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PROJECT REPORT

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Research Methods for Design Projects
Product Design Project ENG_6_557

Acknowledgements

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Also I would like to thank the lecturers that have offered me constructive feedback during the oral presentation stage and helped to develop my work.

Lastly, I appreciate all those that took the time to participate in my primary research.

Abstract

The aim of this project was to explore various barriers that young women experience, and design and prototype a product that is able to empower the girls in vulnerable situations to achieve equal opportunity in education. It specifically addresses period poverty as it is still a global challenge, as it has been for many decades, that is not often highlighted in many societies around the world, despite it directly affecting millions of people every day. There are many contributing factors as to why this issue fails to be tackled including stigma, religious dogma, preconceptions regarding poverty and a lack of people occupying the highest position in the social hierarchy that can shed light. Period poverty does not only involve the inability to afford basic menstrual care, but also not having access to hygienic facilities where people can manage their periods safely. Currently there has been an increase of attention on period poverty and gender equality as people begin to reject certain stagnating beliefs and bring innovative concepts and products to solve this challenge.

ENOVA is a multiproduct comprising of tangible and digital goods which aims to make available a low cost IoT dispenser to secondary, and possibly primary schools in England, where students can easily access menstrual products being distributed at their educational institution with dignity and safe community (application) where girls as well as boys can discuss and share stories around the topic of period in an effort to de stigmatise it amongst youth. Learners will also have the opportunity to purchase a sustainable customisable case to store menstrual care products, there is an option to enter a subscription plan to access exclusive content.

Stage I: Discover

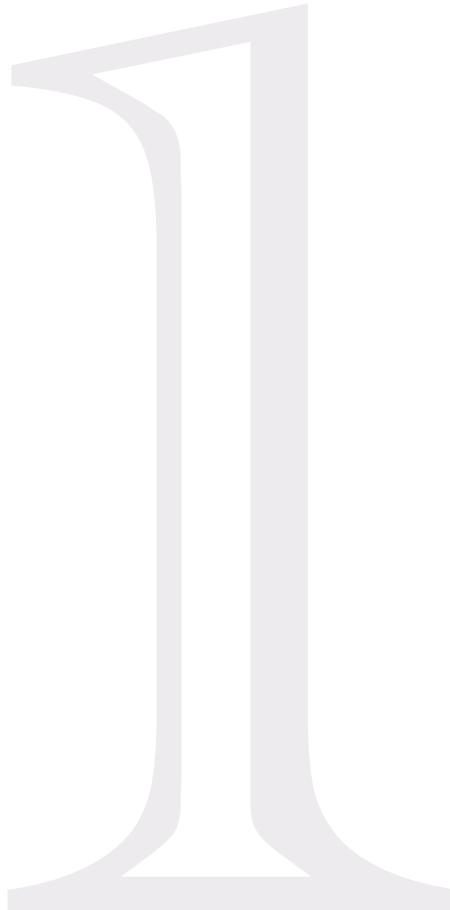


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STAGE I

DISCOVER

Stage I: DISCOVER

1.1. Topic / Challenge

I.1.1. Initial Topic

Due to the measures in place as a result of the Covid-19 Pandemic, certain primary research methods had to be reevaluated and adapted. To overcome this challenge, methods which require minimal contact with research participants were incorporated; face to face interviews were to be carried out digitally, surveys were to be completed online, user diaries tracked online etc. Initially, the topic focused on developing countries, more specific Nepal and Nepalese girls aged 10-18. However this was later changed to "young women aged 11-24 in the UK" after re-evaluating the achievability of the topic since connections to the target user and location of research participants were limited. By increasing the age range, more data was also obtained and accuracy improved.

I.1.2. Initial Investigations / Contextual Background

Over the decades, society has made immense progress in promoting human rights as a core value and introduced various laws and Acts to ensure that individuals obtain equal opportunities, status and rights. The 1948 Universal Declaration of Human Rights (UDHR) was the first global agreement that

defined the basic human rights and freedoms, and formed the foundation for the Human Rights Act 1998 and the Sex Discrimination Act 1975 (repealed by the Equality Act 2010), that are responsible for the modern human rights protections in the UK. Despite these advancements, gender inequality remains a recurring issue that affects men and women equally as a result of societal beliefs, legislations, and unconstitutional practices that violate the laws introduced.

Generally, society has a tendency to overlook the poverty that exists within economically developed countries driven by the preconceptions and Eurocentrism. This results in an imbalance of aid in the form of products and services provided to people from impoverished countries and developed countries. Period Poverty is an example of this as it is a public health crisis that is often ignored. The lack of access to adequate and equitable menstrual hygiene tools i.e. including sanitary products, washing facilities, and waste management caused by financial constraints hinders girls' potential in education and has great impact on the economic empowerment of women.



Stage I: DISCOVER

I.I. Topic / Challange

Education is fundamental to personal development and economic growth as people, especially the youth, become aware of global issues, and the struggles and barriers that individuals face every day, not only in their homes but also in their communities. It significantly reduces inequality, which in turn helps strengthen economies by building stable, resilient societies where all are given the opportunity to fulfil their potential.

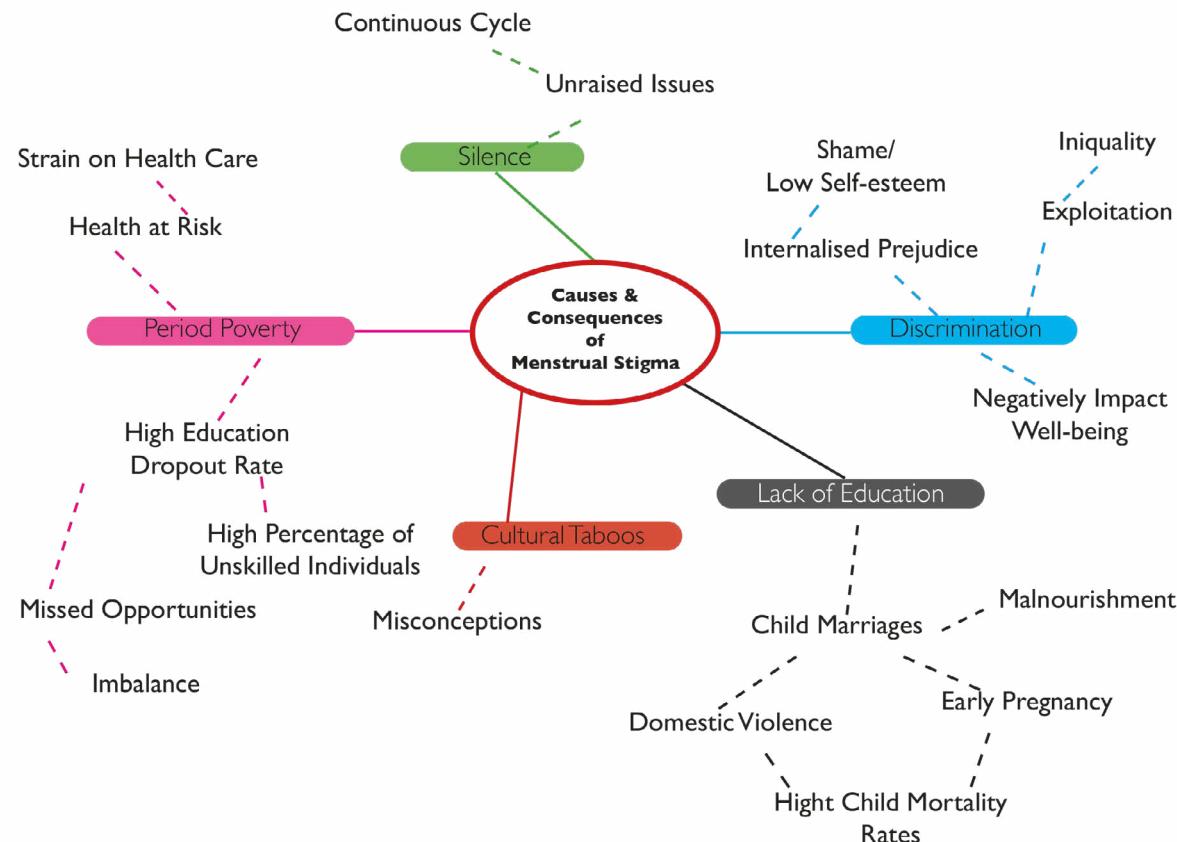


Figure 1: Impact of Menstrual Stigma (Mind map)

Stage I: DISCOVER

1.1. Topic / Challenge

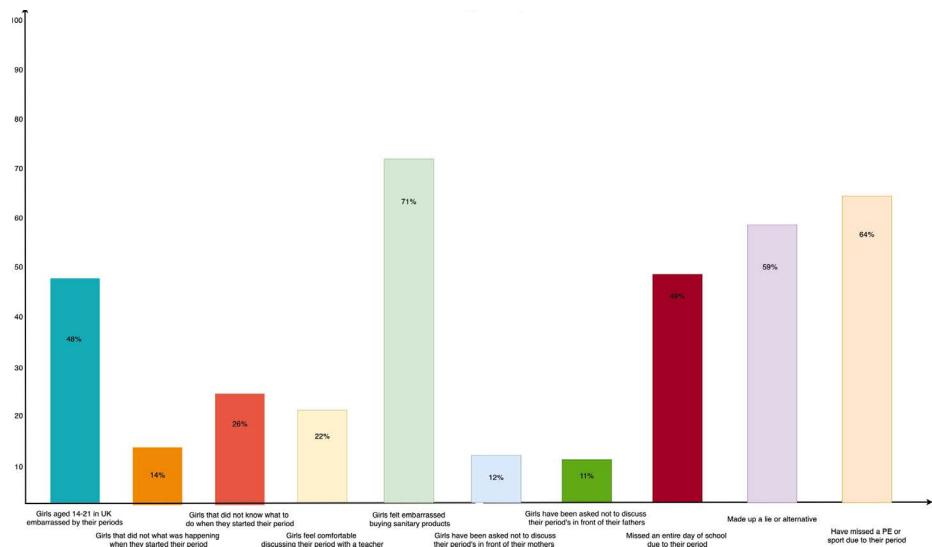


Figure 2: Views and Experience in UK Research Results

Facts

Menstruation is stigmatized all over the world. Usually caused by a lack of information, cultural norms and religious taboos.

Girls and women with disabilities and special needs face additional challenges with menstrual hygiene

500 million women and girls are living each month in period poverty.

10% of girls use newspapers, rags, toilet rolls and leaves as substitutes to sanitary napkins.

The United Nations reported that up to 30% of Afghan and Nepalese girls miss school every month due to period poverty.

In India more than 20% of girls drop out of education upon reaching puberty

Figure 3: Initial Facts and Figures



Stage I: DISCOVER

1.1. Topic / Challenge

I.1.3. Research Questions / Plan

(Refer to Appendix 5.3.2. Research Material)

Research Questions

Research questions to tackle different areas of the initial investigations have been formulated along with a research plan.

Question 1: How does menstruation taboo in the UK contribute to the low percentage of girls in pursuit of education?

This question was necessary to find out whether cultural taboos in communities in the UK affect the importance of education for young women.

Question 2: How does the media influence the career path that occidental girls pursue?

The question enables research into how girls are empowered and encouraged to break gender stereotypes in order to pursue STEM careers. The media, especially Film/Television, is one of the many factors that influence career choices in modern society.

Question 4: How can the use of enabling technology (information and communications) be enhanced to promote the empowerment of women in impoverished communities?

This question is important as it can show how ICT can give women that are financially constrained access to basic needs such as healthcare and education.

Question 5: Do UK born citizens experience period poverty more than people born outside the UK?

Question 6: How can places of education provide support for those that do not have access to basic sanitation?



Stage I: DISCOVER

1.1. Topic / Challenge

1.1.4. Identifying Users

Women and girls represent over 50% of the world's population and thus, empowerment is essential for economic growth and social development. The target user was based on data including, the age of compulsory education in the UK, percentage of higher education students and the average age for girls to start puberty.

(Refer to Appendix 5.3.2 Research Material)

1.2.1. Secondary Research Methods

Stage	Method	Sources	Date Accessed
Stage I:Discover	Literature Review	Period Poverty Is Still a Barrier to Global Gender Equality	2/10/20 (Refer back)
Stage I:Discover	Literature Review	Treanor, M 2012, Impacts of poverty on children and young people. Scottish Child Care and Protection Network (SCCPN), Stirling.	2/10/20 (1 day)
Stage I:Discover	Literature Review	Global Citizen: Period Poverty: Everything You Need to Know	2/10/20
Stage I:Discover	Literature Review	Body Form: What is period poverty?	5/10/20
Stage I:Discover	Literature Review	State of the Period: The widespread impact of period poverty on US students	5/10/20
Stage I:Discover	Literature Review	Barefoot College: PERIOD POVERTY AND OUR SOLUTION	5/10/20
Stage I:Discover	Literature Review	Global Citizen: Free Pads and Tampons Aren't the	5/10/20
Stage I:Discover	Literature Review	NHS: Starting your periods	2/11/20
Stage I:Discover	Literature Review	GENDER EQUALITY: WHY IT MATTERS	14/11/20
Stage I:Discover	Literature Review	United Nations: Gender Equality	14/11/20
Stage I:Discover	Literature Review	The British Academy: How cultural attitudes to menstruation have finally started to shift	14/11/20
Stage I:Discover	Literature Review with Study	Period poverty impact on the economic empowerment of women	14/11/20
Stage I:Discover	Literature Review	ICC: 3 reasons why ICT matters for gender equality	14/10/20
Stage I:Discover	Literature Review	FAWKO Blog: Health Matters: Menstrual Health and the Problem with Menstrual Stigma	14/10/20

Figure 4: Table of Literature Review (A)



Stage I: DISCOVER

1.1. Topic / Challenge

1.2.1. Secondary Research Methods

Stage	Method	Sources	Date Accessed
Stage I:Discover	Literature Review	UNFPA: Period shame, misinformation linked to serious human rights concerns	8/11/20
Stage I:Discover	Literature Review	Global Citizen: Girls' Education: 7 Obstacles and How to Overcome Them	13/11/20
Stage I:Discover	Literature Review	WHO: Health and Development	14/11/20
Stage I:Discover	Literature Review	FIGO: Month After Month: Period Poverty	4/10/20
Stage I:Discover	Literature Review	Equality and Human Rights: A history of human rights in Britain	13/11/20
Stage I:Discover	Literature Review	UNICEF: Gender Equality	13/10/20

Figure 5: Table of Literature Review (B)

Research Analysis

Literature reviews including, articles and news reports have been reviewed.

The use of this secondary research method, is essential as key findings, concepts and developments can be extracted to further support the research question. Findings:

- » Period poverty is a problem in high and low- and middle-income countries

- » Kenya was the first country to remove tax on sanitary products in 2004.
- » Many countries including Canada and Australia also abolished this in 2015 and 2019.
- » There are programmes to help ensure that girls stay in school by providing menstrual products
- » Many girls and women across the world that experience period poverty, use alternatives such as newspapers, rags, toilet rolls and leaves.
- » To help normalise the topic of menstruation for young people in India, the comic book Menstrupedia Comic: The Friendly Guide to Periods for Girls was published.
- » The EU has a gender equality score of 67.9 out of 100, and is predicted to take another 60 years before achieving.
- » For every £1 that men earn, women are paid 83p in the UK (17.3% less).



Stage I: DISCOVER

1.1. Topic / Challenge

- » As of 2019, women made up 24% of the overall UK core-STEM workforce.
- » The gender pay gap is larger in London and the South East.
- » The Glass Ceiling is a barrier that still exists in 2020, especially in the workplace. It prevents people of a specific demographic from achieving a certain level in a hierarchy.

Conclusion & recommendations

By comparing the findings in Research Analysis, it was concluded that women globally still experience inequality in the 21st Century. According to data from the Annual Survey of Hours and Earnings 2019, Men of all races earn 17.3% more than women. This means that women are less likely to receive economic opportunities and remain in poverty. Gender equality will not only benefit women, but also economies as it would mean that women STEM education would increase the percentage of labour market. Through literature review and case studies, the topic questions were answered appropriately with sufficient evidence of previous studies conducted by other researchers.



Stage I: DISCOVER

1.2. Secondary Research

1.2.2. Competition Matrix

This competition matrix identifies and analysis the advantages and disadvantages of similar existing products and services that address the challenges of period poverty and gender equality. This will help find a gap in the market for the product/service.

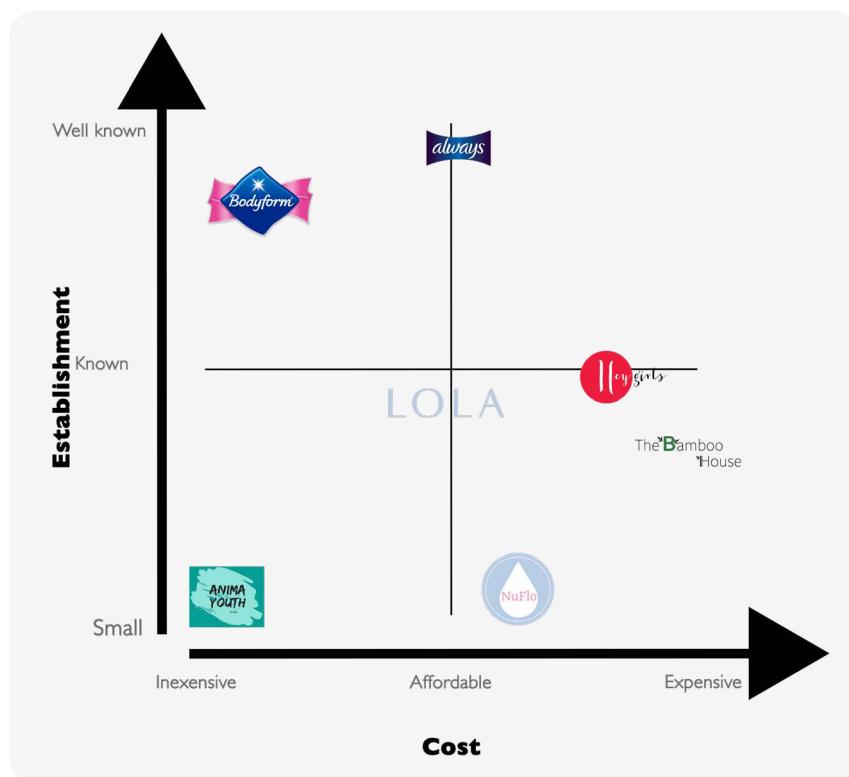


Figure 6: Competition Matrix

Stage I: DISCOVER

1.2. Secondary Research

Product / Service	Pros	Cons	Info
Always Towels	Well known brand worldwide Affordable	Not reusable Have been found to produce chemicals; styrene, chloroethane and chloroform Contain plastic	Price ranges from: £0.99 - £2.99 7.93 million users in GB between 2018-19
Bodyform	Well known brand worldwide Reusable Variety	Contains plastic	Prices range from: £0.99 - £2.69 4.57 million users in GB between 2018-19
Lola	Personalise Quality materials	US based	Products starting from \$8 (£6.06) - \$34 (25.77) Subscription Option
AnimaYouth	Free well being & sanitary box Sustainable packaging	Small presence Only in London Only available for girls under 18	Organisation working on With Love, Anima project
The Bamboo House	Reusable Zero waste products	Expensive	Price of sanitary towels vary from: £7.98 - £105.87
HeyGirls	Reusable Variety	Expensive	Subscription Service Prices range from: £2.50 - £37.50
NuFlo	Organic & Eco- friendly Variety Free UK Shipping Sample Box	Expensive Small company	Subscription Service Prices range from: £4.99 - £72
Kali	Chemical-free and organic Customisable box Sustainable Variety	Small company	Delivered (Convenient) With each purchase, kali donates sanitary products Subscription

Figure 7: Matrix Analysis

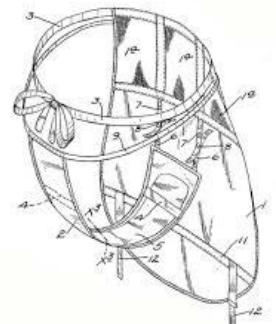


Stage I: DISCOVER

1.2. Secondary Research

1.2.3. Technology Audit and Market Foresight

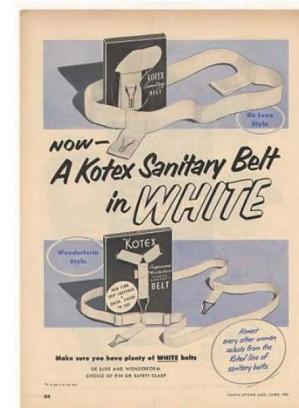
- » the feminine hygiene industry (sanitary protection) is set to rise considerably between 2020-2025 as the global population grows.
- » There are projects being launched to tackle period poverty, with brands such as Always and bodyform donating sanitary protection products to girls and women that are most vulnerable.
- » People are becoming more conscience of their impact on the environment and has caused innovative ideas for alternative solutions to emerge. Well known brands that do not provide sustainable products will experience a drop in sales and must do more to respond to growing environmental concerns.



Sanitary Apron - 1888



Sanitary Apron - 1890s



Kotex Sanitary Belt - 1950s

Figure 8: Early Concepts of Sanitary Towels

Stage I: DISCOVER

1.2. Secondary Research

I.2.4. Intellectual Property and British Standards

Patents

The search engines used to find patents were Google Patents and Espacenet with the key terms, multi compartment cardboard box, reusable pad, feminine hygiene box,:;

» **US9301886B2** - Reusable sanitary pad

Reusable menstrual pad that consists of multiple layers including, two of natural cellulose fabric and two layers of organic bamboo fabric. The cover is formed by a fabric made from cotton.

» **US20130281912A1** - Biodegradable water soluble tampon applicator and process and apparatus to manufacture same

» **KR20150003007U** - Woman hygienic goods packaging box

» **US2012310194A1** - Reusable Pad

British Standards

The following list are standard predictions:

» The General Product Safety Directive (EEC Directive 2001/95/EC) Ensures that business do not distribution products in the market likely to harm the consumer. This applies to feminine hygiene and baby products in the UK.

» BS 5906:2005 - Waste management in buildings - Code of Practice Methods of storage, collection and segregation for recycling and recovery, and on-site treatment of waste from residential/non-residential buildings and healthcare establishments.

» PD CR 14376:2002 - Adhesives

Adhesives for paper and board, packaging and disposable sanitary products



Stage I: DISCOVER

1.3. Primary research

1.3.1. Research Methods

The methods used to obtain primary data were:

(For research questions, refer to Appendix 5.3.2 Research Material)

- » Online Survey
- » (Interview) Online Questionnaire
- » User Diary
- » Ethnographic study

Onlien Survey

(For survey questions refer Appendix 5.3.2 Research Material Online

Survey: Period Poverty and Education)

Online surveys are the most appropriate choice because they are less time consuming and inexpensive. Researchers can easily access the survey digitally and make amendments, avoiding unpredicted costs. 95% of the UK population also own a mobile phone and 93% have access to the Internet, suggesting that surveys accessible online are more appropriate for the research since it increases participant numbers.

Two online surveys were formed and shared on different social media platforms, and forums with the intention to create snowball sampling. To advertise these surveys, as tangible posters were placed around areas with high numbers of young people.



Figure 9: Survey Poster on Bus Stop

Interview

(For interview questions refer to Appendix 5.3.2 Research Material Online interview: Menstruation Stigma and Gender Equality Questionnaire)

Online interviews in the form of questionnaires are to take place with organisations that provide support and empower young women in the UK. Open and close-ended questions are to be used in order to generate more information from research participants and allow them to express thoughts/



Stage I: DISCOVER

1.3. Primary research

raise questions. This has been scheduled for a later date after the report draft submission.

User Diary

A group of participants have been given 2 weeks to document their daily activity. From this information on the amount of sanitary products women utilise each month can be analysed. User logs may generate data after the deadline due to different predictions provided by participants.

Ethnographic Study

To observe young peoples buying habits, permission to set up a camera and record specific shop aisles has been granted. However, customers may not wish to make an appearance in the video and will be informed.

1.3.2. Research Analysis: Combine and Compare

Results from the current online survey show that 50% of girls aged 16-18 have experienced period poverty but this has not affected their ability to

attend school. Half of the participants have access to free menstrual hygiene products in education institutions, however do not make use of the availability, while 25% believe that "it would benefit many people".

1.3.3. Conclusion

A balanced conclusion can not be made on the at this stage as it would be derived from insufficient data. The recruitment for participants process has been challenging due to the sensitivity of the topic and legal barriers, with many potential participants refusing to take part. To solve this, the age range of the target user will increase from 10-18 to 11-24.





STAGE 2

DEFINE



Stage 2: DEFINE

2.1. Design Brief

2.1.1. Title of Proposal and Summary

Gender Equality and Period Poverty

Design and prototype a service or product that can be incorporated into the educational system in the UK to empower and improve the quality of life of students young people that experience period poverty.

The service will ensure that students are knowledgeable and staff have the confidence and adequate training to deliver the sensitive topics to pupils. It aims to help tackle the global challenges of period poverty and gender inequality that derive from stigma and negative preconceptions, in order to improve health and wellbeing and encourage equality amongst men and women.

2.1.2. Scope and Background

Period poverty is an ongoing issue with important global repercussions. As many as 500 million women and girls worldwide struggling every month and in the UK, these numbers have surged in 2020 due to the economic collapse

and many encountering financial difficulties as a result of the Covid-19 pandemic. Numerous organisations such as Anima Youth and Bloody Good Period have launched projects to provide women, especially those considered to be the most vulnerable, with essential kits that include feminine hygiene products. Other schemes and effective campaigns have strived to abolish the Tampon Tax in the United Kingdom and make feminine hygiene products exempt from VAT. Scotland, has passed the Period Products (Free Provision) Bill, which provides free sanitary products for anyone who needs them with the aim to eradicate period poverty as well as period stigma.

Period stigma and period poverty are closely linked because it has the ability to create a detrimental attitude towards menstruation. In many societies this topic is taboo and shed a negative light on the menstruation and because of this, many remain unaware that period poverty exists and the severity of the impact. To solve period poverty period it is important to locate and remove the foundation of the issue; stigma and misconception, from periods and educate people to normalise this topic for women and men.



Stage 2: DEFINE

2.1. Design Brief

2.1.3. Challenges and Opportunities

There is a risk that can arise from the project worth mentioning. The lack of expertise in motor vehicles and their mechanics, more specifically buses, may be challenging for the designer. An internally modified TFL bus must be able to adhere to road safety regulations, bus safety standards and be functional on roads to provide the service. A second risk is that the vehicle also aims to encourage inclusiveness for children with different abilities and must be redesigned to allow access to both floors. The limitations to this is the available space whilst not compromising the safeness. Constraints are expected as the topic of menstruation is sensitive and a taboo in many societies, not only that but it to many and it is often disregarded and current reliable research that is nationally representative may not be available in abundance. As a result, similar existing services and products that aim to be adopted into the educational system have not been found. This shows that there is a clear gap in the market for the proposal, as it will facilitate the introduction of the government's new compulsory RSE curriculum by providing schools with additional education resources able to offer students in-depth knowledge and understanding of topics taught.

2.1.4. Drivers and Project Criteria

The key drivers of the project are user needs, user-centered design, safety, cost effectiveness and system feasibility. The main focus is to design a service system that is safe and educational for schools to use as part of the statutory curriculum as its users are also vulnerable minors. The discarded/discontinued buses produced for TFL must be redesigned sustainably to be able to integrate and operate in a city that is striving for a cleaner environment. This will have a positive impact as it extends the life of buses and thus encouraging a circular economy.



Stage 2: DEFINE

2.2. Ideation

2.2.1. Visual Content

To help communicate the outcome, ideas have been presented in the form

of sketches, concept drawings and service maps:

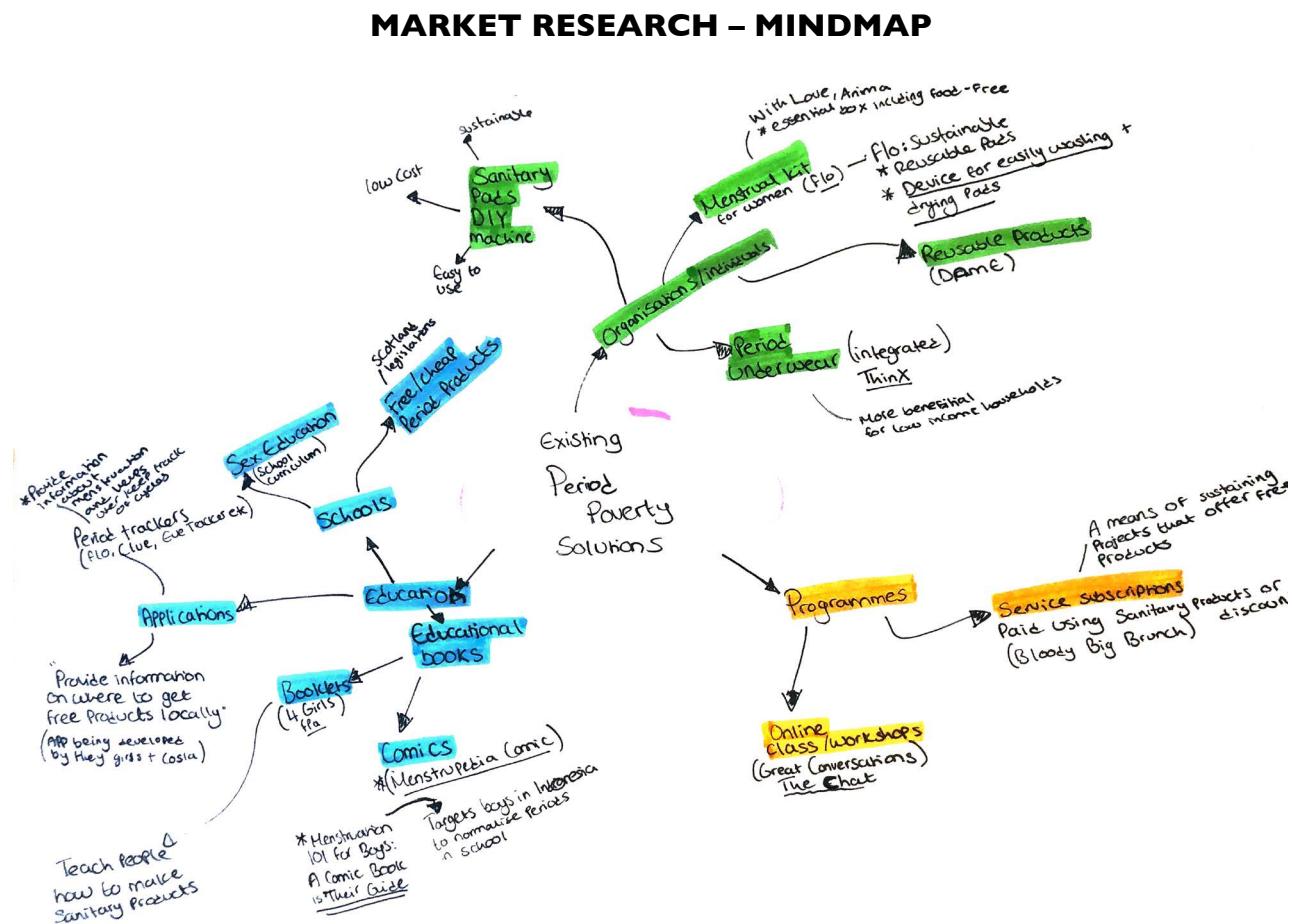


Figure 10: Mindmap of Existing Period Poverty Solutions

Stage 2: DEFINE

2.2. Ideation

CONCEPT GENERATION – MINDMAP

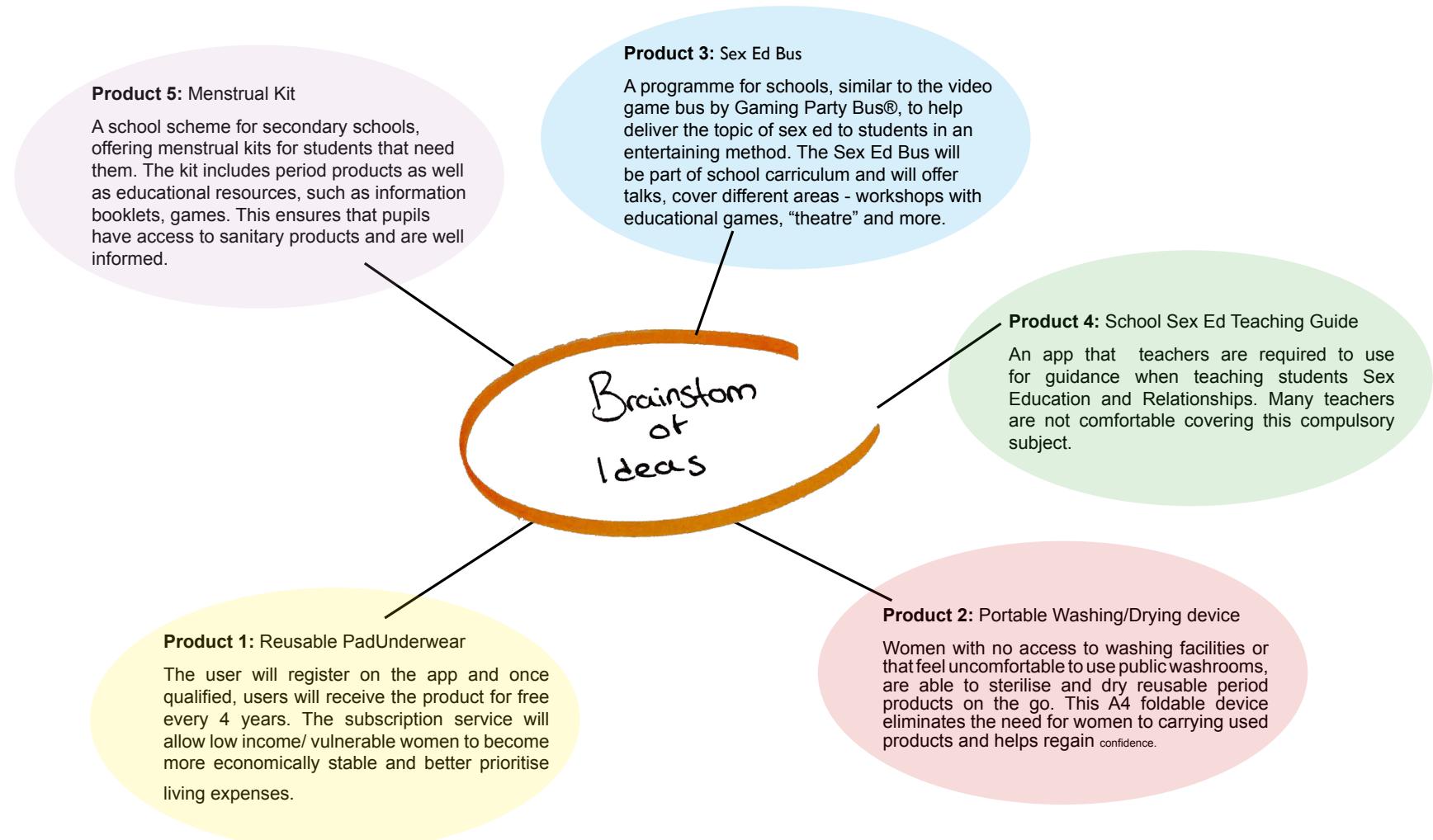


Figure 11: Brainstorm of Period Poverty Solutions

Stage 2: DEFINE

2.2. Ideation

CONCEPT I IDEATION – DRAWING

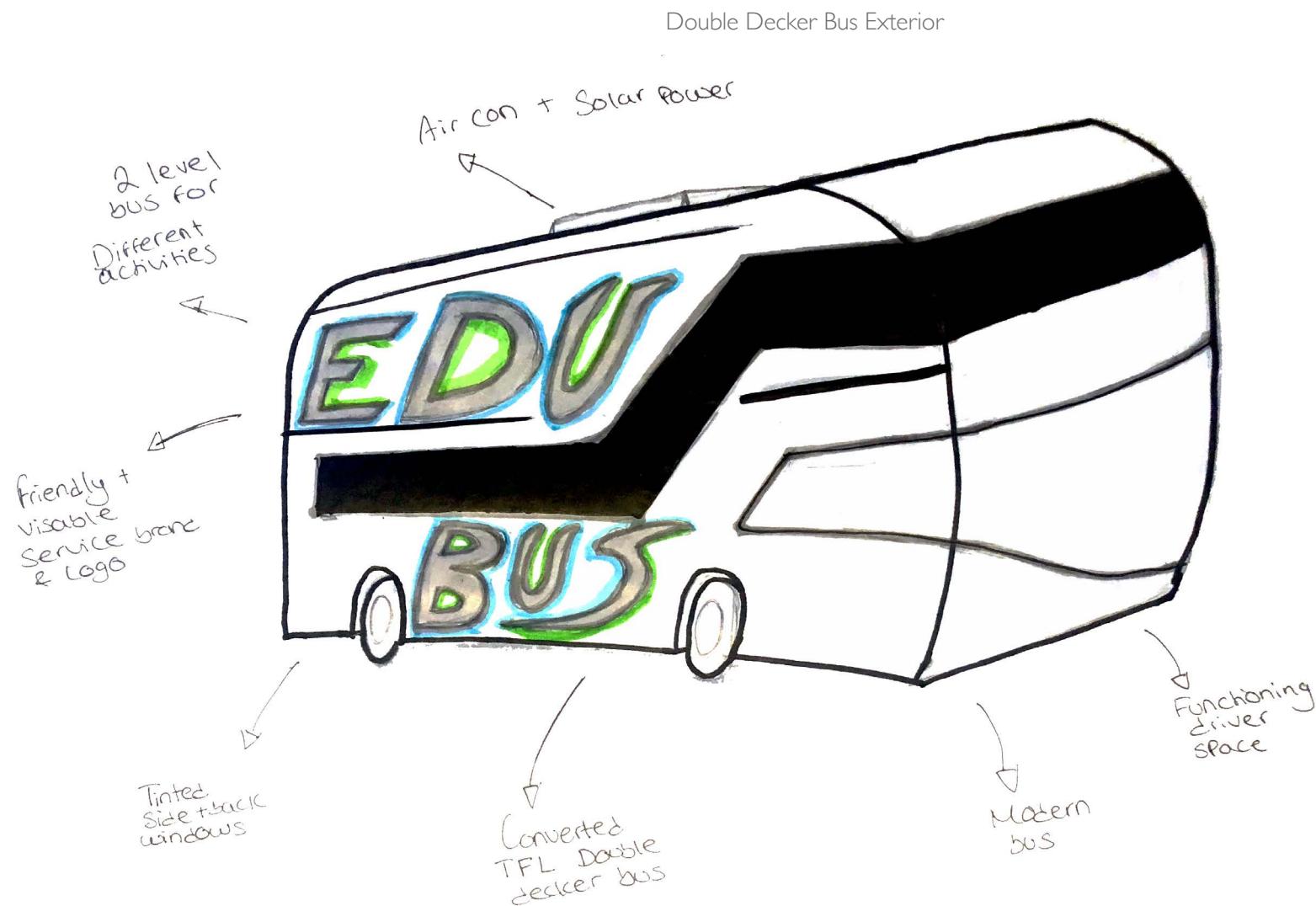


Figure 12: Sketch of Redesigned Double Decker (A)

Stage 2: DEFINE

2.2. Ideation

CONCEPT I IDEATION – SKETCH

Redesigned Double Decker Bus Upper Level Interior

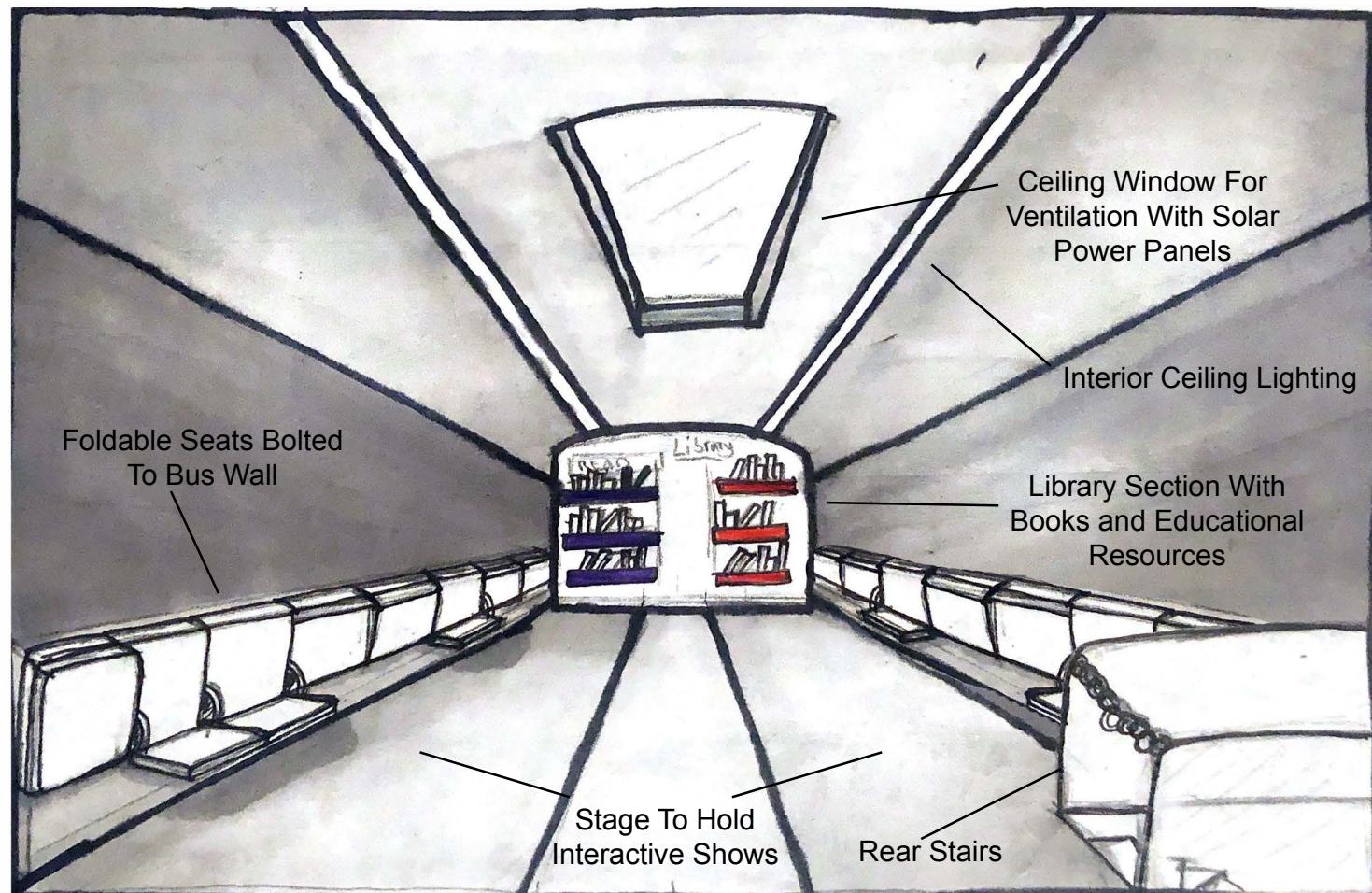


Figure 13: Sketch of Redesigned Double Decker (B)

Stage 2: DEFINE

2.2. Ideation

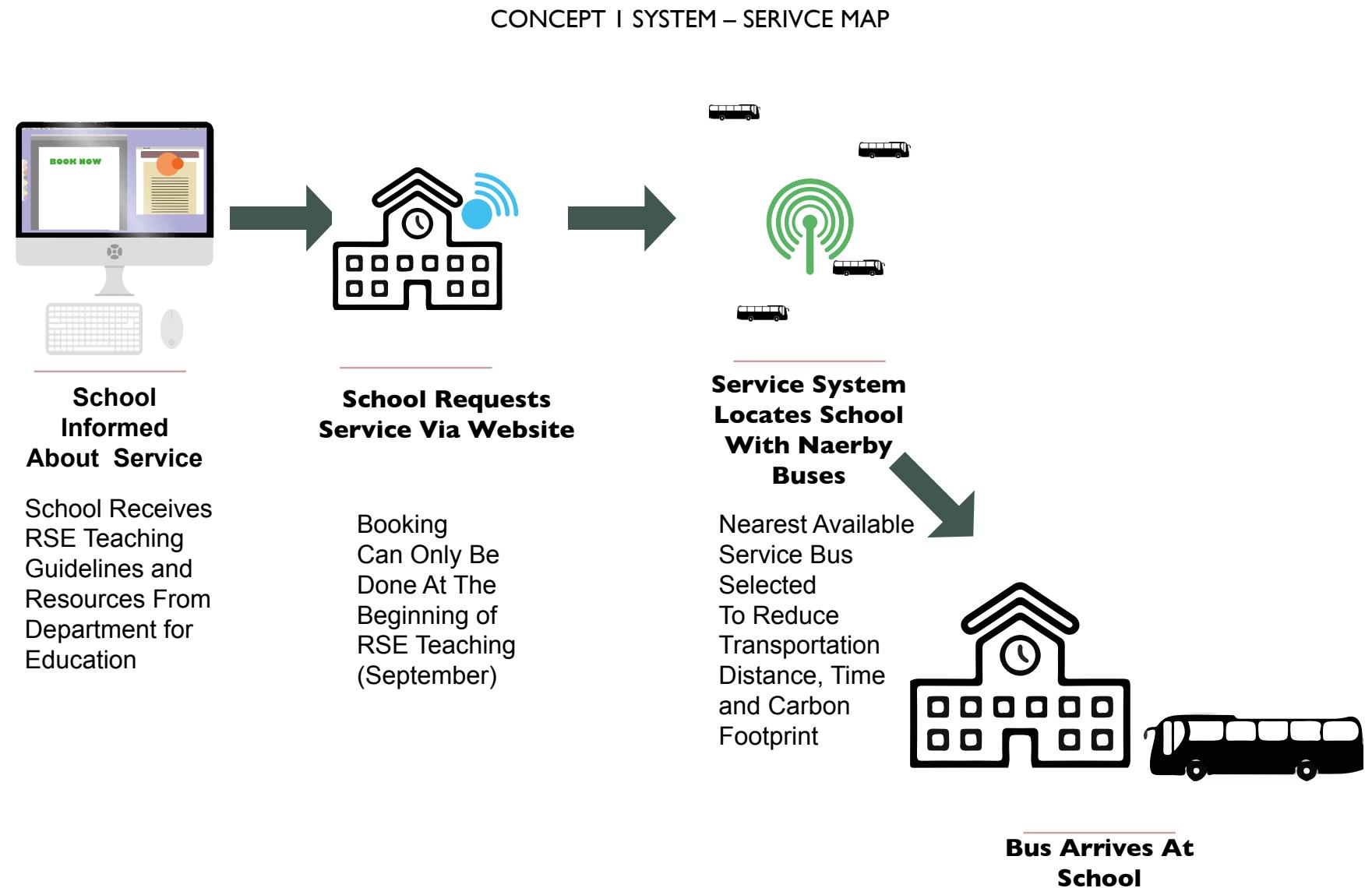


Figure 14: Concept I System Plan

Stage 2: DEFINE

2.2. Ideation

CONCEPT I BRAND IDEATION – BRAINSTORM

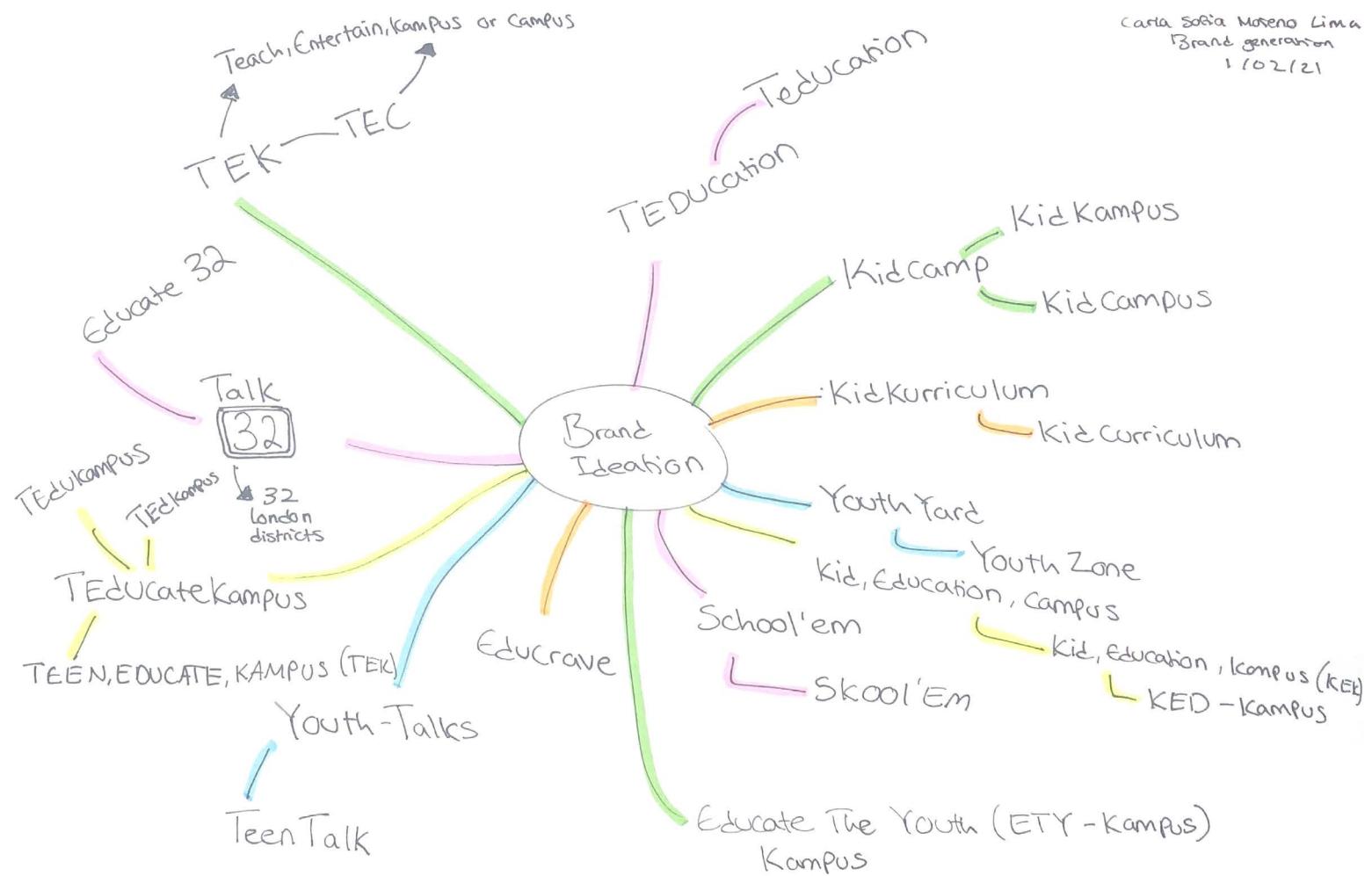


Figure 15: Brainstorm of Brand (A)

