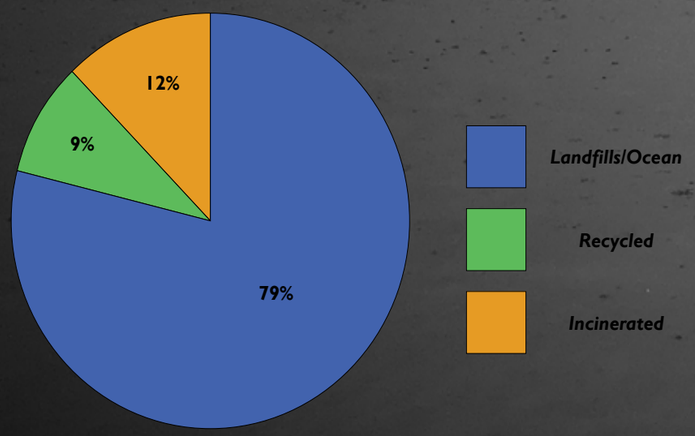
These factors can make school a very difficult place for children with autism to thrive, as such, steps need to be taken to promote and increase awareness of this issue amongst those who don't fully understand the condition, including teachers and students alike.

Red = Sound
Blue = Light

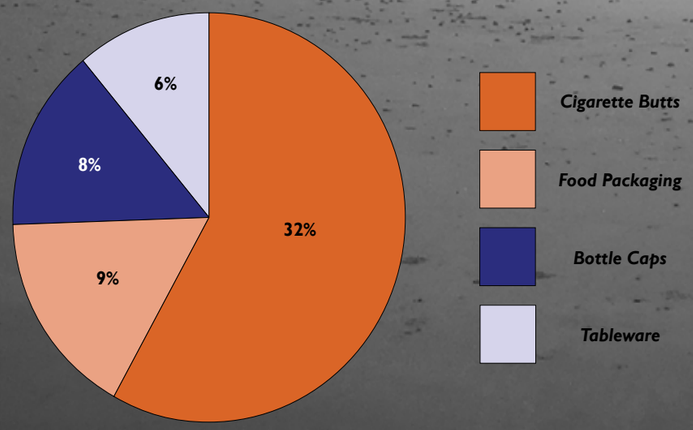




Countries and the percentage of plastic pollution they are responsible for



Where most Plastic ends up



Samples of Plastic Products and their Prevalence in our Oceans

To maximise the potential context for my project I needed to base my choice(s) of material on the most prominently extensive examples of waste products found/salvaged both near shorelines and at sea.

Examples of specific statistics obtained from my research include:

- For each mile of UK beaches there are 5000 pieces of plastic & 150 plastic bottles.
- 700 species of marine animals are considered endangered due to plastic pollution.
- 20% of all plastic waste in the sea comes from ropes, lines and nets used by sailors on boats/ships.
- 32% of plastic waste found originated from cigarette filters, 9% from food packaging, 8% bottle caps, and 6% tableware.
- Disposable plastic straws make up approximately 1% of the plastic waste found in oceans.
- 8 million pieces of plastic pollution find their way into our ocean daily.

Sources for my investigations include the websites condorferries, ourworldindata and oceanclear, to name a few.

Several companies have found success in recycling/remanufacturing plastic products to reduce the amount of discarded plastic in the ocean.

Several organisations have worked to encourage people to recycle plastic in order to prevent ocean pollution from occurring (Ocean Clear, The Ocean Clear up, etc...).

Remanufacturing plastic is becoming a viable method of material development due to its sustainability, cost-effectiveness, circular economy and conservation of emissions from its manufacture.

Designers are being encouraged to experiment and utilise more recycled plastic in their products to help discourage mass pollution and encourage reuse and remanufacturing.

Dura Ocean's Nassau Garden chair was significantly inspiring during my project development, as it was both made from salvaged fishing nets and remanufactured through an injection moulding process. Certain differences were needed as my project took shape.

Body Material: PET Plastic

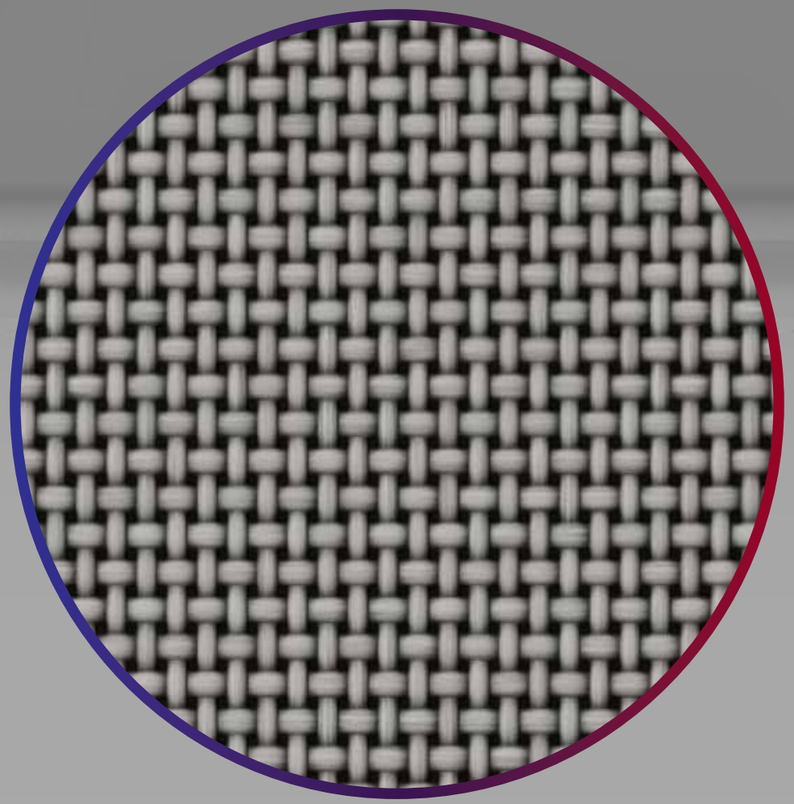
Following the context for my project, I decided on using salvaged/recycled/ remanufactured Polyethylene Terephthalate Plastic.

This is commonly used in products such as soda bottles, plastic tubs and food containers, all items which are commonly found near oceanic environments.

Fabric Material: Camira PET Plastic Sheets

The London based textile company, Camira, have developed a brand of fabric material made from salvaged ocean plastic.

The context of this plastic material in connection with my current material choice would correlate to better emphasise my project aims.