Stage 2: DEFINE

2.2. Ideation

CONCEPT I LOGO DESIGNS – DRAWINGS



Figure 16: Concept I Logos

Stage 2: DEFINE

2.2. Ideation

CONCEPT 2 IDEATION – SKETCHES

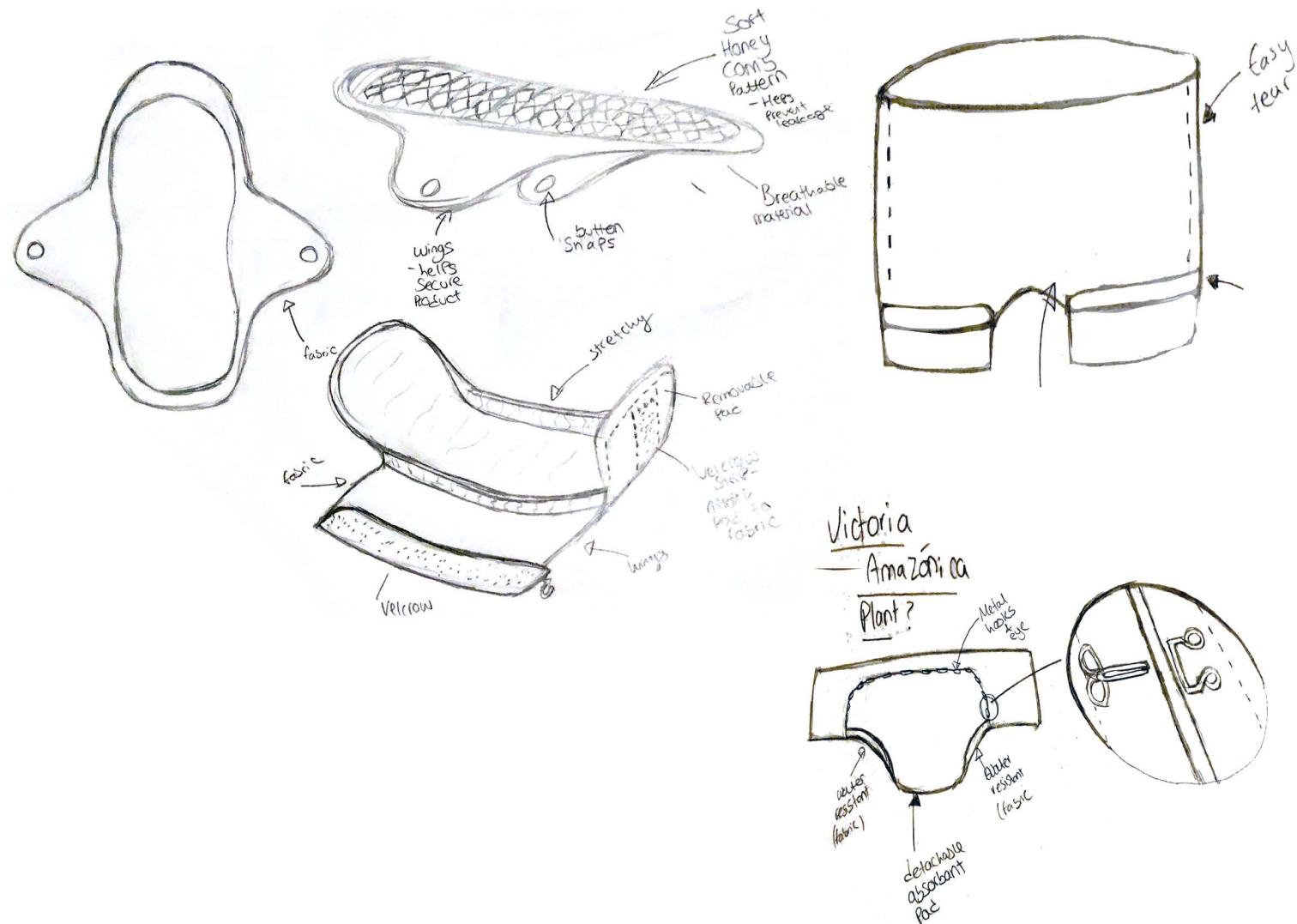


Figure 17: Concept 2 Sanitary Napkin Solutions

Stage 2: DEFINE

2.2. Ideation

CONCEPT 3 IDEATION

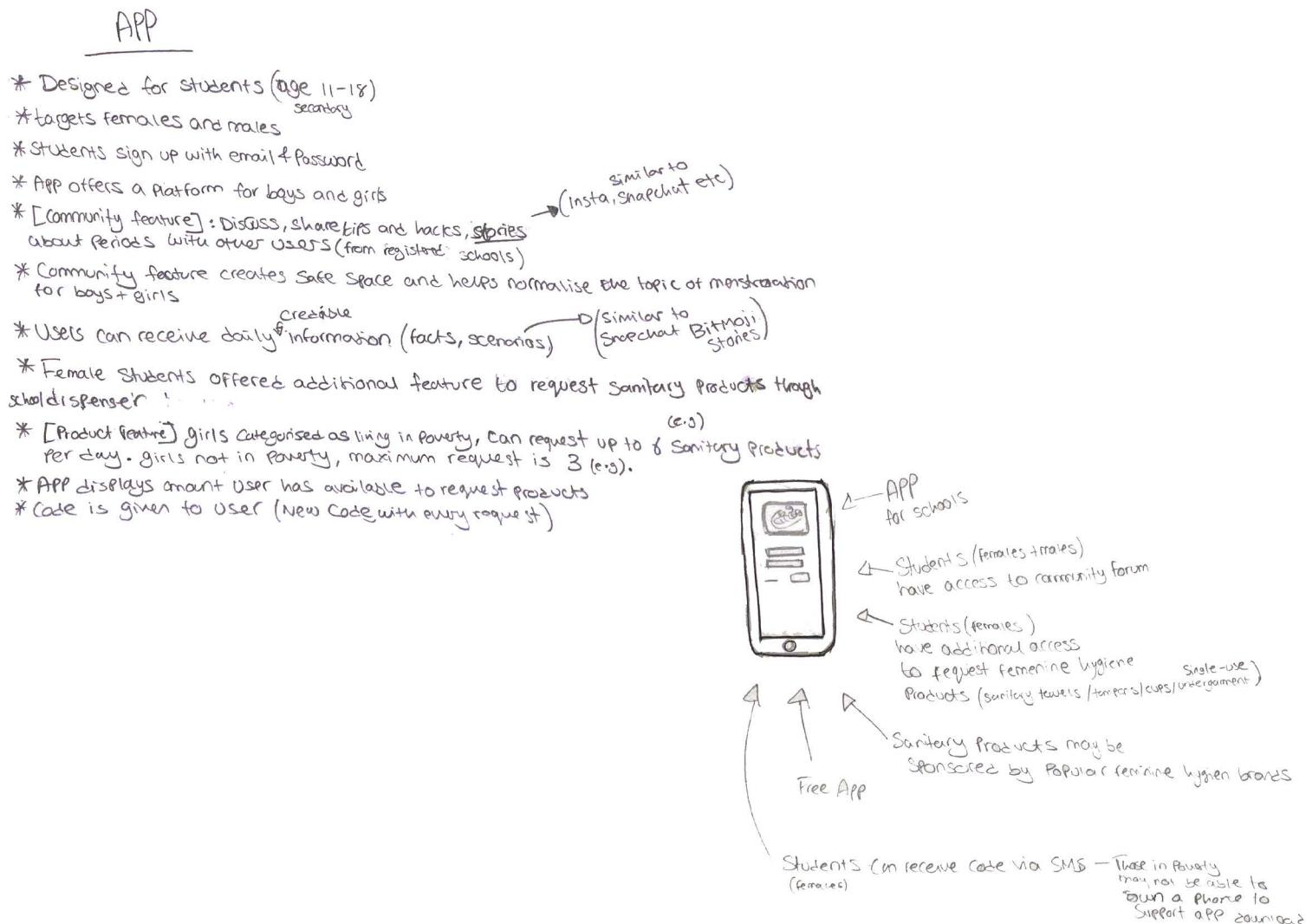


Figure 18: Concept 3 Define The Application

Stage 2: DEFINE

2.2. Ideation

CONCEPT 3 SYSTEM – JOURNEY MAP

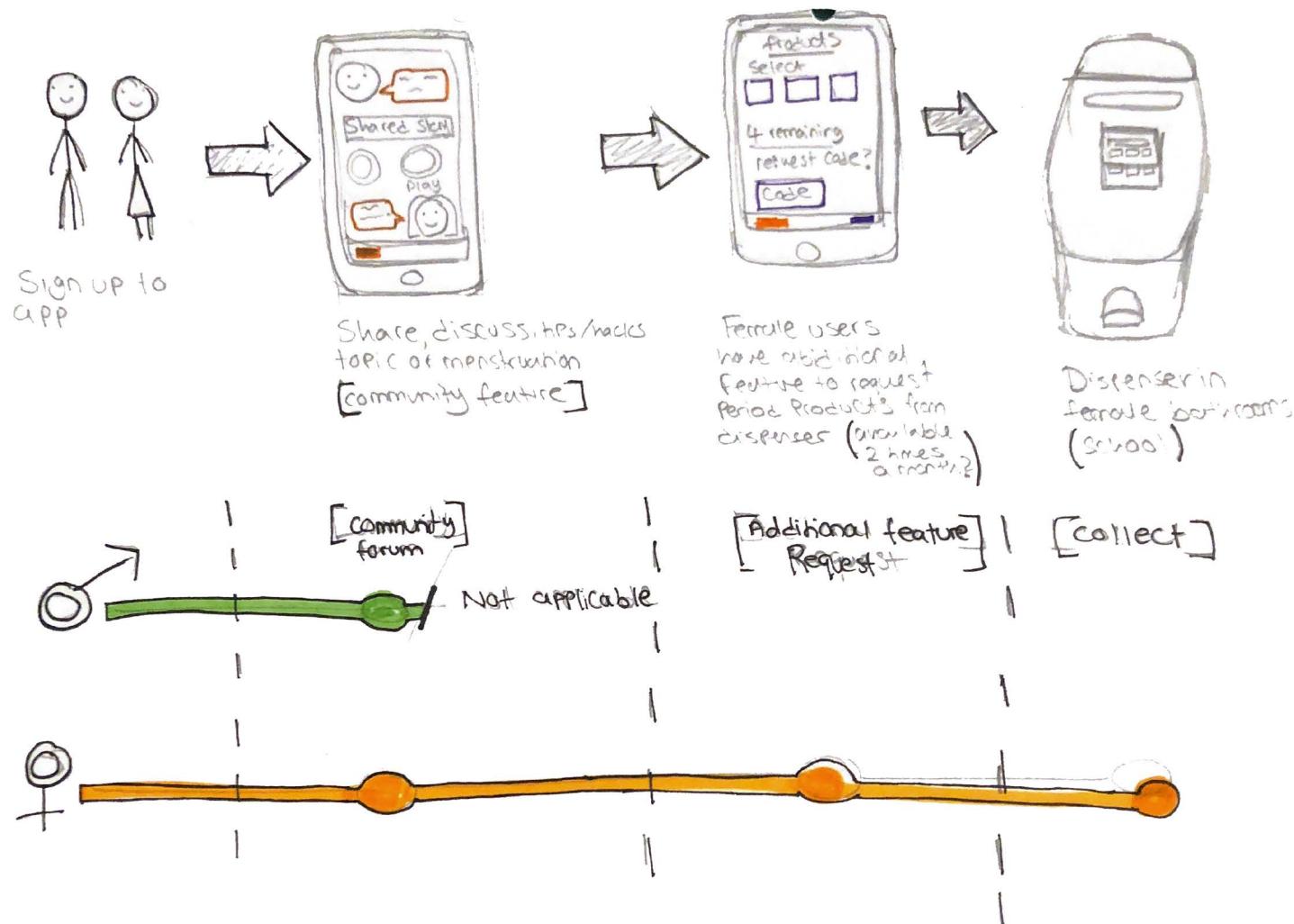


Figure 19: Brief User Journey of Concept 3

Stage 2: DEFINE

2.2. Ideation

2.2.2. Physical / Digital Content

Digital Tools Design

The front page of the application mockup for concept 3 was designed on Moqups, a streamlined web app to give the designer a better vision of the appearance of the final prototype. The device that was selected was the iPhone X. See Appendix 5.3.6: Other – INITIAL APPLICATION PLAN - WIREFRAME

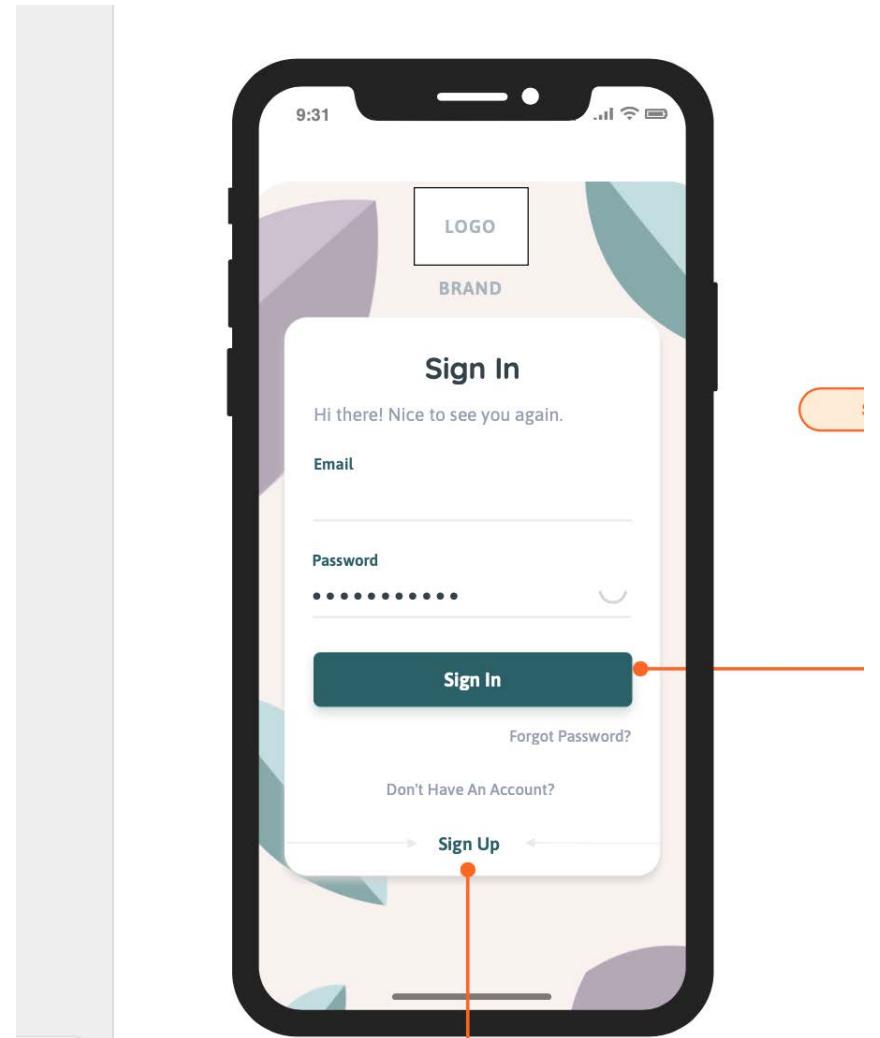


Figure 20: Initial Moqup Wireframe

Stage 2: DEFINE

2.2. Ideation

PRODUCT DISPENSER DESIGNS – SKETCHES

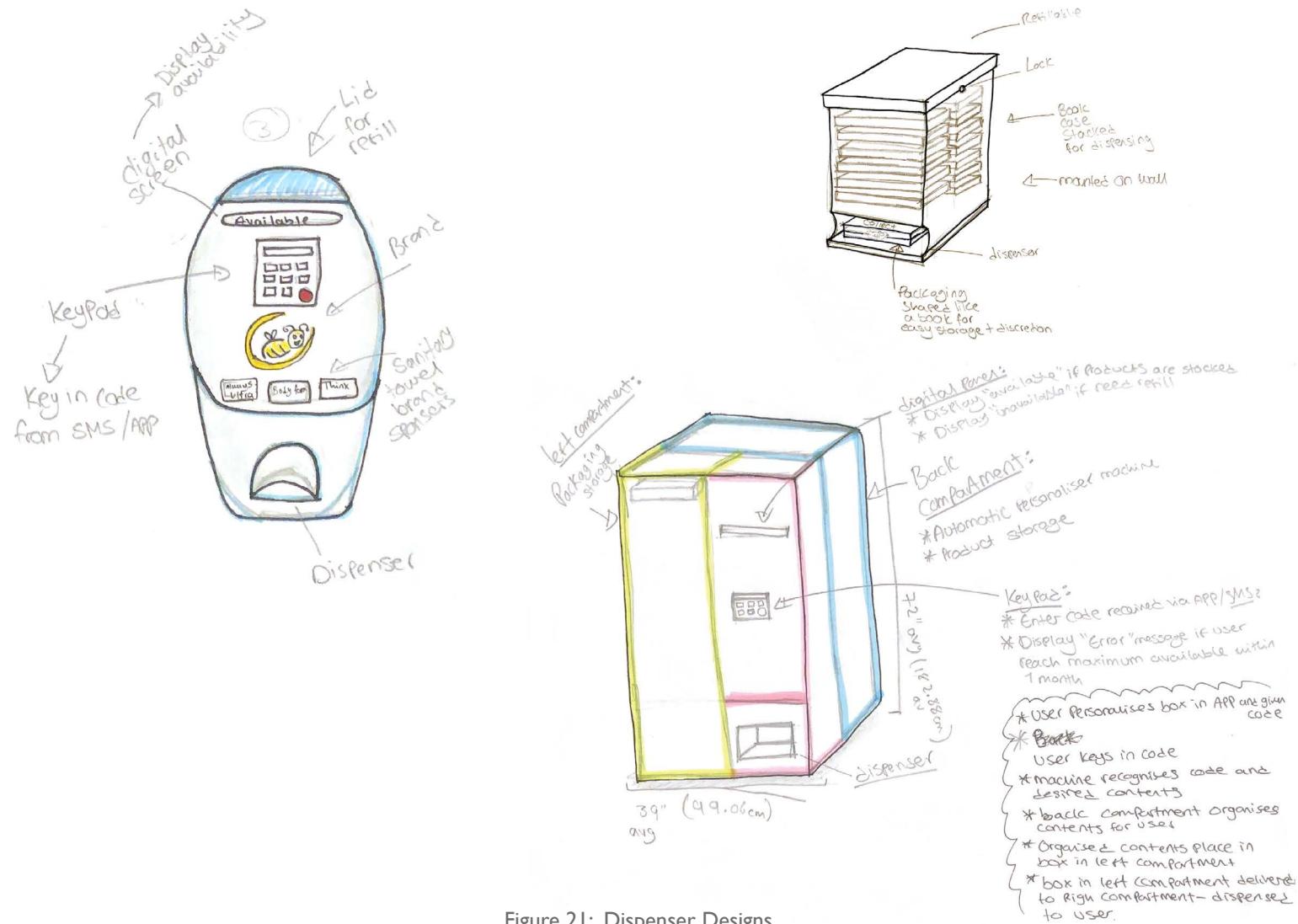


Figure 21: Dispenser Designs

Stage 2: DEFINE

2.2. Ideation

PRODUCT DISPENSER DESIGNS – SKETCHES

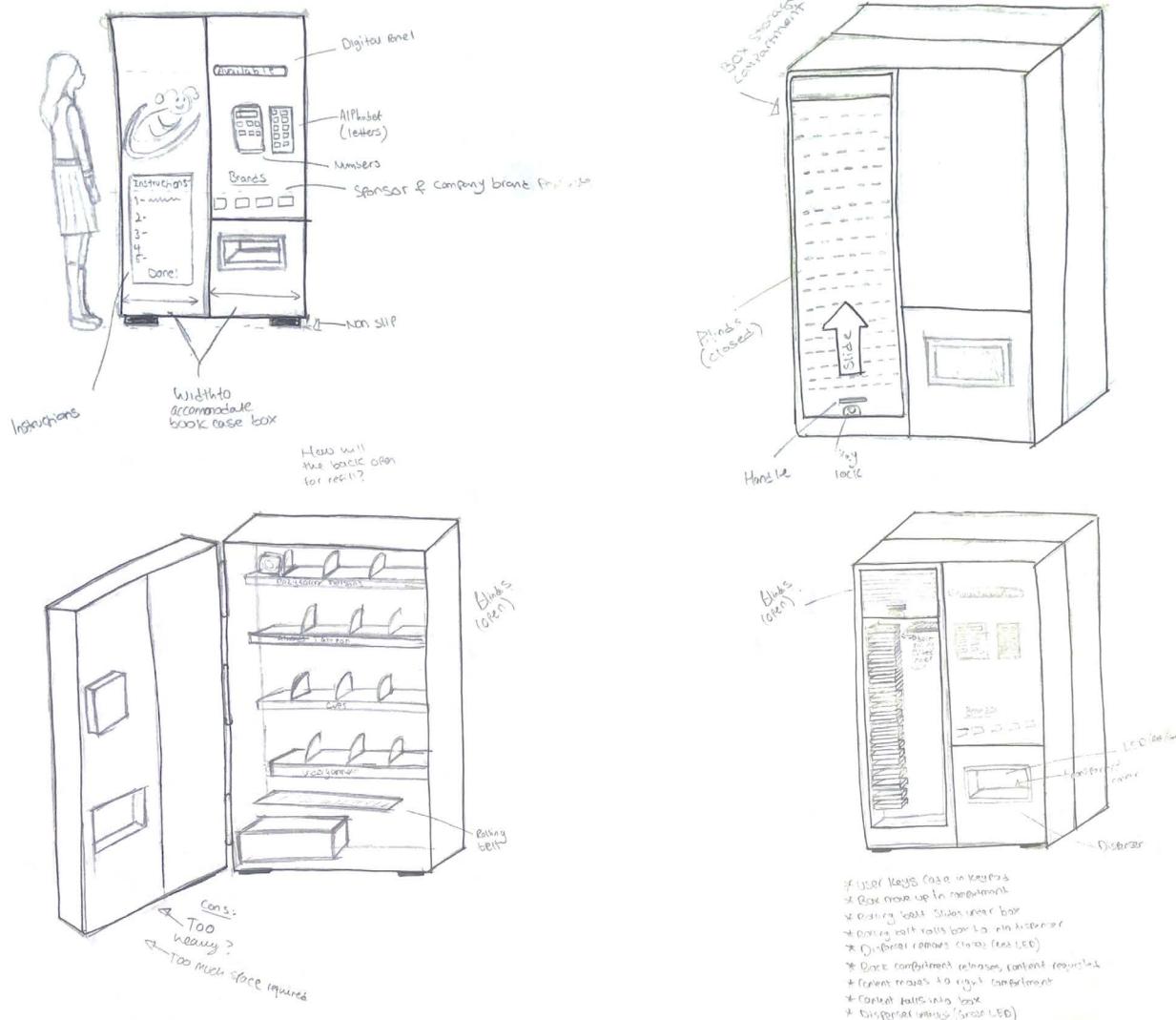
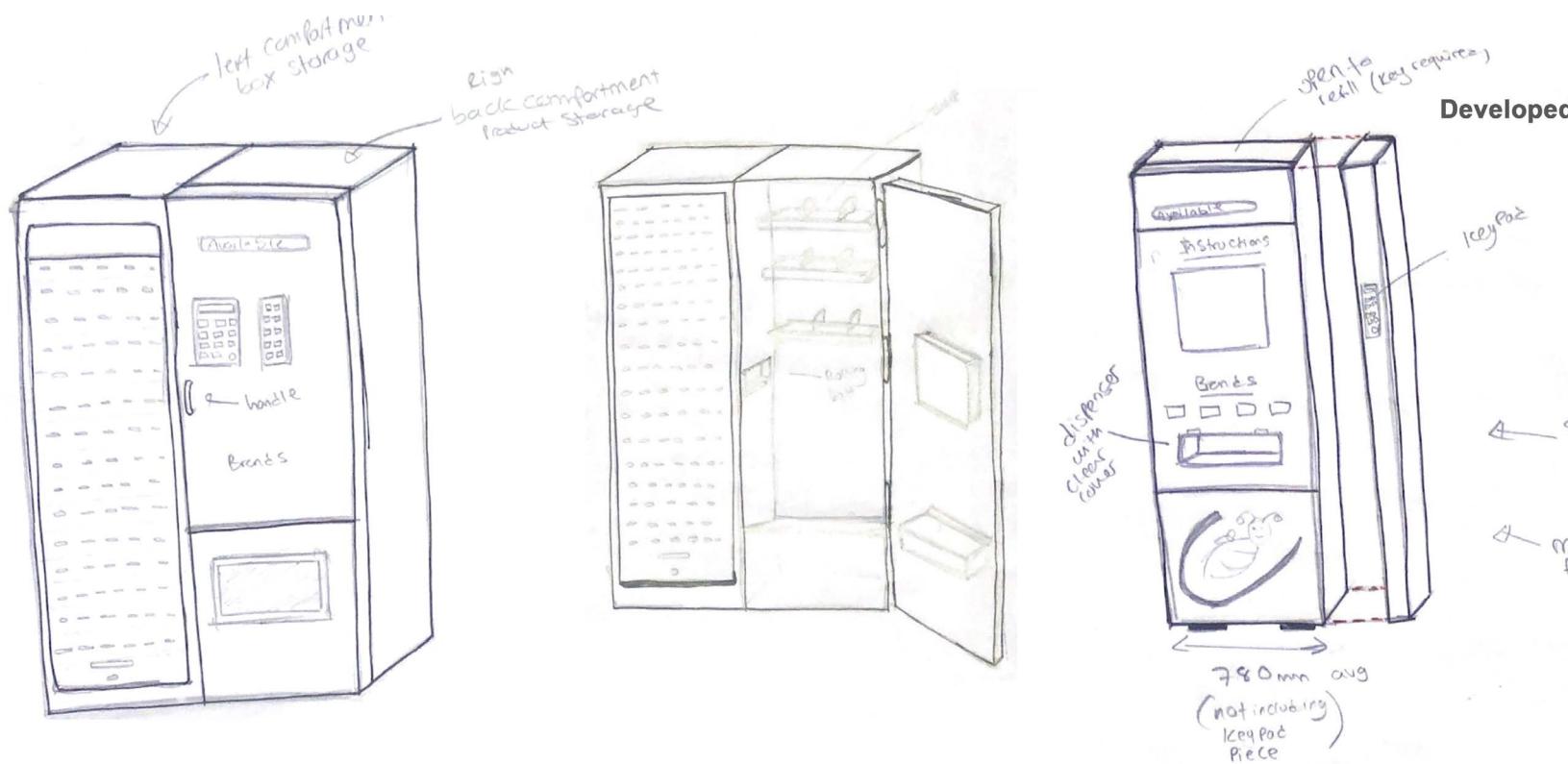


Figure 22: Development of Dispenser Designs (A)

Stage 2: DEFINE

2.2. Ideation

DISPENSER DEVELOPMENT – SKETCHES



- * User is given bookcase box for reuse (via app/school) ?
- * Machine requests user to place box in dispenser
- * Dispenser docks (red LED)

Figure 23: Development of Dispenser Designs (B)

Stage 2: DEFINE

2.2. Ideation

2.2.3. Design Outcomes and Conclusions

Concept 1: Educational Bus

This concept is a scheme consisting of a service and product that is offered to state funded Secondary and Primary schools in London, UK as part of the new government RSE curriculum. Research carried out by the NEU and the NSPCC reveal that a large number of schools are unprepared to deliver RSE lessons as their staff lack the confidence and knowledge. Its purpose is to aid staff in educating pupils on the RSE topics such as sexual health and Equality, depending the phase of education, and ensure that receive in depth knowledge by qualified professionals that specialise in the topics.

Concept 2: Eco Pads

This concept provides sustainable and affordable sanitary products, including informative booklets to women. Users can choose from disposable or reusable napkins manufactured using only natural materials. It will greatly benefit those that are living below the poverty line, struggling to manage their periods and forced to utilise unsafe alternatives due to the costs of available products.

The disposable napkin consists of four layers to allow for easy decomposition whilst maintaining its functionality to absorb. The reusable napkin has one additional layer made from a mixture of naturally absorbing soft materials.

Concept 3: Period Product Dispenser

This proposal is made up of three distinctive products. State secondary schools are given the opportunity to purchase menstrual care dispensers with the purpose of storing and dispensing a variety of period products upon request. The dispenser has the ability to unlock and open to display numerous designated compartments for school staff to easily restock. It is compact and appropriate for school restrooms due to limited space available and safety of students. The smart dispenser is integrated with a QR code scanner to allow students to scan the code generated to the student in the app mobile phone.

A service system offered to schools where students are able to socialise i.e. discuss, share ideas/ advice and useful hacks on the topic of menstruation through the application. An additional feature can be accessed by girls, non-binary and transgender learners who have periods. This allows students to



Stage 2: DEFINE

2.2. Ideation

request a variety of period products for free. Which they will be able to collect via the dispenser located in the school.

The app is designed to allow each school to manage student activity in the community forum and tailor features to conform to its requirements. The application is a tool to help eliminate the stigma present around the topic of menstruation. By creating a place where both females and males can learn more about periods as a community, it can encourage the formation of a supportive system within the school and change student attitudes towards the topic of menstruation i.e. normalising, thus facilitating the lives of those that experience it.

Users may also purchase a unique storage case, customisable via the application.

The profit generated can be put towards manufacturing costs.





STAGE 3

DEVELOP

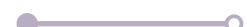
Stage 3: DEVELOP

3.1. Concept Selection

3.1.1. Selection Criteria

The following criteria have been selected:

- » **Affordability-** This applies to the cost from the perspective of the primary and secondary users.
- » **Ease of use-** Straightforward to use without the need to be taught or read instructions.
- » **Ease of installation-** To be easily placed and relocated without damage.
- » **Accessibility-** For every student (Girls, non-binary and transgender boys who have periods) to be able to utilise.
- » **Reliability-** Faults and possibility to malfunction during use are low/ functions as it is intended to.
- » **Appearance-** Must be aesthetically pleasing to the user and integrate well into the environment.
- » **Sustainability-** With regards to the promotion of a circular economy.
- » **Manufacturability-** Easy to manufacture the product with the required quantities.
- » **Safety-** The product is safe to use as intended and by any other user group without harm.
- » **Effectiveness-** Answer the brief and solve the challenge.



Stage 3: DEVELOP

3.1. Concept Selection

3.1.2. Selection Matrices

SELECTION CRITERIA	BASELINE	CONCEPTS		
		ECO PERIOD PAD (1)	EDUCATIONAL BUS (2)	DISPENSER (3)
AFFORDABILITY	0	+	-	+
EASE OF USE	0	+	-	0
EASE OF INSTALLATION	0	+	-	0
ACCESSIBILITY	0	0	0	+
RELIABILITY	0	+	-	0
APPEARANCE	0	-	0	+
SUSTAINABILITY	0	+	0-	0
MANUFACTURABILITY	0	0	-	0
SAFETY	0	+	+	0+
EFFECTIVENESS	0	0-	0	+
TOTAL +	0	6	1	5
TOTAL -	0	2	6	0
TOTAL SCORE	0	4	-5	5

Figure 24: Matrix in Phugh's Concept Selection Format

The above table (Figure 24: Matrix in Phugh's Concept Selection Format) shows how Pugh's concept selection matrix (Ulrich & Eppinger, 2000) was used in order to select the most feasible concept, which can be found on the top row of the matrix, against the criteria , located on the left column, for further development.



Stage 3: DEVELOP

3.1. Concept Selection

Matrix sum key:

- » Better than the baseline “+”
- » Worse than the baseline “-”
- » The same than the baseline “0”

From the above matrix, the designer was able to conclude that:

- » Design concept (1) is better than the design concept baseline for (RELIABILITY), (2) is worse and (3) is the same.
- » Design concept (1) is worse than the design concept baseline for (APPEARANCE), (2) is the same and (3) is better.
- » Design concept (1) is better than the design concept baseline for (SUSTAINABILITY), (2) is the same but slightly worse, and (3) is the same.
- » Design concepts (1) and (3) are the same as the design concept baseline for (MANUFACTURABILITY), and (2) is worse.
- » Design concepts (1) and (2) are better than the design concept baseline for (SAFETY), (3) is the same but slightly better.
- » Design concept (1) is the same but slightly better than the design concept baseline for (EFFECTIVENESS), (2) is the same and (3) is better.



Stage 3: DEVELOP

3.1. Concept Selection

3.1.3. Concepts Selected For Further Development

After analysing the proposals and the results gathered from Pugh's concept selection matrix, the Dispenser – concept 3, will be developed as it has more potential and provides the best solution to the topic. The focus will be on conducting further research on UK government schemes that are or will be in effect to identify any plans that could adopt the concept, the Department For Education guidelines and standards to get a better insight into the safety requirements, an important area especially when dealing with young people and minors.

In addition, various types of models will be produced to aid in visualising the final prototype size, material, interaction, testing of electronic components and digital 3D designs will also aid the designer in this step.

The necessary skills for the next stage of the design process are as followed:

- » Engineering Drawing
- » Web design
- » Coding
- » Application develop

- » CAD modelling
- » Metal work
- » Rendering
- » Photography



Stage 3: DEVELOP

3.2. Concept Generation

3.2.1. Concept Documentation

By using a number of techniques, a range of potential concepts to solve the challenge has been generated.

SCAMPER:

The dispenser concept focuses on redesigning the traditional feminine hygiene dispenser and combining the product with technological tools widely used by the target user. The idea is to provide students that experience period poverty with easy access to free period products in school, and possibly those that may require it in emergency situations, and offer young people a safe space in the form of a social application to enable them to share, discuss and learn– with the aim of destigmatising menstruation. The dispenser will ensure that the education of students is not compromised because of their inability to access safe and adequate products to manage their periods. The primary users are young people, specifically girls, non-binary learners, and transgender boys in state secondary schools (England) who have periods and are from low income backgrounds. The concept is gives students more control over their basic needs eliminating the need to seek permission from

a staff nurse and by making these products easily accessible, promotes the idea that period products are a basic necessity.

Dispenser Development

From the selection of designs in Figure 21: Dispenser Designs, the vending style machine inspired by the existing soda machines, was chosen for development. The ENOVA Dispenser must be able to store 22 different period products from the three primary categories; collection methods including menstrual pads, tampons and menstrual cups, which have 8 other subcategories. This design allows more products to be stored.

A number of implications came to surface as the design was later developed. The product is intended to be placed inside school toilets (not cubicles) to offer users privacy, although schools may install the dispenser wherever they see fit. The machines in Figure 22: Development of Dispenser Designs (A) measure 39" in Length (99.06 cm), 35.433" in Width (89.99982 cm) and 72" in Height (182.88 cm), the size of an average beverage vending machine. However, according to the Education Funding Agency's Baseline School Designs the recommended female washroom size for a Secondary school with 1,120



Stage 3: DEVELOP

3.2. Concept Generation

pupils is 19m². See Figure 25: Washroom Layout - Secondary and Figure 26: Education Funding Agency's Baseline School Designs Washroom Layout - Primary. This means that dispenser will prevent a circulation space for students to safely manouever in.

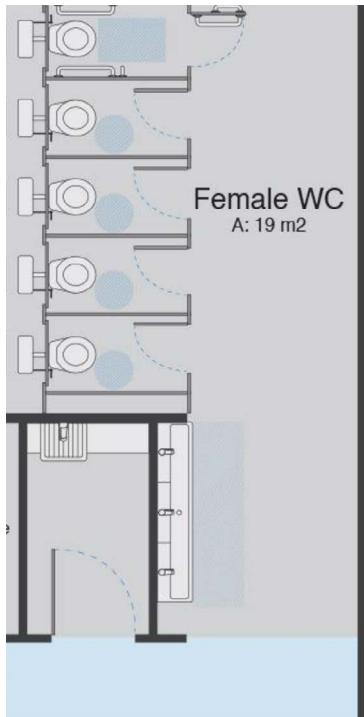


Figure 25: Washroom Layout
- Secondary School

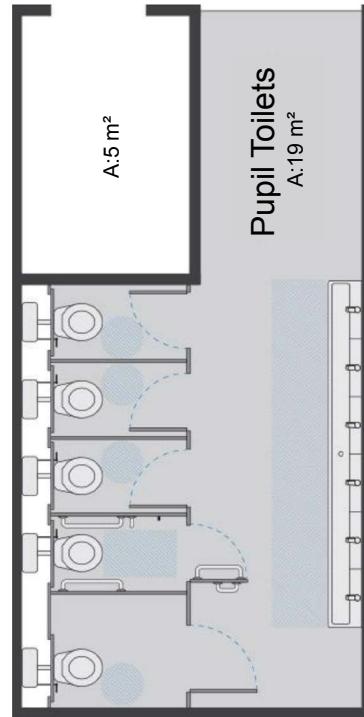
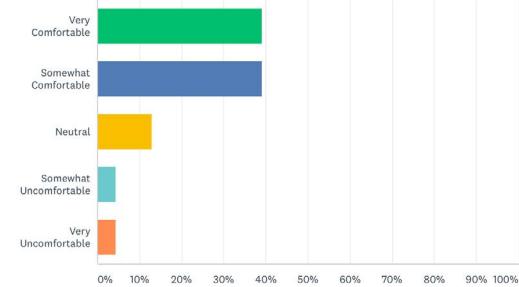


Figure 26: Washroom Layout
- Primary School

Another implication with this is that the size of the dispenser only allows it to be installed in a large area such as the cirulation space in the washrooms, which is shared by other students. This location may also not be ideal as users may feel that it enroaches privacy. Although, more people especially the youth are more comfortbale to discuss the topic of menstruation with 91.3% of people surveyed being open to this topic, see Figure 27: Period Poverty and Education Survey, it continues to be stigmatised and taboo in many cultures and societies. There are still people that are not as comfortable and may feel discouraged to use a dispenser in a location that encoaches their privacy.

In general, how comfortable are you discussing the topic of menstruation?

Answered: 23 Skipped: 0



ANSWER CHOICES	RESPONSES
Very Comfortable	39.13%
Somewhat Comfortable	39.13%
Neutral	13.04%
Somewhat Uncomfortable	4.35%
Very Uncomfortable	4.35%
TOTAL	23

Figure 27: Period Poverty and Education Survey

Stage 3: DEVELOP

3.2. Concept Generation

Research into existing period dispensing machines such as the Period Poverty Cubicle Dispenser by Initial, showed that there is a need to develop these products to be able to fit in individual areas such as cubicles as periods are still a sensitive topic for many. To provide free period products to a wider range of people, and decrease the number of those that experience period poverty, the dispenser would be redesigned to be wall mounted on the washroom cubicle, where it can be accessed anonymously.

DISPENSER DESIGN DEVELOPMENT – SKETCHES

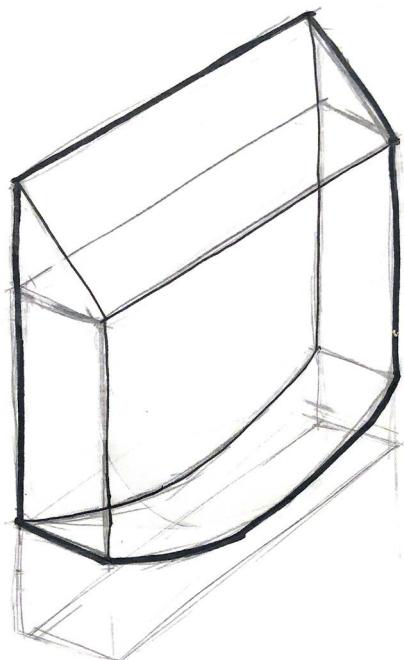


Figure 28: Dispenser Design Shapes (A)

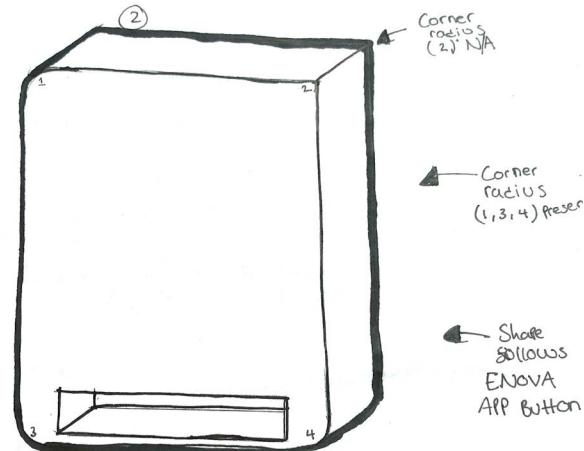


Figure 29: Dispenser Design Shapes(B)

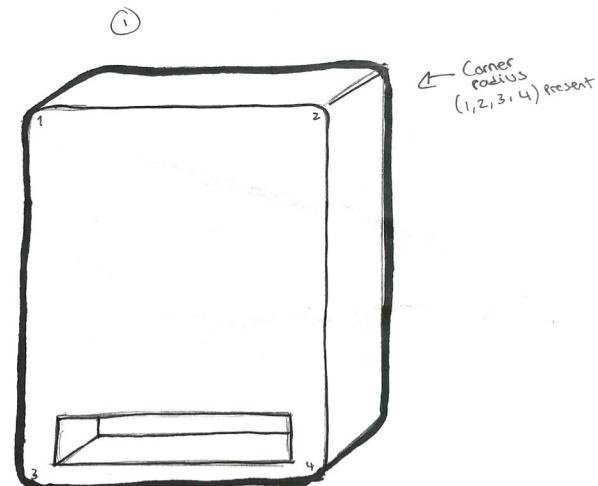


Figure 30: Dispenser Design Shapes (C)

Stage 3: DEVELOP

3.2. Concept Generation

DISPENSER DESIGN DEVELOPMENT – SKETCHES

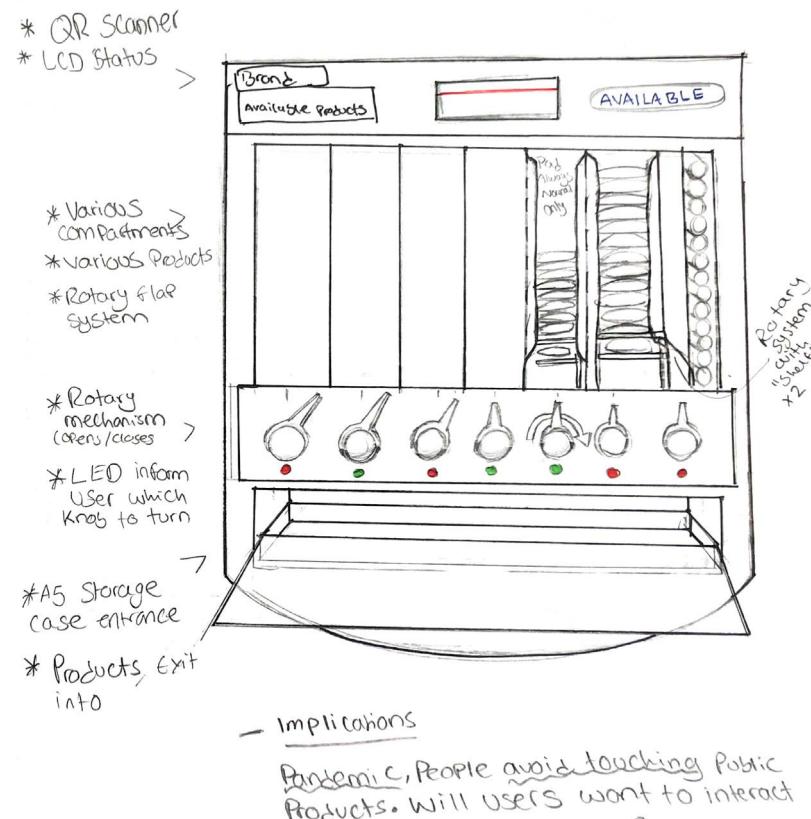


Figure 30: Wall Mount Dispenser (A)

1: Material - Steel

2: QR Scanner

3: Lock Mechanism

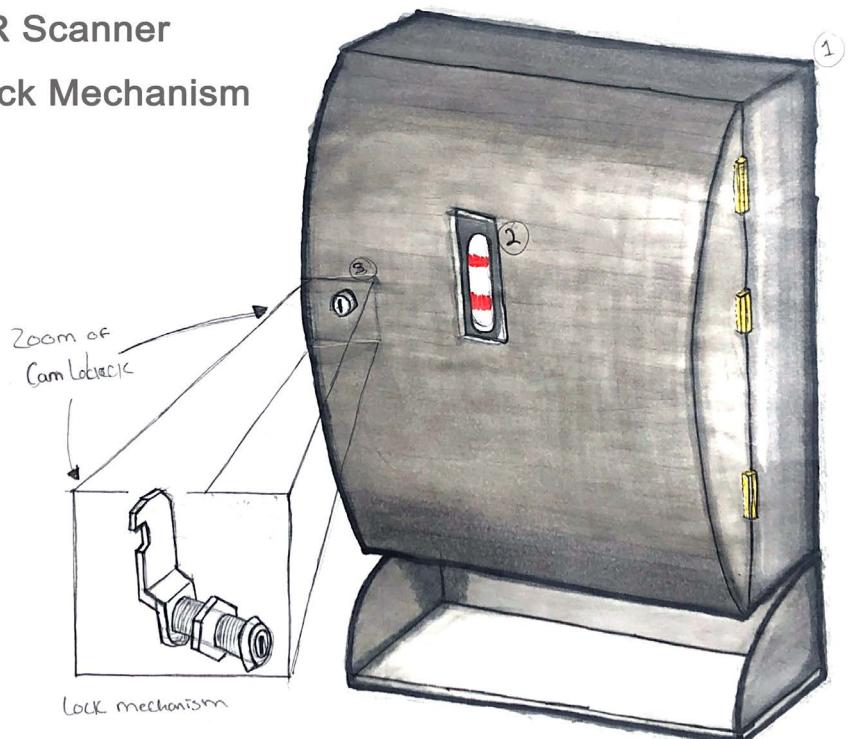


Figure 31: Wall Mount Dispenser (B)

Stage 3: DEVELOP

3.2. Concept Generation

It was important to consider the journey of the user; once the dispenser has performed its intended function and the system has been completed. For additional convenience and better overall experience with the product, a compact and portable product to allow the student to safely store the goods and facilitate transportation will be designed. Understanding the environment that the target user is intended to utilise the product; availability of space, was also imperative.

CASE DESIGNS – SKETCHES

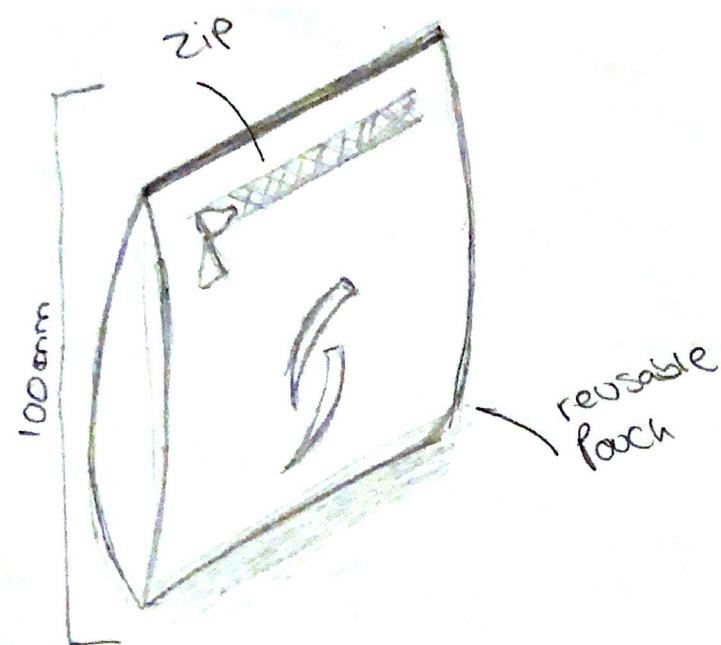


Figure 32: Portable Pouch

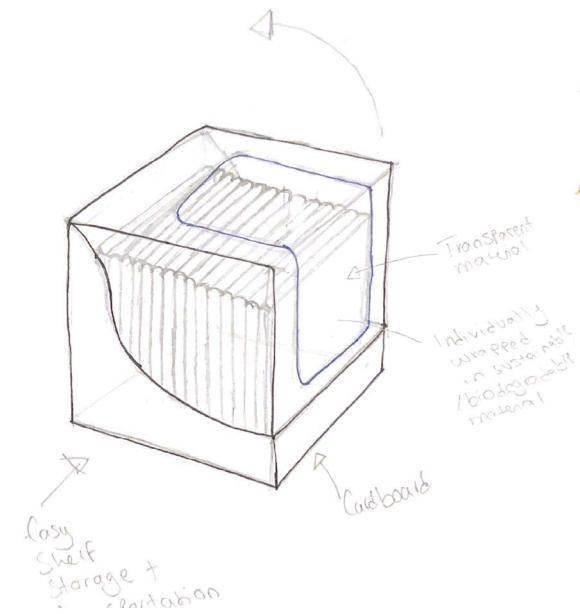
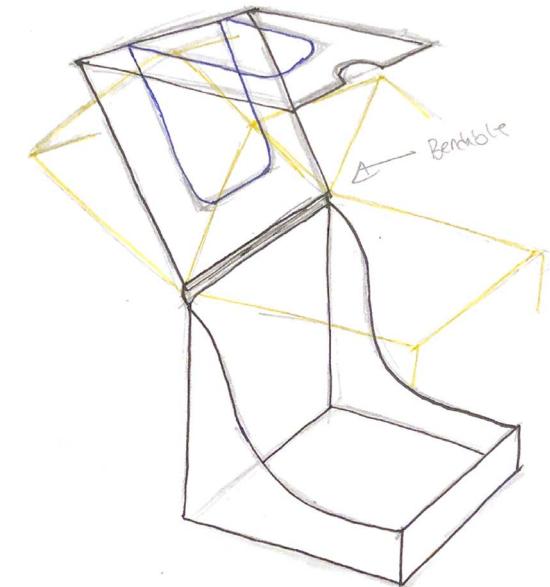


Figure 33: Sustainable Portable Box



Stage 3: DEVELOP

3.2. Concept Generation

CASE DESIGNS – SKETCHES

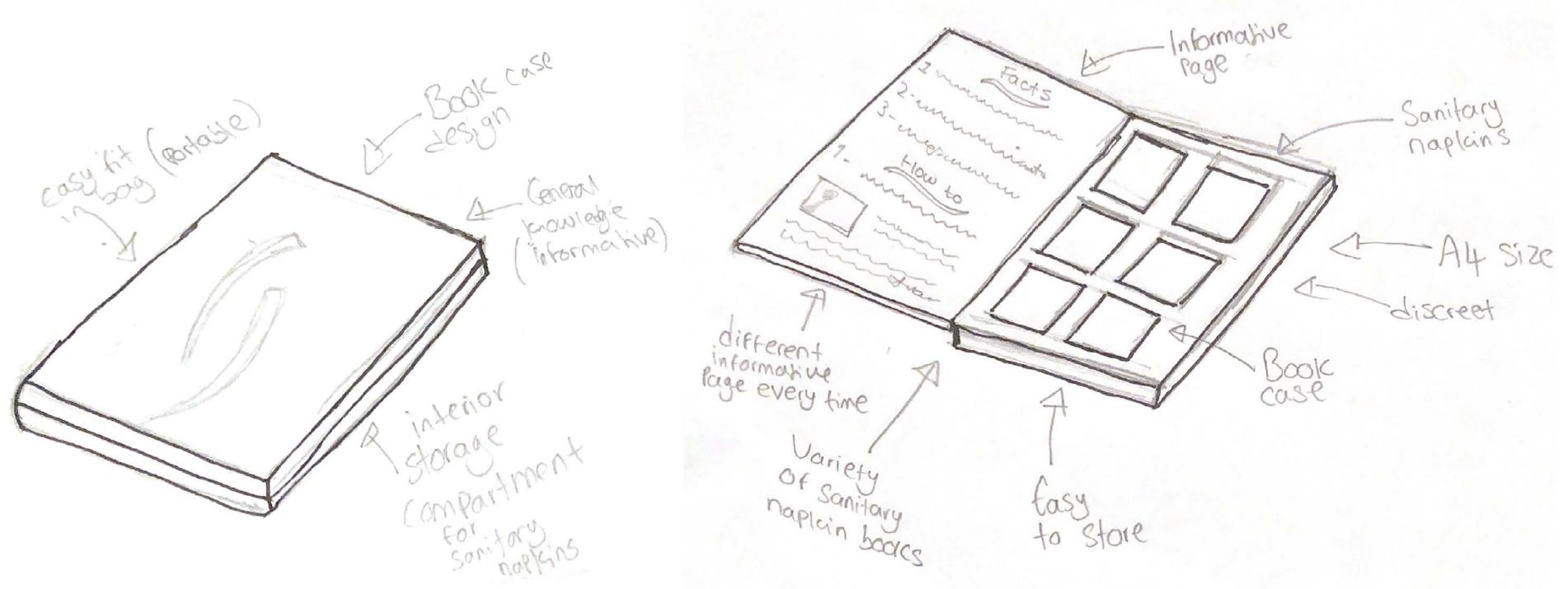


Figure 34: Book Case Design Sketch

Stage 3: DEVELOP

3.2. Concept Generation

CONCEPT STUDENT JOURNEY – STORYBOARD



1:

This illustration shows the student utilising their phone whilst on the public transport. This user is on their typical journey to school in the morning.

2:

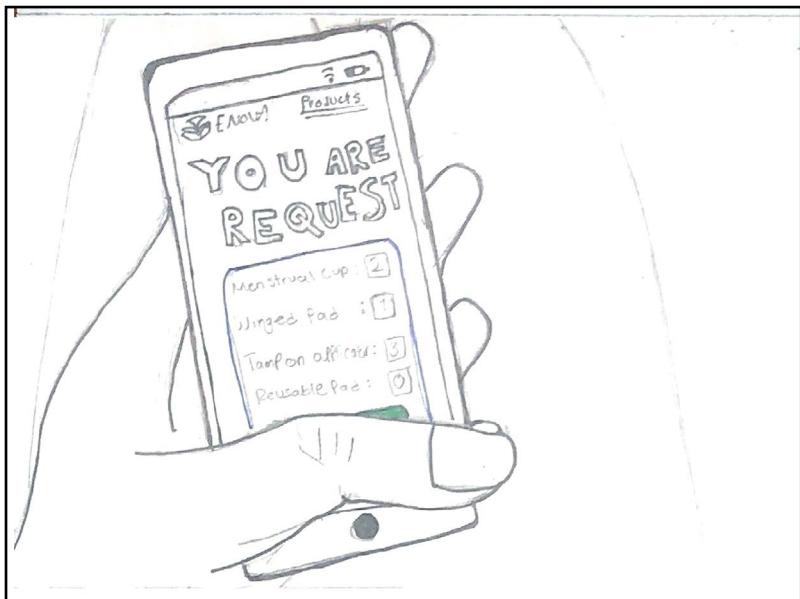
This shows the student having accessed one of the products (application) on their smartphone. The user would then be able to view the amount of products that they have been permitted to request, how many they have claimed and the next refresh date.

Figure 35: Storyboard of Products and User (A)

Stage 3: DEVELOP

3.2. Concept Generation

CONCEPT STUDENT JOURNEY – STORYBOARD



3:

The user would also be able to request the desired products to collect at a dispenser point registered to the school.



4:

Once the student has requested the product, they will have to use the QR code generated by 11:59 of that day. Here the student is in class being excused to the washroom.

Figure 36: Storyboard of Products and User (B)



Stage 3: DEVELOP

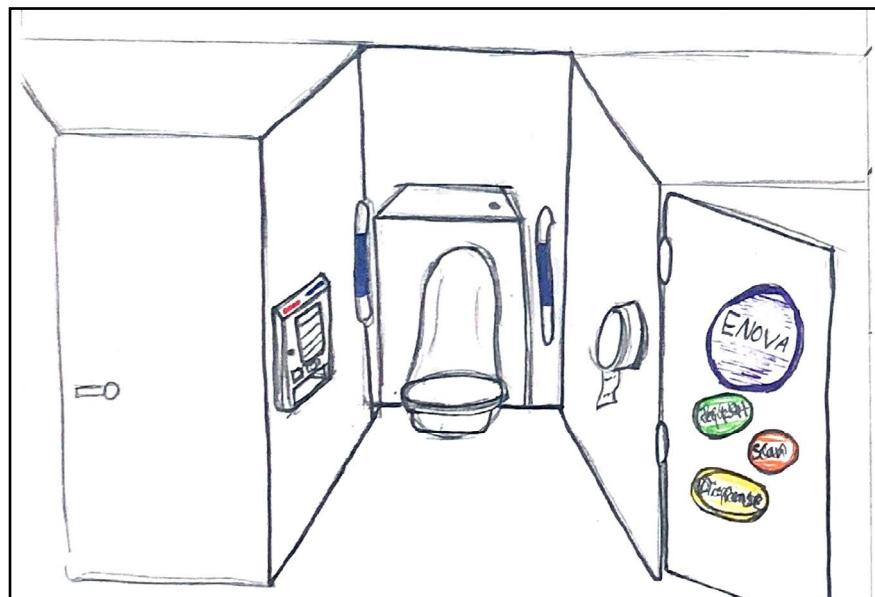
3.2. Concept Generation

CONCEPT STUDENT JOURNEY – STORYBOARD



5:

This shows the user accessing a female washroom within the school while carrying a backpack.



6:

The student is accessing a cubicle that has been chosen to install the dispenser.

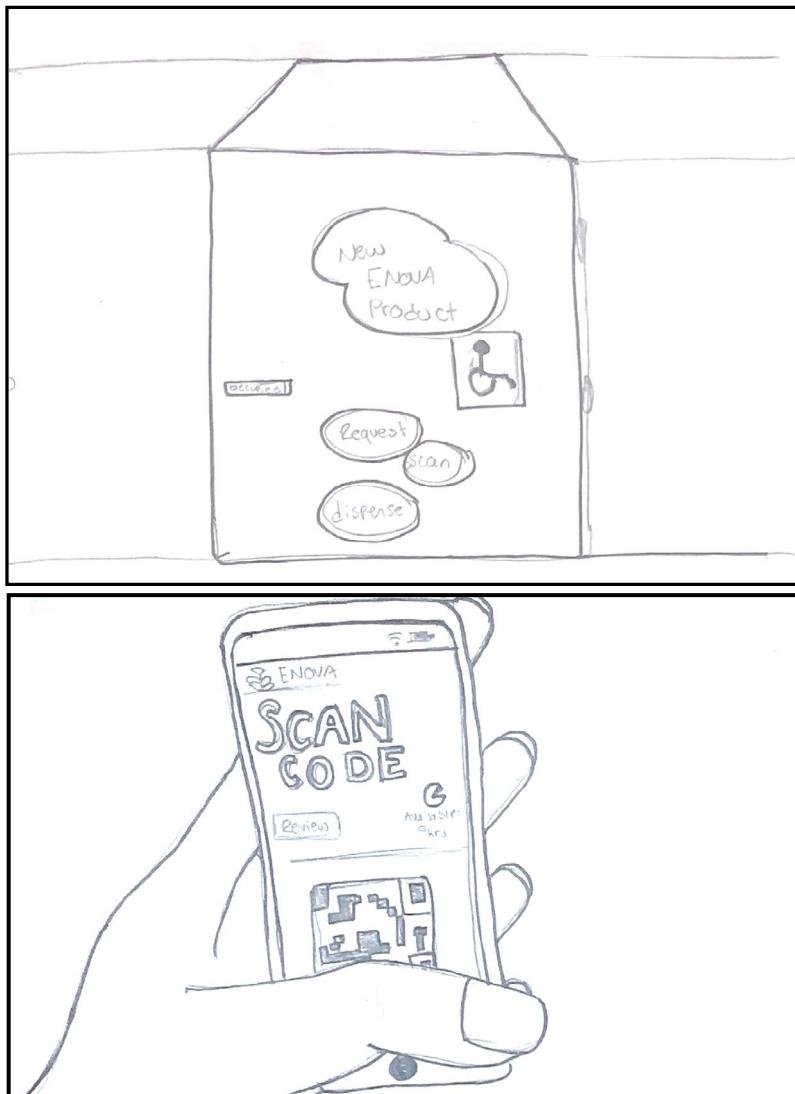
Figure 37: Storyboard of Products and User (C)



Stage 3: DEVELOP

3.2. Concept Generation

CONCEPT STUDENT JOURNEY – STORYBOARD



7:

There are advertisements for the dispenser product on the door to inform the user.