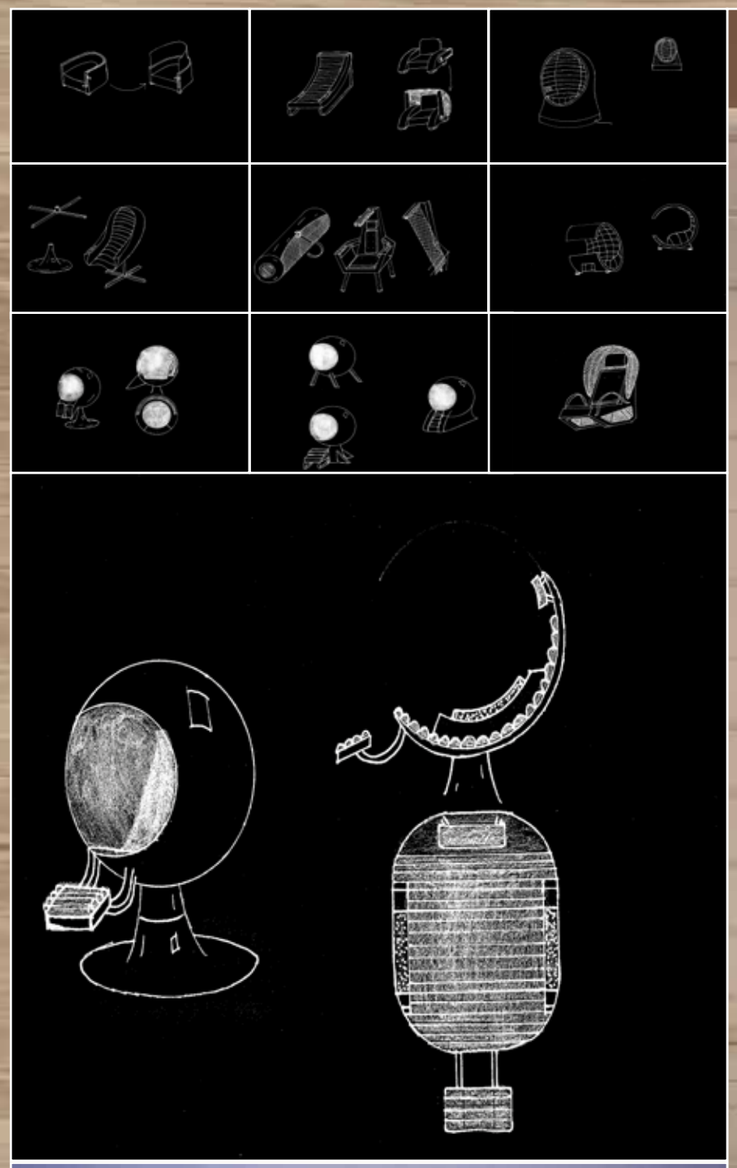


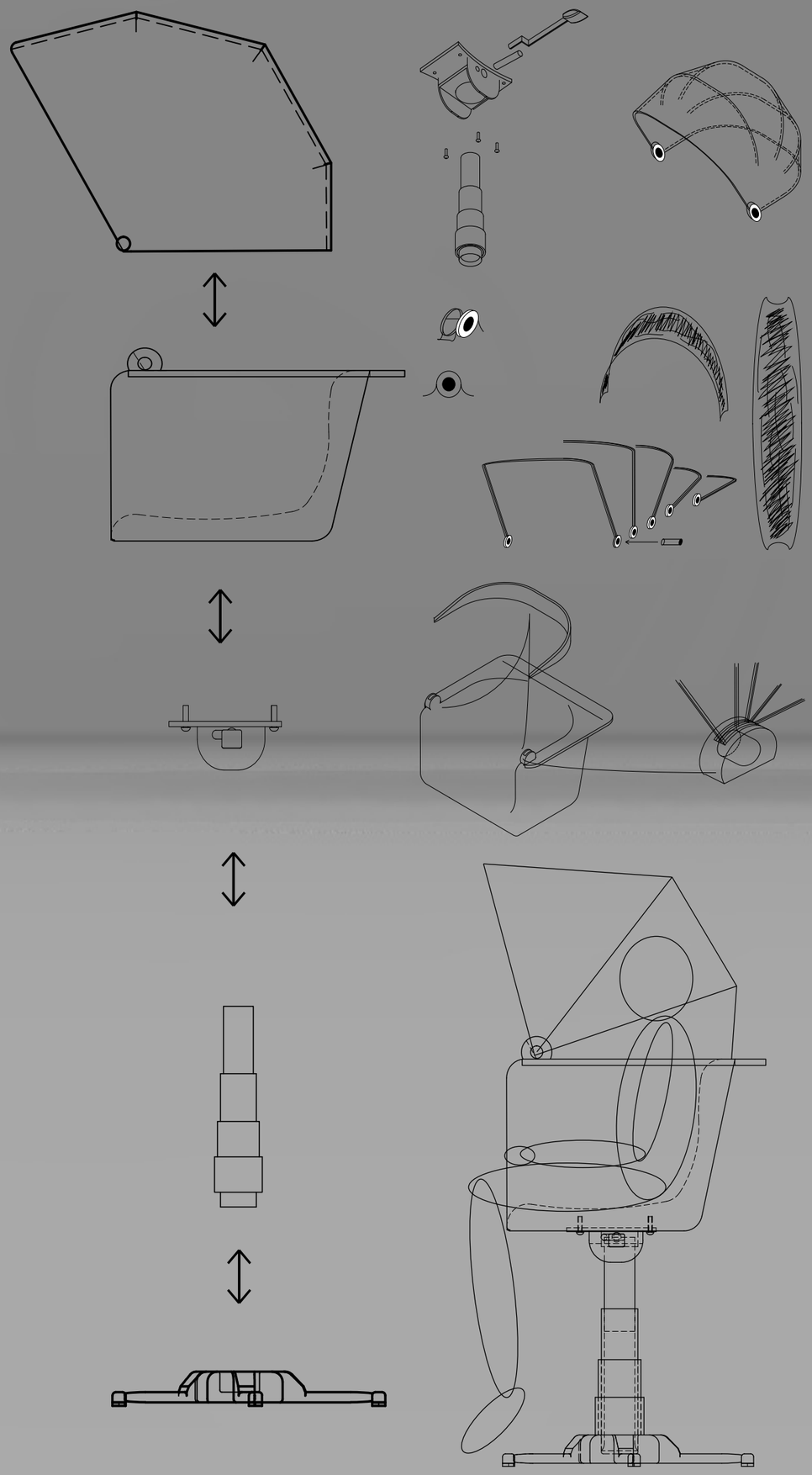
Manufacturing Method: Rotamoulding

To get a quick and cost-effective method of manufacturing down pat, I would recommend roto moulding as a suitable manufacturing method.

This is preferable for this iteration due to its high durability, strength and low-cost tooling. The cheaper moulds also fit with the nature of children's seats requiring a variety of sizes.

My original intention was to use Injection Moulding as my preferred manufacturing