8:

The student will then bring up the QR Code generated to their account when the request was completed on their smartphone.

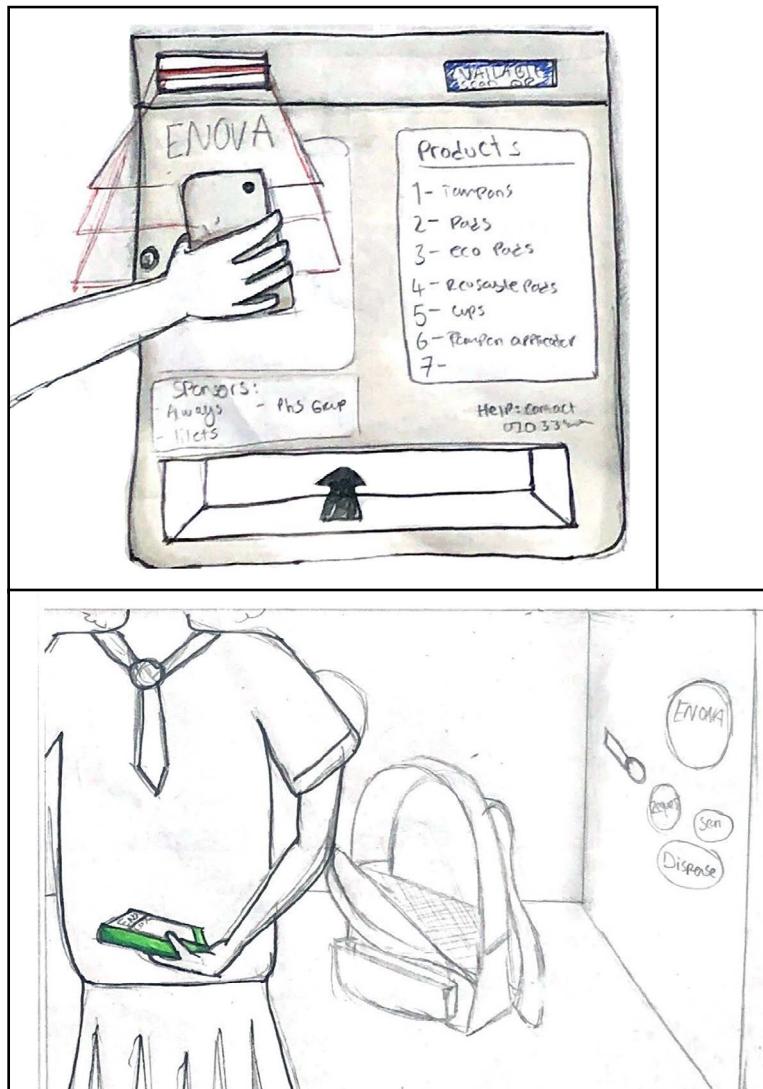
Figure 38: Storyboard of Products and User (D)



Stage 3: DEVELOP

3.2. Concept Generation

CONCEPT STUDENT JOURNEY – STORYBOARD



9:

This shows the user using both the application and the dispenser to have the QR Code scanned and the data processed.

10:

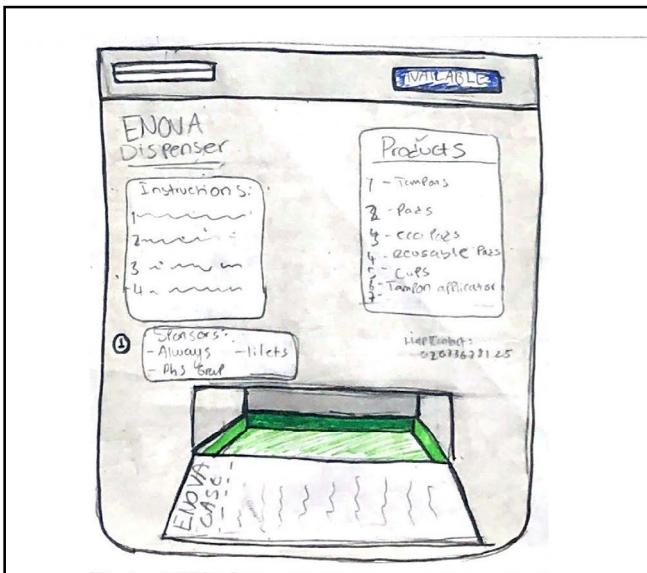
This sketch is showing the student will retrieving the product (storage case) from their backpack.

Figure 39: Storyboard of Products and User (E)

Stage 3: DEVELOP

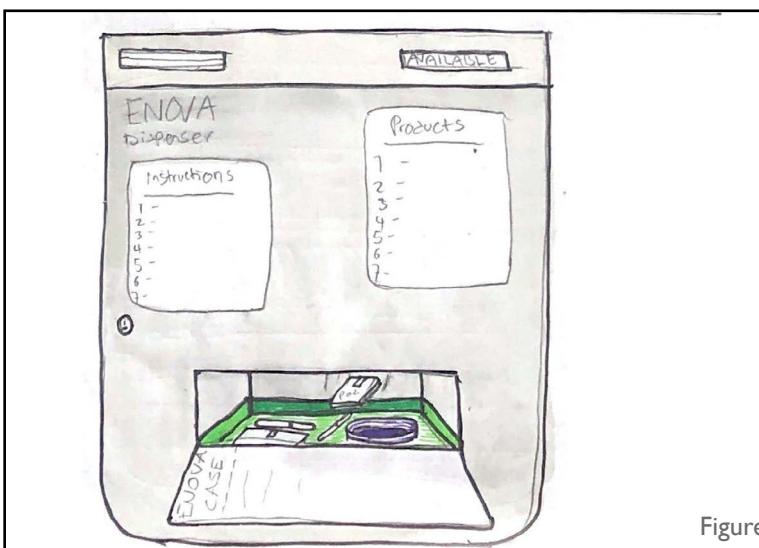
3.2. Concept Generation

CONCEPT STUDENT JOURNEY – STORYBOARD



11:

The dispenser will inform the user to place the open case in the dispenser.



12:

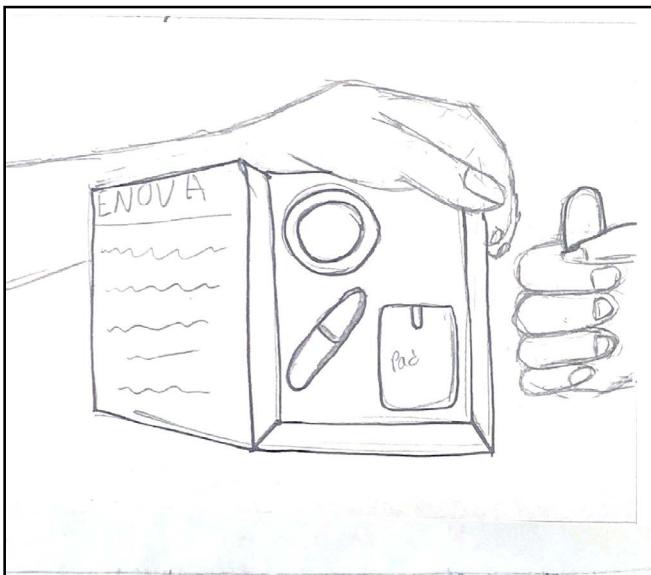
The dispenser will release the in the goods that the QR Code contained, into the case.

Figure 40: Storyboard of Products and User (F)

Stage 3: DEVELOP

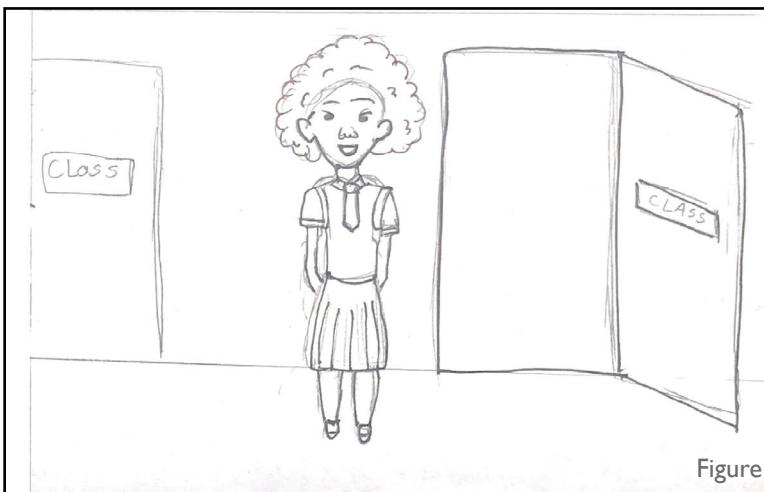
3.2. Concept Generation

CONCEPT STUDENT JOURNEY – STORYBOARD



|3:

The student can use the products dispensed at point of need.



|4:

Here shows the user returning to class confidently.

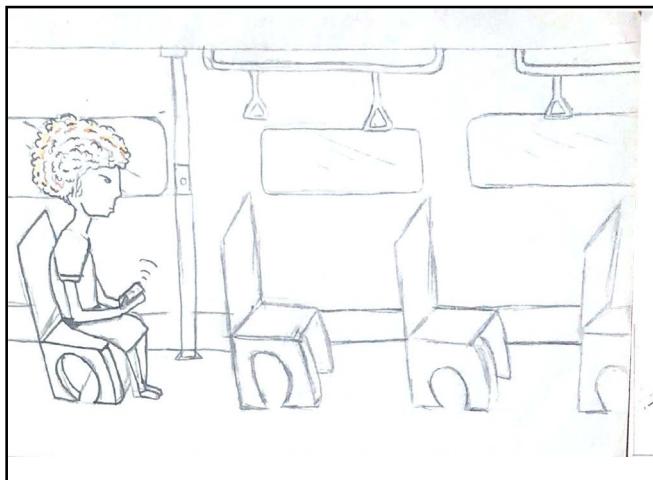
Figure 41: Storyboard of Products and User (G)



Stage 3: DEVELOP

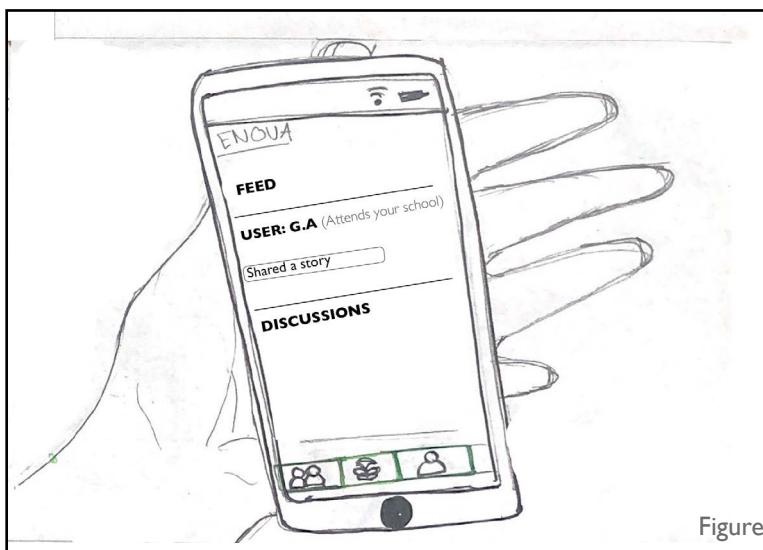
3.2. Concept Generation

CONCEPT STUDENT JOURNEY – STORYBOARD



15:

This illustration depicts the user on the journey back home after school.



16:

The user can access the social element of the application after their educational institution re-enables it for after school hours use.

Figure 42: Storyboard of Products and User (H)



Stage 3: DEVELOP

3.3. Concept Testing and Model Making

3.3.1. Virtual Models I

A range of models including sketch models, CAD models, appearance models, virtual models and analytical models, have been used in the model making and prototyping process to further explore and better communicate the concept proposed.

Results

The online 3D modeling programme TINKERCAD was used to make the experiment more efficient. However this method proved to be an issue as the text in the LCD did not display. After various failed attempts programming on the browser, the designer moved the experiment to arduino with tangible components to build the circuit. A number of different hardware setups and codes were tested before the designer was able to make a functional liquid crystal display (1602). The LCD used in this experiment has 16 pins. The typical LCD setup features a potentiometer to allow control over the display contrast, however this component was not used for the experiment. A resistor with 220ohm between lcd pin A and 5V was also added to complete the setup. For TINKERCAD test, refer to Appendix 5.3.6 Other

Digital modelmaking: Dispenser LCD 1602.

The designer tested the ENOVA dispenser electronics using Arduino software and components. The LCD 1602 module will be used to display the following dispenser status:

- » AVAILABLE (Scan QR Code) – The dispenser is stocked with products and users may use.
- » OUT OF ORDER (Please Refill) – Alerts the school staff (cleaner or nurse) in charge to refill the compartment and the user may not use the dispenser as the scanner will not scan or process QR codes, and will cease to provide products until resolved.
- » ERROR (Tech Support) – This alerts that the dispenser has an electrical issue and requires professional assistance. The school will need to contact the provider as users can not use the product.



Stage 3: DEVELOP

3.3. Concept Testing and Model Making

3.3.2. Analytical Models – Dispenser Module



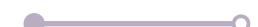
Figure 43: Dispenser LCD 1602 Arduino – Available (Scan QR Code)



Figure 45: Dispenser LCD 1602 Arduino – Error (Tech Support)

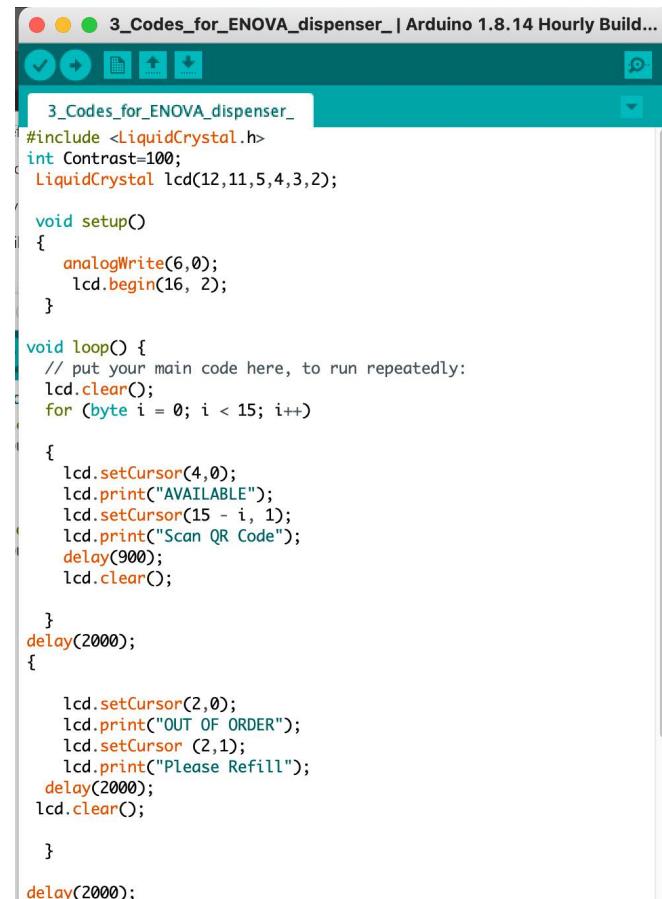


Figure 44: Dispenser LCD 1602 Arduino – Out of Order (Please Refill)



Stage 3: DEVELOP

3.3. Concept Testing and Model Making



```
#include <LiquidCrystal.h>
int Contrast=100;
LiquidCrystal lcd(12,11,5,4,3,2);

void setup()
{
    analogWrite(6,0);
    lcd.begin(16, 2);
}

void loop() {
    // put your main code here, to run repeatedly:
    lcd.clear();
    for (byte i = 0; i < 15; i++)
    {
        lcd.setCursor(4,0);
        lcd.print("AVAILABLE");
        lcd.setCursor(15 - i, 1);
        lcd.print("Scan QR Code");
        delay(900);
        lcd.clear();
    }
    delay(2000);
    {

        lcd.setCursor(2,0);
        lcd.print("OUT OF ORDER");
        lcd.setCursor (2,1);
        lcd.print("Please Refill");
        delay(2000);
        lcd.clear();
    }
    delay(2000);

    lcd.setCursor(6, 0);
    lcd.print("ERROR");
    lcd.setCursor(2,1);
    lcd.print("Tech Support");
    delay(5000);
    lcd.clear();
}
}
```

Figure 46: Liquid Crystal Display 1602 Code in Arduino Software

Arduino software version 1.8.14 was used to produce the code displaying on the LCD.

3.3.3. CAD Models 2 and Sketch Models

Figure 48: CAD Design of Storage Case (A) and Figure 49: CAD Design of Storage Case (B) show the case renders designed in Fusion 360 software from different perspectives.

These CAD renders have been created to allow the designer to visualise and identify any faults with the design of the final product storage case. The arrangement and materials used for the digital design will potentially be found in the prototype.

When modelling the sketch models, it was necessary for the designer to research and collect anthropometric data related to the intended user of the products in order to design the product to the correct measurements.

Stage 3: DEVELOP

3.3. Concept Testing and Model Making

REUSABLE STORAGE CASE – SCHEMATICS

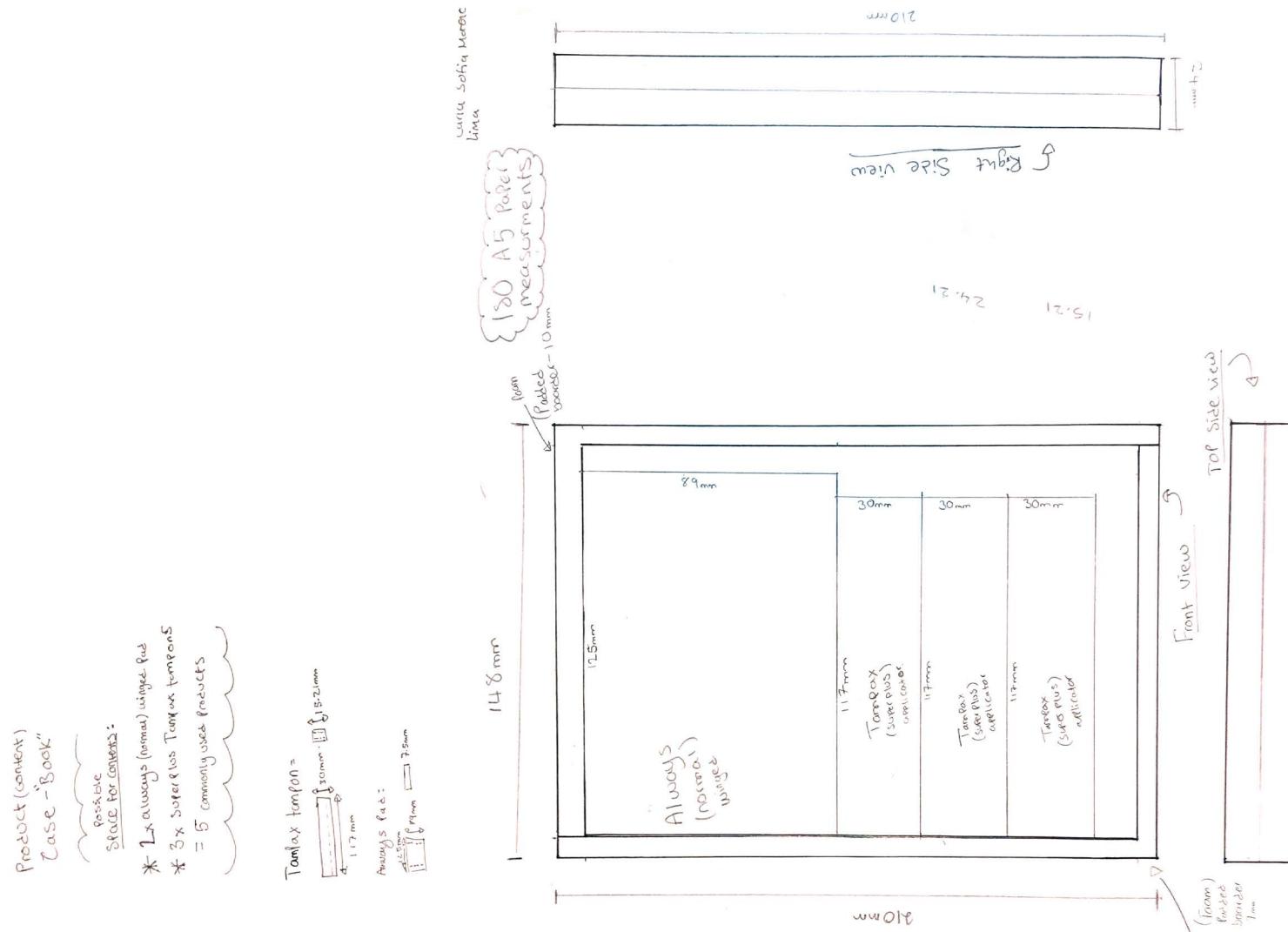


Figure 47: Storage Case Mock Model Schematics

Stage 3: DEVELOP

3.3. Concept Testing and Model Making

REUSABLE STORAGE CASE – CAD



Figure 48: CAD Design of Storage Case (A)



Figure 49: CAD Design of Storage Case (B)

Stage 3: DEVELOP

3.3. Concept Testing and Model Making

Hand Breadth							
FEMALE N = 2208				MALE N = 1774			
Centimeters	Inches	Centimeters	Inches	Centimeters	Inches	Centimeters	Inches
7.94	.31	9.04	.35	8.07	.31	3.18	
.38	.15	.42	.17	8.19	.32	3.22	
9.80	3.86	10.60	4.17	8.27	3.25		
6.60	2.60	7.70	3.03	8.36	3.29		
Percentiles							
7.09	1 st	2.79	8.07	8.51	10 th	3.35	
7.19	2 nd	2.83	8.19	8.61	15 th	3.39	
7.25	3 rd	2.86	8.27	8.86	20 th	3.42	
7.34	5 th	2.89	8.36	9.09	25 th	3.45	
7.47	10 th	2.94	8.51	9.30	30 th	3.47	
7.56	15 th	2.98	8.61	9.55	35 th	3.49	
8.63	20 th	3.00	8.69	9.76	40 th	3.51	
7.69	25 th	3.03	8.75	9.86	45 th	3.54	
7.74	30 th	3.05	8.82	9.93	50 th	3.56	
7.79	35 th	3.07	8.87	9.98	60 th	3.60	
7.84	40 th	3.09	8.93	10.04	65 th	3.62	
7.89	45 th	3.11	8.98	10.11	70 th	3.64	
7.93	50 th	3.12	9.03	10.16	75 th	3.67	
7.98	55 th	3.14	9.09	10.21	80 th	3.67	
8.03	60 th	3.16	9.14	10.26	85 th	3.73	
8.08	65 th	3.18	9.20	10.31	90 th	3.78	
8.13	70 th	3.20	9.26	10.36	95 th	3.84	
8.18	75 th	3.22	9.32	10.41	97 th	3.88	
8.25	80 th	3.25	9.40	10.46	98 th	3.91	
8.32	85 th	3.28	9.48	10.51	99 th	3.94	
8.42	90 th	3.31	9.59	10.56			
8.56	95 th	3.37	9.76	10.61			
8.66	97 th	3.41	9.86	10.66			
8.74	98 th	3.44	9.93	10.70			
8.86	99 th	3.49	10.04	10.74			

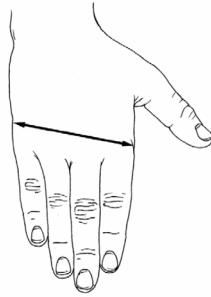


Figure 50: Hand Anthropometric Data (A)

Hand Length							
FEMALE N = 2208				MALE N = 1774			
Centimeters	Inches	Centimeters	Inches	Centimeters	Inches	Centimeters	Inches
18.05	7.07	19.38	7.63	7.10	.28	17.52	2 nd
.97	.38	.98	.39	17.67	3 rd	17.52	6.90
21.50	8.46	23.30	9.17	18.46	7.24	17.87	6.96
14.90	5.87	16.00	6.30	18.18	7.16	18.39	7.04
Percentiles							
15.89	1 st	6.26	17.28	1 st	6.80	17.28	
16.13	2 nd	6.35	17.52	2 nd	6.90	17.52	
16.29	3 rd	6.41	17.67	3 rd	6.96	17.67	
16.50	5 th	6.50	17.87	5 th	7.04	17.87	
16.83	10 th	6.63	18.18	10 th	7.16	18.18	
17.06	15 th	6.72	18.39	15 th	7.24	18.39	
17.24	20 th	6.79	18.56	20 th	7.31	18.56	
17.39	25 th	6.85	18.71	25 th	7.37	18.71	
17.53	30 th	6.90	18.85	30 th	7.42	18.85	
17.66	35 th	6.95	18.97	35 th	7.47	18.97	
17.78	40 th	7.00	19.09	40 th	7.52	19.09	
17.90	45 th	7.05	19.21	45 th	7.56	19.21	
18.02	50 th	7.09	19.33	50 th	7.61	19.33	
18.14	55 th	7.14	19.45	55 th	7.66	19.45	
18.26	60 th	7.19	19.57	60 th	7.70	19.57	
18.39	65 th	7.24	19.70	65 th	7.75	19.70	
18.62	70 th	7.29	19.84	70 th	7.81	19.84	
18.67	75 th	7.35	19.99	75 th	7.87	19.99	
18.84	80 th	7.42	20.16	80 th	7.94	20.16	
19.04	85 th	7.49	20.37	85 th	8.02	20.37	
19.29	90 th	7.60	20.64	90 th	8.13	20.64	
19.69	95 th	7.75	21.06	95 th	8.29	21.06	
19.96	97 th	7.86	21.34	97 th	8.40	21.34	
20.16	98 th	7.94	21.55	98 th	8.49	21.55	
20.50	99 th	8.07	21.90	99 th	8.62	21.90	

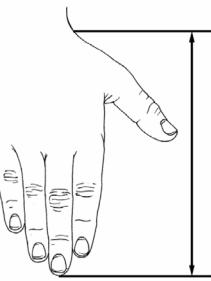


Figure 51: Hand Anthropometric Data (B)

Data from female and male column was analysed since the users of the products will includes girls, non-binary and transgender learners who have periods.

PRODUCT STORAGE CASE DIARY OF MANUFACTURE

The packaging for Iphone screen protectors manufactured by JETECH seen in Figure 52: Mock Model (A), were used as an inspiration for the product case, and some of the measurements were also used for guidance. The packaging consisted of a foam (polyurethane) border . This was extracted using a scalpel (10A).

Using an empty cereal box (paperboard) seen in Figure 53: Mock Model (B), the designer was able to construct the body of the product case.The outline was drawn with a pencil and stainless steel rule for an accurate measurement.

The final product will, however, be made from a thicker and more durable type of card.This will make the product more easily recyclable and reduce the carbon footprint during manufacture and transportation,thus conserving the environment.The use of card will enable a various designs to be printed

Stage 3: DEVELOP

3.3. Concept Testing and Model Making

and allowing the user to better personalise it.

The outline was cut using a scalpel (A10) for better precision and a cleaner finish. The foam was glued using craft glue onto the back card to create the border. See Figure 54: Mock Model (C). The cover was designed digitally and printed on paper.

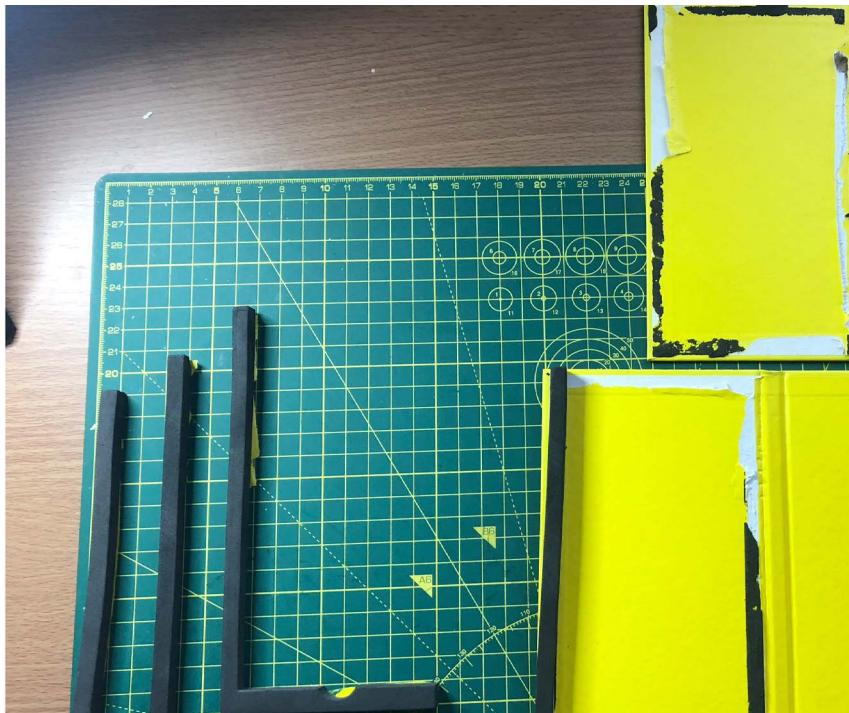


Figure 52: Mock Model (A)

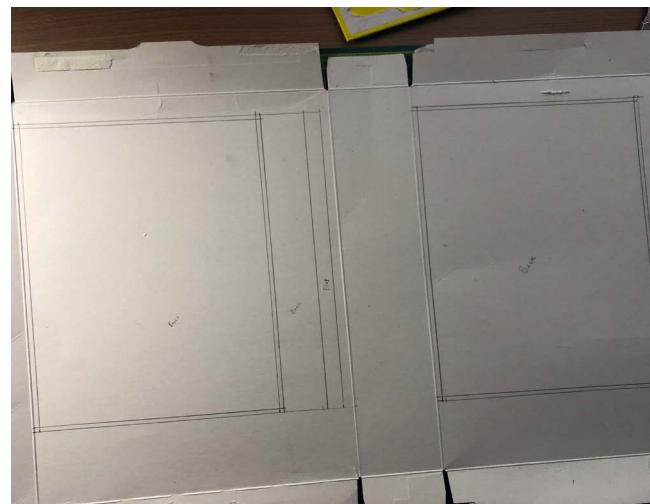


Figure 53: Mock Model (B)



Figure 54: Mock Model (C)



Stage 3: DEVELOP

3.3. Concept Testing and Model Making

3.3.4. Appearance Models

The motive for the models was to understand whether the case size is appropriate for the user to hold and carry in a bag.

Further development could include testing different materials as the user demographic group may benefit from a more durable product, considering the age and environment in which the product will be used in.

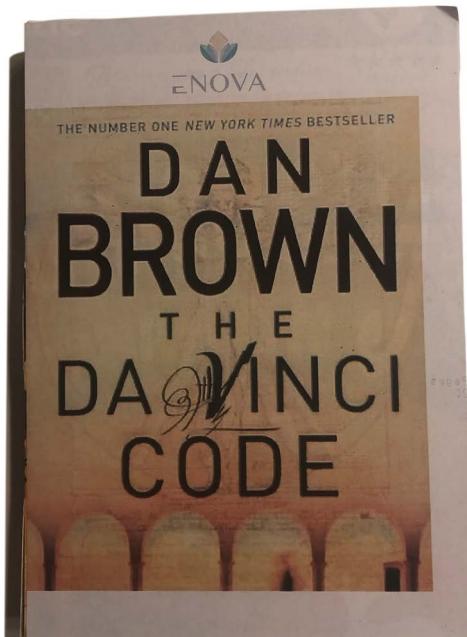


Figure 55: Mock Model Front Exterior View

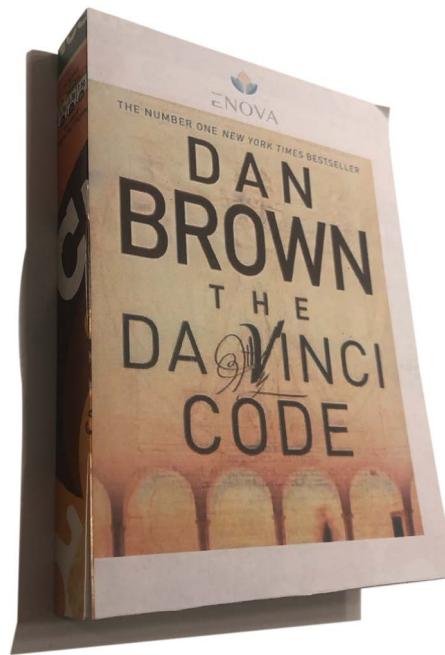


Figure 56: Mock Model Perspective View



Figure 57: Mock Model Interior

Stage 3: DEVELOP

3.3. Concept Testing and Model Making

Concept Testing

User testing for the application prototype could not be carried out but will be at a later date. User testing was instead focused on the storage case, an observation of the target user interacting with the product and generating constructive feedback took place.



Figure 58: User Testing The Storage Case Mock Model (A)

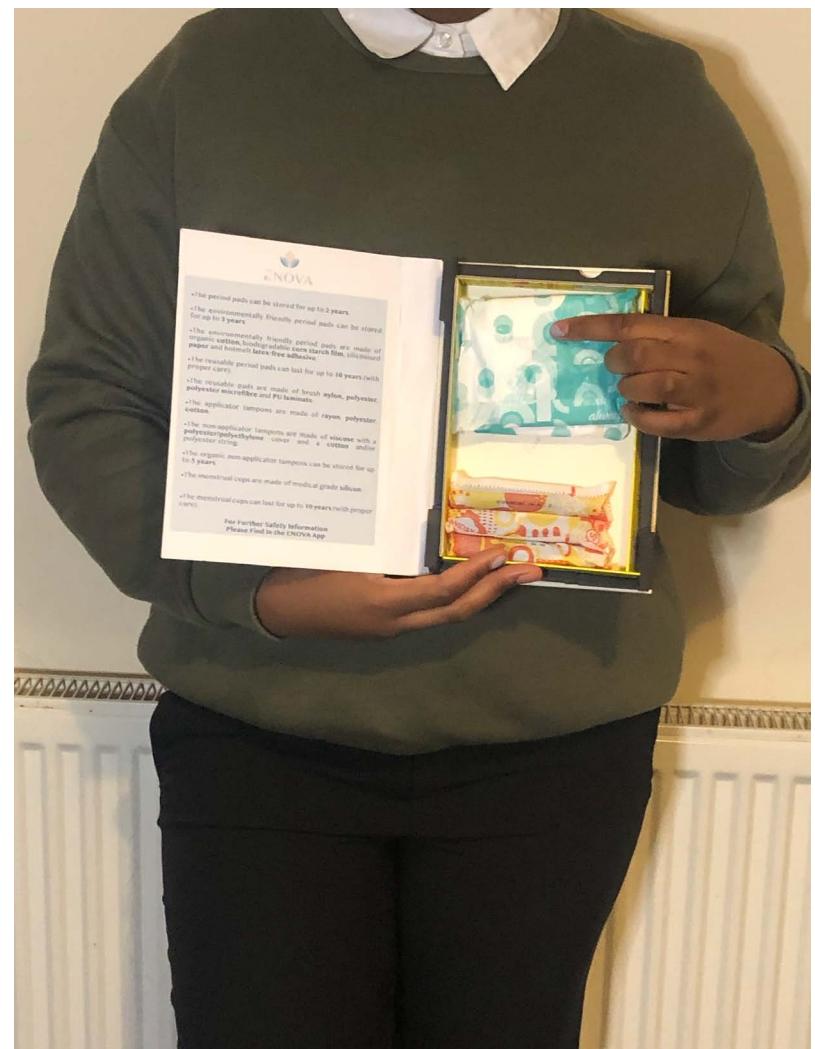


Figure 59: User Testing The Storage Case Mock Model (B)

Stage 3: DEVELOP

3.3. Concept Testing and Model Making



Figure 60: User Testing The Storage Case
Mock Model (C)

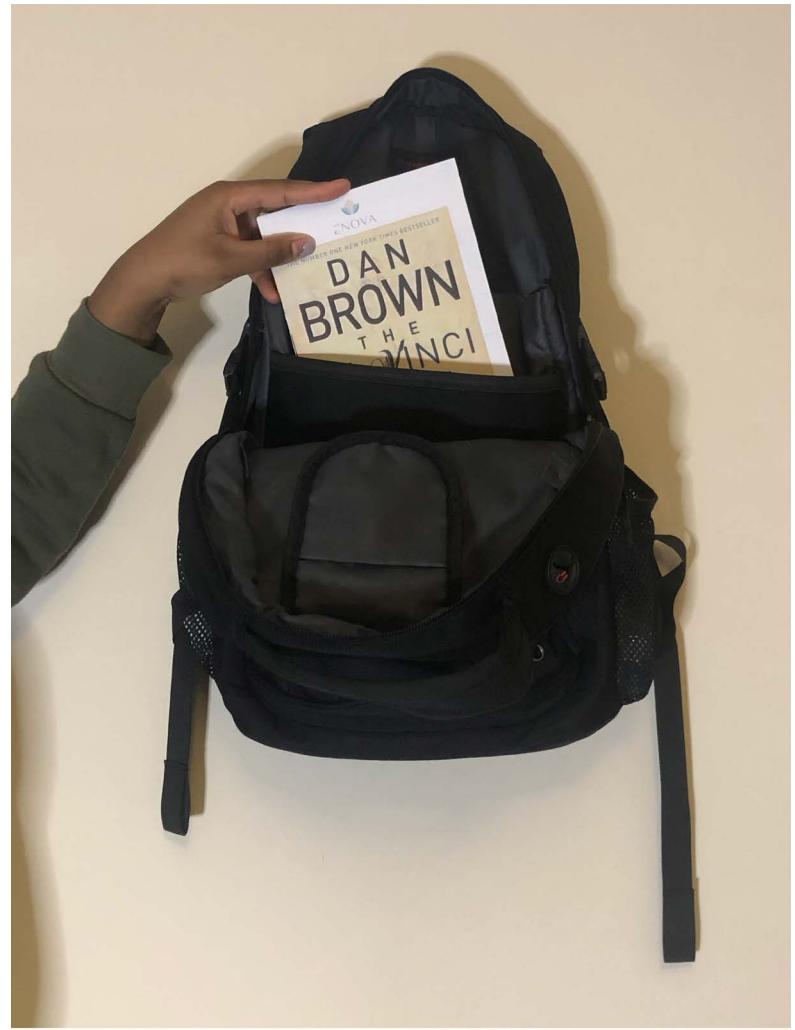


Figure 61: User Testing The Storage Case
Mock Model (D)



Stage 3: DEVELOP

3.4. Human Centred Design Analysis

3.4.1. Introduction and Objectives

A key area to conduct analysis is the user group and product interaction.

» **Observation**

Usability testing on people with no prior exposure will give direct input on how users will approach and interact with the product in context. The designer will then be able to evaluate prototype functionality and gain better insight into the users' motivations, in addition to their actions.

» **Survey**

This qualitative information gathering method was executed to allow the potential users to have an opinion and understand whether such product, both the dispenser product and the application, would be beneficial for the demographic.

Non physical communication between the user and product, will occur before any form of physical interaction. This means that a good brand, memorable, is crucial to inform users of the products purpose. To achieve this, research into brand identity guidelines and existing brands will be carried out. The

fundamental aspects for the application include user navigation, page layout, graphics and colours will be designed following the User Experience (UX) and User Interaction (UI) standards and codes of practice.

3.4.2. Design of Experiments

Initial Brand and Logo

The aim was to begin a meaningful brand to represent the product and which users could associate with. The design process generated numerous potential brands, however, after receiving significant feedback the most favourable was the "DORHER.VITA", a working brand.

Dispenser Measurements and Limitations

The standard cubicles should have a 450mm diameter manoeuvring space within the cubicle. The recommended internal width of a cubicle is 800mm wide with an internal cubicle depth of 1500mm. Typically, doors are open inward with an opening of approximately 600mm wide. This means that the dispenser product must be designed and installed in a way that does not



Stage 3: DEVELOP

3.4. Human Centred Design Analysis

obstruct.

Testing The Application Design

The aim of this experiment was to test whether the application was clean and had efficient interfaces for a broad set of users. To ensure that this was achieved, four fundamental design aspects had to be considered. Interactivity, readability, graphics and clarity.

Figure 62: Initial Application Wireframes, were designed to correspond to guidelines set by Apple Developer.

Throughout the Pages, the text is legible, the interface elements are appropriately distanced and identifiable to the user. A series of standard input controls, navigational components and information components such as the message box in screen 3, can be seen in the application. (Refer to Appendix 6.6. Other – INITIAL WIREFRAMES, for complete wireframes of initial app. This process also helped to plan the function of each element and which screen would be attached to it.

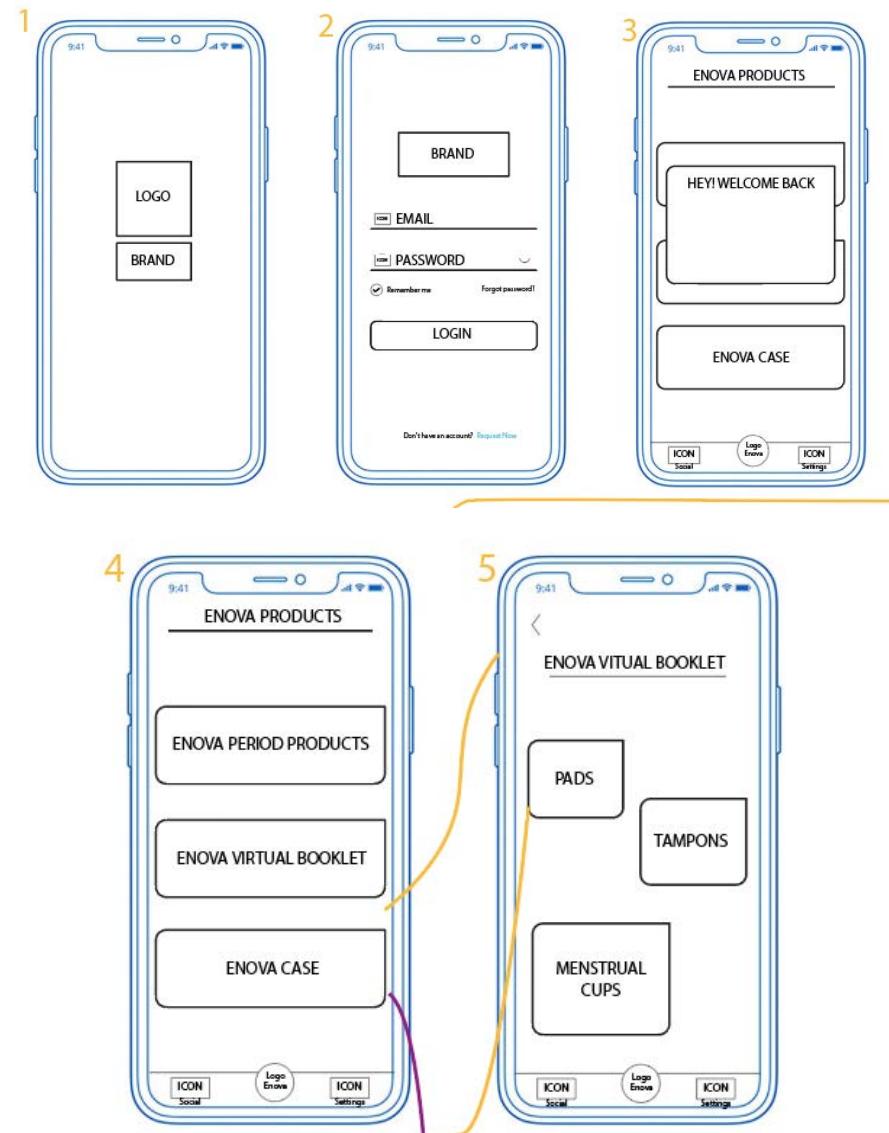


Figure 62: Initial Application Wireframes

Stage 3: DEVELOP

3.4. Human Centred Design Analysis

3.4.3. Results

The ideal size of the product model is A5– 210mmx148mm (ISO measurement) as it must store a variety of combined products ranging from period pads to menstrual cups. For example, a user may request 2x menstrual cups (typically from 35-43 mm to around 43 mm- 48mm in diameter at the rim).

The appearance model comfortably fits in a standard size backpack with remaining space. The material used for the model is also lightweight, making it portable and ideal for the target user.

After the human model tested the product model as it is intended to be used, it was clear to the designer that the case would require a latch to prevent the contents from falling during transportation (backpack). The latch could possibly be a card tab on the side of the case with magnetic properties for easier access.

Further development could be testing more materials as the user demographic group may benefit from a more durable product, considering

the age and environment in which the product will be used in.

The design of the stroage case model proved to be successful as users would occasionally ask “what book are you reading” before any explanation of the product, this showed that it aim of mimicing a readable book was achieved.

3.4.4. Discussion and Conclusions

The tests conducted in the experiment stages have been extremely useful as they have aided in mapping out the products, in terms of design, function and physical appearance, as well as the interaction of between the user and product.

In the Testing The Period Care Dispenser Size experiment, it was shown that the size of product would not be appropriate for the desired location as it would limit the user when manouvering in the available space significantly. This would especially become an issue if the user is larger in size than the average. To solve this, the dispenser will not reduce in size because of the number of products that it must house, but instead the recommended location for installation will be in an enlarged WC cubicle or a wheelchair accessible toilet cubicles with increased space as seen in Figure 63: Washroom Cubicle Sizes



Stage 3: DEVELOP

3.4. Human Centred Design Analysis

and Figure 64: Wheelchair Accessible Washroom Cubicle. This will also make the dispenser more inclusive as both sexes will have access to it and those that require mobility aids.

The wireframes designed in the Testing The Application Design experiment will be taken forward and used as a guide to develop the final prototype. The “DORHER.VITA” brand tested in the Initial Brand and Logo has been useful in helping the designer visualise the final brand and understand the direction. It also informed how users feel about and name. This will need to be developed to make sure that the final brand also has a modern and clean feel. and that there is a clear connection between the products.

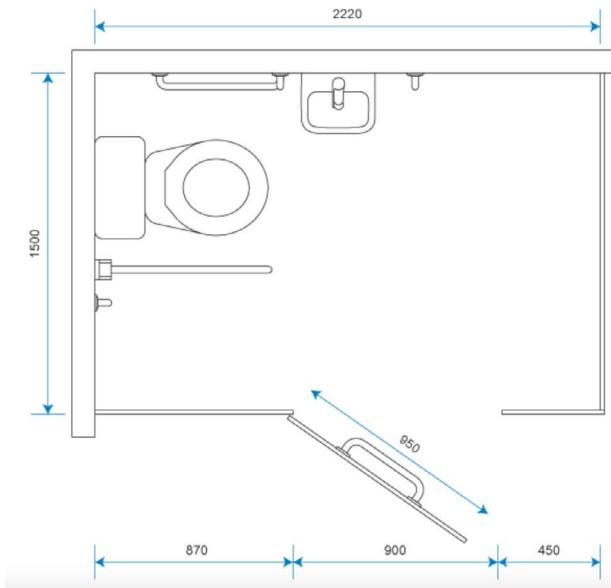
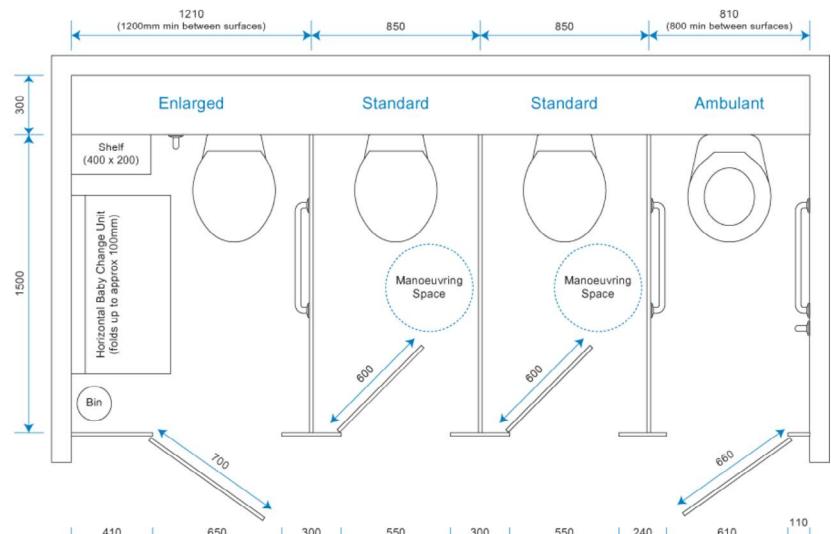


Figure 64: Wheelchair Accessible Washroom Cubicle

Stage 3: DEVELOP

3.4. Human Centred Design Analysis

DISPENSER – SEMANTICS				
Project DNA	Shape/Form	Colour	Materials/ Texture	Interaction
Natural/Organic			Metal Glass	Press Push
Geometric			Plastic	Tap
Modern				Press
Modern/ Geometric				N/A

Figure 65: Dispenser Product Semantics



Stage 3: DEVELOP

3.4. Human Centred Design Analysis

3.4.5. Draft Design Show Banner

As per brief, the banner for the Product of South Bank Design Show must have a display of 800x2000. This will give enough room for images, texts and other material relevant to the product. A draft version of the final main banner has been composed and can be seen in Figure 66: Draft Banner.

Text has been placed to make the layout planning easier. This will be replaced with final CAD renderings, application prototype, and images of the product being used in a real scenario.



Stage 3: DEVELOP

3.4. Human Centred Design Analysis

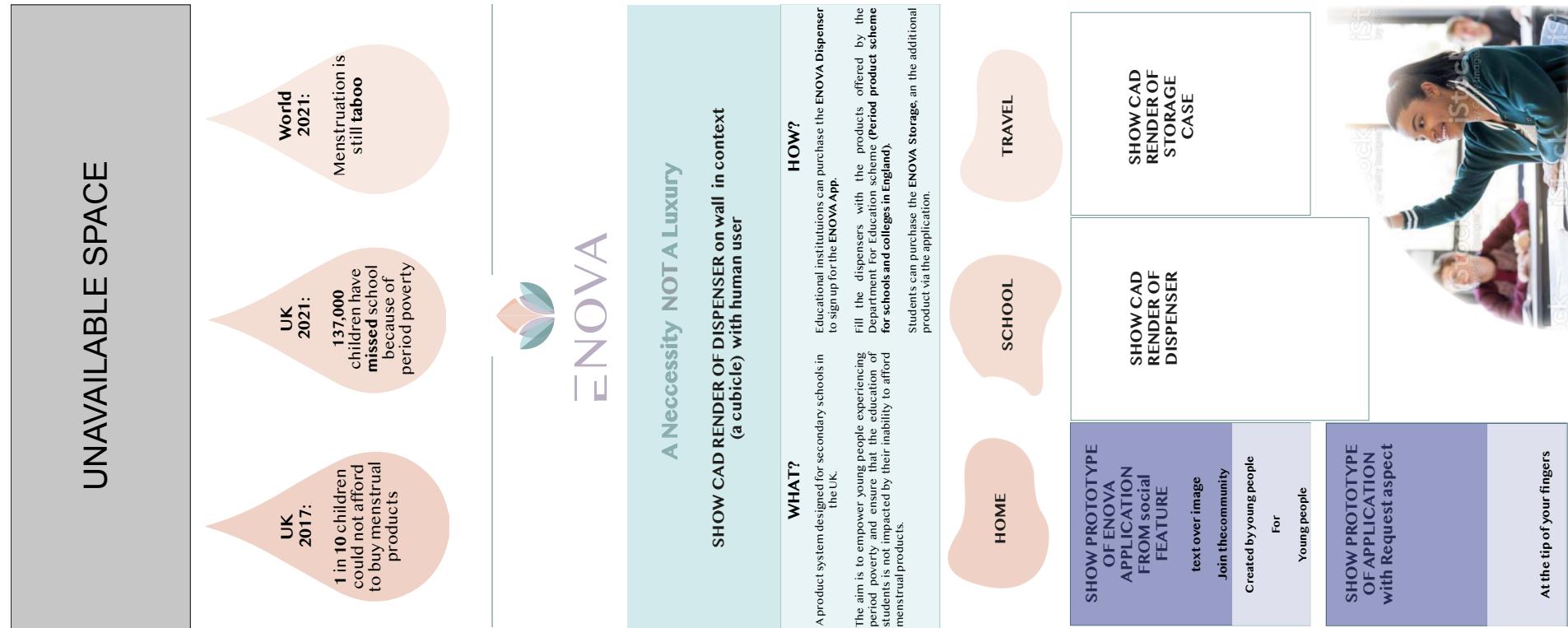


Figure 66: Draft Banner

Stage 3: DEVELOP

3.5. Design Development

3.5.1. Project Design Development

Constructive Questions

In order to further develop the products the designer had to foresee any possible barriers that may arise from the utilisation of the application. By raising the appropriate questions and offering a solution, the designer will be able to construct a well thought through concept.

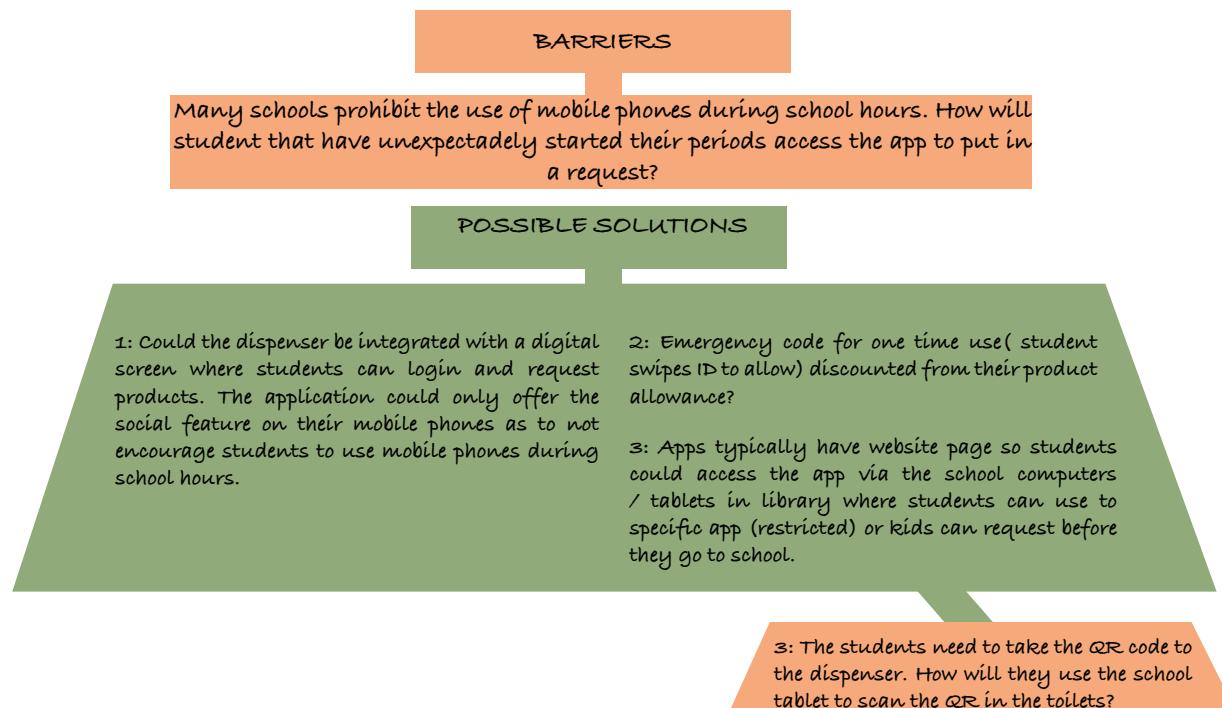


Figure 67: Potential Product Barriers (A)

Stage 3: DEVELOP

3.4. Human Centred Design Analysis

CONSTRUCTIVE QUESTIONS

BARRIERS

Education intake may be negatively affected as students become distracted by their mobile phones' social feature of the app

POSSIBLE SOLUTIONS

1: Could schools be given the choice to lock the social feature during the compulsory school hours? E.g. 8am-3pm? So that if they are requesting products before they use the restroom, staff will not mistake students to be socialising.

1: There could be an option for the school to be able to set disabling and unlocking timings for specific year groups

1: Sixth formers may have varying time tables compared to the other year groups. This could mean that the timed lock function may prevent those users from using the social outside their school hours.

Figure 68: Potential Product Barriers (B)

Stage 3: DEVELOP

3.4. Human Centred Design Analysis

CONSTRUCTIVE QUESTIONS

BARRIERS

If a QR code is generated, would the dispenser in a school recognise and accept the code for another school? . E.g. Student from Broomfield given a QR code and somehow accesses Enfield school dispenser, would the machine give out the product.?

POSSIBLE SOLUTIONS

1: The dispensers, that will be registered and synced to the school, will only recognise and process the QR codes under the students account that are registered with that specific school.

E.g. A dispenser will be purchased, and synced to the Broomfield school's admin account. The admin account can then create accounts for the students within that institution. The admin account will only have the ability to lock or unlock certain app features for their students and place a cap on the number of products a student may request.

1: Will schools have the ability to monitor their students activity on the social side of the application? Student may not by knowledge that staff can view their activity such as discussion posts, when the subject menstruation is still sensitive. Would this classify as a breach of personal privacy?

1: Schools will only be able to view a student's social activity on the app if the safety and wellbeing of a user will be at risk. If this is to occur, the school will be alerted and informed that the safety of a student is at risk. E.g. Cyberbullying.

Figure 69: Potential Product Barriers (C)

Stage 3: DEVELOP

3.4. Human Centred Design Analysis

The process of identifying potential challenges has allowed the designer to eliminate any loop holes with the application.

Barrier 3 (orange) mentioned in Figure 67: Potential Product Barriers (A), shows that not all educational institutions may permit their students to utilise their mobile phones on premises because for health and safety reasons. By designing the application so that students are required to display the QR code generated at the dispenser may conflict with school policies. This issue has been tackled by introducing an alternative option in the form of cards. Each student will obtain a card that is connected to their app account, when the user places a request via the app they will receive a QR code on the account and the data will also be stored on their physical, portable card. This will enable the user to retrieve their products at a dispenser product without the need to scan their QR code on the smart phone. Each student card will have a permanent bar code. The school can obtain these cards (blank details) when purchasing a dispenser; however, it is the duty of schools to print the details on the card and distribute this to students as it is an optional additional product. See Figure 70: Initial ID Card CAD Model (A), Figure 71: Initial ID Card CAD Model (B), Figure 72: Final ID Card CAD Model (A), Figure 73: Final ID Card CAD Model (B) and Figure 70: ID Card CAD

Model Development, for development of card design.

Figure 68: Potential Product Barriers (B) suggests that the education of a user may be disrupted with the social feature of the application it is not limited. The most appropriate solution would be to allow the school admin account to set up a time when specific year groups categorised as sub accounts, would not be able to access the socials.

In Figure 69: Potential Product Barriers (C), a concern was who would be responsible for monitoring user activity and ensure that students remain safety. It was concluded that schools will only be alerted if there is a cyber incident involving their sub accounts. i.e student users.

» Users that are reported in the app will be closely monitored by professional moderators. If no issue is identified, in of a breach of terms and conditions breach with the user's activity, then the report will be dismissed.

» Users that share potentially harmful content will be flagged and the school alerted. The school will then be able to disable the student's account.



Stage 3: DEVELOP

3.4. Human Centred Design Analysis

INITIAL CARD PRODUCT (FRONT) – CAD RENDERING

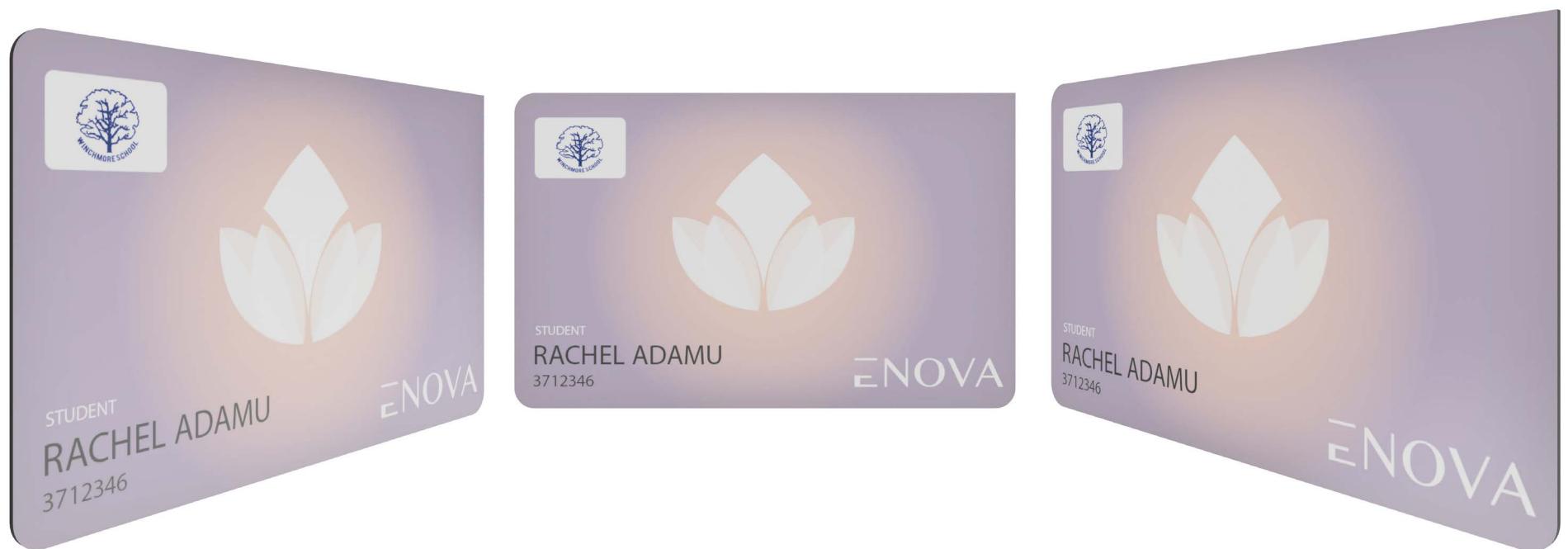


Figure 70: Initial ID Card CAD Model (A)



Stage 3: DEVELOP

3.4. Human Centred Design Analysis

INITIAL CARD PRODUCT (BACK) – CAD RENDERING



Figure 71: Initial ID Card CAD Model (B)

Stage 3: DEVELOP

3.4. Human Centred Design Analysis

FINAL CARD PRODUCT (FRONT) – CAD RENDERING

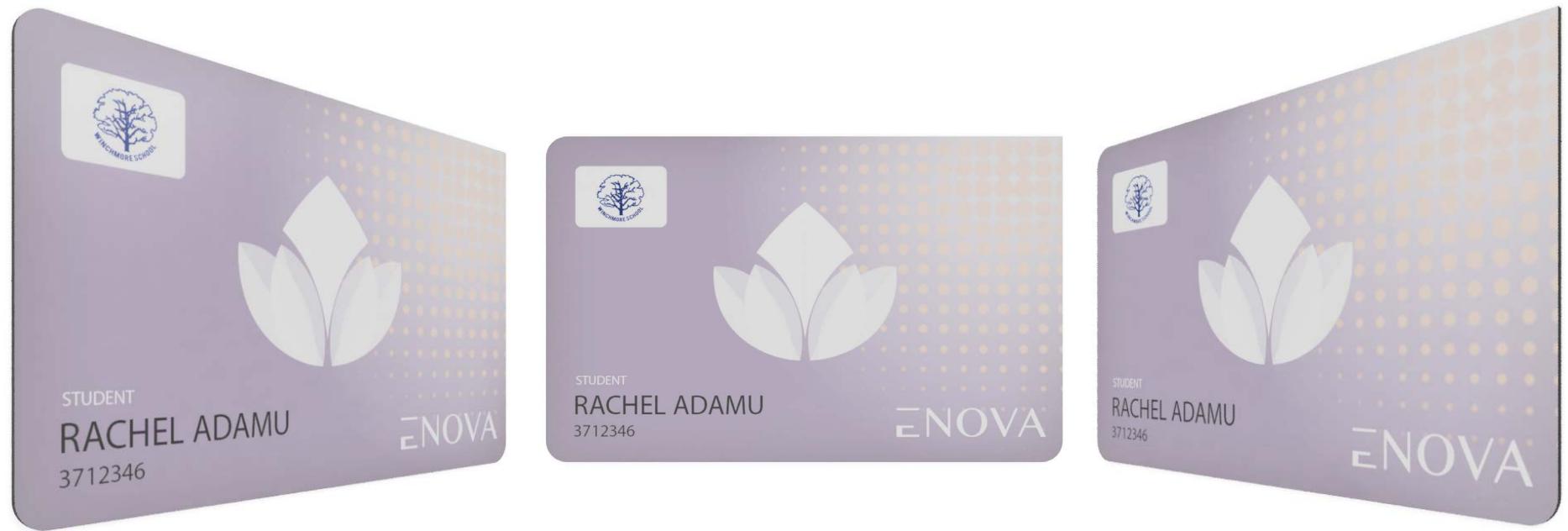


Figure 72: Final ID Card CAD Model (A)



Stage 3: DEVELOP

3.4. Human Centred Design Analysis

FINAL CARD PRODUCT (BACK) – CAD RENDERING



Figure 73: Final ID Card CAD Model (B)

Stage 3: DEVELOP

3.4. Human Centred Design Analysis

CARD PRODUCT DEVELOPMENT – CAD RENDERING

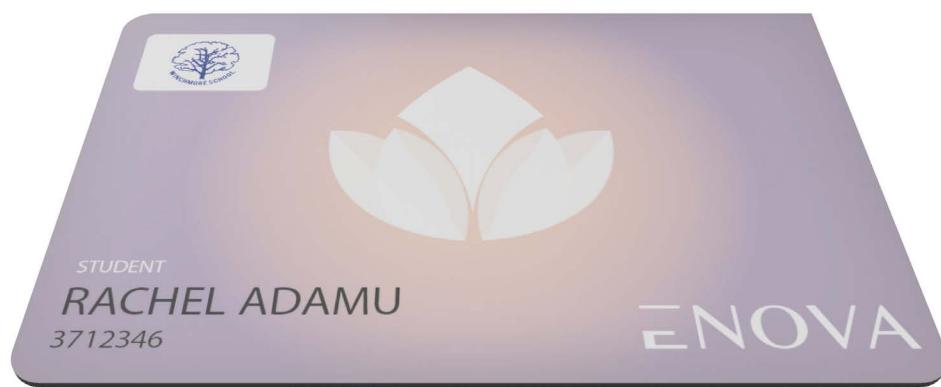


Figure 74: ID Card CAD Model Development





STAGE 4

DELIVER

Stage 4: DELIVER

4.1. Design Proposal

4.1. Overview

The proposal is to introduce a multi product concept to state funded Secondary and Primary schools in England. Designed to help solve the challenge of period poverty in more economically developed countries, the combination of ENOVA products will educate young people with its application, reduce the number of absent students as a result of their inability to afford sanitary products and ensure an equal opportunity with a washroom cubicle IoT menstrual care dispenser to allow students to obtain products anonymously and provide users with a sustainable customisable case to organise and store their products.

The Enova application has been designed to allow registered educational institutions to easily alter their students accounts to suit their policies. It has two primary elements which include the request function which allows students to select from numerous menstrual collection method products; provided by the Phs Group company, a scheme introduced by the Department for Education in 2020 to provide free period products for all learners who need them in schools and colleges in England. In the request function, users will have the opportunity to vote on the products that have not included in the

dispenser to help schools better understand and decide what students want, and promote inclusiveness. In this section, the data of student requests will be stored in a smart card given to pupils or digitally in the form of Quick Responsive codes accessible via the ENOVA app and will renew by 00:00hrs of that same day. Both the card and QR code can then be scanned at any dispenser registered with the school to give out the desired products.

Within the ENOVA app, students can also access the social aspect to discuss, share stories and ideas with other students registered to the app. This will aid in de-stigmatising the topic of menstruation amongst young people and educate by creating a community of people that are of similar age and experience and allowing them to build a connection and feel comfortable. The social will be monitored by professional moderators trained to work and care for minors and the most vulnerable to prevent misconduct and support the users.

User will have the opportunity to personalise and purchase their ENOVA Case, a storage designed to integrate well with items typically found in a student's backpack through the application. Students can choose from a selection of published book jackets, categorised by Key Stage groups recommendation.



Stage 4: DELIVER

4.1. Design Proposal

There is a purchasable case subscription plan to offering additional benefits such as free shipping, exclusive case and book jacket designs and better deals. The ENOVA Case will provide students with a unique storage space where they can safely and confidently carry their products.

4.1.1. Product Language and Semantics

Shape and Form - ENOVA Menstrual Care Dispenser

For this product, the designer opted for a sleek and modern design with rounded corners. The human brain is naturally attracted to circles because rounded, more organic shapes require less cognitive effort to visually process compared to sharp edged shapes. See Figure 75: Visual Perception of Rounded Corners.

It was crucial to use shapes that are capable of evoking friendlier, more approachable vibes to minimise the risk of embarrassment felt by learners that wish to access the dispenser, thus it must be inviting. Additionally, the curvature of the shape makes the product more hygienic and easier to maintain clean as it allows the human arm to perform the natural curve

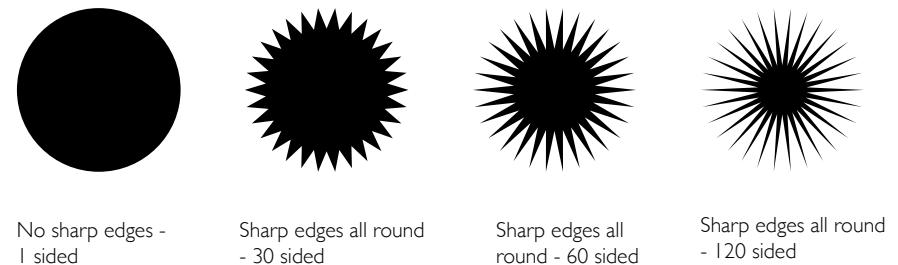


Figure 75: Visual Perception of Rounded Corners

motion compared to zero radius shapes. It also tends to trap less dust particles since it can not easily set. For this reason the rectangle design of the dispenser will feature three rounded corners and a single zero radius top right corner, also imitating the buttons in the ENOVA application to create a similarity throughout the multi products and inform users that there is a link between.

Colour - ENOVA Menstrual Care Dispenser

The colours have been selected based on psychological factors, social trends that influence human behaviour and perception and user demographics. This particular shade of violet - Victorian violet pastel (#b8adc1), is mainly favored by women and is often associated with femininity and female characteristics.



Stage 4: DELIVER

4.1. Design Proposal

Both blue and violet evoke the feelings of intelligence and confidence. This mixed colour was historically connected to royalty, power and spirituality. It was rarely used by artists before the 1860s until the rise of the French Impressionists and began to be widely used for everyday products such as toys, clothing and vehicles, and is now associated with modern culture and life. The colour blue was as it is widely used in health care related products to convey cleanliness and professionalism. It provokes a sense of tranquility, trust and is connected to naturality as it is commonly seen in the natural environment. Pastel peach is the third and primary choice of colour to be utilised on the dispenser. It makes for a subtle background that complements the other colours. This colour has no strong feelings of love or lust, but rather warmth and friendliness, and the expression of modesty and innocence. Experts state the white is a positive colour that is linked with purity, goodness and softness. For this reason, white is predominantly used in infant products.

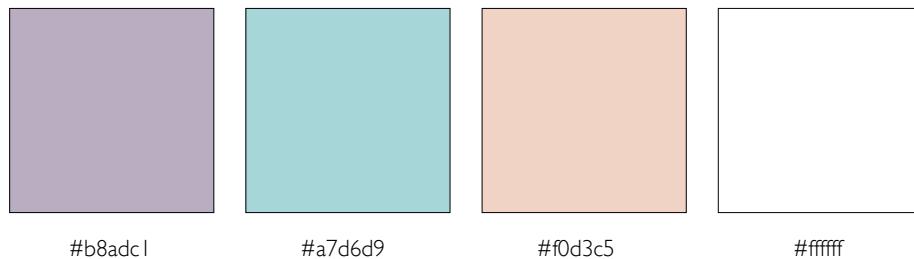


Figure 76: Dispenser Colour Scheme

Material - ENOVA Menstrual Care Dispenser

Type 304 stainless steel was selected as the most ideal material for the external shell of the dispenser due to its properties. This type of austenitic stainless steel has a minimum of 18% chromium with a maximum of 20% and 8% to 10.5% nickel by weight, combined with other major alloying elements including manganese, silicon, and carbon. Usually, the ultimate tensile strength of grade 304 is 73,200 pounds per square inch (psi) and an ultimate yield strength of 31,200 pounds per square inch (psi). The high amounts of nickel and chromium, as well as its affordability make grade 304 a popular material, offering excellent resistance to both corrosion and rust. Its robust and durable properties are appropriate for the setting that the dispenser is intended to be used in as it can protect against student vandalism. See Appendix 5.3.3: Product Design Specification - 13. Materials.

With a melting point of 1450 °C, it is possible to powder coat this type of stainless steel since it is able to withstand the high temperatures when baking and electrostatic charge necessary to bind the paint during the curing process. Powder coating is a cost effective method of painting alloys.

Stage 4: DELIVER

4.1. Design Proposal

Interaction - ENOVA Menstrual Care Dispenser

While developing the dispenser, the designer analysed the anthropometric data of the target user and other potential users and the challenges that some students face when menstruating, particularly those that struggle financially. The aim of the dispenser is to provide anonymity for students that do not feel comfortable requesting for period products from a designated staff member; a safe storage unit capable of dispensing the desired products at point of need and with ease. The user interaction with the dispenser occurs once they have put in an order through the application and received a QR code or confirmation that the request has been stored onto the student's card to scan, up until the user has obtained the products. The convenience of having a dispenser in the right location when most needed and the peace of mind that students will experience is the best user value. The anxiety and fear of not having a means to care for the body and manage periods safely should not be an issue that students undergo, especially in a place where education should be the main focus.



Stage 4: DELIVER

4.1. Design Proposal

ENOVA DISPENSER – MOOD BOARD



Stage 4: DELIVER

4.1. Design Proposal

Shape and Form - ENOVA Case

The designer has chosen a similar shape for this product to show that it is part of the ENOVA multi product concept. Since the book shaped case requires at least two non radius corners in order for it to function, adding curved edges on three corners is unachievable. The product has been designed for a typical student backpack to easily accommodate and blend itself with other items found within. By reducing the Case to A5 Size, it will not only make the product more portable, but also allows younger users with smaller hands to grip the product with ease.

Colour - ENOVA Case

Before an order for the Case is completed, the application will offer a selection of case jacket covers from published books for the user to select. The colour of the printed jackets will depend on the individual book to allow students to personalise their ENOVA Case. The use of published books will make the product appear to be a reading book so as to eliminate embarrassment when transporting it into the washroom.

Material - ENOVA Case

The ENOVA Case will be comprised of two layers to minimise the number of materials used and make it easily recyclable at the end of life. Layer 1 – the external case jacket, is made from faux leather fabric, more specifically constructed with a soft ribbed polyester back and a Polyvinyl Chloride (PVC) face, that will have the graphic print of published books. Made from durable polyester fibers, these are coated with vinyl, made from polyvinyl chloride (PVC) and plasticizers (phthalic acid). The leatherette will have a slight matte appearance with a textured leather feel. Layer 1 will also have a magnetic clasp covered in the same material as the exterior to properly secure the Case closed and prevent any unintentional spillage of contents. Every Case jacket will have a cutout of a square where the ENOVA brand printed on Layer 2, will be visible. See Figure 80: Composition of ENOVA Case.

Layer 2, the interior case that will hold the period products, is sustainable and detachable from layer 1. The material used for this section is rigid paperboard as it is sustainable, durable and less expensive than regular wood. Although the paperboard is a strong material, during the manufacturing process, it is possible to bend the board to create the rectangle side. To attach the two



Stage 4: DELIVER

4.1. Design Proposal

layers, velcro sheets will be fused with the interior back, front and side or layer 1, and exterior back, front and side of layer 2 (loop and hole). The aim of the Case design is to imitate the appearance of a book and by making it possible for the user to remove the jacket, users would be able to change and keep it for the same duration that it would take the average person to read the "book" and not raise questions from other people.

Layer 3 is the most interior as it will be attached onto layer 2. This Border will be made from black High Density Polyethylene (HDPE) foam as it is light in weight and rigid unlike styrofoam that breaks when bent. It has closed cells which means that it will not absorb liquids, making the material the most popular for packaging. The durability of HDPE foam is ideal as it will protect the contents and case from damage caused by other items whilst the student transports the Case in a backpack. See Figure 80: Composition of ENOVA Case Sketch.

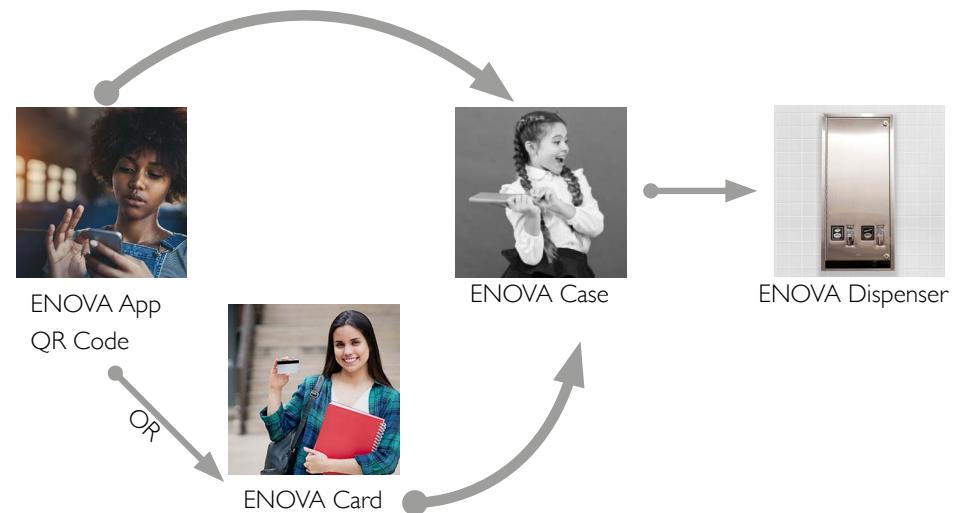


Figure 78: Enova Multi Product Associated Images

The above Figure 78: Enova Multi Product Associated Images, demonstrates the paths that the student can follow when using the products.

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4.1. Design Proposal

ENOVA CASE – MOOD BOARD

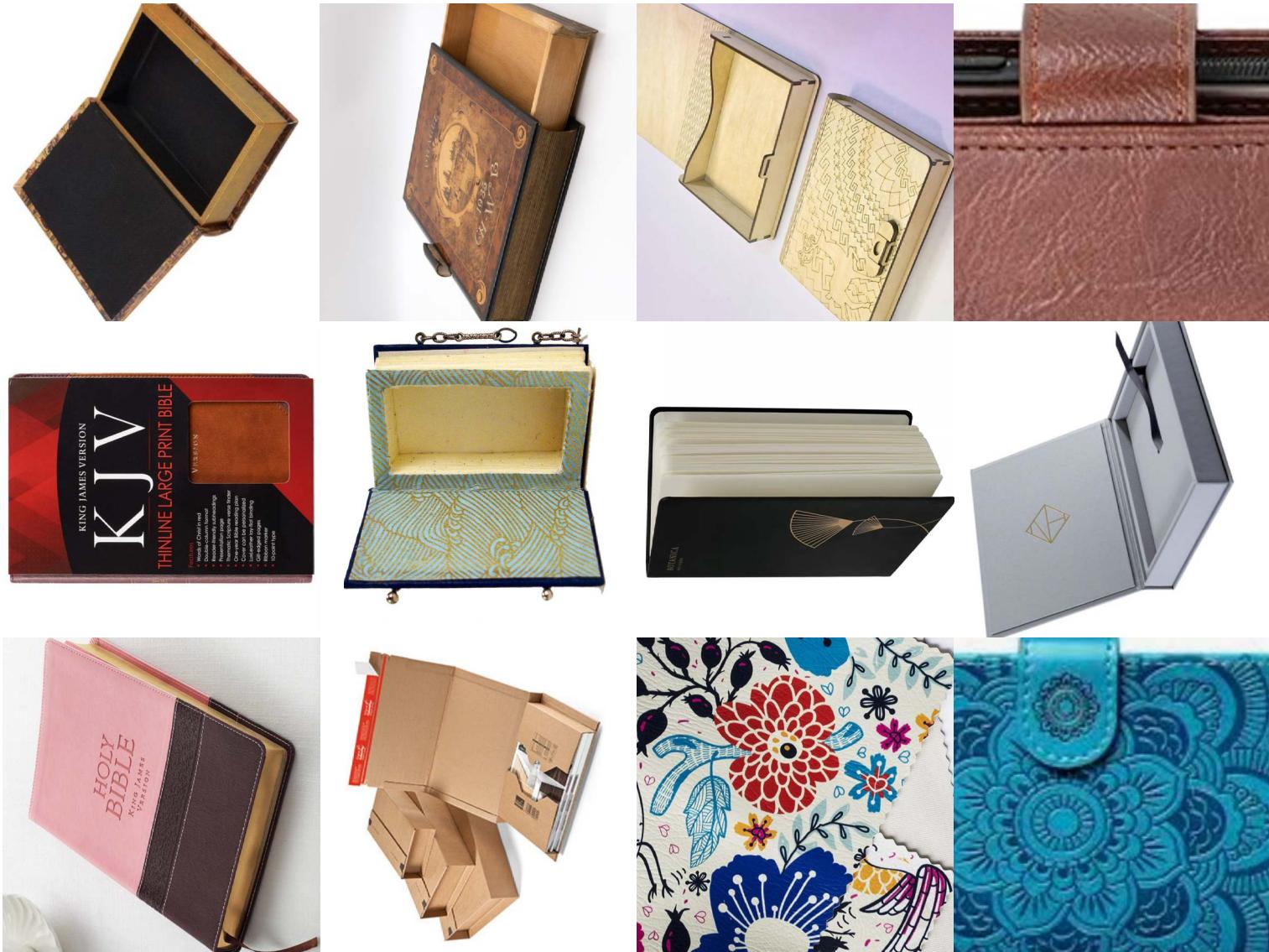


Figure 79: Case Mood Board

Stage 4: DELIVER

4.1. Design Proposal

ENOVA CASE COMPOSITION – EXPLODED SKETCH

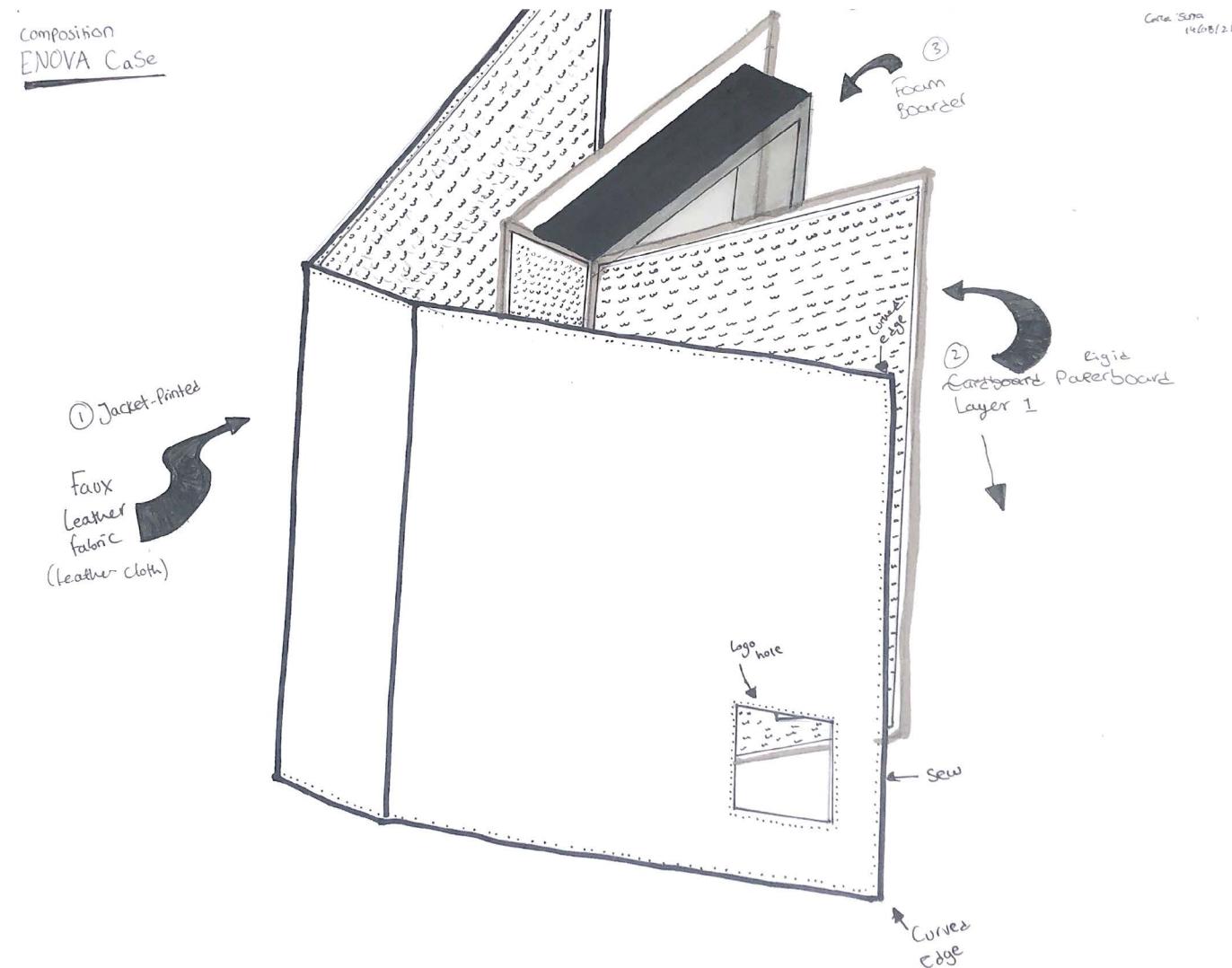


Figure 80: Composition of ENOVA Case Sketch

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4.1. Design Proposal

4.1.2. Material Selection

The materials have been selected based on various contributing aspects including durability, weight and aesthetics.

MATERIAL – ENOVA MENSTRUAL CARE DISPENSER



Grade 304L
- Stainless Steel



HDPE Foam



Steel Alloy



Grade A413
- Aluminium Alloy

Figure 81: ENOVA Dispenser Materials



Stage 4: DELIVER

4.1. Design Proposal

Grade 304L Stainless Steel Application , Advantages and Disadvantages-

This material will be used for the body of the dispenser.

Pros:

- » Excellent corrosion resistance.
- » Excellent hot and cold forming process and performance.
- » Good weldability.
- » Has a long shelf life.
- » High Strength.

Cons:

- » Poor cutting performance.
- » Prone to damage in saline environments.

Perspex Clear Acrylic Application, Advantages and Disadvantages -

This material will be used to cover the dispenser components that will be visible to the user, including the scanner and Liquid Crystal Display module.

Pros:

- » 30x stronger than glass.
- » 2x lighter than glass.
- » It is more shatter-resistant and processing is easier in comparison to glass.
- » Clearer than glass.
- » A safer option compared to glass.
- » Less light reflective than glass.

Cons:

- » More susceptible to scratching.
- » It is not heat-resistant.



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4.1. Design Proposal

- » Can be more expensive than glass

Steel Alloy Application, Advantages and Disadvantages -

The the motorised coil spring mechanism that will push the products out of the dispenser will be made from mild steel with a black oxide finish.

Pros:

- » High impact strength.
- » Good ductility.
- » Good weldability.

Cons:

- » Has a relatively low tensile strength compared to other steels.

Grade A413 Aluminium Alloy Application, Advantages and Disadvantages -

The Tray in which the contents will be placed in and the coil attached to will be made from grade A413 Aluminium alloy. The the aluminium that will be melted in a furnace and poured into a mold and go through a bending process to create the tray form.

Pros:

- » Excellent corrosion resistance.
- » Good formability/ castability.
- » In general, Aluminum can be easily colored.
- » It is a lightweight material, weighing about a third of what steel does.
- » Inexpensive to transport.
- » In comparisson to brass and stainless steel, Aluminium is much more economical.
- » It is strong, with the highest strength to weight ratio than any metal.
- » Conducts electricity better than copper.
- » Aluminium is non-magnetic, good option for applications that needs to avoid this.
- » It is 100% recyclable and will not lose its natural characteristics.
- » It has excellent pressure tightness, making it ideal for hydraulic cylinders.



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4.1. Design Proposal

Cons:

- » Has machinability.
- » Softer than other popular cast alloys
- » Requires special processes to be welded.
- » The aluminum oxide coating that forms upon it is abrasive to tooling.
- » Costs more than steel.

MATERIAL - ENOVA CASE



Velcro (hook and loop fasteners)
-Black



Faux Leather Fabric



Greyboard



Grade 5
-Ceramic magnet Discs

Figure 82: ENOVA Case Materials



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4.1. Design Proposal

For ENOVA Case material application of Velcro (hook and loop fasteners), faux leather and paperboard uses, refer back to section Material - ENOVA Case and Figure 80: Composition of ENOVA Case Sketch.

Velcro (hook and loop fastening) - Black Advantages and Disadvantages -

Pros:

- » Great bonding strength.
- » Easily attaches to fabrics
- » Widely used.
- » A variety of type.
- »

Cons:

- » Hooks can often catch lint and other stray particles, reducing material bonding.
- » Hooks can easily get caught on other materials and cause irreversible

damage.

- » Prolonged use may wear out (break) the loops.
- » Hook and loop make noise when detaching.

Faux Leather Fabric Advantages and Disadvantages -

Pros:

- » Faux leather costs less than real leather.
- » Often it is easier to clean.
- » Resistant against harsh chemicals.
- » Water-resistant because of its topcoat.
- » Faux leather does retain colour if exposed to sunlight for a long period of time.
- » Animal-friendly, making it more appealing to individuals that oppose use of animal products.

Cons:

- » This type of material is not as durable as authentic leather. Topcoats crack and expose the fabric underneath after years of use.



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4.1. Design Proposal

- » Faux leather is prone to punctures and tearing.
- » Faux leather will stretch more than real leather.
- » This material will not develop a patina as it ages, contrary to real leather.

Heavy Greyboard Advantages and Disadvantages -

Pros:

- » Made from 100% recycled fibres.
- » light in weight.
- » Good for screen printing.
- » Good strength and rigid.

Cons:

- » Edges may fray.
- » Not as cheap as cardboard or cardboard paper material.

Grade 5 Ceramic Magnet Disc Application , Advantages and Disadvantages-

To prevent the case from opening when not in use, the designer will use a grade 5 ceramic (Ferrite) magnet placed inside the tab. Initially, another type of magnet known as grade n35 Neodymium (NdFeB), however this would not be appropriate as it is relatively more expensive, with more processes to make them corrosion resistant. On the top layer, there will be a ubber Steel sheet receptive to the magnet.

Pros:

- » Excellent corrosion resistance.
- » Easy to magnetize.
- » Generally do not require extra coatings for corrosion protection.
- » Stronger than natural magnets.
- » These are relatively inexpensive.



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4.1. Design Proposal

Cons:

- » Extremely brittle and easily broken.
- » They become demagnetized if they are exposed to temperatures over 480 degrees celsius 248.889.

4.1.3. Component Selection

The following components will be necessary for the ENOVA dispenser prototype and will be purchased from various external manufacturers.

LCD1602 module

- » A blue background white text LCD1602 module (with pin header) as seen in Figure 83: Arduino 1602 LCD Module, will be used for the dispenser. It is purchasable from Amazon.co.uk.

- » Display: 4 lines x 20 characters
- » Backlight: Blue with white character color
- » LCD controller: HD44780



Figure 83: Arduino 1602 LCD Module

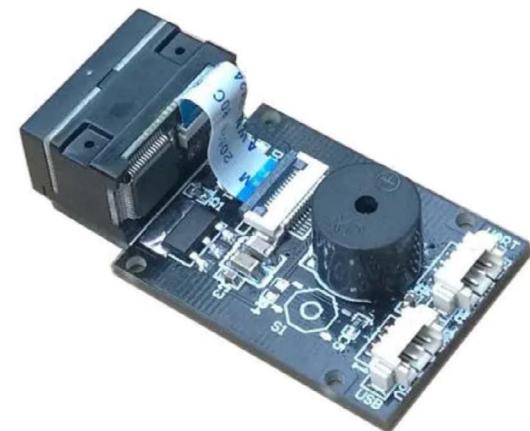


Figure 84: GM65 barcode scanner Module

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4.1. Design Proposal

- » Pin Definition: VCC/ GND/SDL and SCA
- » Contrast Adjust: Potentiometer
- » Backlight Adjust: Jumper
- » Default Address: 0x27, 0x3F
- » Working Voltage: 5V

GM65 barcode scanner module

- » The GM65 barcode scanner will be able to scan QR Codes and barcodes.
- » The built-in image scanning technology can recognise a two-dimensional code or a one-dimensional bar code in all directions at a max distance of 20cm.
- » Capable of identifying barcodes or on-screen display labels.
- » Current: 120mA during scanning / 30mA during standby
- » Interface: USB
- » Working humidity: 10%~80%
- » The working temperature is 0 to 50 degrees celsius.
- » Storage temperature is 40 to 70 degrees celsius.

The manufacturer of this component Semoic. See Figure 76: GM65 barcode scanner Module.



Figure 85: Servo Motor

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4.1. Design Proposal

Gear Motor

This 24vdc vending machine Servo motor will be attached to the tray coil to enable rotation and movement of items between the spacings. This component may be bought from PowerJackMotion.co.uk.

- » Output torque max is more than 40kg.f.cm (Kilogram-force per square centimeter)
- » The output speed with no load is 24 times/minute RPM
- » The output steering direction of the motor is CW/CCW
- » From a 30cm distance, the component will produce \leq 75 dB (A).This is similar to the noise inside car at 60 mph.
- » The no-load current equals 0.28A
- » Out put poswer is 4.5w.
- » Type is Servo Motor
- » Voltage(V) is DC24
- » DC is 0.8A
- » Gearbox ratio is 1:400 (0.54s/circle)

See Figure 85: Servo Motor.

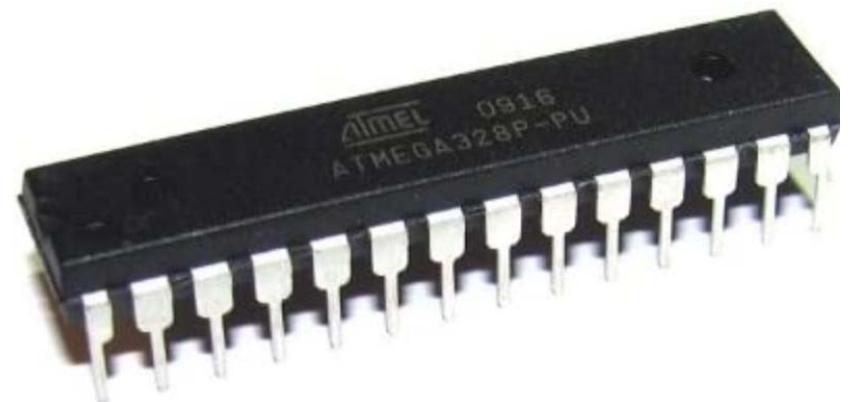


Figure 86: ATMega328P-PU Atmel Microcontroller

Stage 4: DELIVER

4.1. Design Proposal

ATMega328P-PU Atmel Microcontroller

Steel Alloy Tray Spiral Coil

This stainless steel wire will be bent to form a spiral coil for the servo motor.

This will allow users to place period care products between the spacing. See

Figure 87: Steel Alloy Tray Spiral Coil.

- » The load type is compression
- » The shape is coil



Figure 87: Steel Alloy Tray Spiral Coil



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4.1. Design Proposal

4.1.4. Instructions for Use

A single manual will be supplied with the purchase of the ENOVA dispenser that will be separated into sections. The first part of the booklet will be the instruction manual for the user, whilst the second will be a service manual for the service engineers (handyman).

First Part (User Guide)

This section will inform the user step by step how to setup and operate the dispenser, how the user can properly maintain the cleanliness of the product, safety considerations.

Second Part (Engineers)

The second section will contain step by step information on how to and where to wall mount the ENOVA dispenser, which tools are necessary, how to perform electrical repairs, the parts and components provided.

To make the manual user friendly, diagrams with the original 3D technical drawings will be included. A downloadable link will be included to a digital pdf format of the manual in the case that the physical copy is lost or damaged. Refer to Appendix 5.3.3. PDS (Product Design Specification) – 29. Documentation.

4.1.5. Packaging Design

Corrugated cardboard will be used for as packaging material for the boxes. Boxes will have a max capacity for six dispensers, each item divided and padded with expanded polystyrene (EPS) foam to prevent damage in transportation. A single product will be shipped in individual insulated cardboard boxes, however batch purchases, will be placed in additional master carton. See Appendix 5.3.3. PDS (Product Design Specification) – 8. Packing.

The dimensions of the packaging note are, 134mm, 112mm and 0.095mm. (L,H,W). See Figure 92: Thank You Note Back and Figure 93: Thank You Note Back.



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4.1. Design Proposal

TYPES OF PACKAGING – CAD



Figure 88: CAD Batch Shipment Box



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4.1. Design Proposal

BATCH PACKAGING – CROSS SECTION

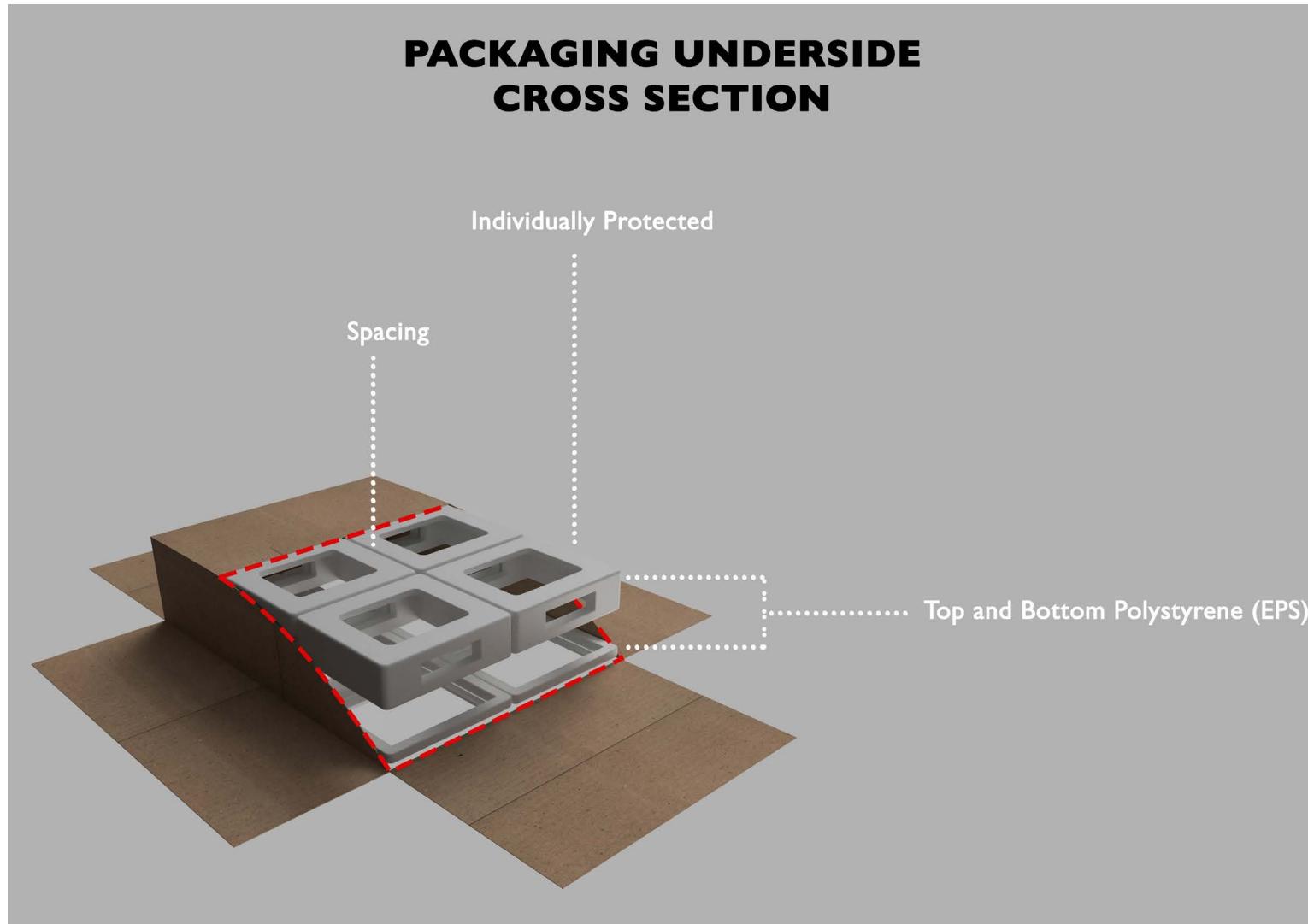


Figure 89 : CAD Batch Shipment Box Diagram



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4.1. Design Proposal

EXTERNAL PACKAGING INFORMATION



Figure 90 : CAD Exterior This Way Up Info



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4.1. Design Proposal

DISPENSER PACKAGING – ENGINEERING DRAWING

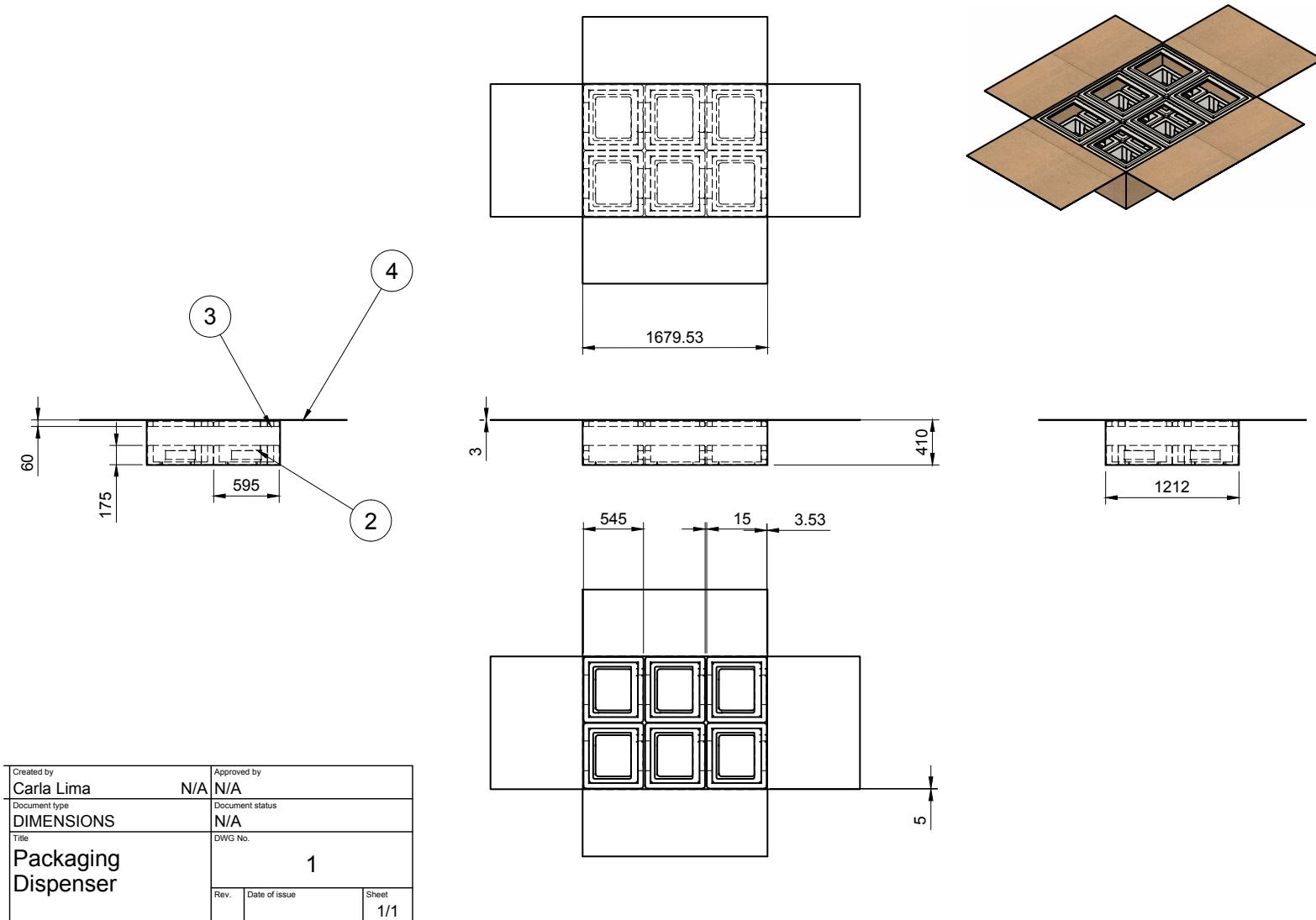


Figure 91 : Packaging Corrugated Cardboard and EPS

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4.1. Design Proposal

ADDITIONAL PACKAGING DOCUMENTS

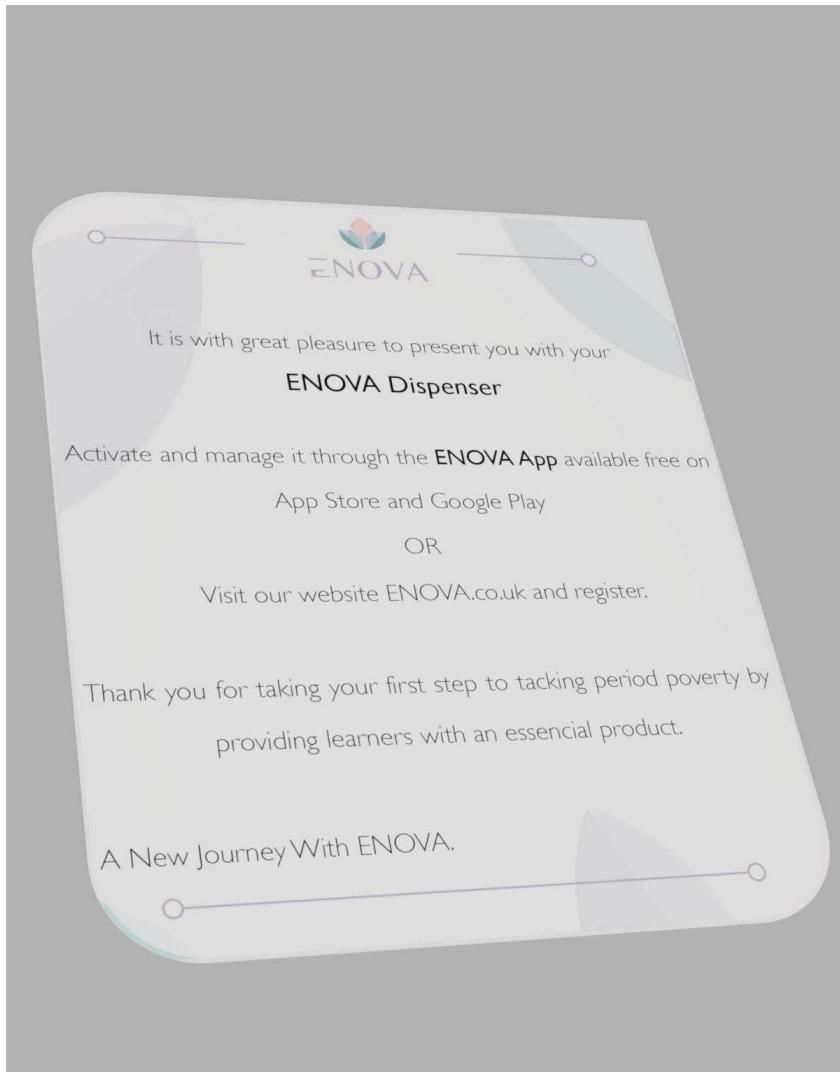


Figure 92: Thank You Note Front

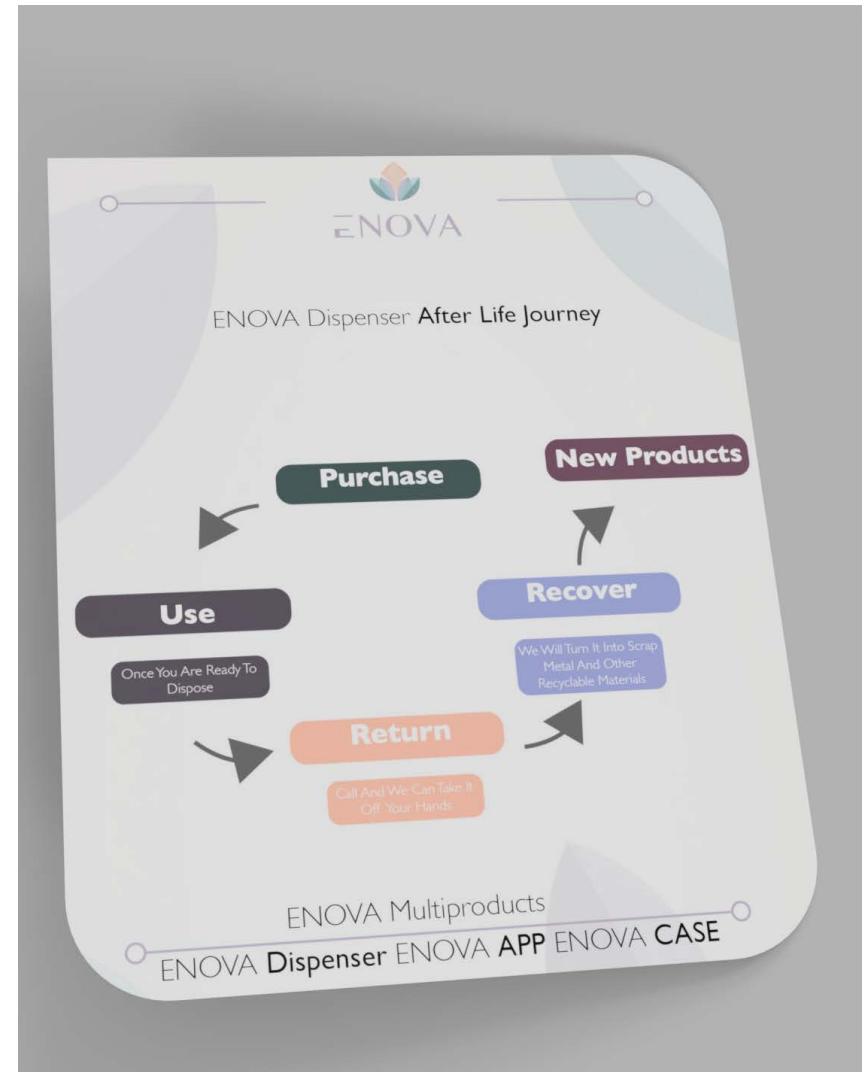


Figure 93: Thank You Note Back

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4.1. Design Proposal

Each box will contain a card that informs the user how the product will be recycled, after its shelf life. This will make the user understand that product will not participate in a linear economy, but rather strives to make the dispenser as recyclable as possible.