method. However, the initial high cost for the moulds in conjunction with the need to have different sizes, due to the varied size of the target audience, meant that I needed to adapt my design to a rotational moulding manufacturing process.





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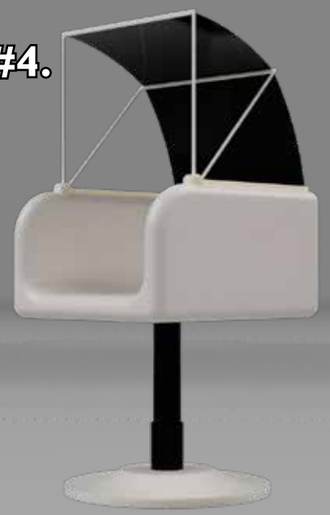
#4.



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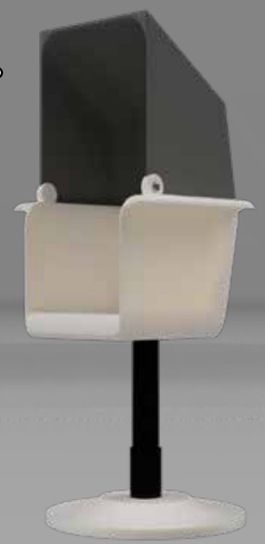

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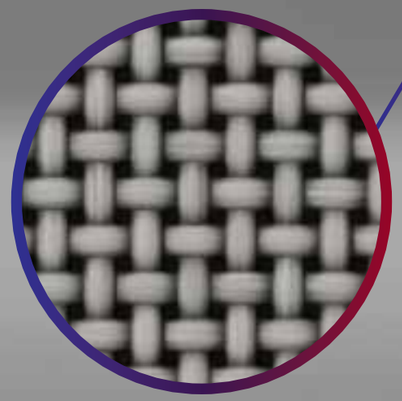
#9.