A card will also be provided to advertise the multiproducts including ENOVA dispenser, ENOVA app and ENOVA Case. The graphics will be visually pleasing with illustrations to catch the users attention.

4.1.6. Branding

The final ENOVA brand has gone through many processes to achieve the current design. The designer conducted research into brands and companies that specialise in similar products, user feedback has been used to improve proposed designs, brainstorm and SCAMPER technique.

Initially, DORHER.VITA had been selected because it had a more meaningful origin, unique and could not be labelled as a copycat brand. Figure 94: Branding Mindmap, shows the brainstorm brand ideation process.

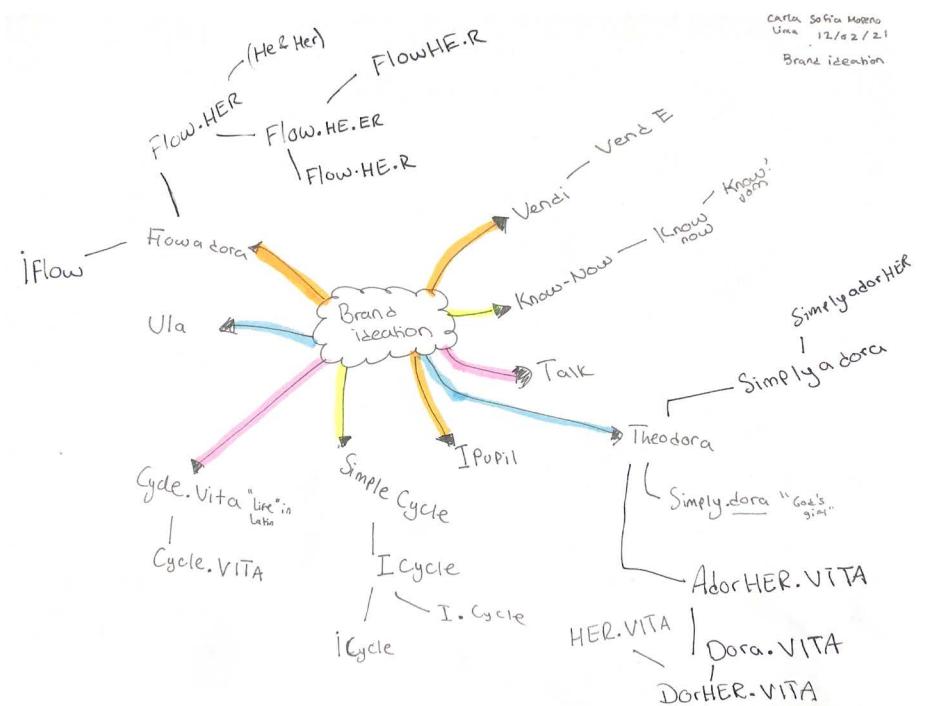


Figure 94: Branding Mindmap

Once the brand was established, the process to generate a logo that compliments the name was carried out. In Figure 95: Ideation of Logo Designs, a variety of potential designs has been conjured, some with slight variations and others completely differing from the other.

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4.1. Design Proposal

BRAND LOGO IDEATION – SKETCHES

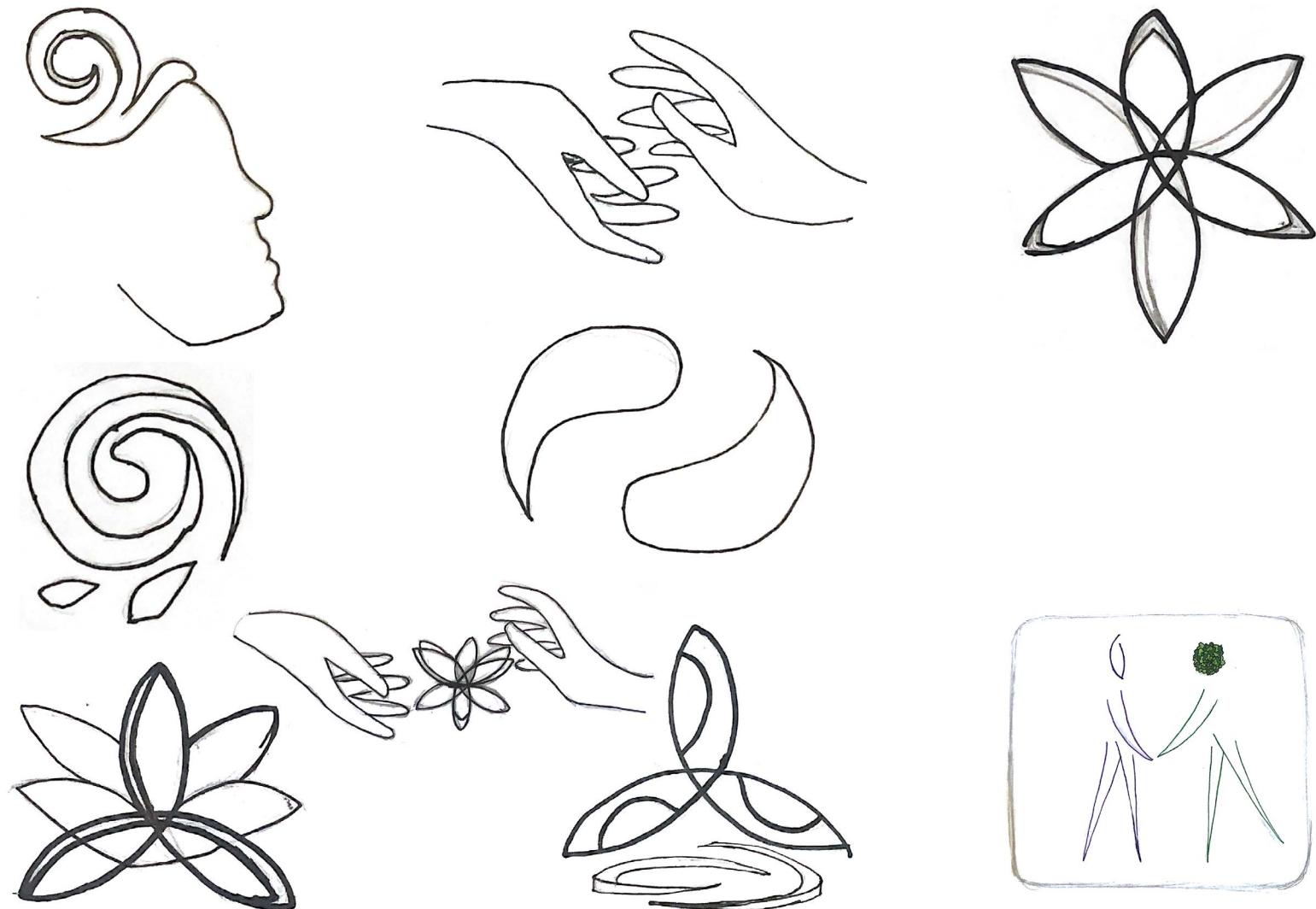


Figure 95: Ideation of Logo Designs



Stage 4: DELIVER

4.1. Design Proposal

BRAND LOGO DEVELOPMENT– DIGITAL DESIGN

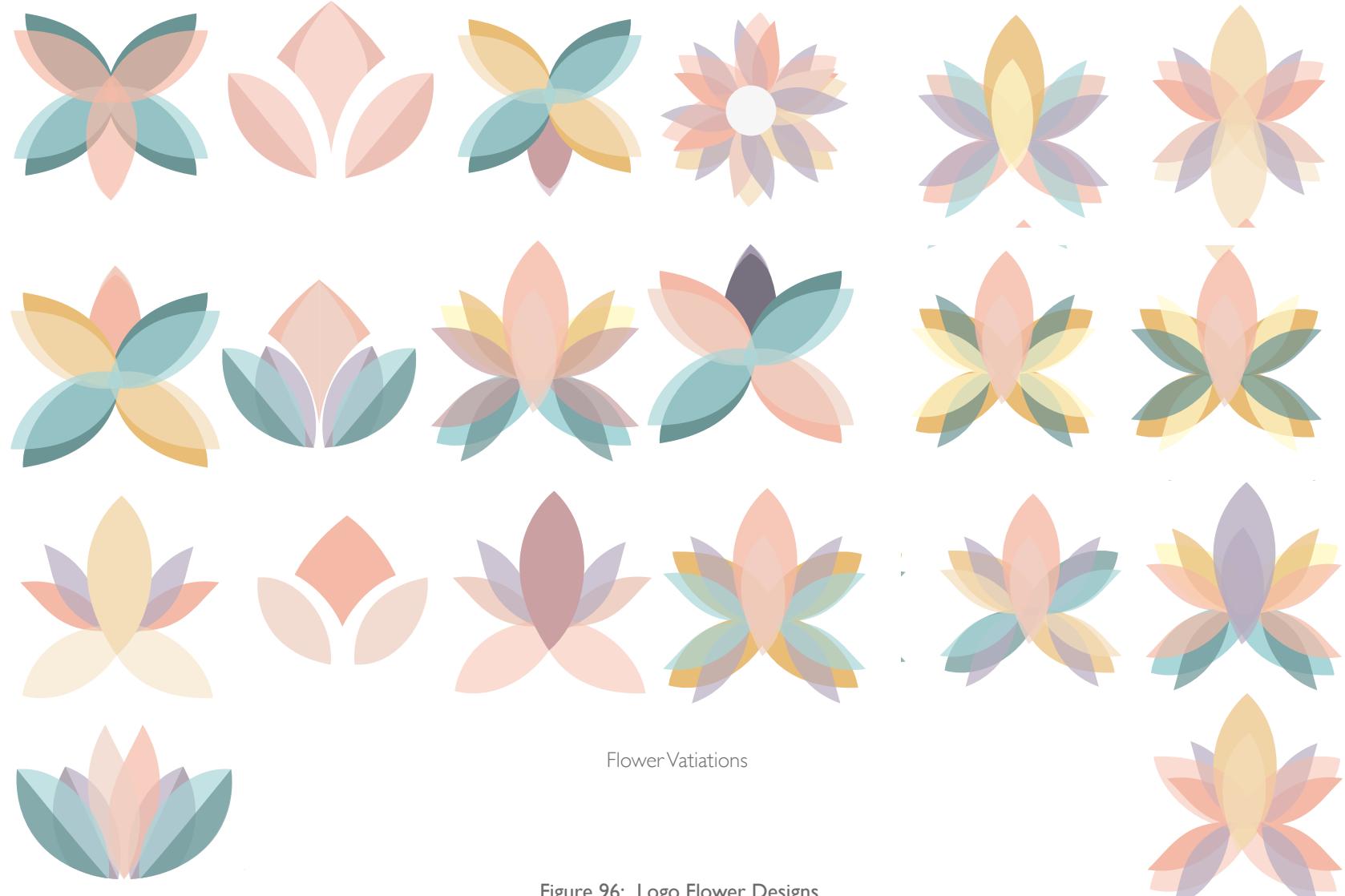


Figure 96: Logo Flower Designs

Stage 4: DELIVER

4.1. Design Proposal

BRAND LOGO DEVELOPMENT– DIGITAL DESIGN



Figure 97: Logo Hand Designs



Stage 4: DELIVER

4.1. Design Proposal

The original logo design featured two light coral coloured hands. This was later changed as the two opposite hands gave a sense of closeness. To better convey the message of the concept, the logo features one hand symbolising the motion of giving. The choice of colour could not represent a single race so that users of various ethnicities could make a connection with the logo.

The dark pink colour was thus chosen. See Figure 97: Logo Hand Designs.

Why The Brand Name?

The feminine name Theodora or Dora, meaning: "gift of God". HER has been used to replace the "a" to indicated that the product is inclusive. The pronouns for male (HE) and female(HER) are within the word "HER".VITA, the latin word for "Life"

Why The Colours?

Soft pastel colours are typically used for feminine hygiene products i.e Period Products, as it creates a calm and welcoming feeling.

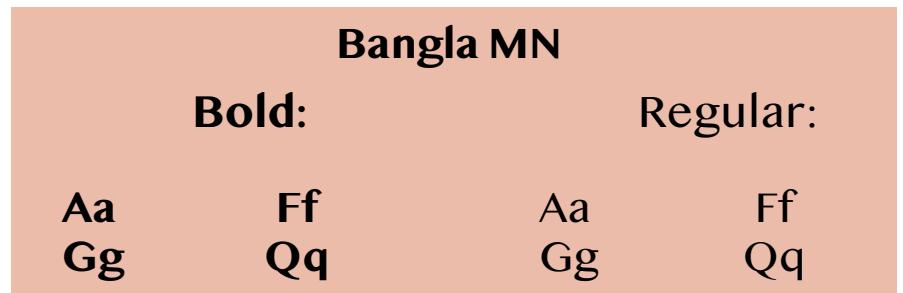


Figure 98: DORHER.VITA Fonts



Figure 99: Colour Palette Hex Codes

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4.1. Design Proposal

BRAND LOGO DEVELOPMENT– DIGITAL DESIGN



Figure 100: Brand For Further Development



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4.1. Design Proposal

Once the brand had been designed, a brand perception survey carried out with volunteers of different genders, age and design knowledge for feedback.

Improvement?

After receiving and analysing the results from the survey, it was clear that the "DORHER.VITA" brand name was not easily pronounced or as visually pleasing evident in Figure 102: Brand Perception Survey Response (A) and Figure 103: Brand Perception Survey Response (B), which meant that other possible designs would be explored. See Figure 101: Brand Development Process.

BRAND DEVELOPMENT – MINDMAP

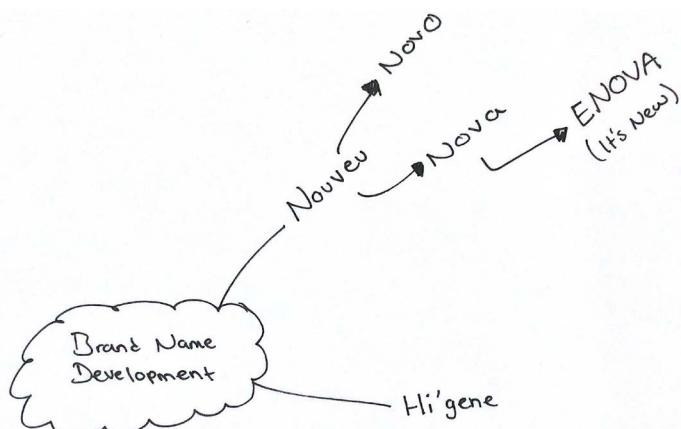


Figure 101: Brand Development Process

HOW DIFFICULT IS IT TO PRONOUNCE THE BRAND NAME?

10 responses

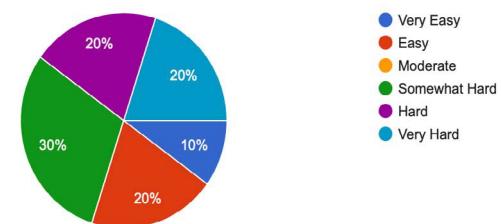


Figure 102: Brand Perception Survey Response (A)

ANY OTHER COMMENTS RELATING TO FIGURE 1: BRAND/LOGO

10 responses

- The colours compliment each other but could be a bit more lively.
- Try to add a different name perhaps because at the moment its a not easy to pronounce.
- Really nice colours. I like that the flower petals are a bit transparent
- Play around with it to see if you can improve the design
- I like the name but I would like to know why the was chosen. is there a meaning behind no
- The name would look better if it were to stand out more
- .
- I think that the hand takes the focus from the name because of its size and darker tone. if you were to remove it, it would look cleaner
- it looks good but instead of a flower, try making it more related to your products. Maybe it could be the female reproductive system instead, but with geometric shapes. Also try working on the spacing between the elements

Figure 103: Brand Perception Survey Response (B)

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4.1. Design Proposal

Why The Brand Name?

The "ENOVA" brand name was derived from the word Nouveau, meaning "new" in French – Also an artistic movement from the late 19th and early 20th Century.

The brand was later translated to the Portuguese word "novo", and "nova" (f). The words "É Nova" meaning "It's New", were combined to create the "ENOVA" brand. Offering users a new and unique product.

NAME DESIGN VARIATIONS

ENOVA
ENOVA
ENOVA
ENOVA
ENOVA
ENOVA
ENOVA

Figure 104: ENOVA Name Designs



Figure 105: ENOVA Fonts



Figure 106: ENOVA Colour Palette Hex Codes



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4.1. Design Proposal

Why The Design?

As the concept addresses the topic of menstruation, the brand logo was a good opportunity to it show this. The designer incorporated the female reproductive system into the design and transformed it in a way that is clean, modern and integrates well into the brand, but does contort much of its natural shape and remains recognisable.

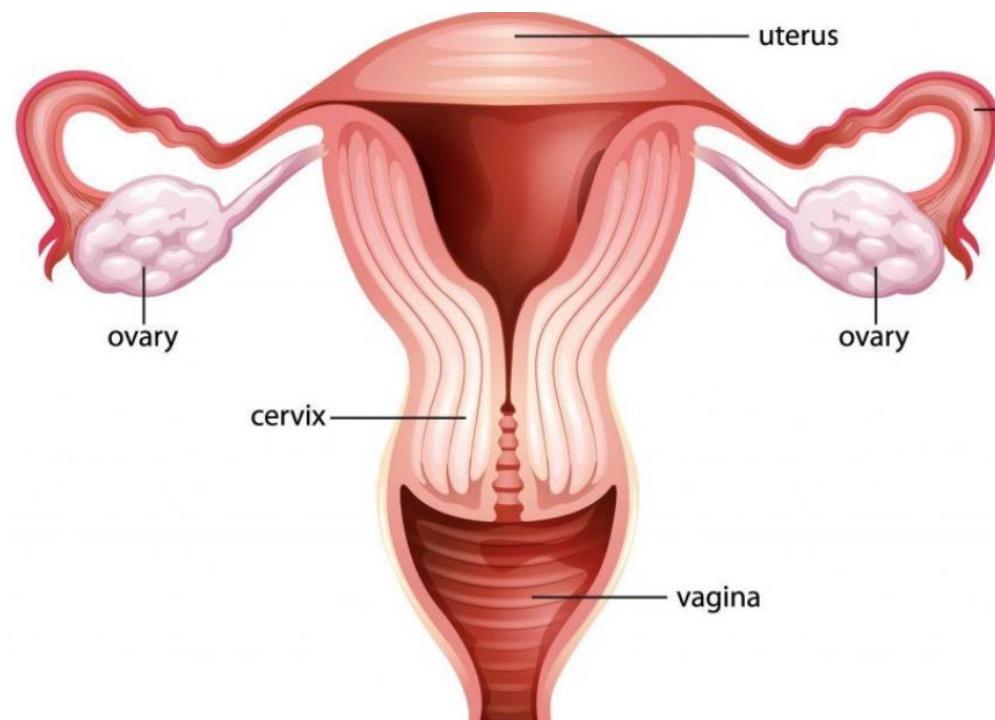


Figure 107: Female Reproductive System Diagram

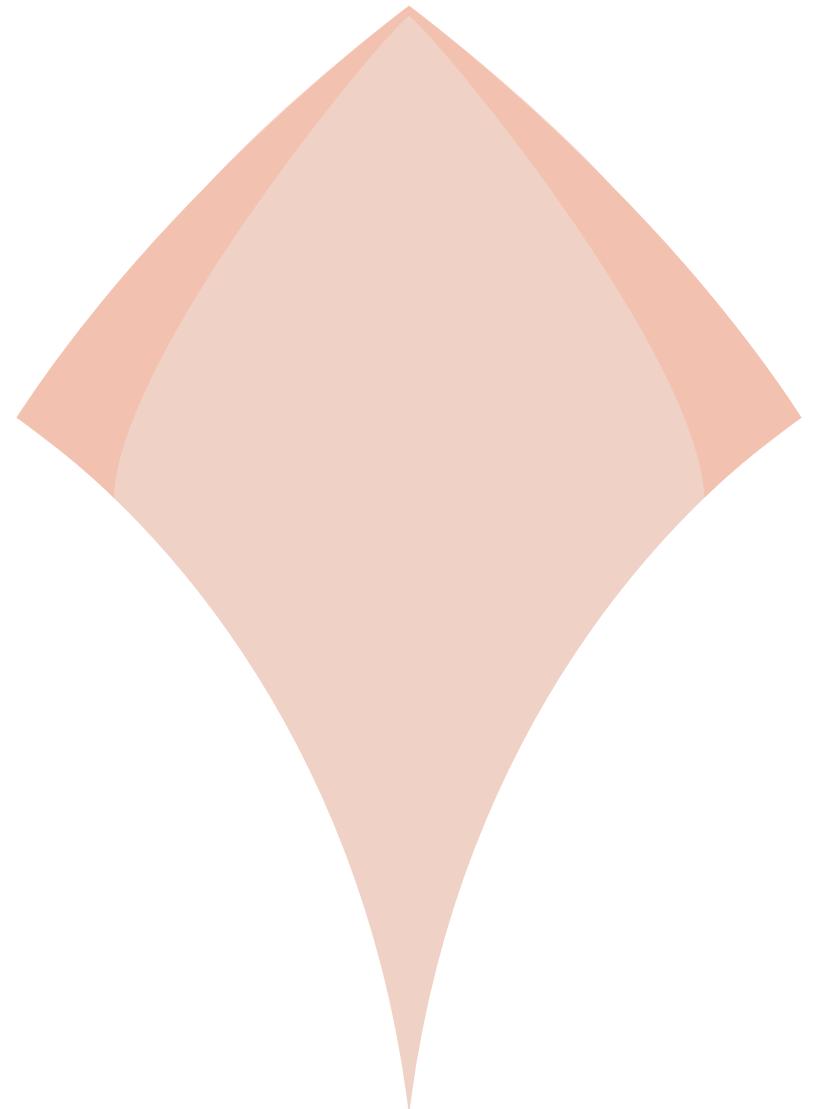


Figure 108: Female Reproductive In Brand Logo



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4.1. Design Proposal

FINAL ENOVA BRAND LOGO – DIGITAL DESIGN



Figure 109: Final Brand



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4.1. Design Proposal

Colour Psychology

Colours provoke feelings and emotions. They have the ability to influence how people view a brand and can even determine the success of a product. The study of the psychology of colours and relationships and meaning has aided the designer in building a strong, relatable brand. Although there are some colours with shared interpretations, the meaning can vary from person to person as different upbringing, gender, location and values are major contributors to the way we perceive the world around.

Red Colour Psychology

- » One of the most visible colours in the spectrum due to its long wavelength and a good choice to grab attention.
 - » Typically associated with danger and provokes the strongest negative emotions.
 - » Considered to be the warmest of all the colours.
 - » Also linked to other positive emotions such as passion and love.

E.g. of common application

- #### » Warning/danger signs



Figure 110: COUCH Health Psychology of Colour Wheel

- » Traffic lights
 - » Fire truck

According to (Cherry, 2020), research has shown that the colour red can cause elevated blood pressure, enhanced metabolism, increased heart rate and increased respiration rate (physical effects). This colour is also known to attract males and females for varying reasons.

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4.1. Design Proposal

Blue Colour Psychology

- » A cool colour that can trigger the feeling of stability, harmony, peace, calm and trust. A good choice to help project an image of security.
- » This colour can also be associated with cold and distant.
- » Regarded as the world's favorite colour— a worldwide survey revealed. (YouGov, 2015)
- » Blue is linked to the male sex in many societies.
- » Can also be linked to sadness, loneliness or aloofness.

E.g. Common Application

- » Healthcare equipment
- » Interior design of office and workplace
- » Natural products

According to colour psychology, blue can lower the pulse rate and body temperature. It also has the potential to increase productivity.

Green Colour Psychology

- » Another cool colour that is widely seen in natural environments. A good option to attract outdoor enthusiasts

- » “Restful, soothing, cheerful, and health-giving” — Paul Brunton
- » This colour can also be connected to positivity including growth, fertility, luck and safety.
- » Negative associations would be jealousy.
- » Green also evokes compassion and optimism.

E.g. Common Application

- » Products for the natural environment such as lawn mowers and landscaping tools.

Pastel Colours

Pastels are not as saturated as primary colours, its paleness emitting a sense of light, softness, and calmness. Pastel colours are typically affiliated with the warmer seasons; spring and summer as their soothing nature are contrast with the darker and moody colours widely used in the winter months.

The product is targeted at young girls, non binary and transgender boys and so it was important to select the appropriate colours that could favour these users. The final logo displays pastel colours throughout as these colours



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4.1. Design Proposal

are not as dramatic and easier to view. Additionally, pastels are associated with femininity as well as masculinity; when combined with specific colours it can be targeted at a specific sex. For example, dark navy or green pastels mainly seen in products for male users and pinks or yellow use for products intended for female users. Green, orange, purple and blue pastels have been used in the design of ENOVA brand.

Orange Pastel

A secondary colour that combines the psychological traits of red and yellow, creating a sense of optimism, enthusiasm, self confidence, freedom and new beginnings among many other positive feelings. This compliments the purpose of the product and the brand name origin.

Purple Colour

A royal color that is linked to power, spirituality and wisdom. This colour has been applied in the “ENOVA” word to show that the product promotes the empowerment of the user.

Blue Colour

This colour was selected to help communicate to the user the type of product that ENOVA provides; health care.

The designer aims to encourage the user to grow confident, enabling them to embrace and live in harmony with the natural part of a life; menstruation, and to eliminate the shame that some people may feel.

Website and Mobile App Accessibility Regulations

- Public Sector Bodies (Websites and Mobile Applications) (No. 2) Accessibility Regulations 2018

Accessibility in design is a crucial step protected by regulations because it means that the content and design is understandable and simple for everyone to use regardless of their impairment or need. It should not require people to adapt. According to the official UK government website, services must achieve WCAG 2.1 level AA in accessibility requirements.



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Contrast

Guideline 1.4 Distinguishable of (WCAG) 2.1, states that the minimum contrast ratio requirement should be at least 4.5:1. Text that is part of a logo or brand name has no contrast requirement. The Webaim online tool was used to test the contrast ratio presented as the colour scheme for the application, concluding that all but one did not pass the WCAG AA or WCAG AAA accessibility requirement. Presented below:

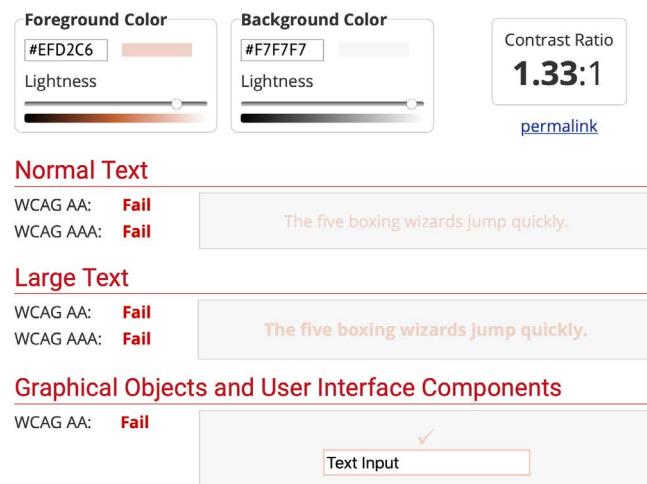


Figure 111: Webaim Contrast Ratio for # EFD2C6

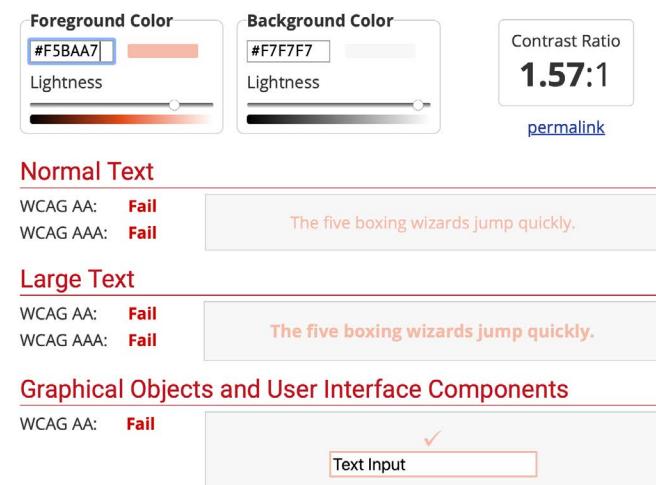


Figure 112: Webaim Contrast Ratio for # F5BAA7

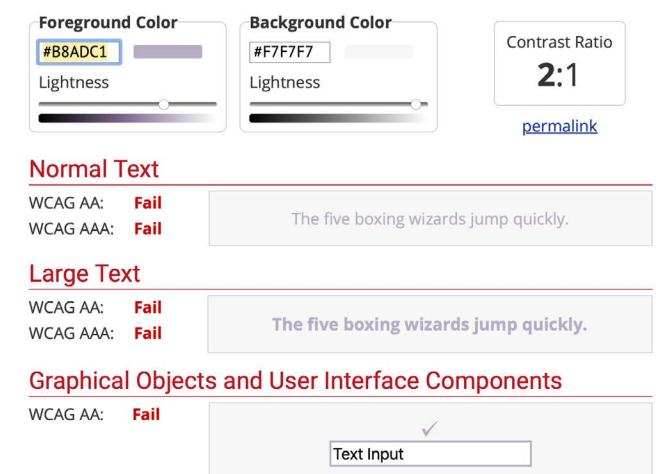


Figure 113: Webaim Contrast Ratio for # B8ADC1

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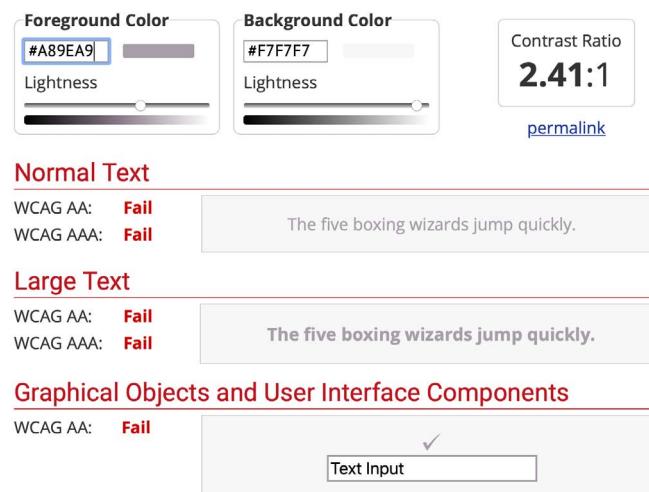


Figure 114: Webaim Contrast Ratio for #A89EA9

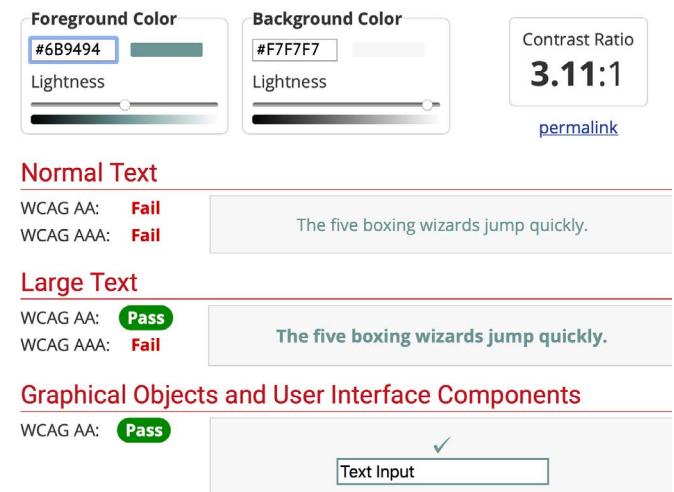


Figure 116: Webaim Contrast Ratio for #6B9494

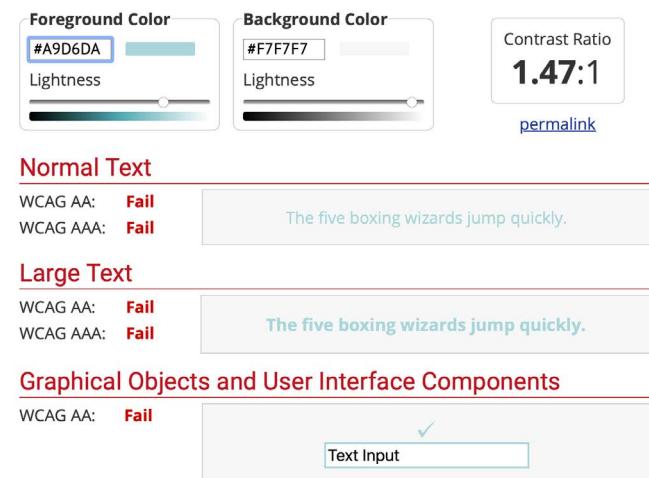


Figure 115: Webaim Contrast Ratio for #A9D6DA

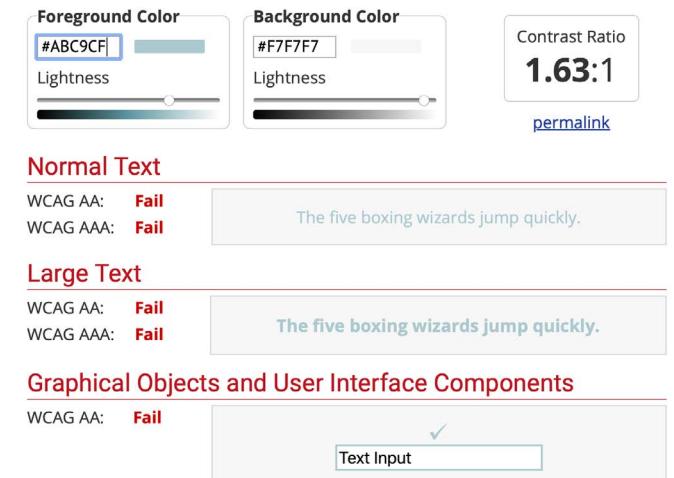


Figure 117: Webaim Contrast Ratio for #ABC9CF

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The results show that all of the foreground colours against the background colours are not compatible in Normal Text, Large Text or Graphical Objects and User Interface Components. The colour "# 6B9494" in Figure 116: Webaim Contrast Ratio for # 6B9494, did however, pass the Large Text and Graphical Objects and User Interface Components. The measure that will be taken in order to conform is to abandon the use of the two colours together within the application.

Readability

The ENOVA products which include the application, the tangible dispensers and the storage case, are required by law to be assessible to different users and meet their needs (WCAG) 2.1 Guideline 3.1 Readable. Bangla MN was chosen as the default font as it is easy to read by even users that are visually impaired. A selection of different size text and boldness will be used for appropriate sections e.g. Titles, headings, sub headings, body text etc. This will create a hierarchy of content to highlight important information and make each element easily distinguishable. The minimum size of a text should be 11 pt.

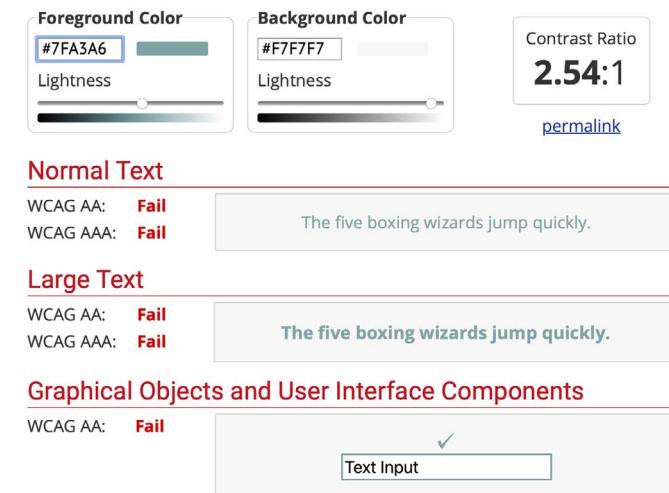


Figure 118: Webaim Contrast Ratio for # 7FA3A6

Layout and Navigation

Navigation is one of the basic aspects of usability. The navigation set up of the application will follow flat navigation style to convey simplicity. This style is commonly used for apps that have numerous functionalities requiring frequent interaction, e.g. Apple App Store.

The layout of application must fit the screen of a variety of devices such as iPhone 8 and an iPad Pro without cropping content when changing orientation. Touch controls with the correct UI elements to encourage a

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natural and familiar feel to the user; appropriate touch gestures that users are accustomed to as swipe, touch and double tap to not create frustration from use.

Additional App Features

In-app purchases are extra content or subscriptions that a user can purchase inside an app. In order to generate income from an application, developers utilize a variety of app revenue models, these may include in-app advertising, donations, paid apps, and data monetization.

Subscription

Subscription is when there is content from an app or service only accessible for a period of time. Apps may offer a free trial, typically 7 day (one week), that will then automatically become a plan and charge the user once expired unless it is cancelled. Developers can also create a variety of plans to suit different users. See Figure 119: App Subscription Plans (A) and Figure 120: App Subscription Plans (B) for example of subscription renewal frequency (weekly, monthly, quarterly or yearly) options.

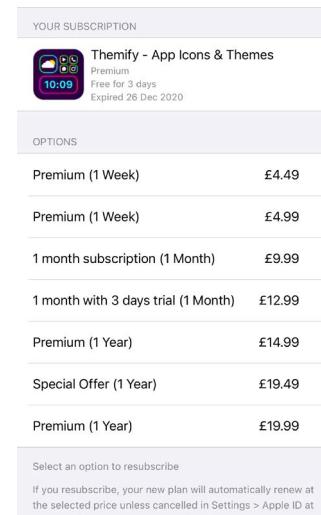


Figure 119: App Subscription Plans (A)

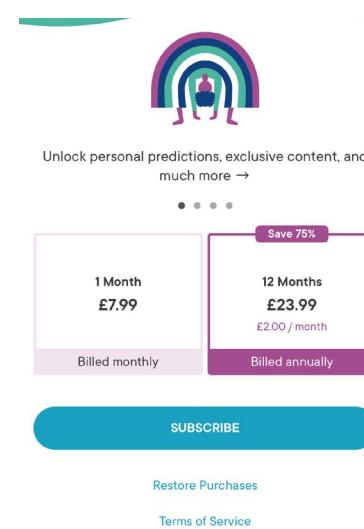


Figure 120: App Subscription Plans (B)

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Non-consumable In-app Purchase

This type of revenue model umbrella allows users to do one time purchase on items such as ads removal, full game unlock, upgrade (to pro edition and bonus game levels. For Apple, users can transfer these items associated with their ID, to other devices with the "Restore in-app purchase".

Consumable In-app Purchase

Unlike non-consumable In-app purchases, with this model the user must buy the desired items every time they wish to obtain more. If the user is to remove and reinstall the app or install it on a new device, they risk losing the consumable purchases. These include any game currency e.g. diamonds, coins, gems etc or a package of exports to a new file format. See Figure 12: Consumable In-app Game.

In recent years, there has been significant growth in the number of subscription-based apps. In this popular trend, Apple introduced a change to encourage and reward developers to adopt this method, offering them a 85/15 revenue split for subscriptions lasting over a year, rather than the standard 70/30. According to Figure 122: Statista Data on Top Subscription Apps, there is a significant spending difference on subscription based apps available on App

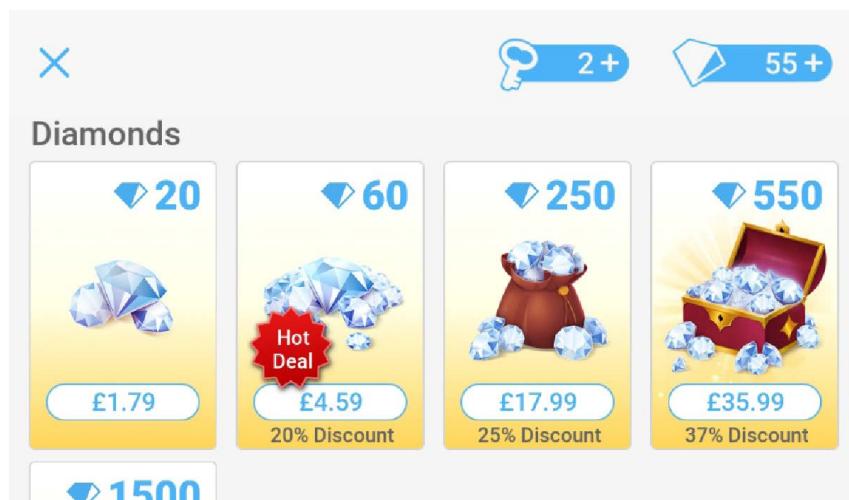


Figure 121: Consumable In-app Game

Store and Google Play Store. In 2019 App Store generated \$2 500mil more than Google Play and in 2020 this difference rose to \$3,100mil. Based on this data it is clear that in the US, subscription apps are more successful on App Store.

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Annual spending in top subscription apps in the United States from 2016 to 2020, by platform (in million U.S. dollars)

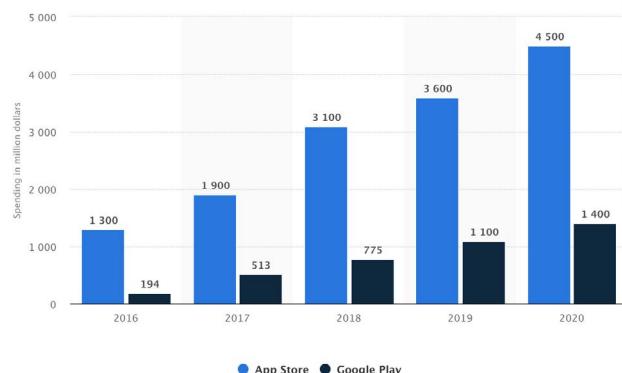


Figure 122: Statista Data on Top Subscription Apps

Disadvantages

- » Highly Competitive - The sudden growth of subscription apps means that developers are now facing more competition to generate customers and remain in the industry.
- » High Initial Cancellation Rate - Subscription plan purchases do mean that the numbers are fixed. In fact, TechCrunch data states that "the median churn rate for subscription apps is around 13% for monthly subscriptions and

around 50% for annual. Monthly subscription churn is generally a bit higher in the first few months."

»

- » Sign-Up Avoidance - Customers tend to hesitate to sign up for contracts they may not utilize the app frequently.
- » Value - Prices of subscription services and products may fluctuate depending on the success or failure of competitive apps. e.g. Netflix is increasing its monthly subscription fee for streaming movies and television shows from £5.99 to £6.99 (TheGuardian, 2014).
- » Developers need to continuously provide new features and content to make users know that price is justifiable.

Advantages

- » Subscription Based Apps Result in More Engaged Audience as their money is put into the app.
- » Subscription-Based Apps see Great Revenue. - Once established it can offer a steady source of reliable income with a number of users on auto monthly/weekly renewal options, when comparing to other app revenue models.



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4.1.7. Key Benefits

- » The ENOVA dispenser minimises the risk embarrassment, thus encouraging learners to access period products when needed.
- » The ENOVA case provides students with a safe storage space for their menstrual care products.
- » ENOVA shows that schools take period poverty as a serious issue.
- » Schools are able to understand and purchase the appropriate products students demand with the product vote function in the app.
- » Helps decrease the number of absent students in education.

4.1.8. Application Prototype (Based on Apple Human Interface and Material.io Guidelines)

Subscription

After exploring and analysing some of the possible ways to generate income, including benefits and cons, market predictions and similar existing apps, it was concluded that the ENOVA app will be developed to offer its users subscription plans with trial period for specified plans. Users can select from either monthly or annually billed plans to access exclusive content for the ENOVA Case.

Suscription Type and Benefits

Monthly (1 Month): This plan is purchasable for £2.49 per month and will not offer any trial period.

Benefits:

- » Unlock All Premium Case Jacket Designs



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4.1. Design Proposal

- » 40% Discount off All Jackets
- » 1 Free Jacket Every 4 Months

Yearly (12 months): This plan is purchasable for £19.08 per year or £1.59 per month, and will offer a trial period of 7 days.

Each plan will have a 14 day cancellation window, however, users will be made aware that any items purchased during that period will be charged for before cancellation can be processed. This is put in place to prevent users from carrying out the actions displayed in Figure 123: User Plan Misuse Scenario.

Benefits:

- » Free UK Delivery Charge (Shipping)
- » Unlock All Premium Case Jacket Designs
- » 40% Discount off All Jackets
- » 1 Free Jacket Every 4 Months

Launch Screen

Upon launching the ENOVA App, the first visual is the identifiable flower logo that all of the multiproducts possess.

Sign In Screen

The student user will automatically be presented with this screen where they can Log In with their details.

Welcome Screen

This page will only be shown if the user is logging in for the first time. It informs the user what features they will find in the application and promotes the other products.

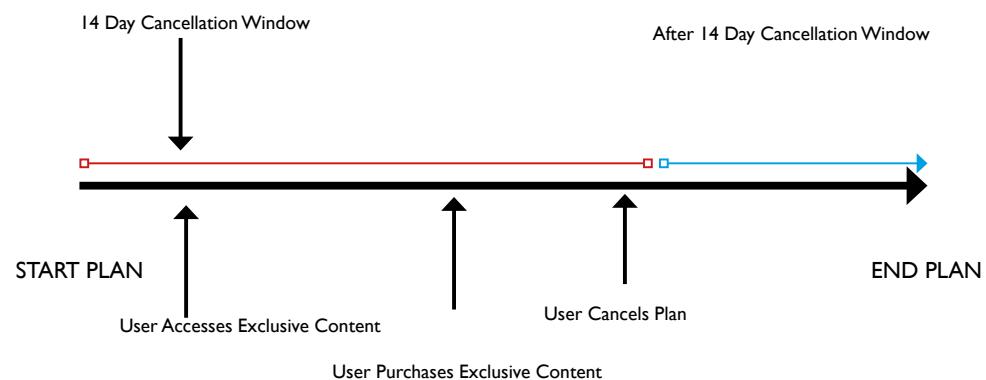


Figure 123: User Plan Misuse Scenario

Home Screen

The home screen is where all users regardless of age or school

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restrictions, will land upon Loggin In (First time or not).

Bottom Navigation

To maintain a quick and simple bottom nav bar; that the user can easily navigate through, there are 3 fixed icons with no user input.

Primary Icons and Functions:

- » DISCOVER (1)- PRESS; Will access the social.
- » SETTINGS (3)- PRESS; Will access App account management; subscription plans etc.
- » HOME(2)- PRESS; Will access the ENOVA Products screen.
- » When the user PRESS HOLD (2), the secondary icons will appear. To select, DRAG finger over the desired icon and RELEASE.

Secondary Icons:

- » REQUEST(4)- Will access the dispenser product request screen
- » QR CODE(5)- Will access the QR codes generated from user.

See Figure 124: Fixed Icons and Figure 125: 2 Unfixed Icons.

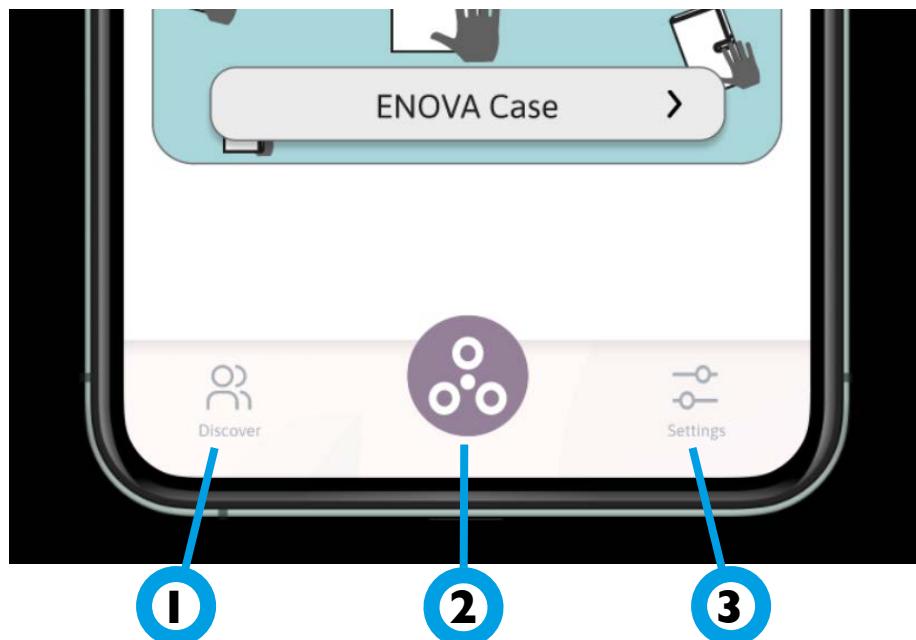


Figure 124: Fixed Icons

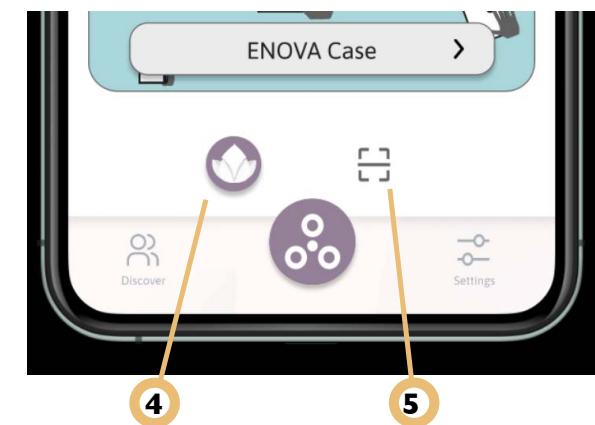


Figure 125: 2 Unfixed Icons

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4.1. Design Proposal

Layout

The application frames have been placed in categories to make different screens and screen elements easily identifiable. See Figure 127: App Developer Layout. For example,

- » **BLUE CIRCLE** - All the contents within this category are the foundation for the app screens. (iPhone 11 Pro Max). These screens have been placed horizontally with the launch screen at the start, in a similar way that the user will navigate the app.
- » **RED CIRCLE** - All elements within the circle are navigational components, more specifically search field, that will allow users to search their educational institution when requesting account registration.
- » **GREEN CIRCLE** - The contents that are to show over the RED CIRCLES such as the subscription message and the menstrual care product info message.
- » **PURPLE** - These are the buttons used in the application. They follow

the traditional ENOVA shape with 3 curved edges and a single right uncurved edge.

- » **GOLD CIRCLE** - ENOVA Case Jacket Designs have been organised under this bubble. Users able to view several images of products across a row, and they can swipe horizontally across the row to navigate between the designs.

Motion and Interactions

The designer aims to introduce an element of fun in the application interactions in an effort to increase engagement from the young target user.

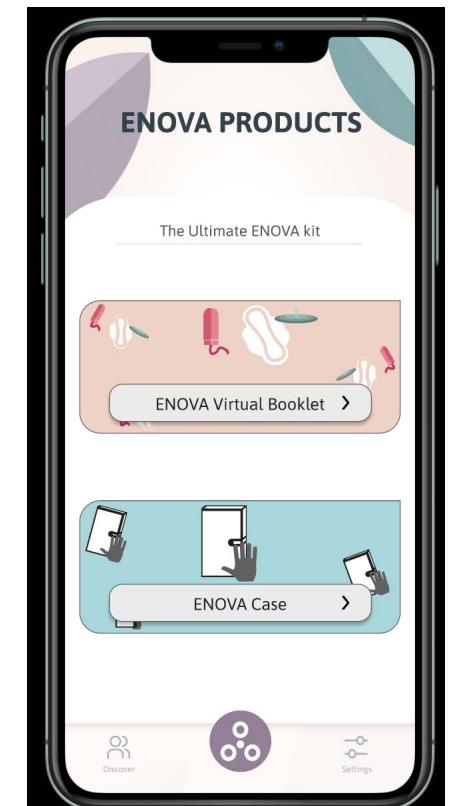
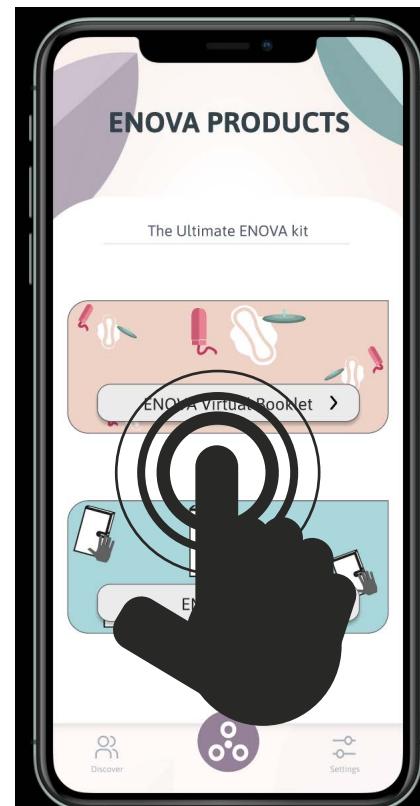
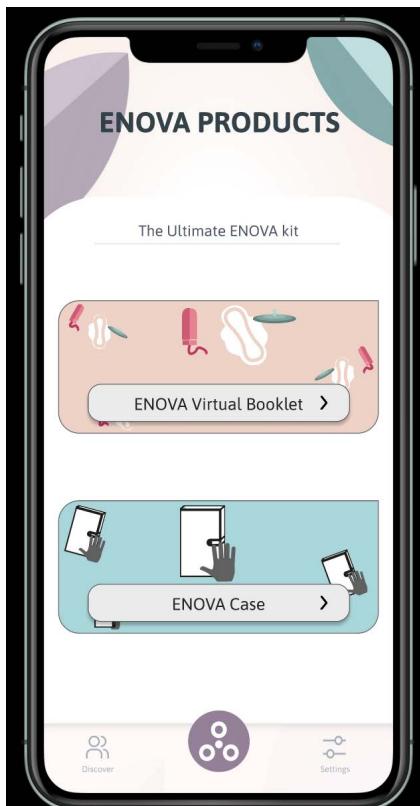
- » Animated Floating Buttons
- » Toggle Sound Effects
- » Pull To Refresh and Vibration
- » Micro Interaction - This will be used to inform the user if for instance, their sign in credentials are registered.
- » Swipe Gestures from each nav bar icon (screen)



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SWIPE GESTURE - INTERACTIVE



Discover



Settings



Figure 126: App Screen Intended Gestures

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4.1. Design Proposal

ENOVA APPLICATION FRAMES

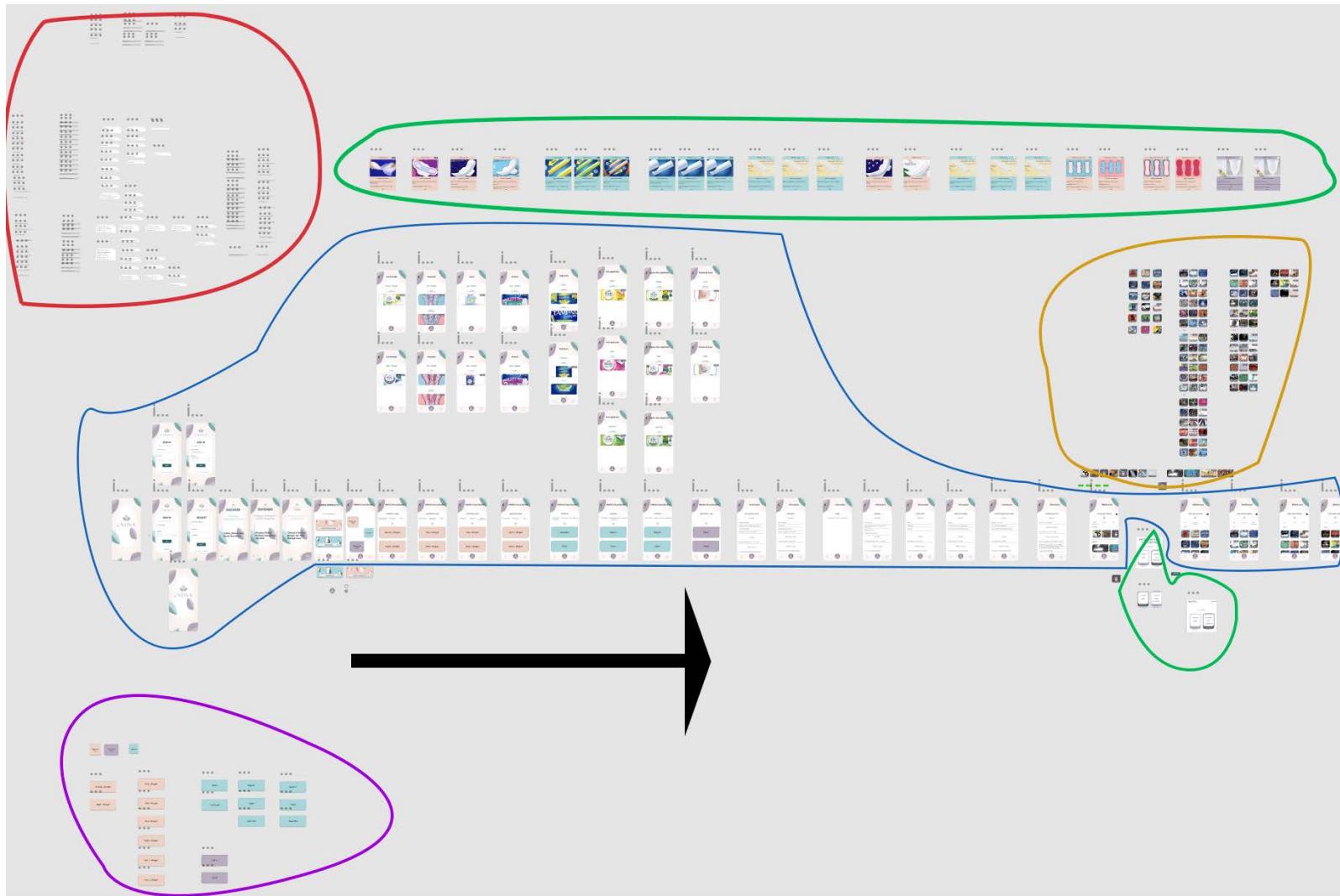


Figure 127: App Developer Layout

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4.1. Design Proposal

User Interface Elements

The ENOVA App interface elements are contemporary and consistent throughout. Are some examples of these elements.