Iterations

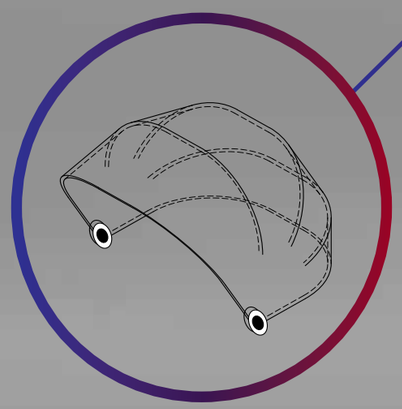
Auditory Moderation Chair for School Children on the Autism Spectrum

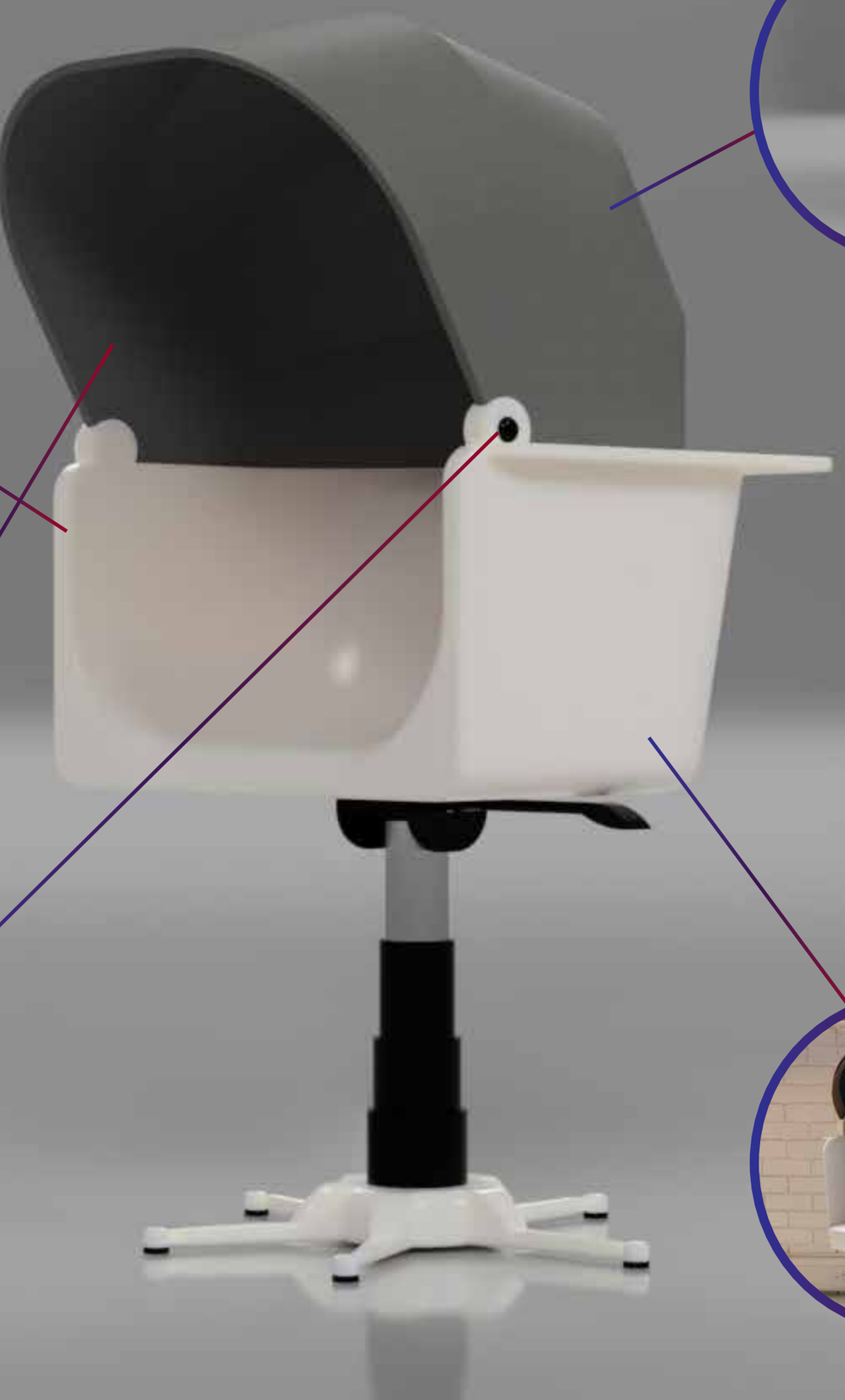
The body is to be primarily composed of recycled/ remanufactured PET plastic (namely soda bottles, containers & packaging which make up a good percentage of plastic ocean waste) using a rotational moulding process.

Camira, a British textile company, has created fabrics that contain recycled plastic collected from oceans and beaches. The canopy from my design employs a similar material choice continuing from my design context.



My design is meant to moderate/ reduce the number of unfocused sounds coming from all directions within the environment.
The cover ensures that the only clear sound will come from one direction, this can be adjusted if the canopy proves to be claustrophobic.



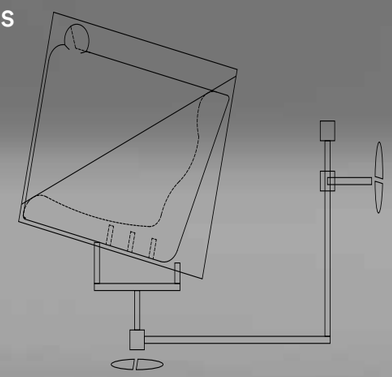


Cover:
Made from remanufactured plastic material
- Plastic
- Textiles
- Weave

Surface Finish:
Smooth texture of body will ensure hypersensitivity to touch is kept to a minimum

Size: Years 5-6
H - 660mm
W - 425mm x 440mm
LH - 380mm
SB - 315mm

Manufacturing:
Rotational Moulding method ensures quick and flexible production of iterations of differing sizes for different age groups



Body:
Remanufactured with recycled PET plastic powder through Rotational Moulding
- Plastic Bottles
- Ice Cream Tubs
- Packaging

5-Point Base:
Ensures more efficient stability when chair is in use, made to be equal distance across the chair base

Swivel Stand:
Installed to give user more control of their enviroment.
Attached to base with bolts

Hood Down

Present Issues:

- Eye contact can prompt anxiety.
- Verbal communication can be impaired depending on the severity of the social situation.
- Loud noises/communication from around the classroom may cause disorientation or prompt a hyper-sensory reaction.

Hood Up

Added Benefits:

- The canopy can isolate the user from unwanted sound/auditory stimulus, helping the user focus on an objective or to gain a comfortable headspace.
- Can be used to replace a conventional school chair if necessary.
- The implementation of this chair in schools can help spread awareness of autism amongst a younger audience who remain unfamiliar/unaware/misinformed.

Now that I have reached the end of my time at UCA, I can confidently say that my Final Project has reached a satisfactory conclusion.

My project comprises extensive primary research regarding autism (introspection and accounts) and ocean plastic pollution (statistics), initial and final drawings, concept models, CAD renders, material studies, manufacturing insights, CMF insights, technical and assembly drawings and an in-depth design report expanding on points that required elaboration.

If I wished to improve in any way, it would be to have had the opportunity to work with, and collaborate with, other individuals and children on the spectrum to help give my views, research, and my introspection a more reinforced validation.

Obviously, given the times we find ourselves in, rational and reflective decisions have been taken to ensure that I could get my concept across as efficiently as possible; with this in mind, I am pleased with where this has taken me and if this is to be my final project at UCA, I am proud that this is the one I am able to share with you.