Text Field Allow users to enter text either a single line or multiple

Toggles Allow change of a setting between two states

Search Field Users can enter a keyword or phrase and submit to get most relevant results

Buttons Indicate an action upon touch

Carousel Allows user to view other images with a swipe either left or right or left and right.

The diagram illustrates various user interface elements and their descriptions. It includes sections for Text Field, Toggles, Search Field, Buttons, and Carousel. Each element is accompanied by a small image and a detailed description. The Buttons section shows a teal 'Login' button, a light orange 'ENOVA Virtual Booklet >' button, a blue 'View' button, and a pink 'Menstrual Pads' button. The Carousel section shows a horizontal scroll bar with three book covers: 'To Kill a Mockingbird', 'The Great Gatsby', and 'Lord Of The Flies'. The ECO-FRIENDLY, REUSABLE, and TEENS sections are also shown at the bottom.

Figure 128: App Elements (A)

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4.1. Design Proposal

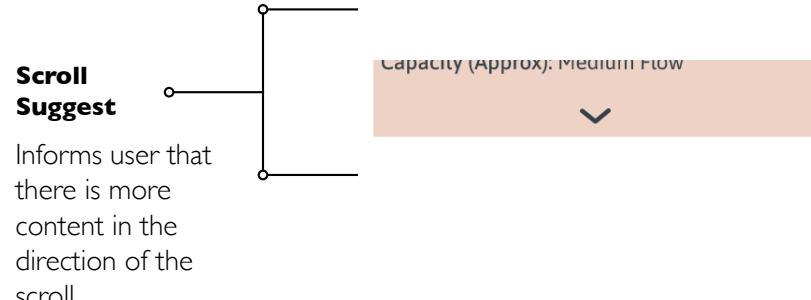


Figure 129: App Elements (B)

Colour System

Visuals

The designer aimed to maintain the same colour style throughout the ENOVA multiproducts. The application is no exception, displaying a soft, modern appearance, fused with a both feminine and masculine style. This aesthetics has become increasingly popular, with many of Pantone's new colours being shades of pastels, well known websites such as Dropbox and Toggl joining in on this colour trend. Pastel colours are highly associated with self-care as seen in many YouTube videos under this category.

Colour Usage and Palette

The final colours have not seen much change from the ones previously shown. Different levels of transparency have changed the appearance of the brand colours used in the final brand design, have been the foundation of the colours in the ENOVA App.

Background

The app background image consists of enlarged vector flowers that surround the screen, the same as the external petals used for the final brand. The background has the pastel peach colour used for the center of the flower brand. The difference is that the app background also has a radial lighter radial gradient, indicating that the user has been drawn into the core of the flower, representing the womb, making the background more symbolic.



Figure 130: Symbolic Brand and App Design

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4.1. Design Proposal

Typography

Font

The Asap, the abbreviation for “as soon as possible” is a contemporary sans-serif family with slightly rounded corners. This family offers a standardised character width on all styles, meaning that lines of text remain the same length. Quicksand font was also utilised for large headings.

The font can be seen in all screens in various a range of sizes and styles. Some of the iPhone Typography Guidelines have been utilised as seen in Figure 131:

ELEMENT	SIZING	NOTES
Titles (of pages or modals)	17pt	Medium font weight iOS 10+ page titles are 34pt before scrolling, 17pt once scrolled
Paragraph text, Links	17pt	
Secondary text	15pt	Lighter color as well
Tertiary text, Captions, Segmented buttons	13pt	Skip a font size between secondary and tertiary text
Form controls (Buttons, Text inputs)	17pt	Highlight important buttons with medium font weight
Action bar	10pt	Don't go smaller than this

Figure 131: Typography Standards

Typography Standards.

ASAP REGULAR

The spectacle before us was indeed sublime.

ASAP ITALICS

The spectacle before us was indeed sublime.

ASAP MEDIUM

The spectacle before us was indeed sublime.

ASAP MEDIUM ITALICS

The spectacle before us was indeed sublime.

ASAP SEMI-BOLD

The spectacle before us was indeed sublime.

ASAP SEMI-BOLD ITALICS

The spectacle before us was indeed sublime.

ASAP BOLD

The spectacle before us was indeed sublime.

Figure 132: App Typography

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4.1. Design Proposal

Navigation

The app navigation is quite clean and effortless for users with simple interactions that app users are already familiarised with. It is crucial that designers include icons that are comprehensible and reduce cognitive load. Iconography is commonly used in social places such as airports, train stations to allow people from different cultures and locations to visually navigate.

The ENOVA App uses these icons to provide additional context and enhance usability. See Figure 133: App Plus (+) Add Icon and Figure 134: App Padlock (locked) Unavailable Icon.



Figure 133: App Plus (+) Add Icon



Figure 134: App Padlock (locked) Unavailable Icon

Navigation Transitions

When a user moves between screens, a process known as navigation transition which depends on motion takes place. This guides users, by communicating the relationship between different elements and expresses the app's page hierarchies.



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Under ENOVA Virtual Booklet, products have an option to view the detailed product. This will create an overlay message box. See Figure 135: Message Box Overlay, and video link of action (<https://youtu.be/2NOTmiYtqDo>)

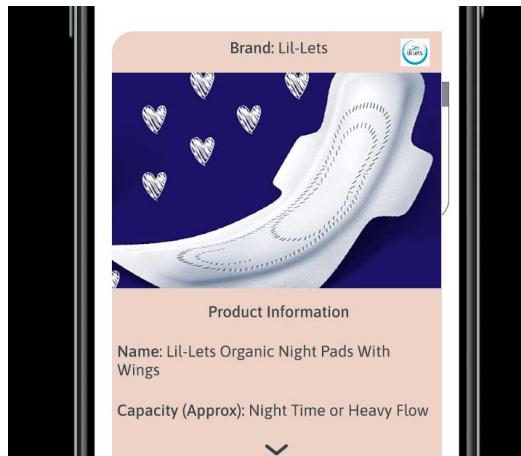


Figure 135: Message Box Overlay

Another transition that improves the user experience is in the screen after the student Logs In. This uses the smart animate- Ease In option to create a smooth integration. The ENOVA logo moves from the center to the top of the screen with decreased size. See video link of action (<https://youtu.be/560xTpC16IE>)

The Welcome screen gives the user 2 action options to transition between screens., Slide In/Ease In - PRESS and Move In/Ease In - DRAG. See Video link (https://youtu.be/9fao_mXflVI)

Accessibility

Contrast

The most important elements have been designed with darker shades of the color palette to avoid eye strain and make the app user friendly to people with vision impairments.

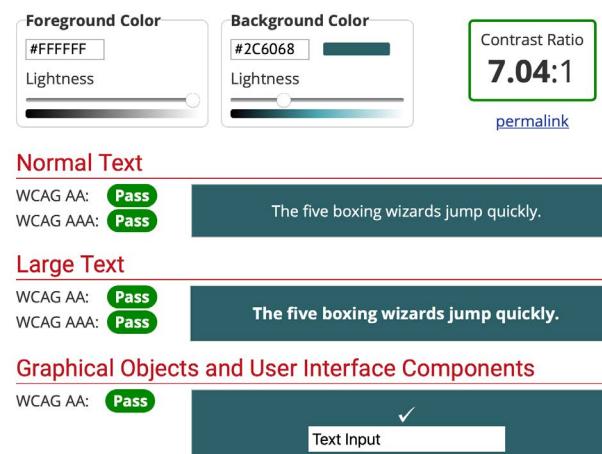


Figure 136: Contrast Ratio - Login Button

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4.1. Design Proposal

The background colour of the icons on the bottom nav bar change to a purple colour when selected. The icons themselves turn from grey to white as it would not pass the GOUIC otherwise, as seen in Figure 137: WCAG Pass Test and Figure 138: WCAG Fail Test.

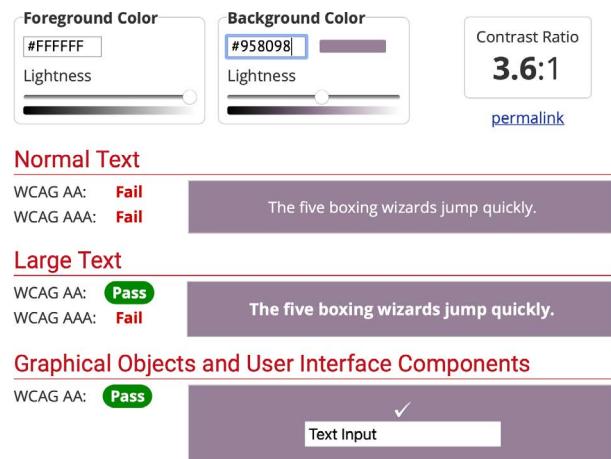
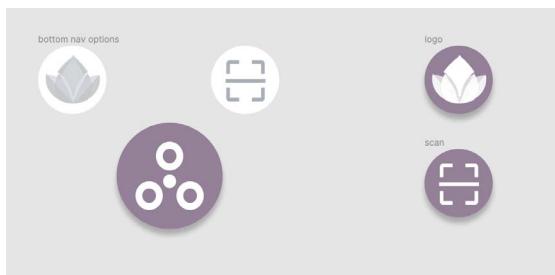


Figure 137: WCAG Pass Test

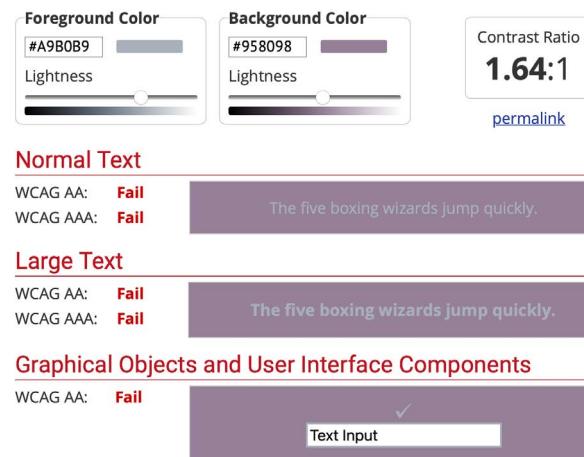


Figure 138: WCAG Fail Test

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4.2. Prototyping Strategy

4.2.1. Production Planning

Figure 139: Multiproduct Production Process (A) and Figure 140: Multiproduct Production Process (B), is an in depth, pre planned type gantt chart documenting all of the tasks, down to the individual components, that the designer will carry out in order to prototype the tangible final products.

4.2.2. Prototype Plan

See Figure 141: App Prototype Plan, documenting the plan for the prototyping the application, completed in order to help identify potential problems with time and resources in advance.

4.2.3. Technical Drawings For Prototyping (Physical Products)

A complete set of engineering drawings of both component and assembly has been created to represent the tangible prototypes. See Appendix 5.3.5. ENOVA DISPENSER TECHNICAL DRAWING – ASSEMBLY and ENOVA DISPENSER TECHNICAL DRAWING – ASSEMBLY PARTS LIST



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4.2. Prototyping Strategy

PRODUCTION PLAN – PARTS LIST

COMPONENT	MATERIAL	PROCESS	TIME (estimated)	RESOURCES NEEDED	SAFETY IMPLICATIONS	COST?
Dispenser						
Body Pieces	304L Stainless Steel	Welding, Cut	5 Days	-Metal Workshop B32 facilities (Metal Cutting Saws, Deburring and Bevelling Tools, Sheet Metal Rolling Equipment, Angle Grinder, Throat-less Shear, Wire Cutters and Drill Bits) Staff Member	-All PPE will be worn in the workshop	None
Body Pieces	304L Stainless Steel	- Pre-treatment (oil and rust removal, phosphatizing and pickling passivation)	2hrs	Workshop facilities	-All PPE will be worn in the workshop -It is non-toxic, does not contain hydrochloric acid, meets RoHS test requirements	None
Body Pieces	304L Stainless Steel	- Electrostatic coating (Apply powder coat)	1hr	-Spray Paint B31 facilities (acrylic powder, High-performance electrostatic spray machine)	-All PPE will be worn in the workshop	None
Body Pieces	304L Stainless Steel	High-Temperature curing	20mins	-Curing Furnace	-All PPE will be worn in the workshop	None
Body Pieces	304L Stainless Steel	-Decoration treatment (Plastic-coated)		-Static generator (Charge the plastic powder and make it adsorb)	-All PPE will be worn in the workshop	None
Body Pieces	304L Stainless Steel	Bake	15mins	Equipment	-All PPE will be worn in the workshop	None
LCD1602 Module	N/A	Soldering (Ordering in)	30mins	https://www.amazon.co.uk/ -Electronics Room (T6)	None	£6.59
GM65 Barcode & QR Scanner Module	N/A	Soldering (Ordering in)	30mins	https://www.aliexpress.com -Electronics Room (T6)	None	£13.33
Tubular Cam Lock	Zinc and Black Finish	N/A (Ordering in)	8mins	https://www.amazon.co.uk/	None	£19.64
Vending Machine Servo Motor	Metal and Plastic	Attach (Ordering in)	10mins	https://www.aliexpress.com/ -Electronics Room (T6)	None	£3.68
Tray Spiral Coil	Stainless Steel	Pre Hot rolled (Ordering in)	Varies	https://www.made-in-china.com/ -Metal Workshop B32 facilities	None	Varies
Door Hinges	Steel	Metal work	1 day	Metal Workshop facilities	-All PPE will be worn in the workshop	None

Figure 139: Multiproduct Production Process (A)



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4.2. Prototyping Strategy

PRODUCTION PLAN – PARTS LIST

COMPONENT	MATERIAL	PROCESS	TIME (estimated)	RESOURCES NEEDED	SAFETY IMPLICATIONS	COST?
Case						
Ceramic Megnet	Ceramic	Ordering In (Glue)	1 day	B34 Workshop Facilities	Young children may accidentally swallow the magnet	£0.76
Velcro Sheet	Nylon	Ordering In	1day	https://www.amazon.co.uk/	None	£12.87
Case Jacket	PVC face and polyester (Faux Leather)	Ordering In	2 days	https://www.contrado.co.uk/	None	Varies
Body (layer 1 and 2)	Greyboard	Cut, Bend etc	1 day	B34 Workshop Facilities	None	None
Foam Boarder	High Density Polyethylene (HDPE) foam	cut,sand, glue	1hr	B34 Workshop Facilities	None	None
Card						
Card (1)	CAD	Design	1hr	Adobe Illustrator and Photoshop	None	None
Card (1)	Polyvinyl Chloride (PVC) sheet	Print	30mins	Inkjet printer, Laminator, ID card cutter, paper cutter LSBU Student ID card materials and machines	Follow machine safety instructions to prevent burns and cuts	£5.00

Figure 140: Multiproduct Production Process (B)



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4.2. Prototyping Strategy

PROTOTYPE PLAN

Process	Time	Resources
Identify Key Functionality Requirements (App Features)	1-2 Days	Paper and Pen or PC and Online Document
Create Sketches of Primary Screens (Wireframes)	1 Day	Sketch Paper and Pencil
Explore App Development Standards	5 Days	Online Document
Turn Sketches into Wireframes	2 Days	Adobe Illustrator
Select Colours, Typography, Iconography, Additional Images	3 Days	UX guidelines, Adobe Illustrator, Adobe Photoshop, Iconify Tool
Identify and Select a an app prototyping tool	1 Day	Figma, Marvel, Mintel
Test Wireframes and receive Feedback	2 Day	Volunteers, Feedback Sheet
Turn Illustrator Wireframes to P.Tool Designs	2 Weeks	Figma P.Tool
Transform Designs To Prototypes	1 Week	Figma P.Tool

Figure 141:App Prototype Plan



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4.2. Prototyping Strategy

4.2.4. Documentation of Process

Due to current global situations, physical prototypes were suspended and could not be achieved. Instead the designer transferred the prototypes digitally.

ENOVA DISPENSER

This was the first multiproduct final prototype to be designed. Fusion 360 software was used to design this multiproducts' final prototype as it enabled the designer to generate designs, engineering drawings and high quality renders. The target was to refrain from making the dispenser large with a basic shape. The amount of content for menstrual care product dispenser (Vending machine) that showed the internal compartments was quite limited, therefore standard food and beverage vending machines videos and photos were also used to better understand.

Door

Two types of door designs were explored to produce the desired modern look. The first option was to have a flat door that would not take up as much space when installed, however, this was quickly changed to a design added a



Figure 142: Dispenser Door Variations (A)



Figure 143: Dispenser Door Variations (B)

Stage 4: DELIVER

4.2. Prototyping Strategy

slight 3D feel with more curvature and depth. The overall height of the door has decreased from 535.00mm to 495.00mm. See Figure 142: Dispenser Door Variations (A) and Figure 143: Dispenser Door Variations (B).

The final door design also has cam locks as seen in the initial design, but instead it has two locks on the edge midpoint. It displays a laminated sticker on the exterior. See Figure 144: Final Dispenser Door Variation.

Collection Tray

During this stage, the designer encountered a challenge where the user could not easily place and remove the ENOVA Case in the collection tray because the bottom measurement of the gap is too high, towards the center of the door and could potentially obstruct. This was overcome by lowering the position so that the spacing between the edge is a mere 5.00mm. Figure 145: Initial Dispenser Collection Point.



Figure 144: Final Dispenser Door Variation

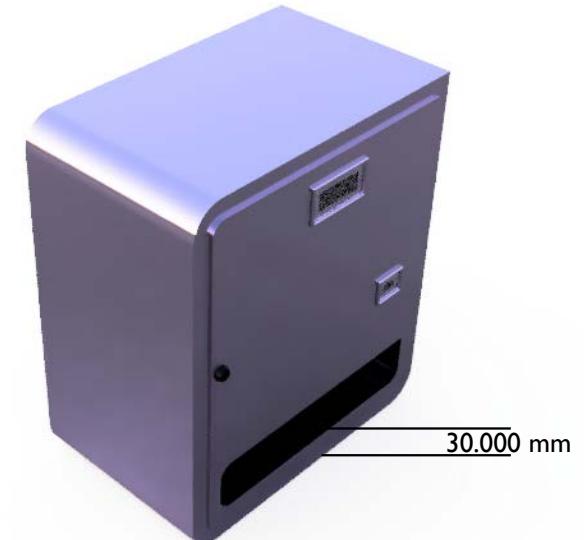


Figure 145: Initial Dispenser Collection Point

Stage 4: DELIVER

4.2. Prototyping Strategy

Door Hinge

A further challenge was faced when attempting to attach the door to the dispenser body. This process required the designer to expand exploration of hinges used on similar products. Household appliances such as fridges and a series of microwaves were analysed with secondary and primary research.

At first, it was found that the SHARP R-274 (K)M, see Figure 147: SHARP Microwave R-274(K)M - (A), microwave oven door operates in a very similar fashion and the designer attempted to replicated the component digitally. This proved difficult and did not succeed as there was insufficient content on the specific hinge and door opening direction; Left, to which the designer could reference to.



Figure 146: Cupboard Hinge



Figure 147: SHARP

Microwave R-274(K)M



Figure 148: Fridge Bottom Hinge



Figure 149: Fridge Freezer Hinge



Figure 150: Top Fridge Hinge



Stage 4: DELIVER

4.2. Prototyping Strategy

A trial and error stage is seen with the hinges in the figures. The designer prototyped a piano style hinge to be “welded” onto the dispenser. This challenge was overcome by having the hinges as part of the two components and designing them directly on. Figure 151: Hinge Example of CAD and Figure 152: Knob CAD Hinge show the first designs that were also designed on CAD, the second design can be viewed in Figure 153: Piano Style Hinge and the final choice in Figure 154: Final CAD Hinge.

Colour Variations

The initial design was a purple; 183,173,193 (RGB) or #b8adc1, colour with polished Stainless Steel. See Figure 155: Initial Dispenser Colour.



Figure 151: Hinge Example of CAD



Figure 152: Knob CAD Hinge

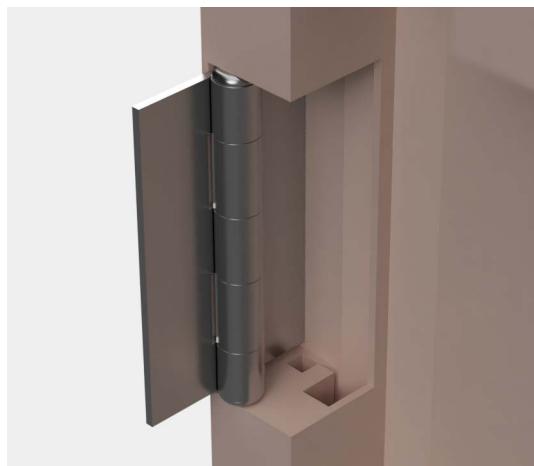


Figure 153: Piano Style CAD Hinge

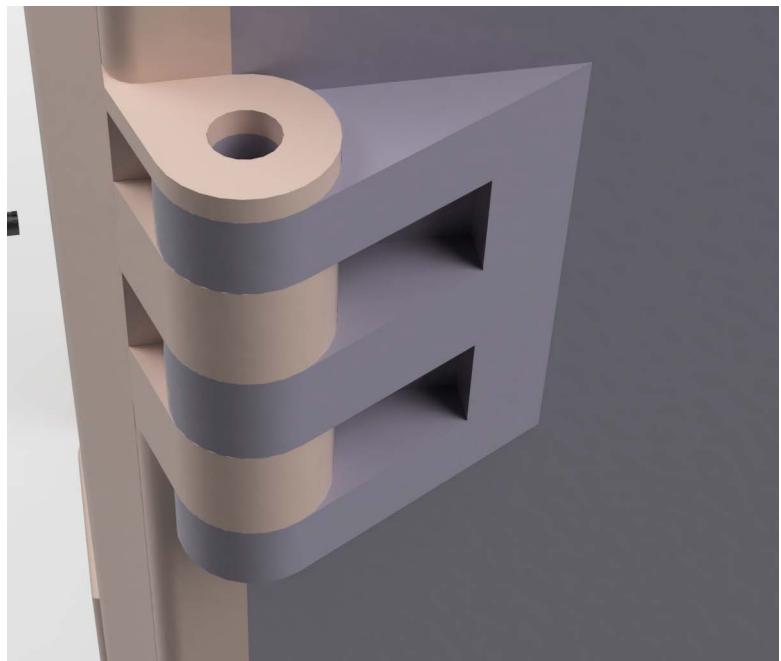


Figure 154: Final CAD Hinge



Stage 4: DELIVER

4.2. Prototyping Strategy

The second design produced had two different colours. The external was peach pink; 240, 211, 197 (RGB) or #f0d3c5, on a powder coated Stainless Steel material. The interior of Figure 156: Colour Combinations, is polished Stainless Steel, which gives the shiny metallic appearance, and coloured 167,214,217 (RGB) or #a7d6d9. The final prototype was influenced by the first design in terms of colour as it has more than one. The door is powder coated with pink peach powder and the body including interior and exterior is Victorian violet; 184, 173, 193 (RGB) or #b8adc1. See Figure 157: Final Prototype Colour.



Figure 155: Initial Dispenser Colour



Figure 156: Colour Combinations



Figure 157: Final Prototype Colour



Stage 4: DELIVER

4.2. Prototyping Strategy

ENOVA MENSTURAL CARE PRODUCT DISPENSER CAD COMPONENTS

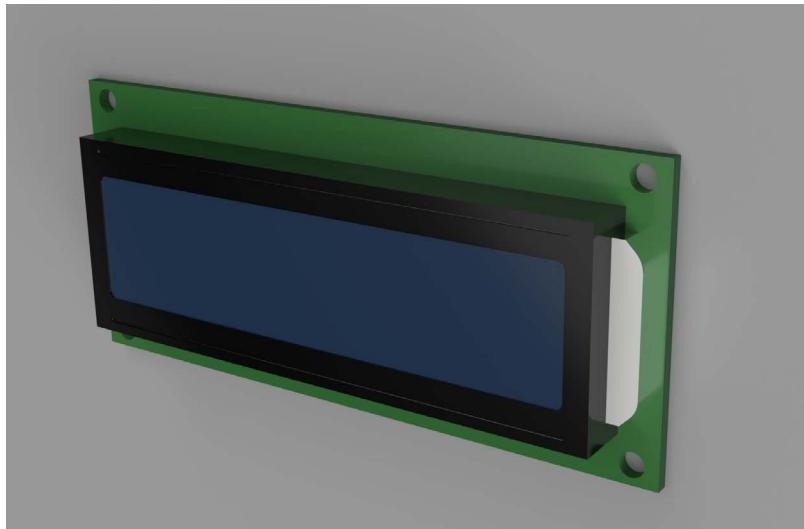


Figure 158: LCD 1602 Display CAD Module

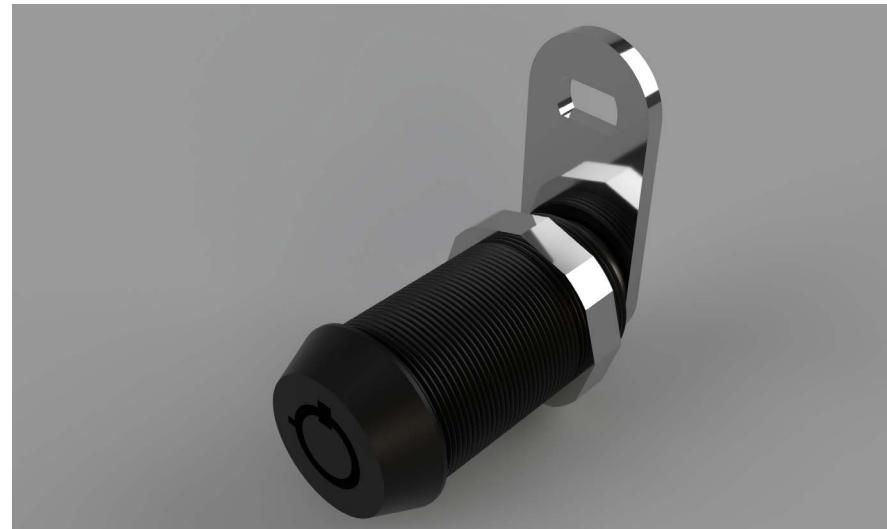


Figure 160: CAD Tubular Camlock

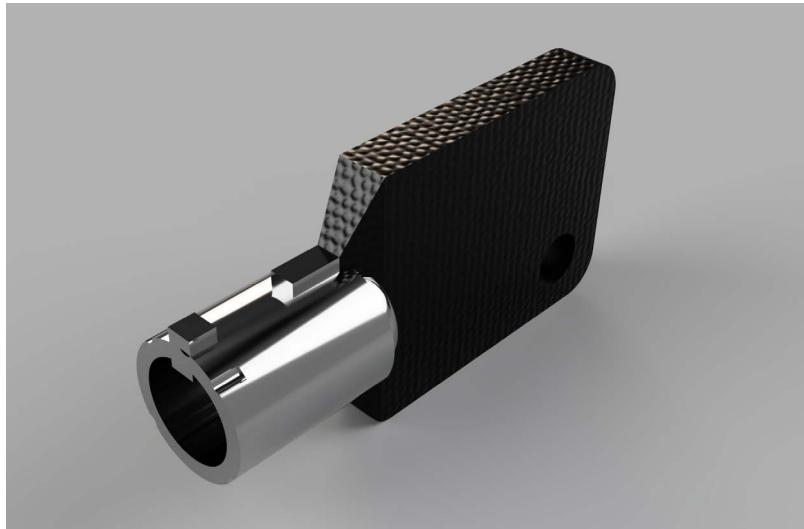


Figure 159: CAD Tubular Camlock Key

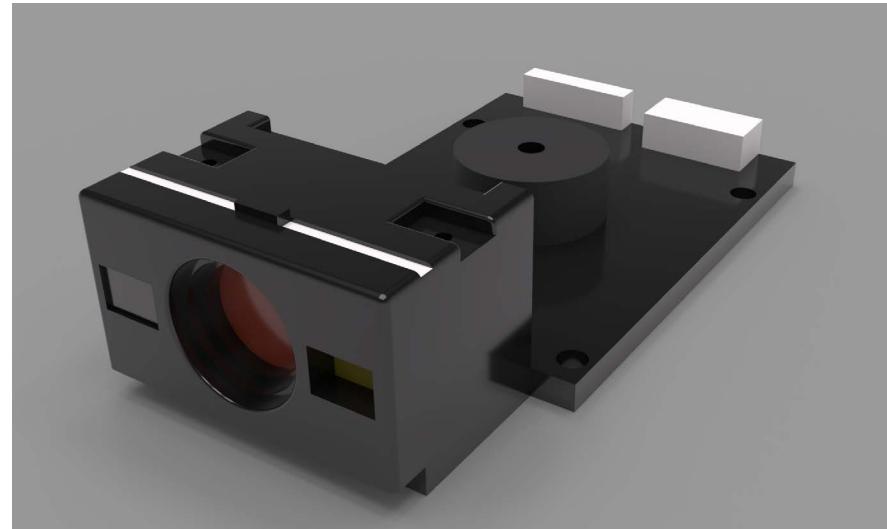


Figure 161: CAD GM65 Barcode/QR Scanner Module



Stage 4: DELIVER

4.2. Prototyping Strategy

ENOVA MENSTURAL CARE PRODUCT DISPENSER CAD COMPONENTS



Figure 162: 24V Front Servo Motor CAD

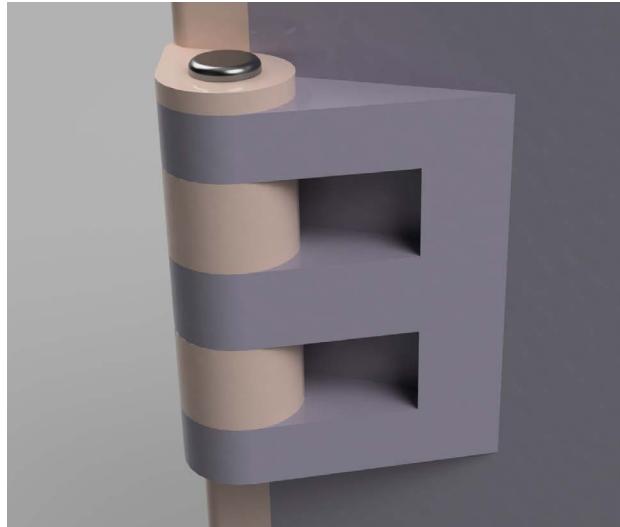


Figure 164: Finger Joint Type Hinge and Pin CAD

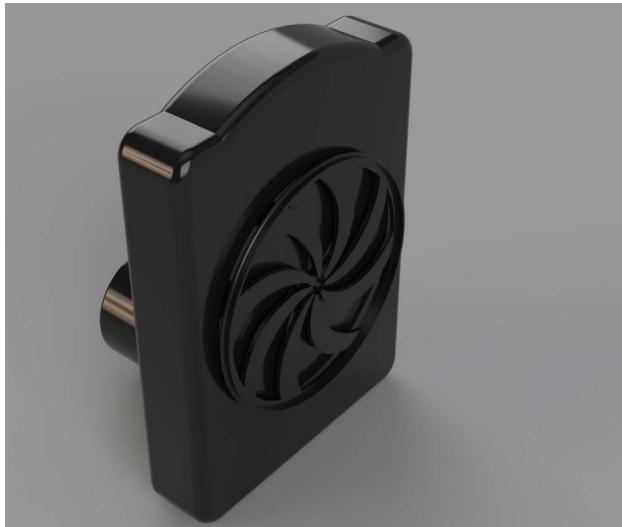


Figure 163: 24V Back Servo Motor CAD

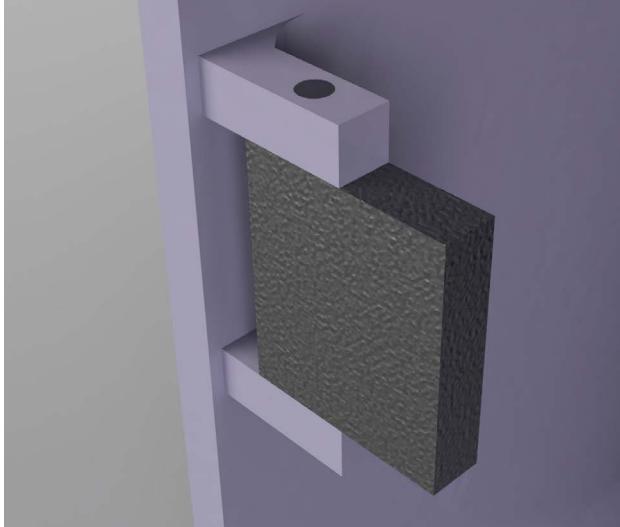


Figure 165: Retractable Camlock Locker and Pin CAD



Stage 4: DELIVER

4.2. Prototyping Strategy

See video link (https://www.youtube.com/watch?v=g_pYIK9BgFQ&list=PLBb5VxtHK_n_JGOV66HqvVE7QESpE8zNi) for playlist of final prototype and components in motion.

ENOVA MENSTURAL CARE PRODUCT DISPENSER CAD COMPONENTS

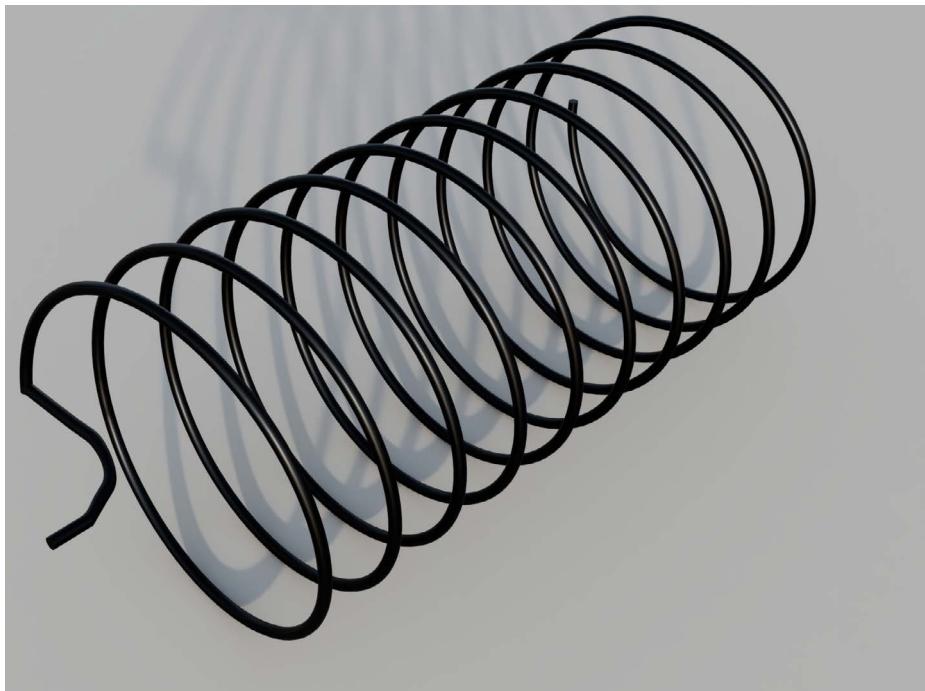


Figure 166: CAD Motorised Spring Coil



Stage 4: DELIVER

4.2. Prototyping Strategy

ENOVA MENSTURAL CARE PRODUCT DISPENSER



Figure 167: Final ENOVA CAD Dispenser Prototype



Stage 4: DELIVER

4.2. Prototyping Strategy

ENOVA CASE

Lock Feature

The initial design has undergone a few alterations. When testing the sketch model, it was mentioned that the designer would be implementing a an additional feature which would prevent the product from opening unintentionally. Figure 168: Initial ENOVA Case Prototype, does not include this feature and would cause an issue for the user when storing and transporting the goods.

The lock feature in as shown in Figure 169: Final ENOVA Case Prototype, consists of fthe faux leather material, greyboard with a ceramic magnet sandwiched between the two layers. This was inspired by a vegan friendly leather diary, which has a similar magnetic strap. See Figure 170: CAD Strap and Section Analysis, for internalised magnet component. See Figure 172: Jacket Rubber Steel Magnet 2 CAD and Section Analysis, for magnet between front external jacket.

Case Bind



Figure 168: Initial ENOVA Case CAD Prototype



Figure 169: Final ENOVA Case CAD Prototype

Stage 4: DELIVER

4.2. Prototyping Strategy

Initially, the ENOVA Case did not have any replaceable parts such as the jacket. Therefore there was no need to explore binding methods for it. See Figure 173: Initial Binding Method. The final prototype however, does require consideration. It uses (velcro) on the faux leather and greycard to attach and detach the jacket from the body. See Figure 174: Final Prototype Binding Method.

Jacket

See Figure 128:Faux Leather Jacket, for final prototype design texture.

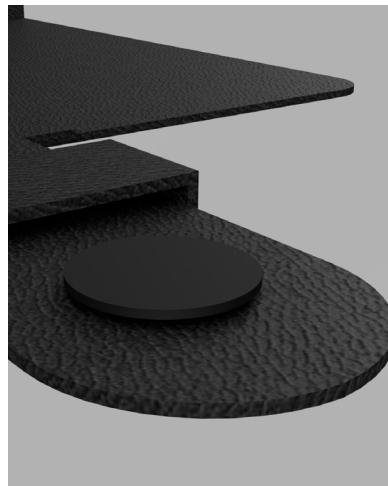


Figure 170: CAD Strap Section Analysis

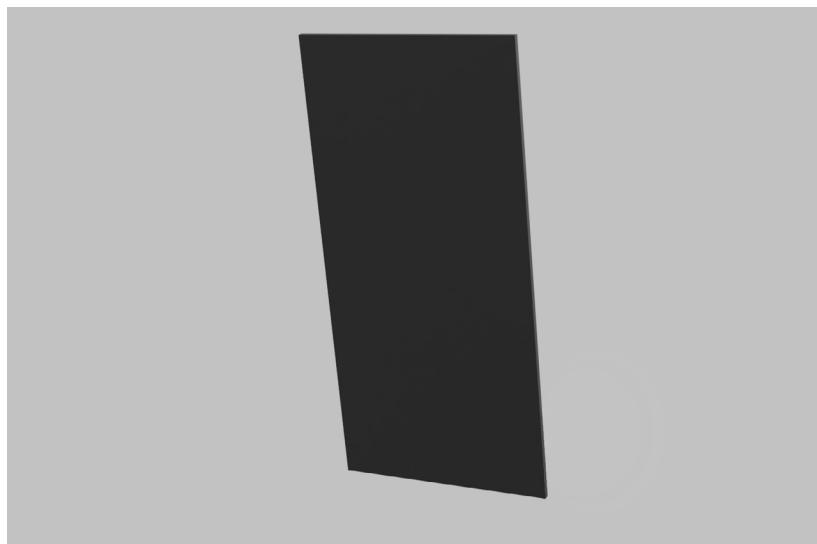
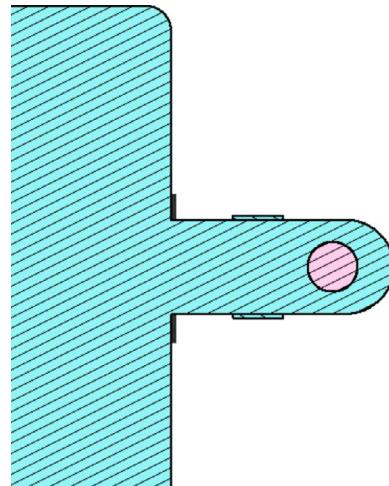


Figure 171: CAD Rubber Steel Receptive Metal

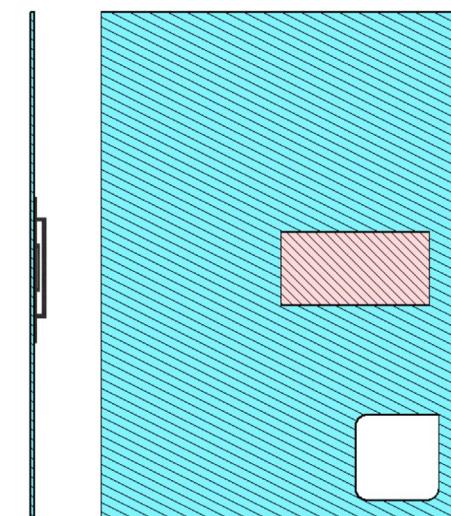


Figure 172: Jacket Rubber Steel Magnet 2 CAD and Section Analysis



Stage 4: DELIVER

4.2. Prototyping Strategy

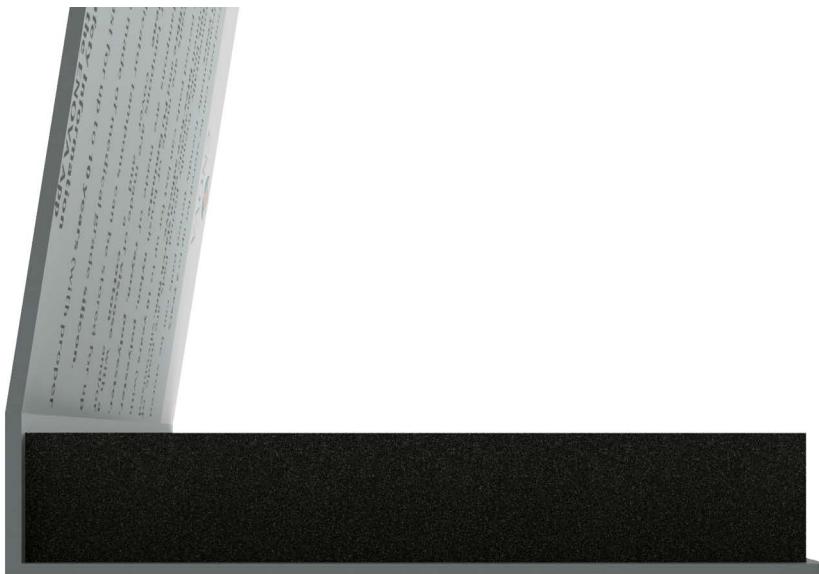


Figure 173: Initial Binding Method

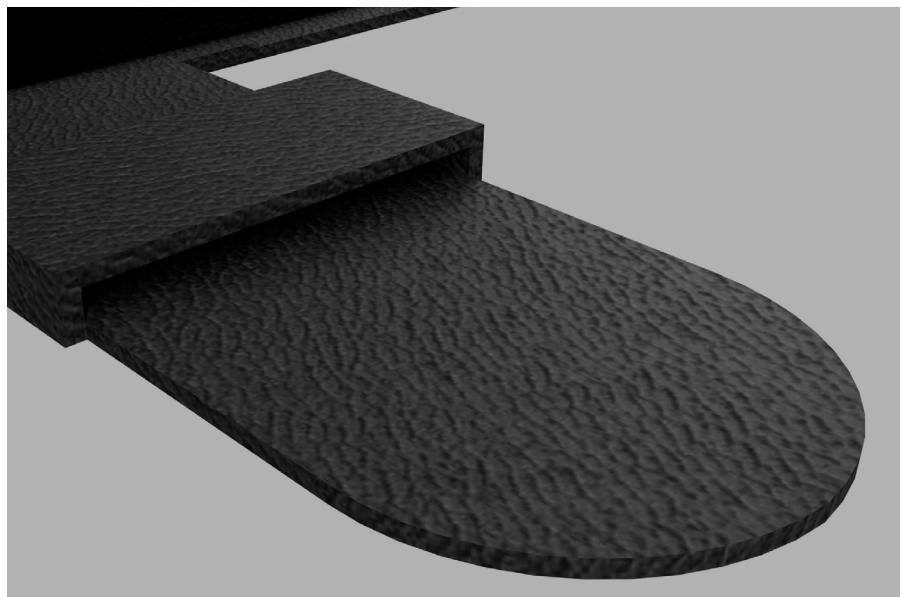


Figure 175: Faux Leather Jacket

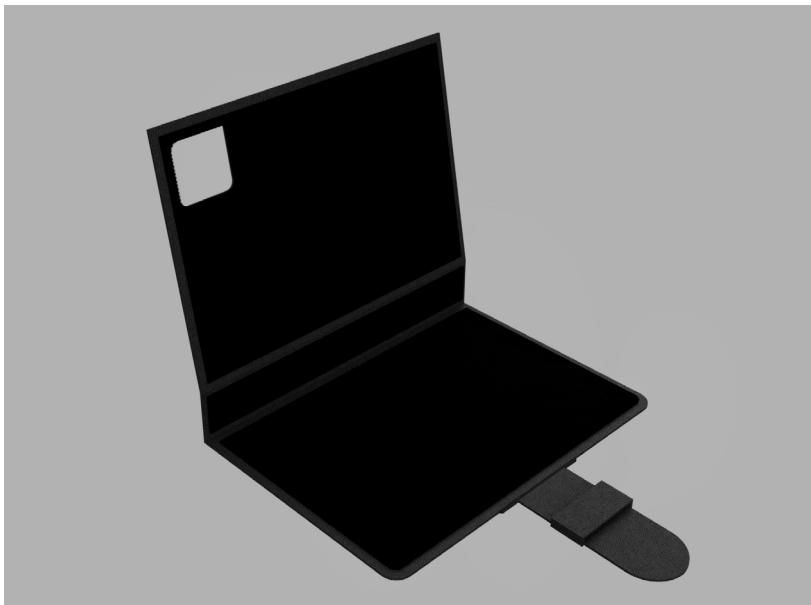


Figure 174: Final Prototype Binding Method



Stage 4: DELIVER

4.2. Prototyping Strategy

Brand

The brand has been printed at the top of exterior and interior board. This brand is does have colours and a white container background. See Figure 176: Initial Binding Location (A) and Figure 177: Initial Binding Location (B). The location and style has changed and in the final prototype, with the brand not printed on the external case but on the internal coloured paper over the greyboard. See Figure 178: Internal Brand Final Prototype. The external brand location; printed onto the external paper attached to the greyboard, is covered with clear acrylic, closer to the bottom and visible through the jacket slot .The brand also loses its original colour and is a slight transparent white logo with no brand name. See Figure 179: Final Prototype Jacket Slot and Figure 180: Final Prototype External Logo Location.

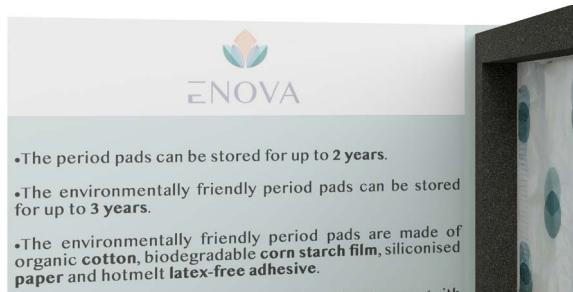


Figure 176: Initial Binding Location (A)

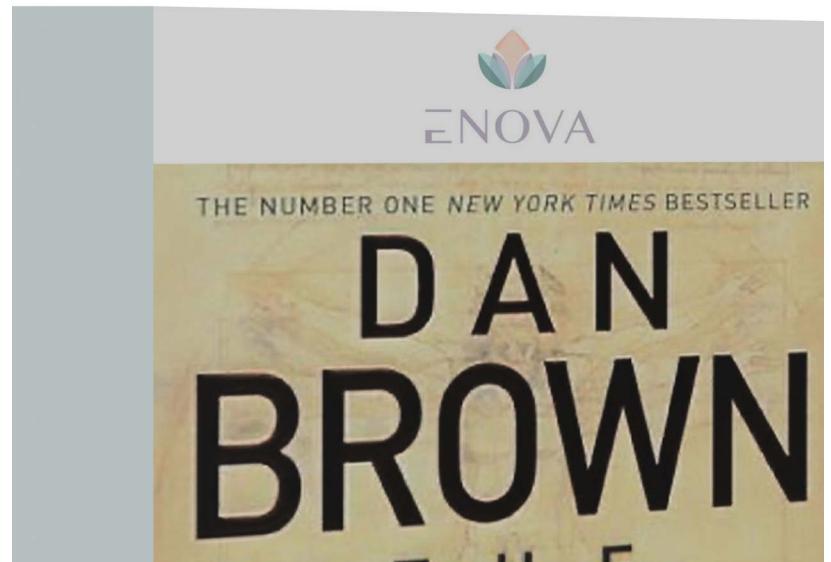


Figure 177: Initial Binding Location (B)

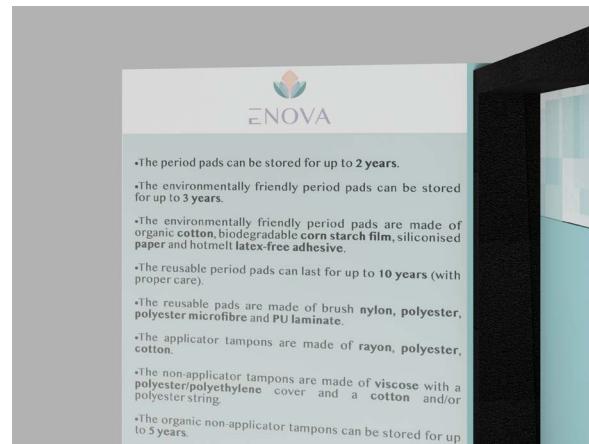


Figure 178: Internal Brand Final Prototype

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4.2. Prototyping Strategy

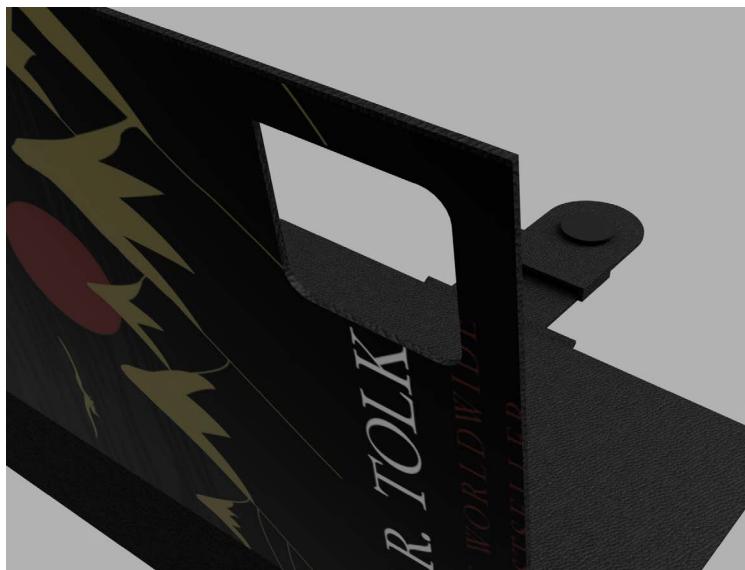


Figure 179: Final Prototype Jacket Slot

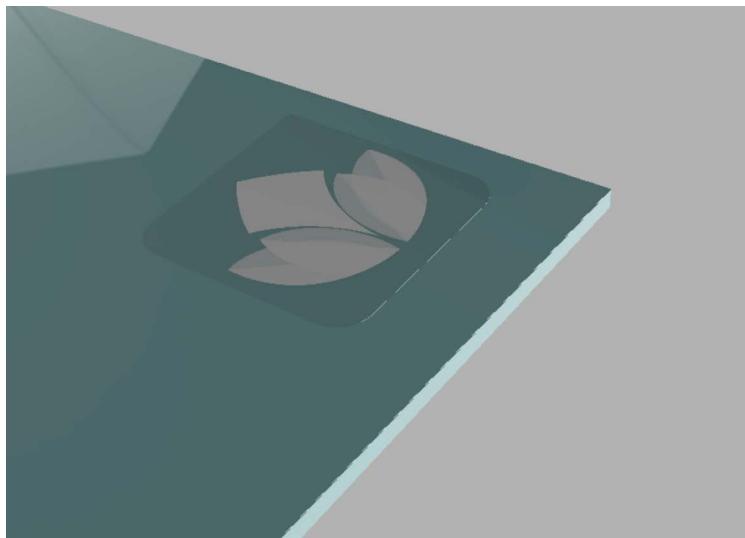


Figure 180: Final Prototype External Logo Location



Figure 181: Final Prototype Perspective Angle



Stage 4: DELIVER

4.2. Prototyping Strategy

ENOVA MENSTRUAL CARE PRODUCT STORAGE CASE PROTOTYPE

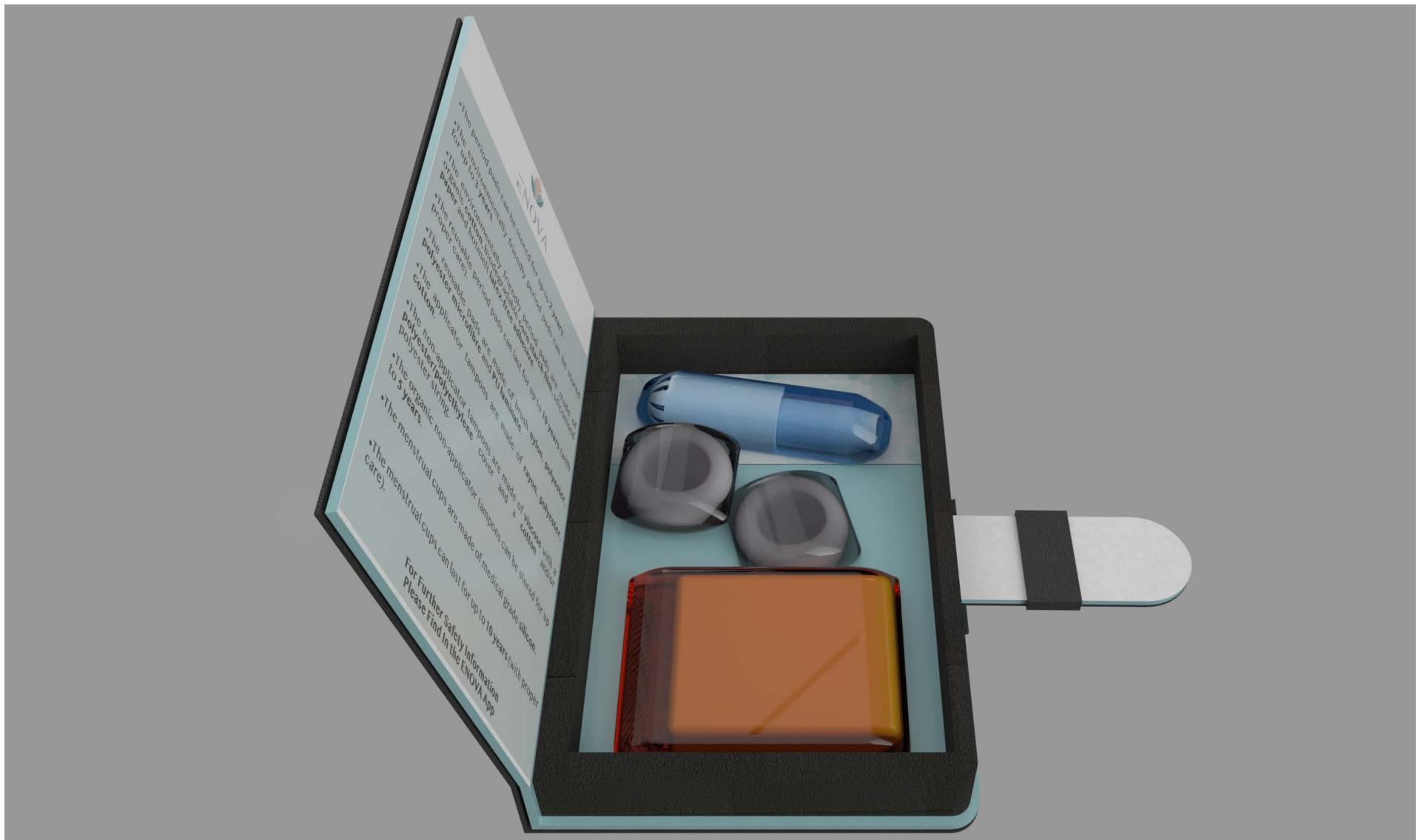


Figure 182: Final ENOVA Case CAD

Stage 4: DELIVER

4.2. Prototyping Strategy

ENOVA APP

Influence

The first step in the prototyping was to conduct research into applications with innovative interactive UI designs and current trends. It was found that among many others, applications with clean pastel backgrounds were considered clean and modern and increasing in popularity.

“ I have to say I love this trend. [Smiling Face with Hearts] I've seen a lot of astounding, lightweight, aesthetically pleasing designs with very delicate, bright pastel color schemes. It makes the designs look very modern, non-intrusive, fresh and delightful...” – UX Collective

Wireframes

The first wireframes were designed digitally (Adobe Illustratior) to get a clear idea of the possible final prototype wireframe plan, and can be found in Appendix 5.3.6. Other – INITIAL WIREFRAMES.

The final prototype plan was also designed on Adobe Illustrator and these

can be found in

Exploring Mockups and Figma

At first, Marvel was to be selected as the prototyping tool to design the final application. This plan was not put into action as the designer also aimed broaden their knowledge and experience using of different app design and prototyping tools. Mockups was chosen as the web tool to create the mockups of the ENOVA app. For the final prototype, the designer transferred to another web-based prototyping tool; Figma.

With no previous knowledge of using Figma, the designer experienced a “learn as you go” phase, often relying on intuitivity and personal exploration. Online videos would be used if a difficult challange was encountered. See video playlist link (https://www.youtube.com/watch?v=inhwbCZLWc&list=PLBb5VxtHK_n8SFemKb3zPU0rW_N3BLYWC)



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4.2. Prototyping Strategy

ENOVA WIREFRAMES – LAUNCH TO HOME FUNCTIONS

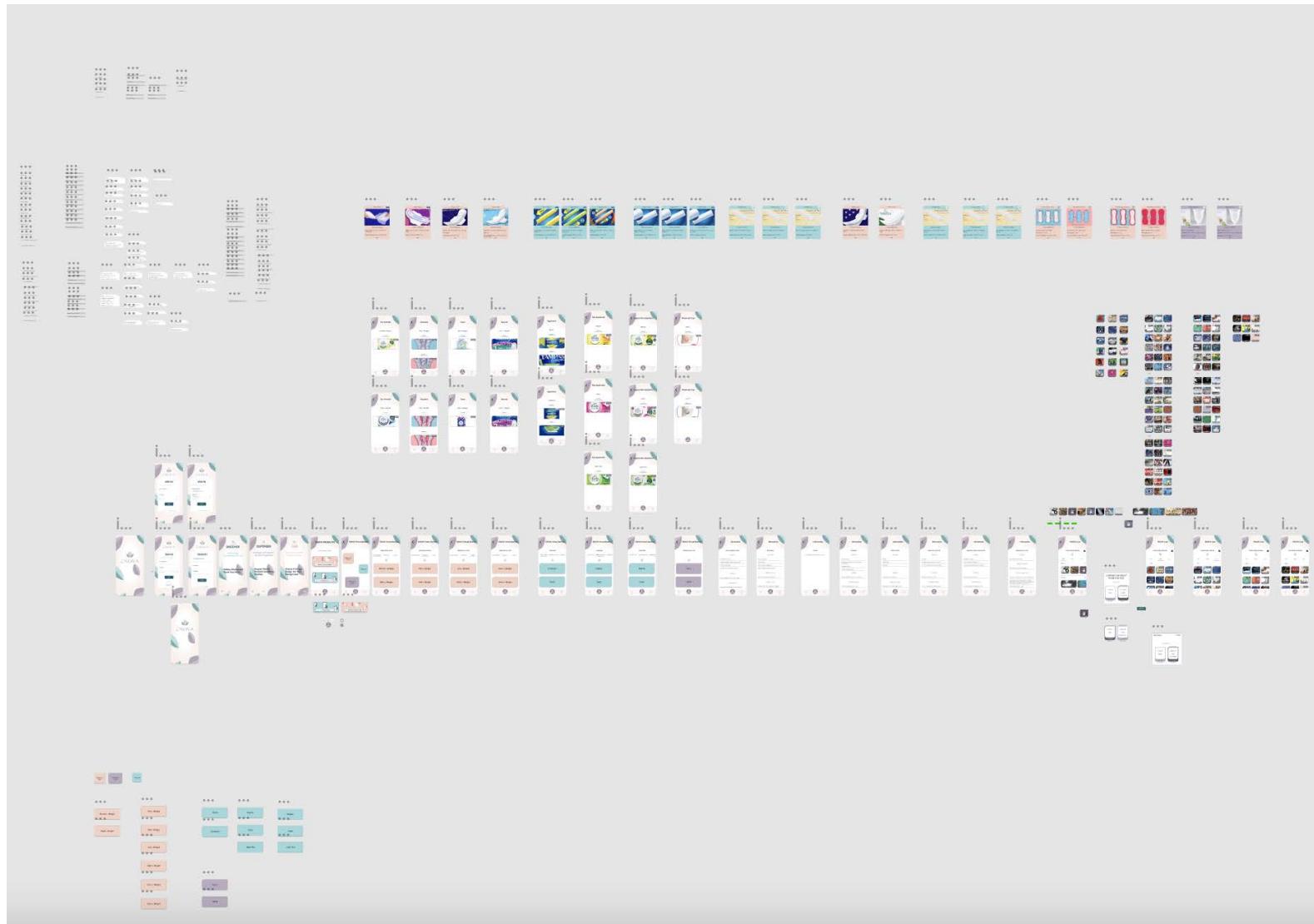


Figure 183: Current Final App Wireframe

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4.2. Prototyping Strategy

ENOVA WIREFRLOW DIAGRAMS– LAUNCH TO HOME FUNCTIONS

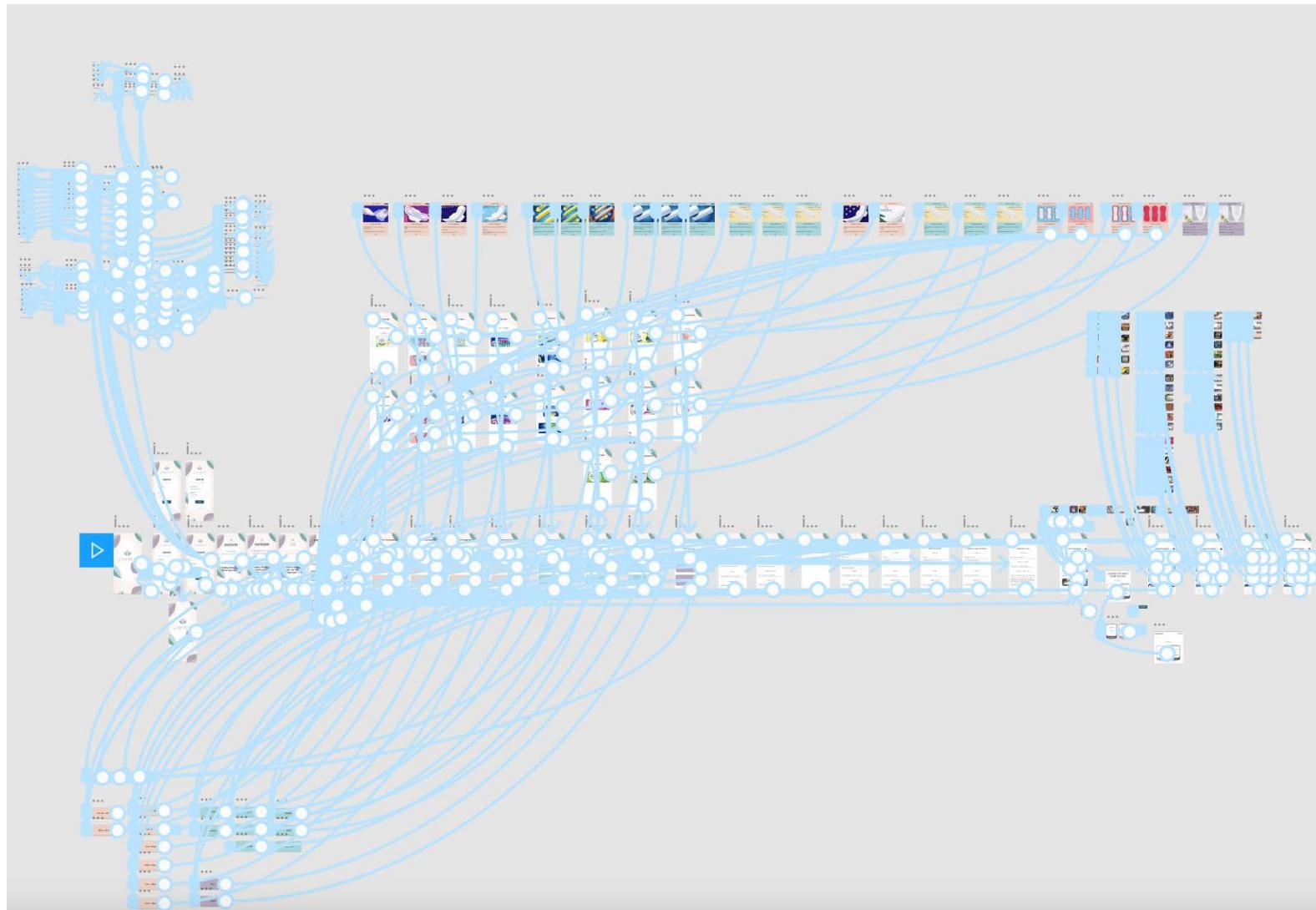


Figure 184: Current Final App Wire-flow



Stage 4: DELIVER

4.2. Prototyping Strategy

Final ENOVA App Walkthrough

A video has been produced to demonstrate the journey from the point of view of a student accessing the application for the first time. It is annotated with information of what actions are being carried out and the functions of elements. See video link (<https://www.youtube.com/watch?v=OIWOaEc2Id4>)



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4.3. Design For Manufacture

4.3.1. Technical Drawing For Manufacture

Refer to Appendix 5.3.3. Technical Drawings.

4.3.2. Bill of Materials

Part Name	Quantity	Material	Process	Cost	Notes
ENOVA DISPENSER					
Body	1	304L Stainless Steel	Bought-in, welded and powder coated	£124.11+	-Matt Finish 1.5MM -STAINLESS STEEL 304-304L SH -Supplied by Metalsupermarkets
Hinge Pin(Rod/Stake)	2	Steel	Made by CNC Machinery and Polished	N/A	-Supplier to be confirmed
Spring Coil	9	Steel Alloy	Bending method and Black Oxide Finish	£149.95	-Supplier by Metals4U
Tray Body	1	Grade A413 9 - Aluminium Alloy	Melted, poured into a mold, bending process to create the tray form	>£20	-Supplier to be confirmed
Servo Motor	9	Mix (Metal and Plastic etc)	Ordering in, solder,programme	£33.12	- Supplied by AliExpress
LCD1602 Module	1	Mix (Metal and Plastic etc)	Ordering in, solder,programme	£6.59	- Supplied by Amazon
GM65 Barcode & QR Scanner Module	1	Mix (Metal and Plastic etc)	Ordering in, solder,programme	£13.33	- Supplied by Semoic
Tubular Cam Lock	2	Zinc Alloy with Black Finish and Steel	Ordering in, Metalwork and Attach	£19.64	-Supplied by Amazon and Modific
Tray Suspenders (Brackets)	1	Steel	Ordering in , Casting	>£20	-Supplied by Marketplace
Plexiglas (Acrylic)	2	Plexiglass(Acrylic)	Ordering in	£4.06	-Supplied by Displaypro
Camlock Locker	2	Stainless Steel Flat Bar 304	Ordering in, Cut, hole	£4/96	-Supplied by Metalsupermarkets
Camlock Locker Pin(Rod/Stake)	2	Steel	Made by CNC Machinery and Polished	N/A	-Supplier to be confirmed
Cost				£395.76	
ENOVA CASE					
Case Body (Velcro)	1	Greyboard sheet	Ordering In, Cut, attached with adhesives	£17.99	- Supplied by Protectafile
Case Foam Boarder	1	Hook and Loop attach Sheet	Ordering in, Cut, attached with adhesives, sew	£12.87	- Supplied by On1shelf
Faux Leather	1 (Made to Request)	HDPE Foam	Ordering In, Cut, attached with adhesive	N/A	- Supplier To Be Confirmed
Disc Ceramic Magnet	1	PVC face and polyester backing	Ordering in, Sew	£19.50	- Contrado
Sheet Magnet	1	Ceramic		£0.76	-Magnetshop
				£6.95	-Supplied by The Magnet Shop
				£58.07	-Receptive
Total Cost				£453.83	

Figure 185: Dispenser and Case Bill of Materials

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4.4. Testing and Evaluation

4.4.1 Evaluation Planning

This aspect of the design journey shows evidence of a well-planned, critical, and rigorous evaluation process.

The best method to test the ENOVA multiproducts would be in a location, for example a secondary school in London, by users that are the same or of similar demographics as the intended target users. Due to current restrictions implemented as a result of the COVID-19 pandemic, this will not be achievable as many educational institutions have adapted to this unforeseen measure and shifted to digital teaching. Brief deliverables require digital prototypes rather than physical. To overcome this, the evaluation will have to be conducted at home with students of similar age groups. The ENOVA App however, may be tested.

Evaluation Points:

- » Does the Case withstand in transportation with no damage?
- » Is the App easy to navigate through?
- » Can the Case be easily accommodated within a backpack?

- » Does the App appeal to the age group?
- » Does the Case minimize embarrassment?
- » Does the App make the user more open to discuss periods and surrounding topics?

Tests To Be Conducted

- » Feedback from students point of view on the appearance and the app interface.
- » Feedback from student point of view regarding the interconnectivity of App and Dispenser.
- » Feedback from the student on the aesthetic, shape and features of the Case product.

Necessary Resources

A gender mix of students including girls, non-binary and transgender learners who have and do not periods, as well as boys. This is because the ENOVA Dispenser is designed to facilitate the distribution of menstrual care products-



Stage 4: DELIVER

4.4. Testing and Evaluation

used by those that need them. Whereas the App allows socialisation between all students whether or not they experience periods, as a means to normalise period discussion, educate and relate, helping eliminate a branch of contribution to period poverty.

A range of state funded primary and secondary schools in London to present product and receive feedback.

FEEDBACK

Student Feedback 1-

Age: 18

Gender: Female

This volunteer stated that the app had a pleasing appearance “very soft and feminine”. They are unsure whether the social feature should be within the same application “could create two apps instead, one with for people to socialise and the other for information and the request function”.

Student Feedback 2-

Age: 15

Gender: Male

This student commented about the app, “male individuals may feel like it’s not their place to discuss periods but the girls might like it. The vending machine [Dispenser] looks compact and useful for that environment”.

Student Feedback 3-

Age: 11

Gender: Female

“I really like the jackets with the different book designs. The App subscriptions are also cheap so it’s good for young people and students”. It was also mentioned that the ENOVA Case material could be more durable and there could be an option for metal or card cases. They would use the dispenser if it were available in the school.

Student Feedback 4-

Age: 22



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4.4. Testing and Evaluation

Gender: Female

When asked for feedback on the application after prototype use, they stated that the interface is very simple to what one would find in any app today, "gestures make it is easy to navigate and I didn't need to guess what the icons and their functions were.

When asked about the ENOVA Case as an additional product, the student commented, "I personally wouldn't use the case as I feel that i have surpassed the age where people tend to care about hiding period product, but I can imagine that it may be useful for people that are young and perhaps have not still feel the stigma attached to period products."

Student Feedback 5-

Age:22

Gender: Female

The student expresses interest in the dispenser and application and would be curious to trial the physical prototype. It was mentioned that the product appears to have durable materials and high quality finish.

User (Teacher)

Age 28

Gender: Female

The user does not believe that a state funded school would be able to afford the dispenser especially as a batch, however the app and case could still be made available to students as it is free. "The schools that are lucky enough to be able to buy the period product dispensers, I think that it is a good way to make sure that those students from disadvantaged backgrounds can stay in school, have these essential products so easily available, get their education and have the same opportunity to as every other student".

It was mentioned that the disposal method was useful as it would take the load off the school's responsibilities.

Student Feedback 7-

Age: 13

Gender: Male



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4.4. Testing and Evaluation

The student would not purchase the ENOVA Case for the purpose of storing period products, but for other items. The different key stage book recommendation was also a useful element. "The app could be more interactive with things like the Snapchat reload function. But the app looks nice and clean".

User 8-

Age: 31

Gender: Female

The user would definitely consider the ENOVA Case, "It looks eco friendly and it's good because people are all about sustainability nowadays". It was mentioned that products have a unique theme, all following the same colour [palette]. The card ID card is a good addition as students may not have access to their mobile phones for many reasons e.g. school restrictions, low battery, lost or stolen etc. "The included social media and technology, that is already popular with young people, would mean that the dispenser and app are more appealing and more people will want to use it".

Age: 33

Gender: Male

The user stated that "having a multi product under one brand is a good idea as it makes it easier to generate reperative purchase when users have had a positive experience with, aspects such as material quality, ethics and appearance of a products, of one purchased product. They stated that the price of the Case available for purchase versus the price to produce could be re evaluated because it would means that there is no profit being generated. This user would like to see the dispenser in other public spaces.

4.4.2 Evaluation against PDS

See Figure 186: Table of PDS Evaluation (A) and Figure 187: Table of PDS Evaluation (B).

User 9-



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4.4. Testing and Evaluation

PDS Criteria	Test/ Evaluation	Achieved Critria	Further Development Required	Note
Performance	The ENOVA dispenser will have a multi column that dispenses 22 different products, from 3 different collection methods and 8 products subcategories.	No	Yes	It offers 9 different sections for a total of 81 products
Environment	The unit dispenser unit will be placed within the schools premises. Operation must also be tested.	Yes	Yes	
Life in service	The scanner is disabled once the unit dispenser becomes unavailable.	Yes	Yes	
Maintenance	The unit will be designed for easy disassembly. The built-in durability of the dispenser material will reduce the need for long-term maintenance and cleaning costs.	Yes	Yes	
Target Product Cost	State funded schools will not want to pay £218 per dispenser unit	No	Yes	The cost to manufacture is greater than the selling price
Competition	IoT Dispensers. No multiproduct	Yes	Yes	
Shipping	The unit will not disassemble for transportation. (Please refer to PDS)	No	No	No unit will arrive disassembled
Packing	Each dispenser has a protective layer made form EPS.Excessive packaging will not be exercised. (Please refer to PDS)	Yes	Yes	
Manufacturing Facility	The factory must be producing goods or products that are very similar to the unit, in order to better understand the target market.Electrical components used in the unit, will be purchased from external manufacturers.	Yes	Yes	
Quantity		Yes	Yes	
Size	The actual size of the dispenser is 410mm x 485mm x 285mm (W x H x D)	No	Yes	The dispenser exceeds the intentioned size. It may have to increase if it is to store 22 different products
Weight	Based on the weight of similar existing products when empty, the unit must not exceed a total weight of 18kg.	Yes	Yes	
Aesthetic, Appearance and Finish	-The dispenser will follow the same shape as the ENOVA App buttons; displaying three round edges and a single 90 degree edge. -The dispenser exterior will display laminated stickers for brand and product instructions. -The dispenser will be designed with a range of unisex pastel colours.	Yes	Yes	It has a mix of feminine and masculine pastel colours. Feedback has shown that it was still too feminine and masculinity must be highlighted more
Materials	The unit will be primarily made from 1.2mm powder coated 304 antibacterial stainless steel external, to reduce opportunity for vandalism.	Yes	Yes	Cheaper materials must be considered
Standards and specifications	The product conforms to EU and international standards,ISO 9001:2015	Yes	Yes	
Ergonomics	-The dispenser will not require any physical input from the end user. -The location of the components such as the scanner, must be placed at the appropriate distance from each other for the users to navigate with ease.			
Customer and User	Potential expansion could see this multi product or the physical unit being used not just in educational spaces, but also in businesses, transport, retail and leisure spaces.	Yes	Yes	Users are happy to use the dispenser in other environments

Figure 186:Table of PDS Evaluation (A)



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4.4. Testing and Evaluation

Customer and User	Potential expansion could see this multi product or the physical unit being used not just in educational spaces, but also in businesses, transport, retail and leisure spaces.	Yes	Yes	Users are happy to use the dispenser in other environments
Quality and Reliability	Reliability of bought-in components will be verifying that companies meet reliability goals numerically rather than qualitatively to make sure that the electronics are being managed and are able to provide reliability specifications.	Yes	Yes	User mentioned that the dispenser was sturdy and good final quality
Processes of Manufacture	The manufacturing includes all of the mentioned processes	Yes	Yes	
Time scale	Pre- production prototype	Yes	Yes	

Figure 187:Table of PDS Evaluation (B)



Stage 4: DELIVER

4.5. Conclusion and Recommendations

4.5.1. Conclusion

At the beginning of the project, the designer was primarily focused on designing a physical product that they believed a group of people from countries in the developing world. As the project evolved the designer was able to shift this target and rather focus on challenges that are still present in their location and design for what those users need. By doing this, the products could be modified, appeal and applied in less economically developed countries as they also strive to progress.

This project has allowed the various processes of design, including UX and UI principles, Computer Aided Design, Computer Aided Manufacture, human-centred design and prototyping to be exercised.

Overall this has been a great project with a number of opportunities in the form of challenges to which the designer has learnt from. A series of trial and error forced the exploration beyond their comfort zone, with a range of prototyping tools; Figma and MoqUp, that had not been previously used and the designer possessed very little understanding of. In the end invaluable skills were improved and acquired, that enabled a desired multi product which

answers the brief to be produced. The aim will now be to further improve the application based on the extensive feedback received.

4.5.2. Recommendations

Following the evaluation against the Product Design Specification (PDS), and assuming that there were more time and investment to put towards this project to improve it, the designer recommends gathering a wider pool of volunteers from various backgrounds to test the prototypes. The products could also be manufactured and installed in a real life environment point of need, where users can utilise the product, obtain the menstrual products and comment on overall experience. This will help collect data of the number of people that made use of the dispenser. Expanding the targets of the dispenser as it would also be beneficial in washrooms within Universities, private businesses and leisure centres.

The designer also recommends developing the App by exploring and implementing innovative interactive UI designs.

Lastly, the selling price per ENOVA Case jacket compared to the cost of



Stage 4: DELIVER

4.5. Conclusion and Recommendations

manufacture also requires evaluation to allow profit to be generated, raising the price of the per unit would guarantee this.





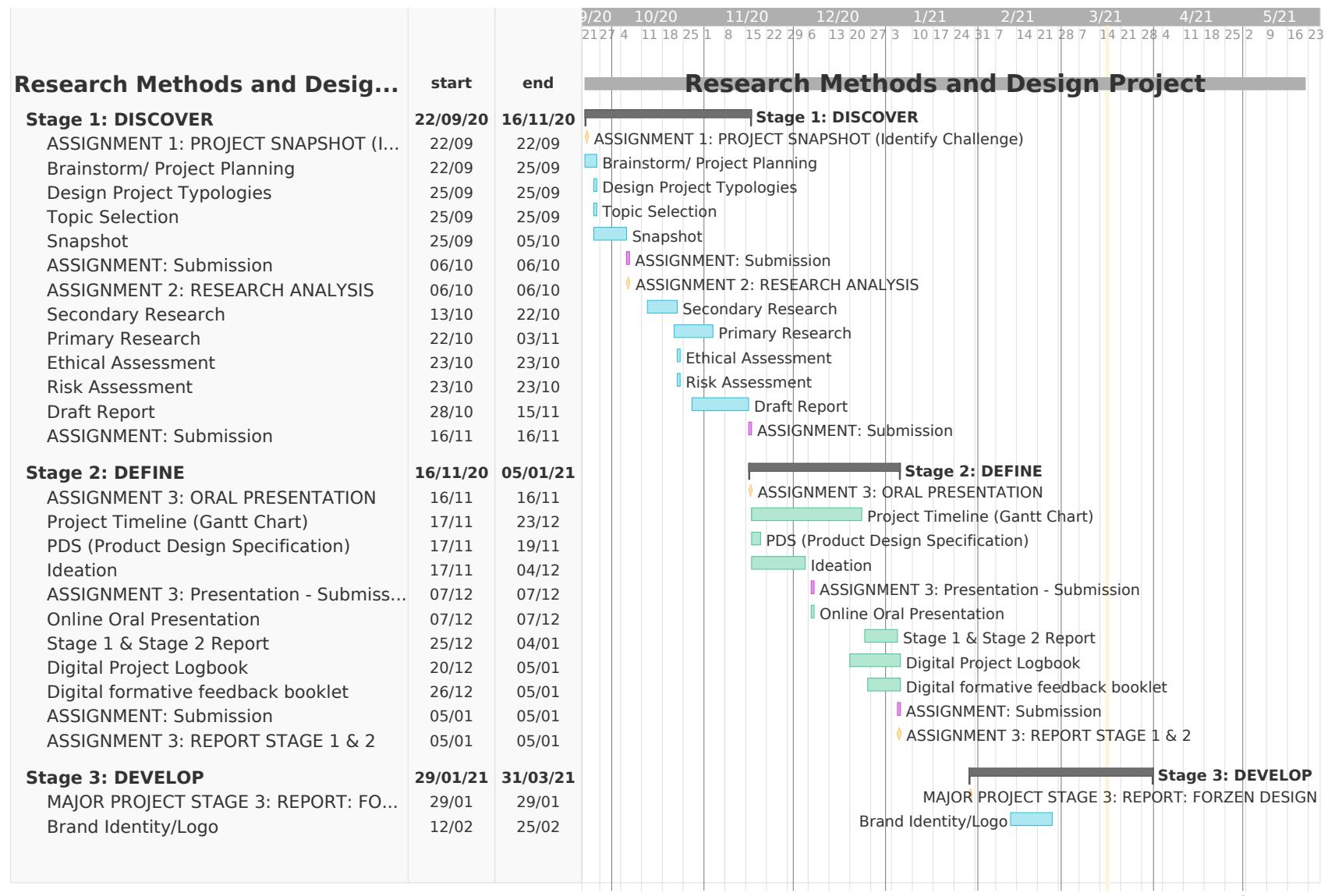
STAGE 5

OTHER

APPENDIX

5.3.1. Project Timeline (Gantt Chart)

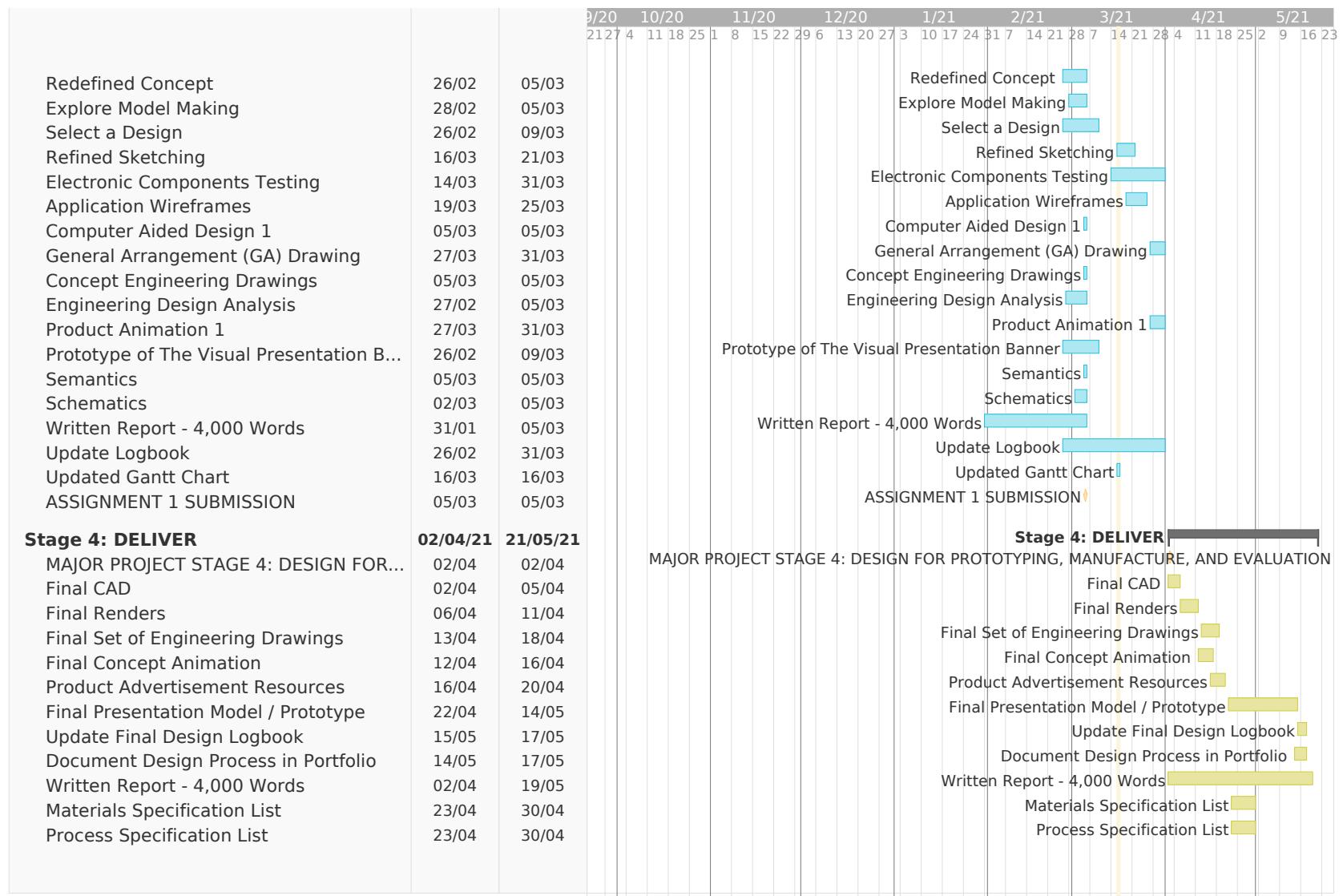
UPDATED GANTT CHART: PART I



APPENDIX

5.3.1. Project Timeline (GantChart)

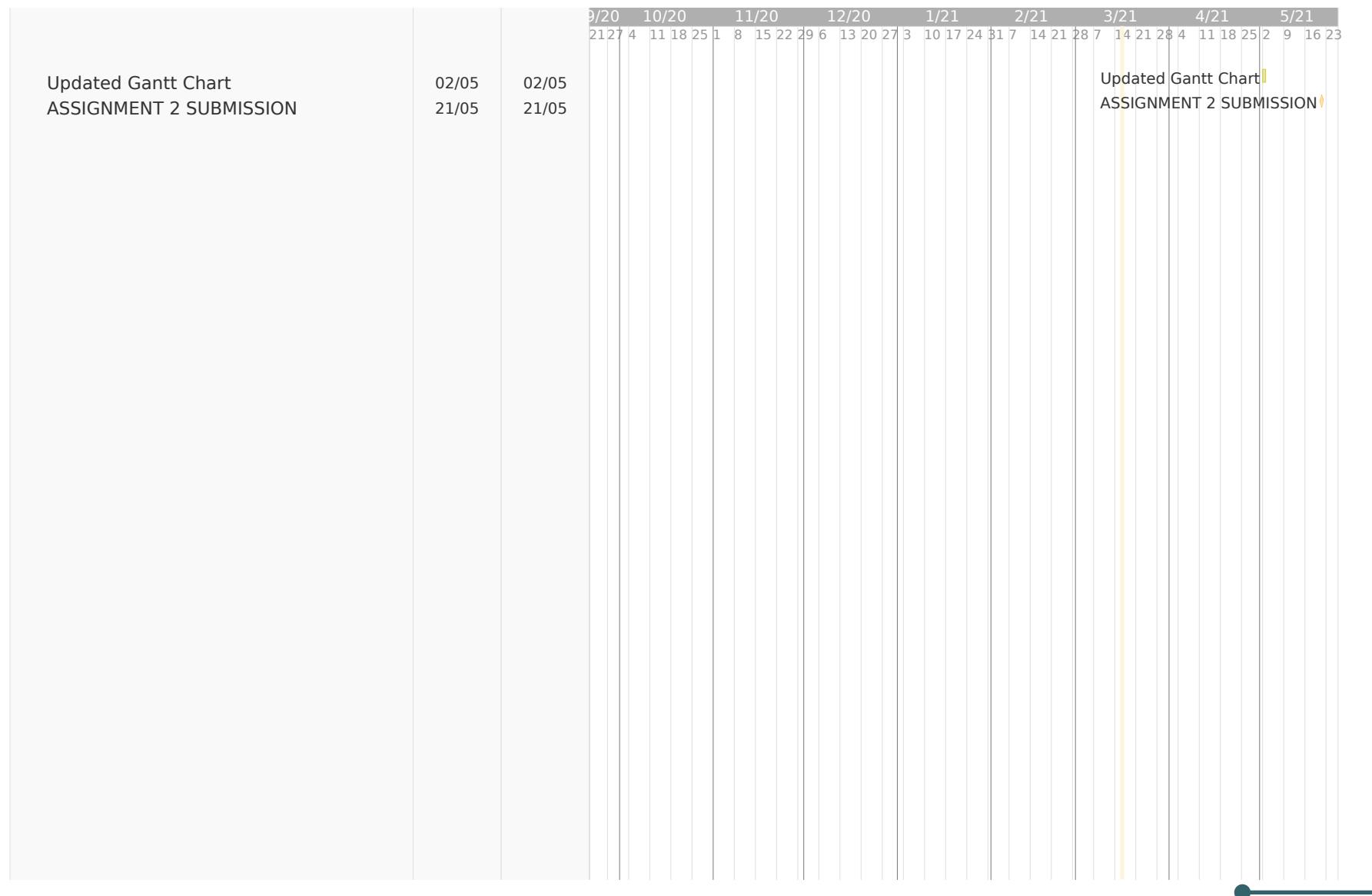
UPDATED GANTT CHART: PART 2



APPENDIX

5.3.1. Project Timeline(*GantChart*)

UPDATED GANTT CHART: PART 3



APPENDIX

5.3.2. Research Material

USER PROFILE

Demographics

Name: Note: can be fictitious	Rachel Adamu
Age range:	17 (10-24)
Gender:	Female
Ethnic origin:	Black African
Location:	UK (London)
Marital status/ family: (State if children and how many)	Single

Social economic status

Occupation / experience: Current job / responsibilities / previous experience	Previously Part Time Retail Assistant
Education:	Full Time College Student
Annual income range:	N/A
Ethnic origin:	Black African
Digital literacy:	Knowledgeable in the digital field

Physical and personality traits

Relevant physical details: State limitations / disabilities	N/A
Preferences:	Attend classes online rather than physically
Goals:	Become a financially stable adult through her passion for Forensic science

APPENDIX

5.3.2. Research Material

RESEARCH PLAN

Student name:	Carla Sofia Moreno Lima
Module:	Research Methods For Design Projects
Date:	13/10/20

Topic/ challenge:	Period Poverty and Gender Equality
Users:	Young Women aged 10-24

Research purpose

The purpose of the research is to gather existing data as well as primary in order to have a better understanding of how women in vulnerable situations can be empowered in education. The design proposal and development at stage 2 and 3 will then be based on the information collected further support the understanding of the context.

Research questions (Primary)

- How old are you?*
- How familiar are you with the term period poverty?*
- Do you or does someone you know experience period poverty?*
- Do you believe that women and men are given the same opportunities?*

Research questions (Secondary)

- How many school age girls miss school due to not being able to afford sanitary products?*
- What can be done to decrease gender gap in the workplace?*
- What is the difference in percentage of how much men and women earn today?*



Online Survey Topic: Period Poverty and Education

Online Survey Question: Does period poverty stagnate progress in education for young women in the UK?

Attempt Number: 1 (Original)

Questions and Answers

Q1 - What is your age?

What is your age?

Answered: 4 Skipped: 0



Q2 - What is your gender?

What is your gender?

Answered: 4 Skipped: 0

“Female”

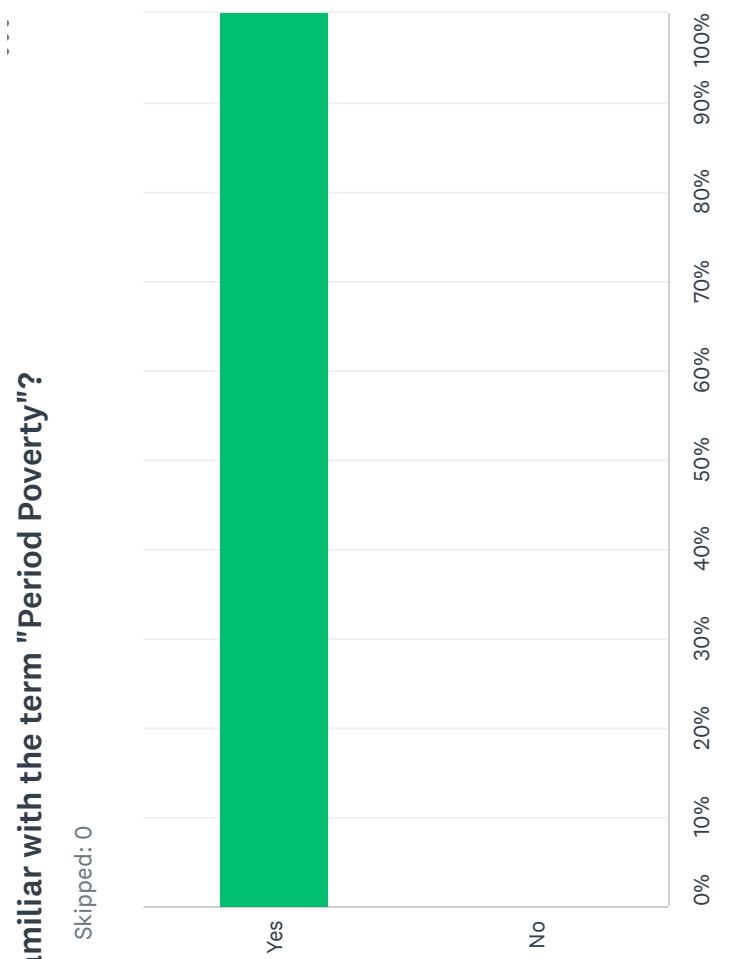
APPENDIX

5.3.2. Research Material

Q3 - Are you familiar with the term “Period Poverty”?

Are you familiar with the term “Period Poverty”?

Answered: 4 Skipped: 0

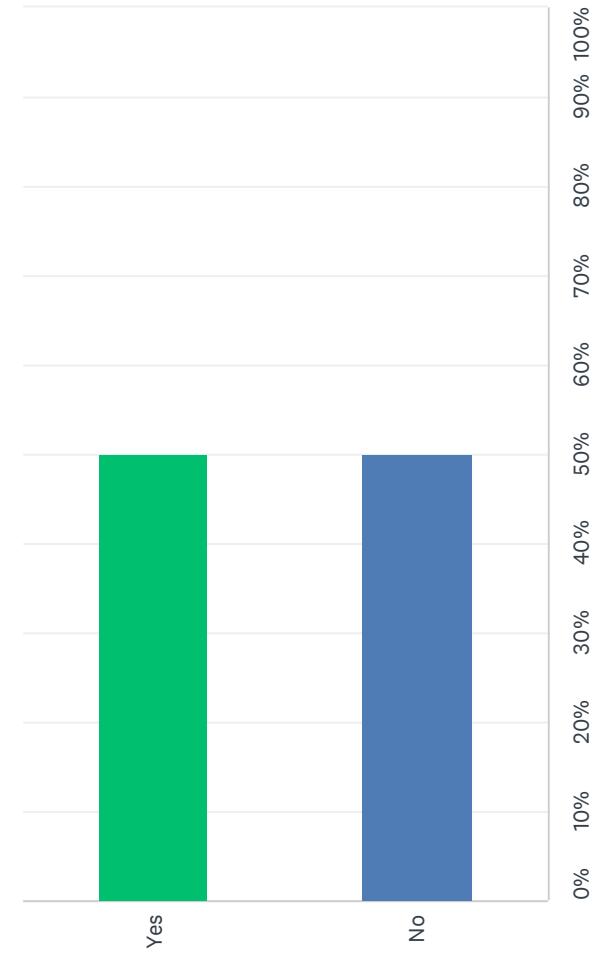


INITIAL SURVEY RESULTS

Q4 - Have you ever experienced period poverty? (The lack of access to adequate menstrual hygiene tools, washing facilities, and waste management, caused by financial constraints.)

Have you ever experienced period poverty? (The lack of access to...

Answered: 4 Skipped: 0



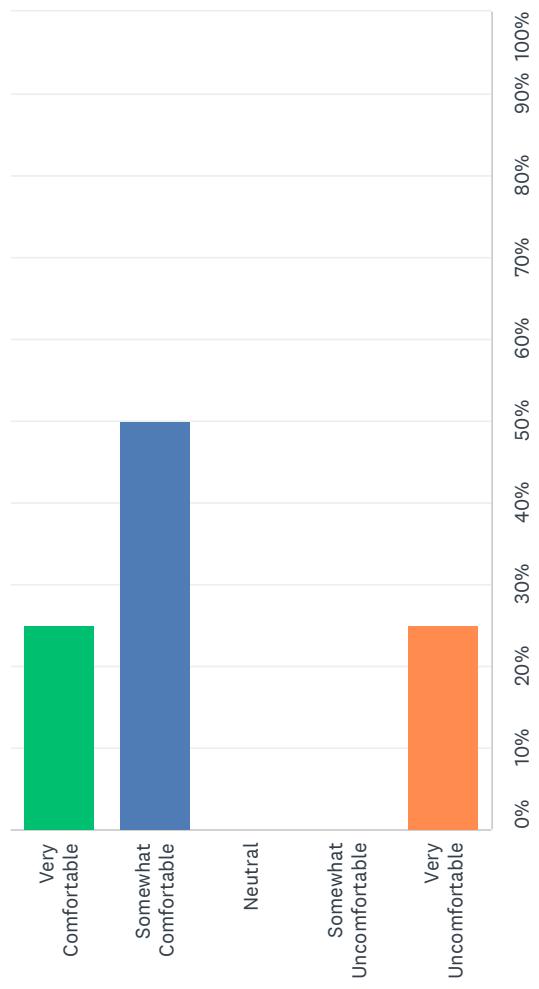
APPENDIX

5.3.2. Research Material

Q5 - In general, how comfortable are you discussing the topic of menstruation?

In general, how comfortable are you discussing the topic of mens...

Answered: 4 Skipped: 0

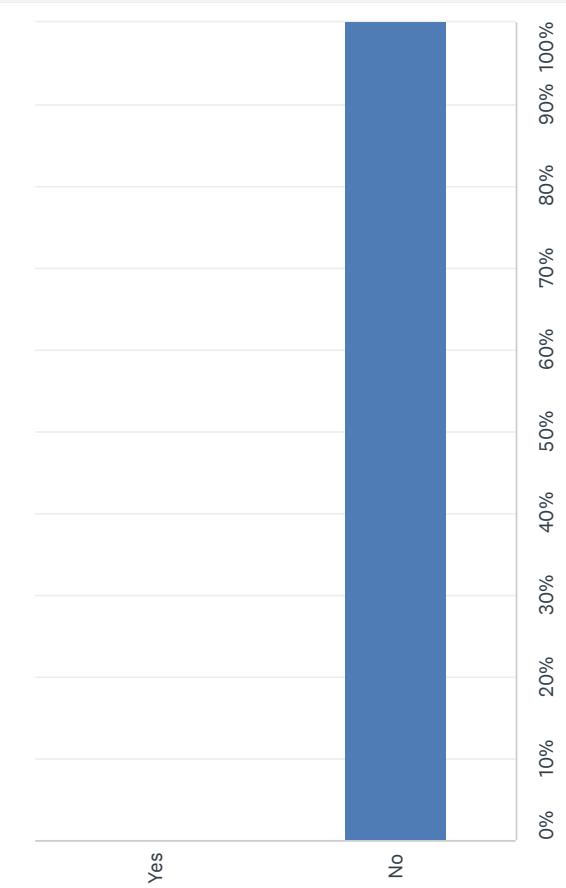


INITIAL SURVEY RESULTS

Q6 - Do you feel that students are taught enough about menstruation in schools?

Do you feel that students are taught enough about menstruation ...

Answered: 4 Skipped: 0



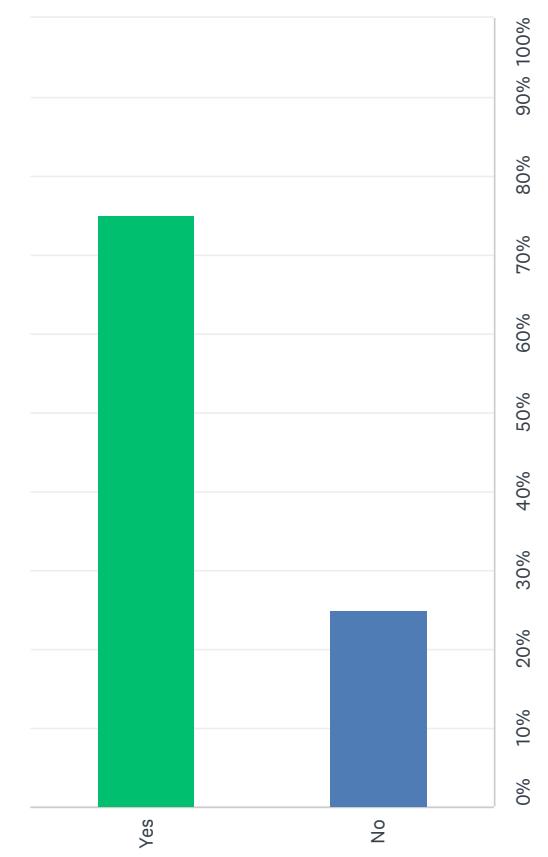
APPENDIX

5.3.2. Research Material

Q7 - Do you feel that menstrual hygiene products are easily affordable?

Do you feel that menstrual hygiene products are easily affordable?

Answered: 4 Skipped: 0

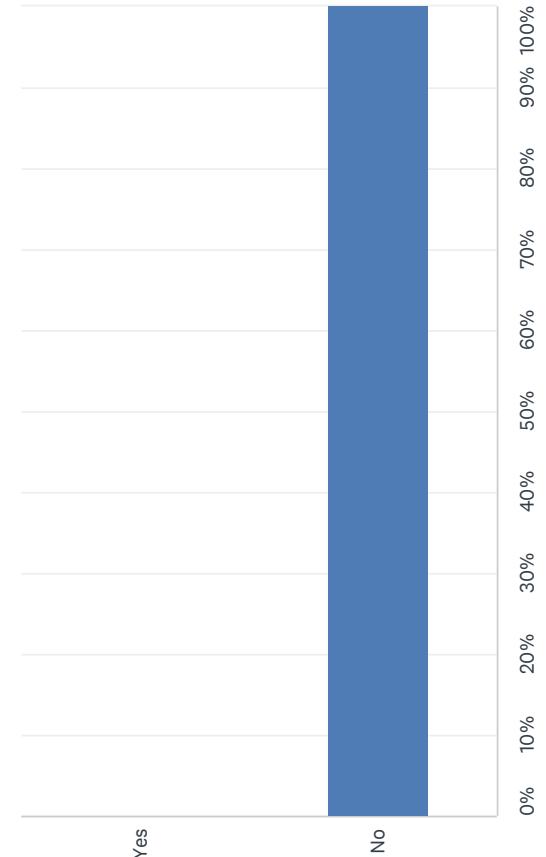


INITIAL SURVEY RESULTS

Q8 - Has the lack of access to menstrual hygiene products prevented you from attending school/education?

Has the lack of access to menstrual hygiene products prevented ...

Answered: 4 Skipped: 0



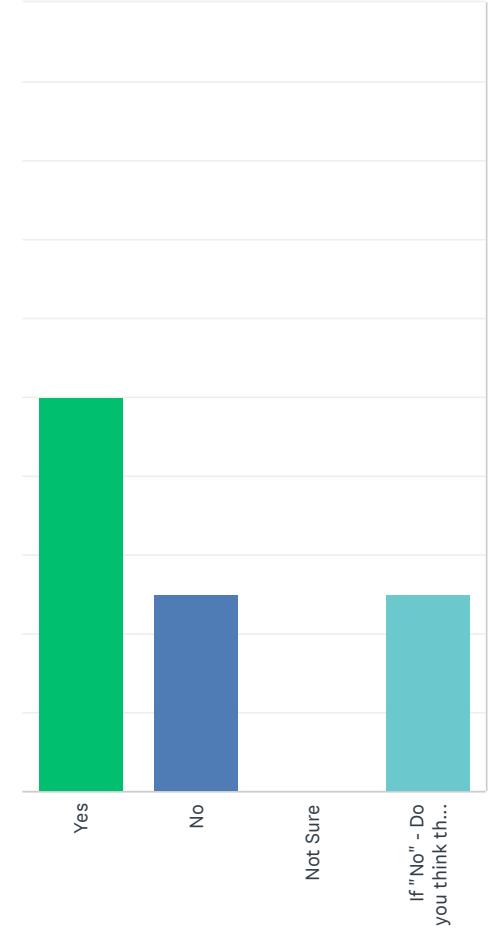
APPENDIX

5.3.2. Research Material

Q9 - Does your education institution provide free menstrual hygiene products to students?

Does your education institution provide free menstrual hygiene p...

Answered: 4 Skipped: 0

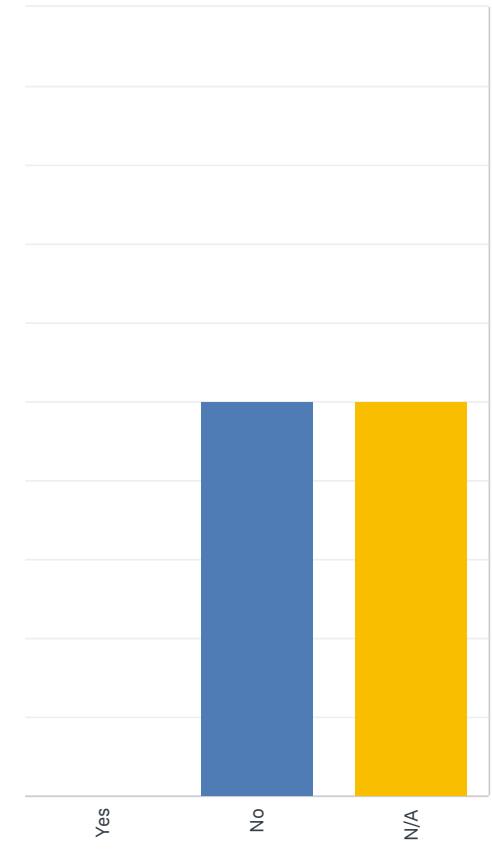


INITIAL SURVEY RESULTS

Q10 - If you selected "Yes" to question 9 - have you used the support?

If you selected "Yes" to question 9 - have you used the support?

Answered: 4 Skipped: 0



APPENDIX

5.3.2. Research Material

INITIAL SURVEY RESULTS

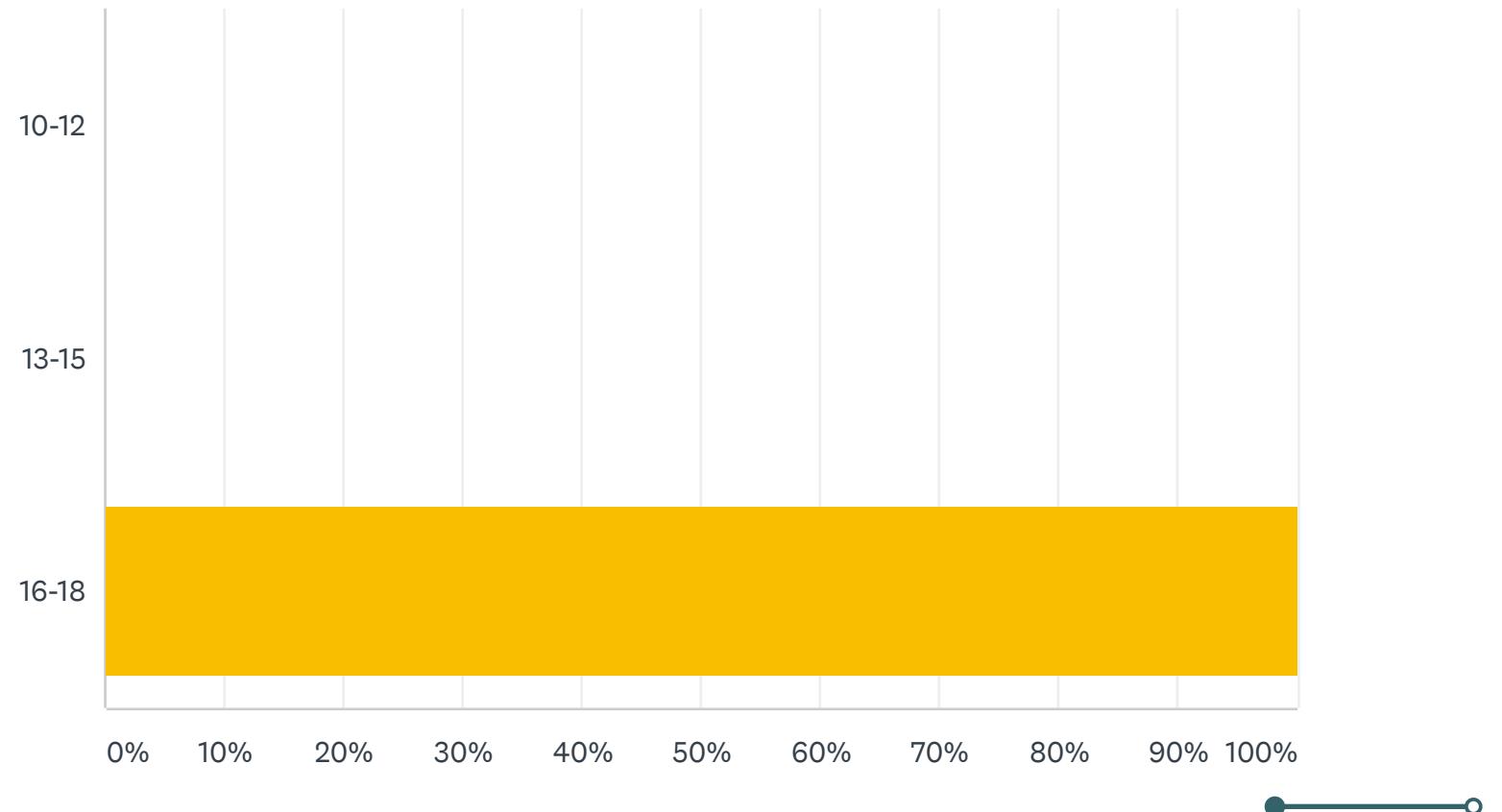
Q1 - What is your age?

Online interview: Menstruation Stigma and Gender Equality Questionnaire

Question: Does the stigma of menstruation hinder gender equality in the UK?

What is your age?

Answered: 1 Skipped: 0



APPENDIX

5.3.2. Research Material

INITIAL SURVEY RESULTS

Q2 - What is your gender?

What is your gender?

Answered: 1 Skipped: 0

“Female”



APPENDIX

5.3.2. Research Material

INITIAL SURVEY RESULTS

Q3 - What is your cultural background?

What is your cultural background?

Answered: 1 Skipped: 0

“Somali”



APPENDIX

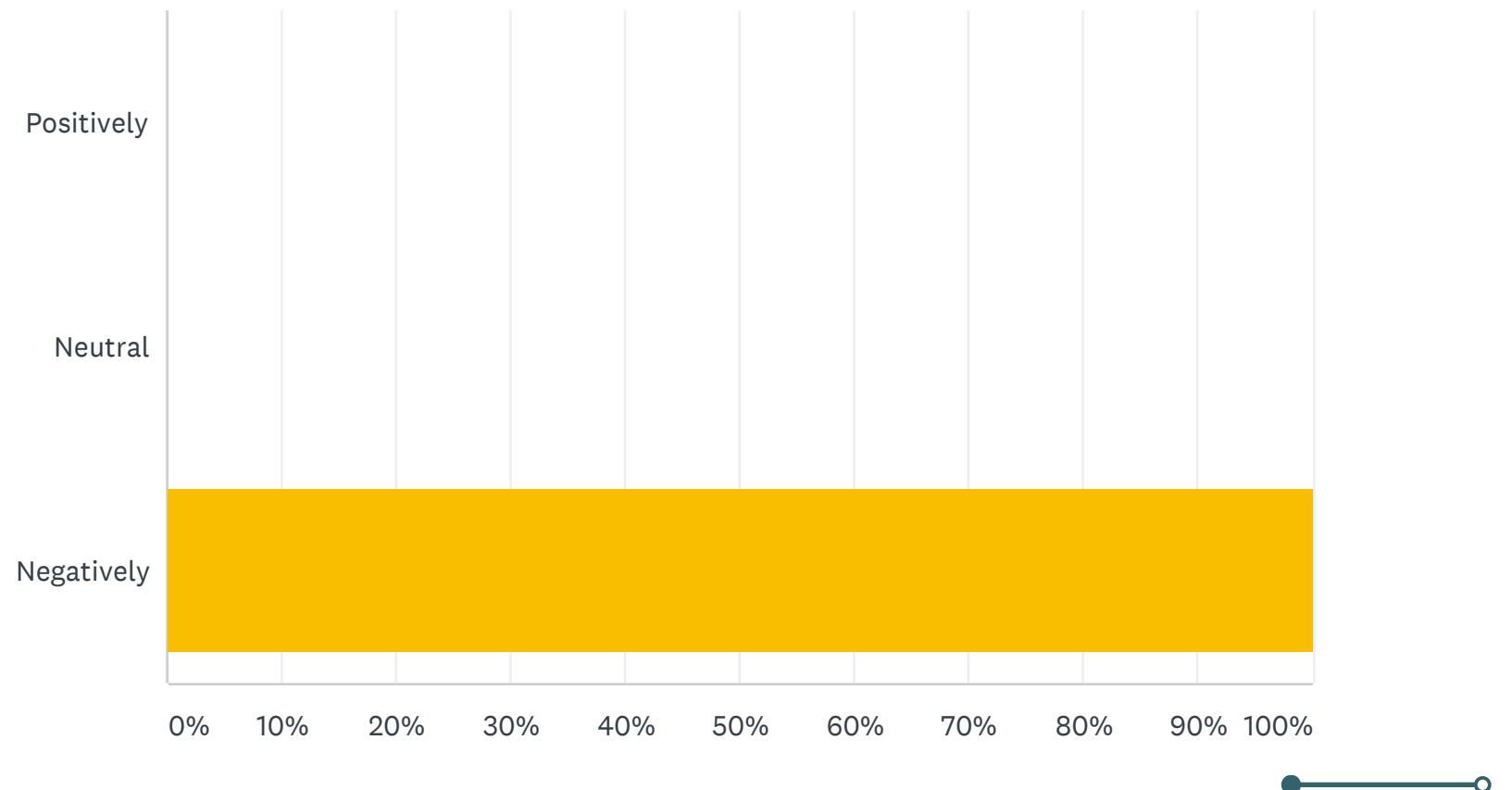
5.3.2. Research Material

INITIAL SURVEY RESULTS

Q4 - How do you think society views menstruation?

How do you think society views menstruation?

Answered: 1 Skipped: 0



APPENDIX

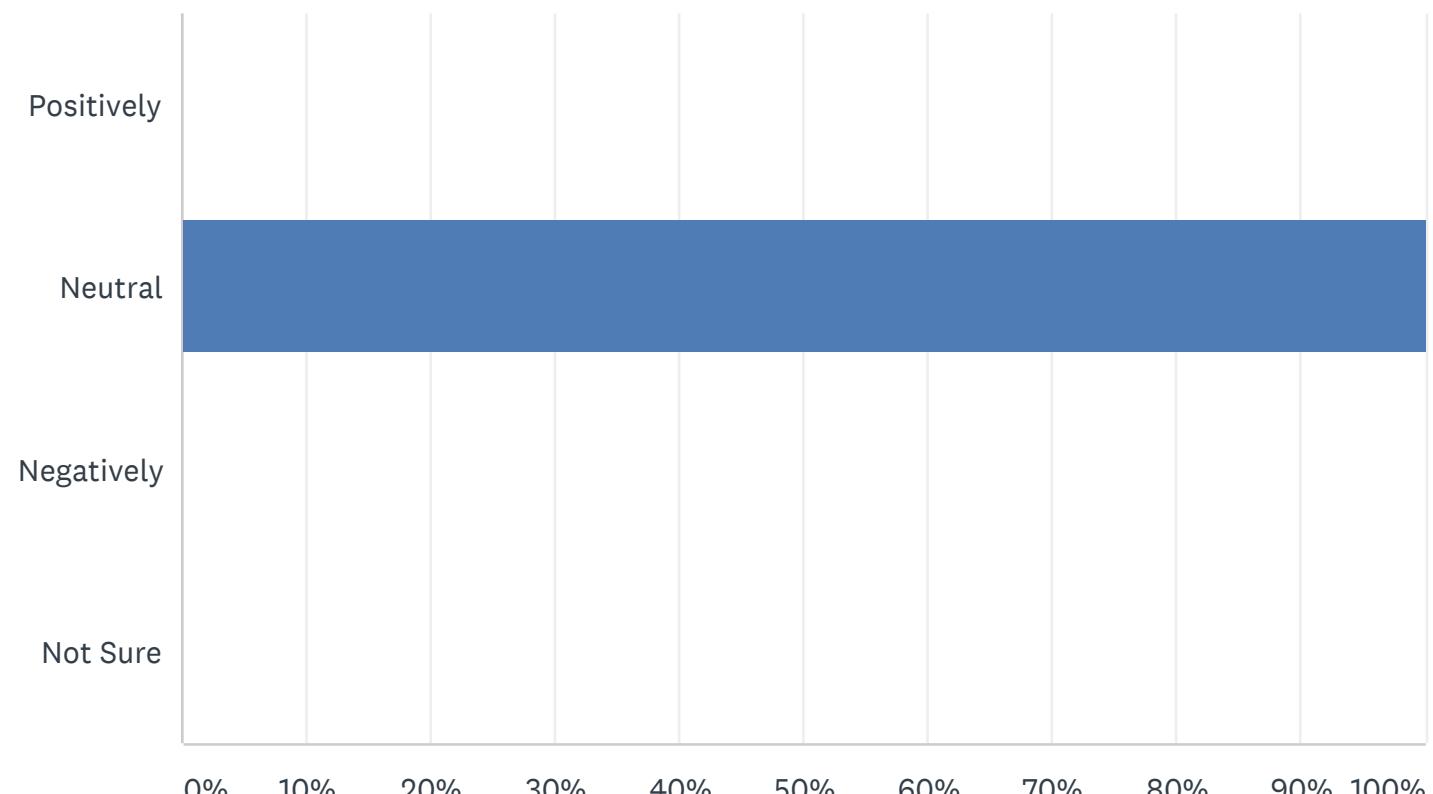
5.3.2. Research Material

INITIAL SURVEY RESULTS

Q5 - What is your attitude towards menstruation?

What is your attitude towards menstruation?

Answered: 1 Skipped: 0



APPENDIX

5.3.2. Research Material

INITIAL SURVEY RESULTS

Q6 - Do you feel that students are taught enough about menstruation in schools?

What do you think has formed your attitude?

Answered: 1 Skipped: 0

“Friends/family school”



APPENDIX

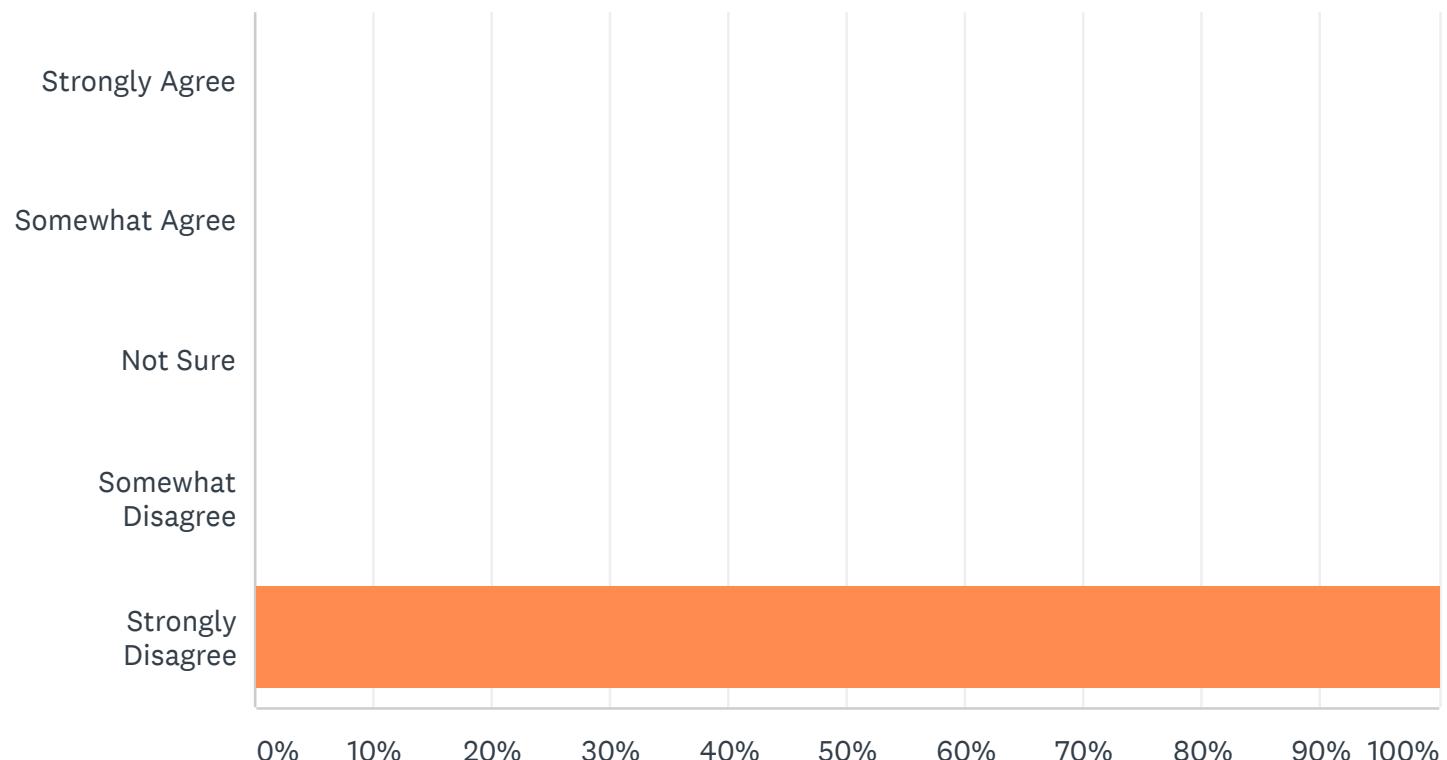
5.3.2. Research Material

INITIAL SURVEY RESULTS

Q7 - To what extent do you agree with the following statement? "Men Feel More Comfortable Discussing Periods Than Women"

To what extent do you agree with the following statement?. "Men..."

Answered: 1 Skipped: 0



APPENDIX

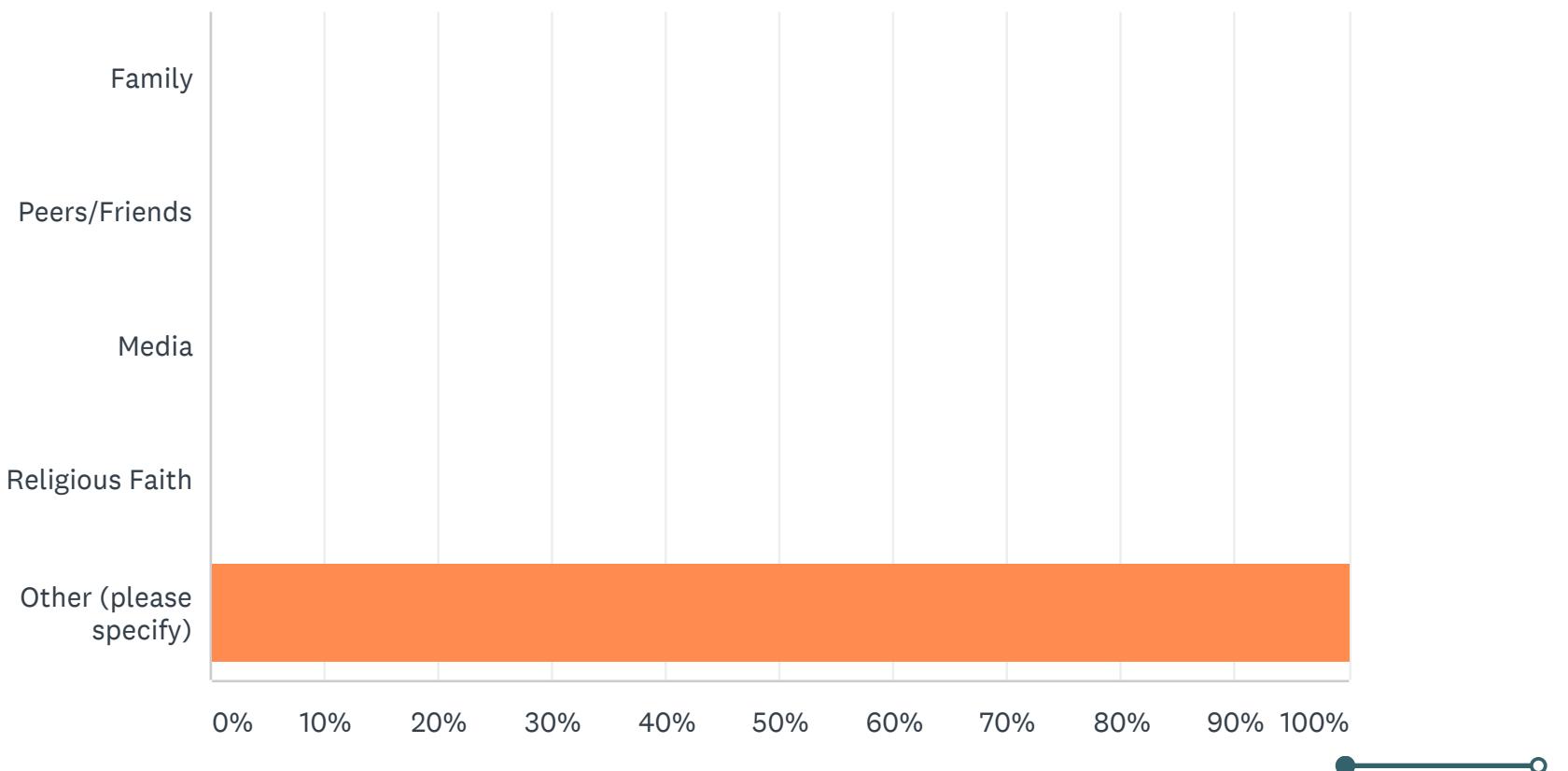
5.3.2. Research Material

INITIAL SURVEY RESULTS

Q8 -Which of the following do you believe is the biggest contributor of menstrual shaming? (The shame and stigma that surrounds menstruation, and associations such sanitary products)

Which of the following do you believe is the biggest contributor o...

Answered: 1 Skipped: 0



APPENDIX

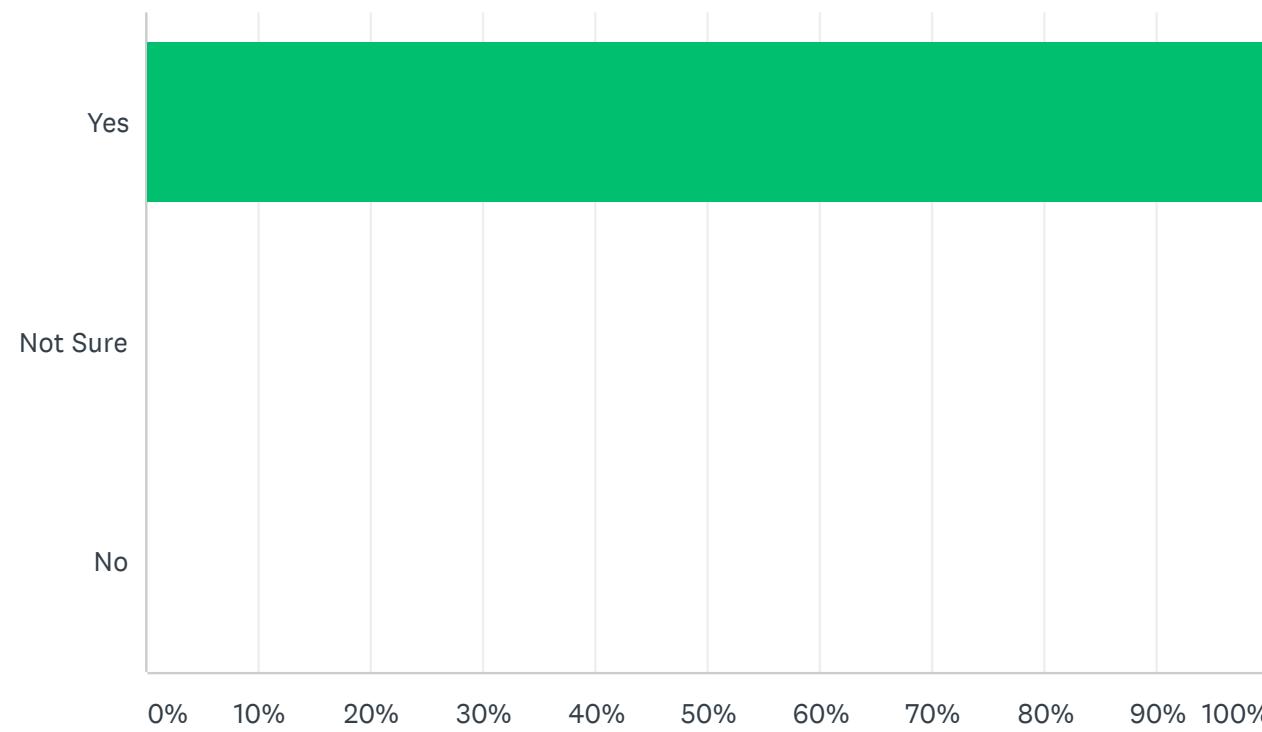
5.3.2. Research Material

INITIAL SURVEY RESULTS

Q9 - Do you believe that shame, stigma and misinformation surrounding menstruation are affecting women's rights negatively?

Do you believe that shame, stigma and misinformation surroundi...

Answered: 1 Skipped: 0



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q1:

Online Survey Topic: Period Poverty and Education

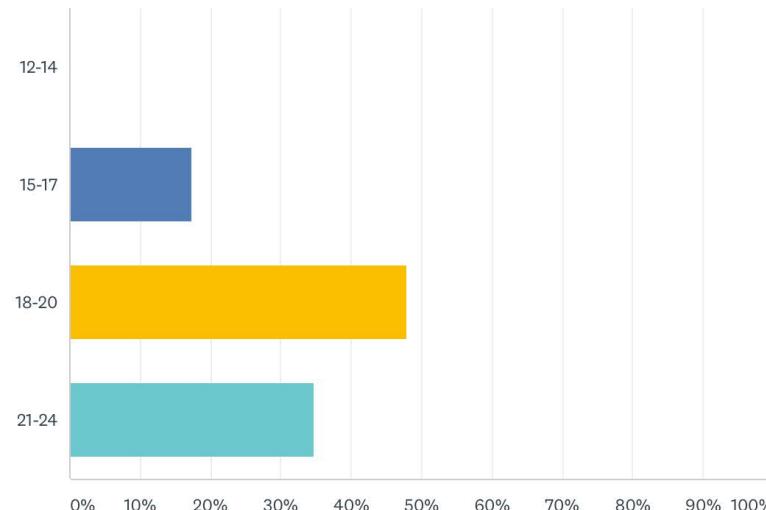
Online Survey Question: Does period poverty stagnate progress in education for young women in the UK?

What is your age?

Answered: 23 Skipped: 0

Attempt Number: 2 (Developed)

Questions and Answers



ANSWER CHOICES	RESPONSES
▼ 12-14	0.00%
▼ 15-17	17.39%
▼ 18-20	47.83%
▼ 21-24	34.78%
TOTAL	23



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q2: 23/23 Female

What is your gender?

Answered: 23 Skipped: 0

RESPONSES (23) WORD CLOUD TAGS (0) 🔒 Sentiments: OFF 

  Filter: by tag▼ Search responses  

Showing 23 responses

<input type="checkbox"/> Female 12/3/2020 10:48 AM	View respondent's answers	Add tags ▾
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APPENDIX

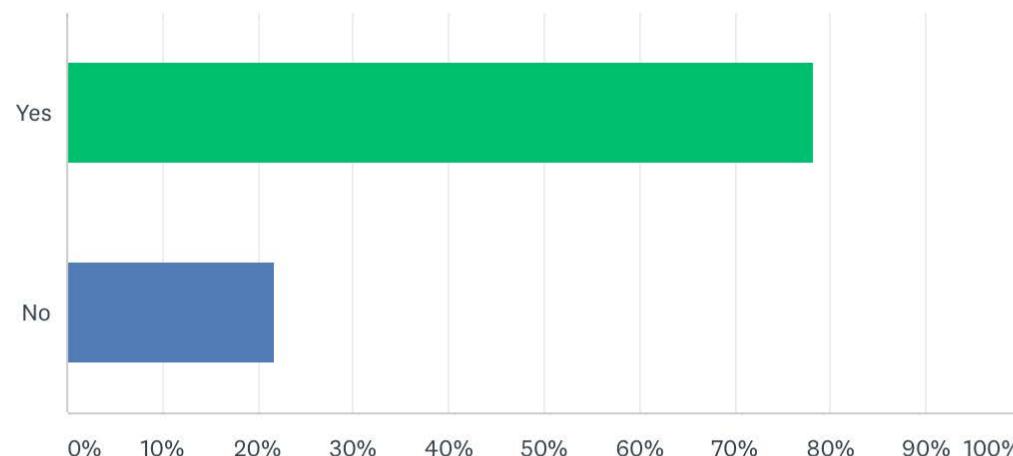
5.3.2. Research Material

FINAL SURVEY RESULTS

Q3:

Are you familiar with the term "Period Poverty"?

Answered: 23 Skipped: 0



ANSWER CHOICES	RESPONSES	
▼ Yes	78.26%	18
▼ No	21.74%	5
TOTAL		23

APPENDIX

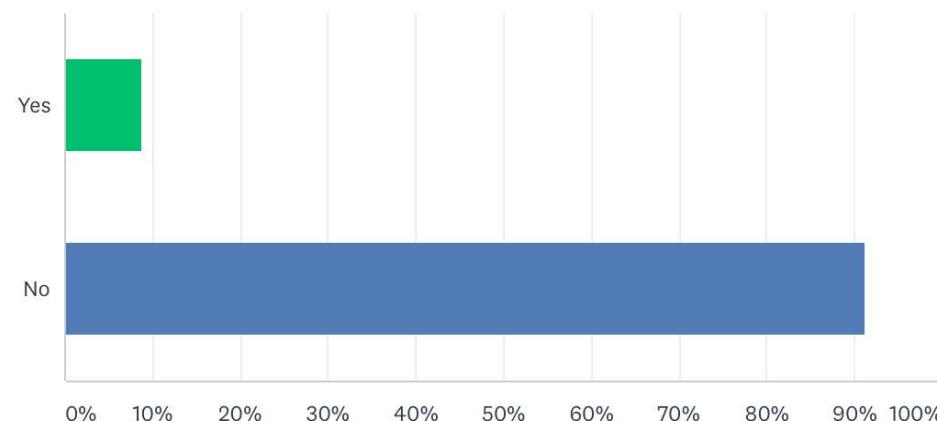
5.3.2. Research Material

FINAL SURVEY RESULTS

Q4:

Have you ever experienced period poverty? (The lack of access to adequate menstrual hygiene tools, washing facilities, and waste management, caused by financial constraints.)

Answered: 23 Skipped: 0



ANSWER CHOICES	RESPONSES	
▼ Yes	8.70%	2
▼ No	91.30%	21
TOTAL		23



APPENDIX

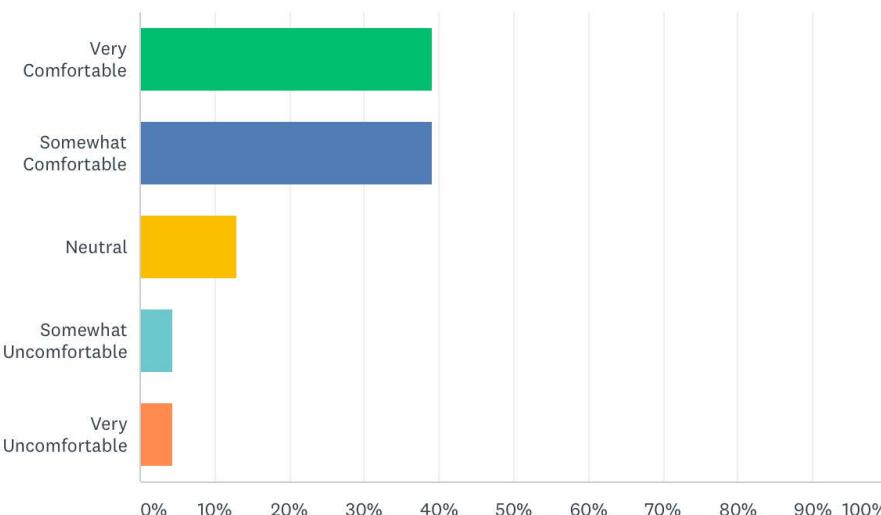
5.3.2. Research Material

FINAL SURVEY RESULTS

Q5:

In general, how comfortable are you discussing the topic of menstruation?

Answered: 23 Skipped: 0



ANSWER CHOICES	RESPONSES
▼ Very Comfortable	39.13%
▼ Somewhat Comfortable	39.13%
▼ Neutral	13.04%
▼ Somewhat Uncomfortable	4.35%
▼ Very Uncomfortable	4.35%
TOTAL	23



APPENDIX

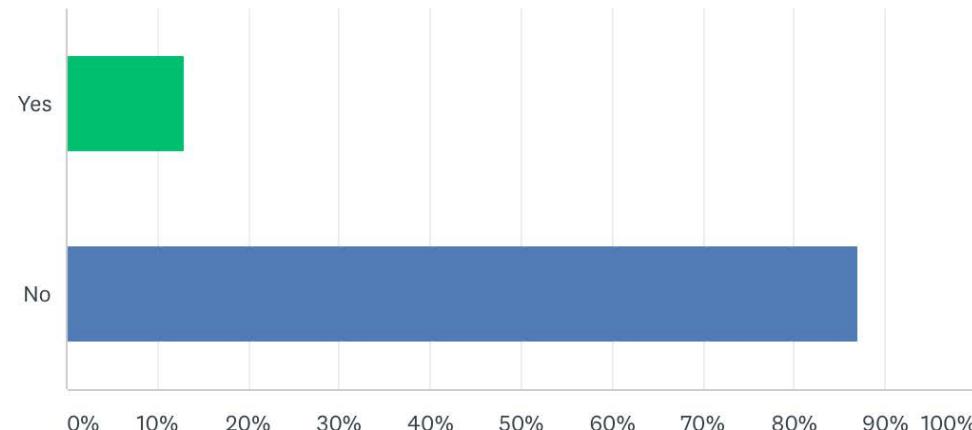
5.3.2. Research Material

FINAL SURVEY RESULTS

Q6:

Do you feel that students are taught enough about menstruation in schools?

Answered: 23 Skipped: 0



ANSWER CHOICES	RESPONSES
▼ Yes	13.04%
▼ No	86.96%
TOTAL	

Comments (20)



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q6: Comments

A: I remember having period talks from a very young age.

B: Because of the taboo menstruation represents.

C: I never understood it [Menstruation] when was younger and everything I was taught was informative in an academic way but not supportive or instrumental.

D: Nobody talked about it at all.

E: I feel like students need to be taught the science behind menstruations and schools should debunk ideads regarding menstruation.

F: Only covered once [Topic of Menstruation], not a repeated subject. Just taught about the basics, nothing in depth. Need more education on things like menstruation cups, the side affects of tampons, more info about the pill etc.



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q6: Comments (Continued)

G: Personally, I was only taught briefly how a tampon works. I don't remember learning much about the other affects menstruation can have on your body/mood etc.

H: It happens to half the population and people don't know enough about it.

I: I feel that schools do not educate students enough in sex ed and it feels like they expect us to know or learn it by ourselves or dont expects us to ever have any problems.

J: It's seen as a taboo or embarrassing topic which means it hasn't been naturalised like other bodily functions have been.

K: Not enough lessons.

L: We were taught very little relevant information.



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q6: Comments (Continued)

M: Seen as ‘taboo’ and I don’t feel like I leaned much about it in high school in my experience.

N: The topic is avoided, especially if there are boys in the class and it’s seen as a weird thing to talk about when it’s literally just a biological process. I feel like we should learn more about menstruation.

O: This topic is not covered in depth.

P: It should we [be] taught more instead of a simple biology lesson because even now at my age 16-18 I’m still learning about my period and cycle.

Q: Because when a girl starts their period for the first time, they sometimes don’t know what to do or what they need.



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q6: Comments (Continued)

R: Only basic overview is provided and they're taught that things are normal just because they're common.

S: For some girls they learn about it after they have already started their period.

T: Schools dont go in depth about the subject.



APPENDIX

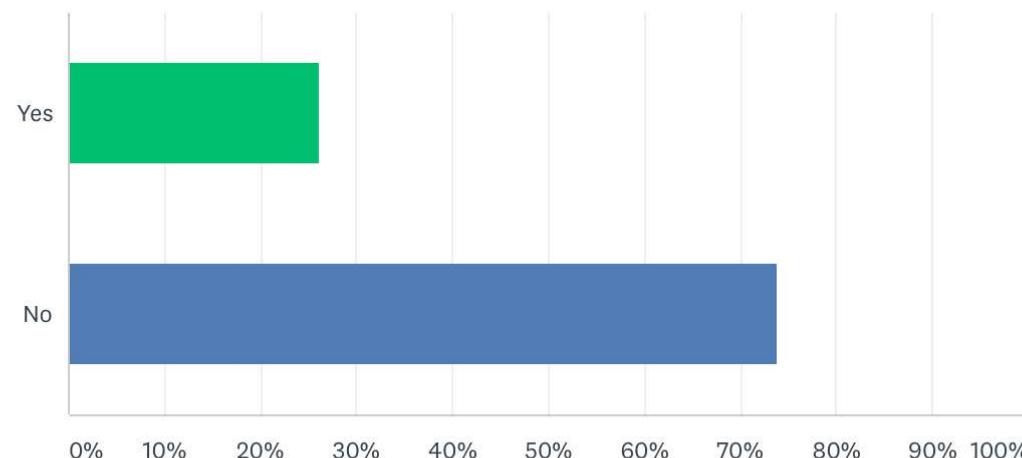
5.3.2. Research Material

FINAL SURVEY RESULTS

Q7:

Do you feel that menstrual hygiene products are easily affordable?

Answered: 23 Skipped: 0



ANSWER CHOICES	RESPONSES
▼ Yes	26.09%
▼ No	73.91%
TOTAL	23

APPENDIX

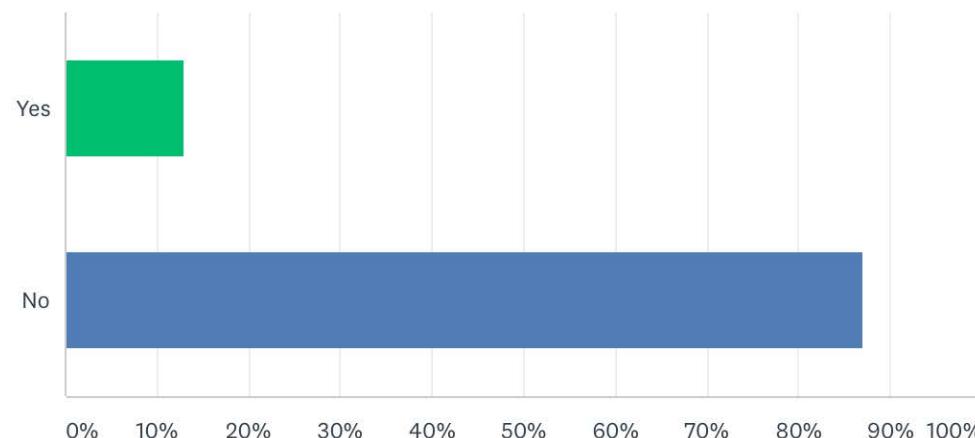
5.3.2. Research Material

FINAL SURVEY RESULTS

Q8:

Has the lack of access to menstrual hygiene products prevented you from attending school/education?

Answered: 23 Skipped: 0



ANSWER CHOICES	RESPONSES
▼ Yes	13.04%
▼ No	86.96%
TOTAL	23



APPENDIX

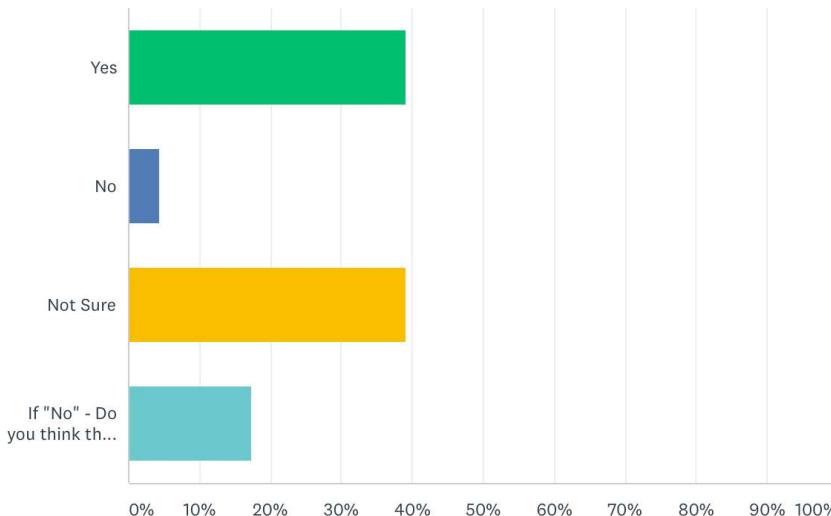
5.3.2. Research Material

FINAL SURVEY RESULTS

Q9:

Does your education institution provide free menstrual hygiene products to students?

Answered: 23 Skipped: 0



ANSWER CHOICES	RESPONSES
▼ Yes	39.13% 9
▼ No	4.35% 1
▼ Not Sure	39.13% 9
▼ If "No" - Do you think that you would benefit if free menstrual hygiene products were available for students?	Responses 17.39% 4
TOTAL	23



APPENDIX

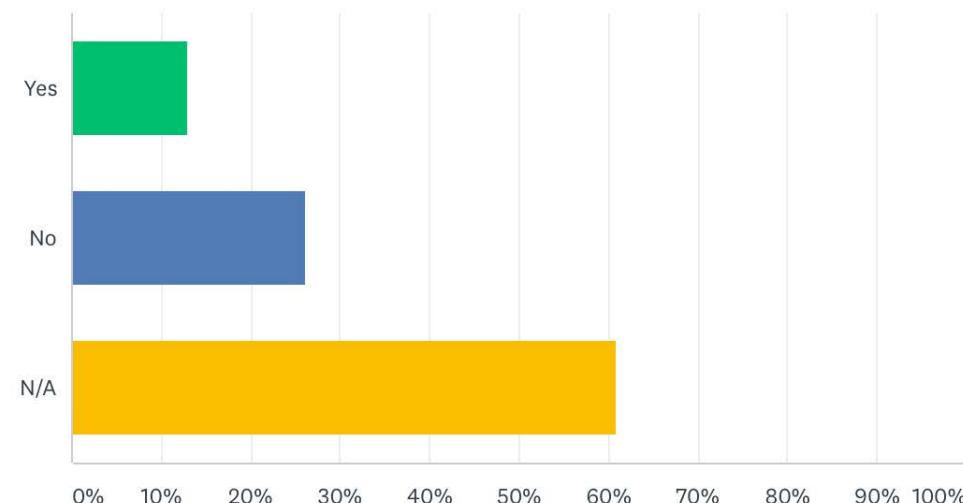
5.3.2. Research Material

FINAL SURVEY RESULTS

Q10:

If you selected "Yes" to question 9 - have you used the support?

Answered: 23 Skipped: 0



ANSWER CHOICES	RESPONSES
▼ Yes	13.04%
▼ No	26.09%
▼ N/A	60.87%
TOTAL	23



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q1:

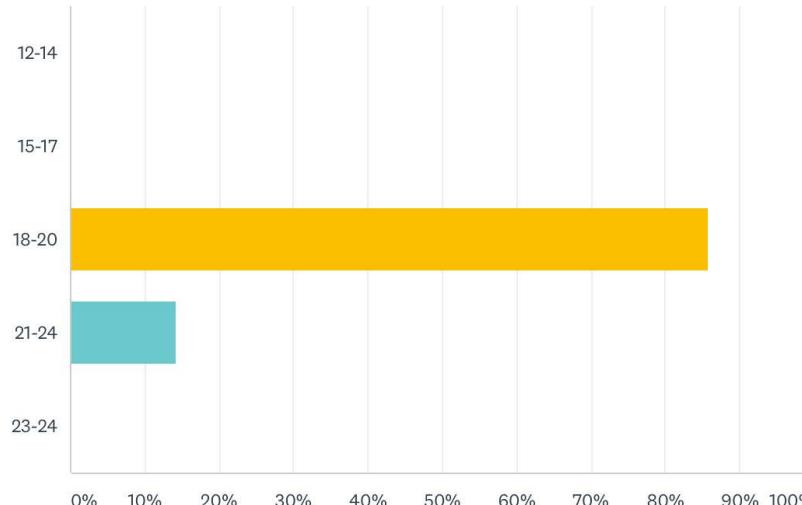
Online Survey Topic: Menstruation Stigma & Gender Equality - Questionnaire
Online Survey Question: Does the stigma of menstruation hinder gender equality in the UK?

What is your age?

Answered: 7 Skipped: 0

Attempt Number: 2 (Developed)

Questions and Answers



ANSWER CHOICES	RESPONSES
▼ 12-14	0.00% 0
▼ 15-17	0.00% 0
▼ 18-20	85.71% 6
▼ 21-24	14.29% 1
▼ 23-24	0.00% 0
TOTAL	7



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q2: 7/7 Female

What is your gender?

Answered: 7 Skipped: 0

RESPONSES (7) WORD CLOUD TAGS (0) 🔒 Sentiments: OFF 

  Filter: by tag ▾ 

Showing 7 responses

<input type="checkbox"/> Female 12/3/2020 7:58 AM	View respondent's answers	Add tags ▾
<input type="checkbox"/> female 11/29/2020 5:58 PM	View respondent's answers	Add tags ▾
<input type="checkbox"/> Female 11/19/2020 1:28 PM	View respondent's answers	Add tags ▾
<input type="checkbox"/> Female 11/17/2020 10:11 PM	View respondent's answers	Add tags ▾



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q3.1:

What is your cultural background?

Answered: 6 Skipped: 1

RESPONSES (6) WORD CLOUD TAGS (0) 🔒 Sentiments: OFF

Filter: by tag ▾ ?

Showing 6 responses

<input type="checkbox"/>	white British, atheist	11/29/2020 5:58 PM	View respondent's answers	Add tags ▾
<input type="checkbox"/>	White British	11/19/2020 1:28 PM	View respondent's answers	Add tags ▾
<input type="checkbox"/>	Angolan	11/17/2020 10:11 PM	View respondent's answers	Add tags ▾
<input type="checkbox"/>	Congolese	11/16/2020 7:40 AM	View respondent's answers	Add tags ▾

APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q3.2: Continuation

What is your cultural background?

Answered: 6 Skipped: 1

RESPONSES (6) WORD CLOUD TAGS (0) 🔒 Sentiments: OFF

Filter: by tag ▾

Showing 4 selected responses

11/19/2020 1:28 PM [View respondent's answers](#) [Add tags](#)

Angolan
11/17/2020 10:11 PM [View respondent's answers](#) [Add tags](#)

Congolese
11/16/2020 7:40 AM [View respondent's answers](#) [Add tags](#)

Black Portuguese
11/16/2020 4:37 AM [View respondent's answers](#) [Add tags](#)

Somali
11/13/2020 4:30 PM [View respondent's answers](#) [Add tags](#)

APPENDIX

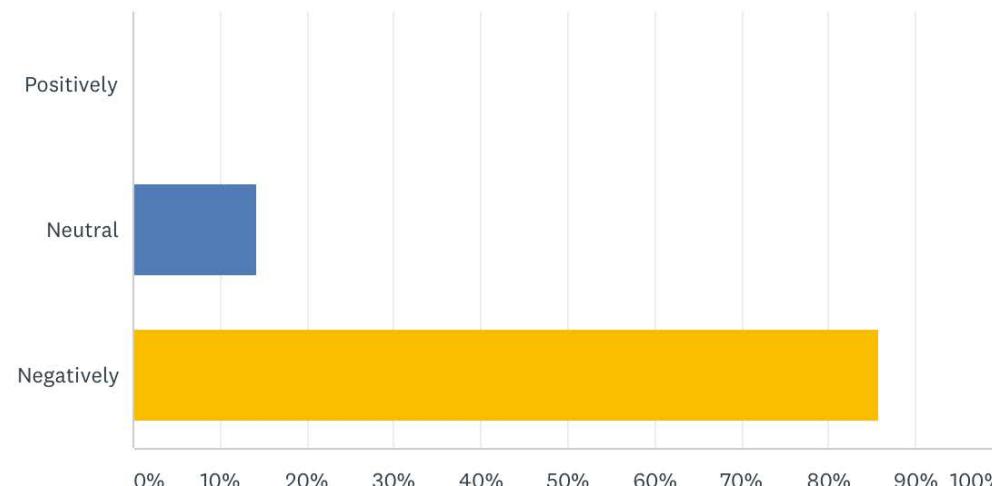
5.3.2. Research Material

FINAL SURVEY RESULTS

Q4:

How do you think society views menstruation?

Answered: 7 Skipped: 0



ANSWER CHOICES	RESPONSES
▼ Positively	0.00%
▼ Neutral	14.29%
▼ Negatively	85.71%
TOTAL	7

Comments (6)



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q4: Comments

A: Very hush hush subject, stigma that we can't talk about menstruation. Believe a lot of women feel like they can't talk about their menstruation problems.

B: I think people get uncomfortable when people who menstruate talk about their bodily functions perhaps because of the thread of misogyny that underlies the patriarchal society we live in.

C: Some people are open about it, while others not so much.

D: For some reason people avoid the subject.

E: Painful.

F: They see it as dirty.



APPENDIX

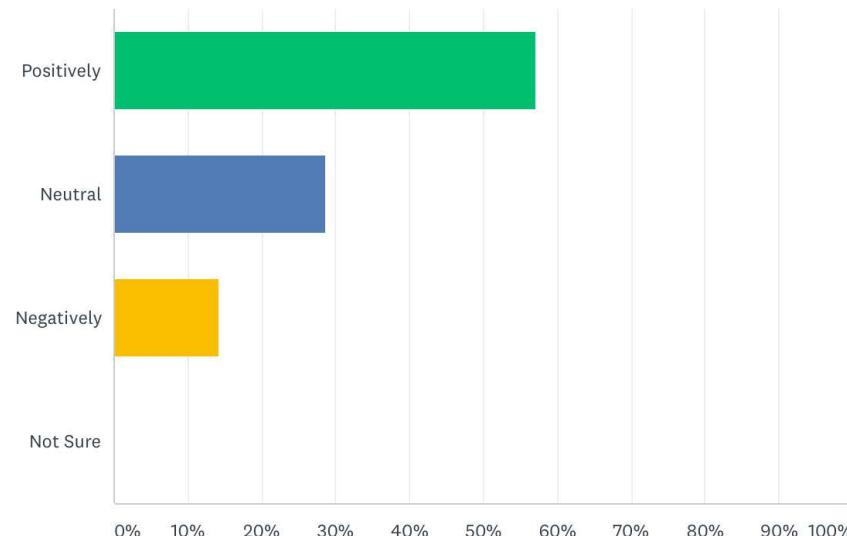
5.3.2. Research Material

FINAL SURVEY RESULTS

Q5:

What is your attitude towards menstruation?

Answered: 7 Skipped: 0



ANSWER CHOICES	RESPONSES
▼ Positively	57.14%
▼ Neutral	28.57%
▼ Negatively	14.29%
▼ Not Sure	0.00%
TOTAL	7

Comments (6)



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q5: Comments

A: I don't have any negative views on menstruation other than it should be free to buy sanitary products.

B: It's a natural bodily function and it's an incredible process that our bodies have to go through to prepare for potential egg fertilisation every month (on average).

C: It is a natural process.

D: It's a natural thing that occurs to many many women.

E: Painful, uncomfortable.

F: It's natural/normal.



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q6.1:

What do you think has formed your attitude?

Answered: 6 Skipped: 1

RESPONSES (6) WORD CLOUD TAGS (0) 🔒 Sentiments: OFF

  Filter: by tag▼ Search responses  ?

Showing 6 responses

Friends, openly having conversations with them about issues
11/29/2020 5:58 PM [View respondent's answers](#) [Add tags ▾](#)

Being a person who menstruates probably helped. Also just having access to so many resources online about it and the fact that my friends all talk about it openly as well.
11/19/2020 1:28 PM [View respondent's answers](#) [Add tags ▾](#)

Campaigns, family members and peers
11/17/2020 10:11 PM [View respondent's answers](#) [Add tags ▾](#)

The fact that it's not only me who has a period so I don't care what others think
11/16/2020 7:40 AM [View respondent's answers](#) [Add tags ▾](#)

APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q6.2: Continuation

What do you think has formed your attitude?

Answered: 6 Skipped: 1

RESPONSES (6) WORD CLOUD TAGS (0) Sentiments: OFF

Filter: by tag Search responses ?

Showing 5 selected responses

11/19/2020 1:28 PM View respondent's answers Add tags

Campaigns, family members and peers
11/17/2020 10:11 PM View respondent's answers Add tags

The fact that it's not only me who has a period so I don't care what others think
11/16/2020 7:40 AM View respondent's answers Add tags

Not sure
11/16/2020 4:37 AM View respondent's answers Add tags

Friends/family school
11/13/2020 4:30 PM View respondent's answers Add tags

APPENDIX

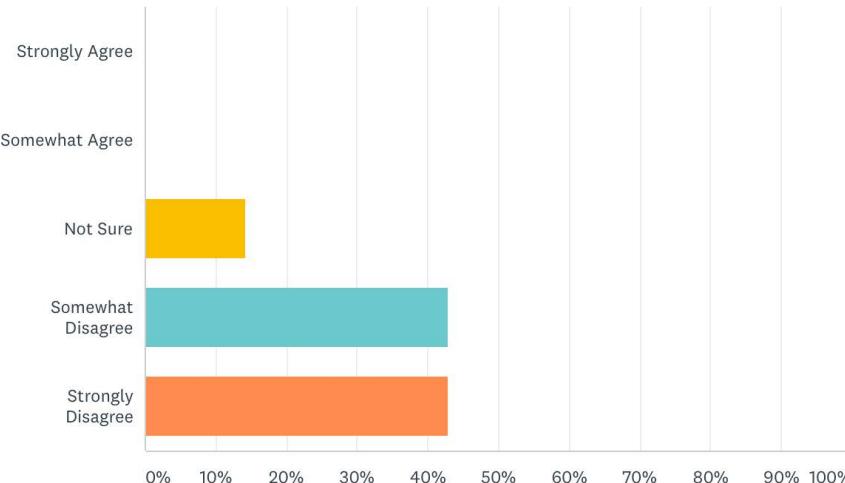
5.3.2. Research Material

FINAL SURVEY RESULTS

Q7:

To what extent do you agree with the following statement?. "Men Feel More Comfortable Discussing Periods Than Women"

Answered: 7 Skipped: 0



ANSWER CHOICES	RESPONSES
▼ Strongly Agree	0.00% 0
▼ Somewhat Agree	0.00% 0
▼ Not Sure	14.29% 1
▼ Somewhat Disagree	42.86% 3
▼ Strongly Disagree	42.86% 3
TOTAL	7

Comments (5)



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q7: Comments

A: Men aren't always considerate and are not willing to learn and educate themselves they just pull faces and go ew.

B: In my experience, cis men often shy away from topics like periods - they cringe or get embarrassed or feel disgusted by it. I don't think they really want to think about how we bleed for a week straight every month.

C: Men tend to feel awkward.

D: I think men don't really understand what periods are and how much they affect our hormones and body.

E: Most men feel ashamed to talk about periods.



APPENDIX

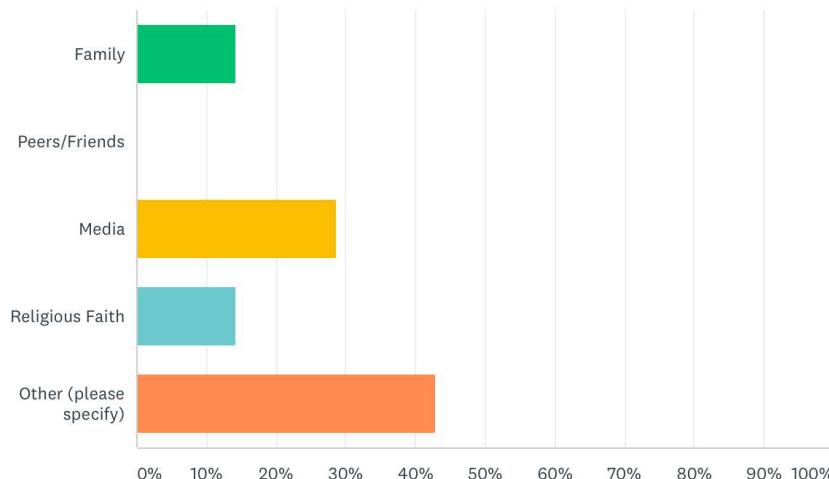
5.3.2. Research Material

FINAL SURVEY RESULTS

Q8:

Which of the following do you believe is the biggest contributor of menstrual shaming? (The shame and stigma that surrounds menstruation, and associations such sanitary products)

Answered: 7 Skipped: 0



ANSWER CHOICES	RESPONSES	
▼ Family	14.29%	1
▼ Peers/Friends	0.00%	0
▼ Media	28.57%	2
▼ Religious Faith	14.29%	1
▼ Other (please specify)	Responses	3
TOTAL		7



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q8: Comments (Other)

A: The traditional, unprogressive views that we build our society on that has made the weirdest, most natural things ‘taboo’. Like sex or sexuality, periods etc. Perhaps that does come from religion, but I don’t think faith is the issue I think it’s used as a crutch to support the views (but isn’t necessarily the source of them). I could be wrong though.

B: Peers and friends.

C: Culture.



APPENDIX

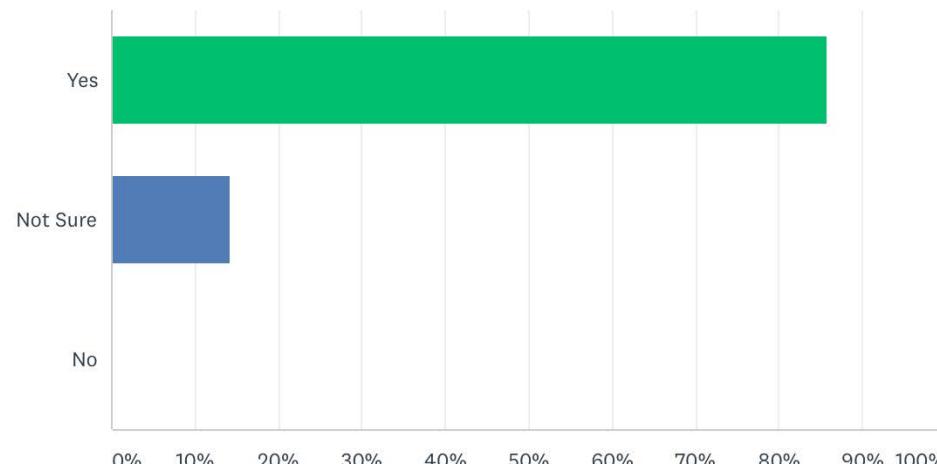
5.3.2. Research Material

FINAL SURVEY RESULTS

Q9:

Do you believe that shame, stigma and misinformation surrounding menstruation are affecting women's rights negatively?

Answered: 7 Skipped: 0



ANSWER CHOICES	▼	RESPONSES	▼
▼ Yes		85.71%	6
▼ Not Sure		14.29%	1
▼ No		0.00%	0
TOTAL			7

Comments (4)



APPENDIX

5.3.2. Research Material

FINAL SURVEY RESULTS

Q9: Comments

A: The shame is causing women to stay silent which is not good, we need women to speak out and not be afraid.

B: If we were able to be more open about reproductive health or menstruation etc. then we'd be able to have more progressive rights put in place for womxn. Especially womxn of colour and menstruating trans men etc.

C: Can cause discriminatory behaviour towards women.

D: Makes women feel uncomfortable about talking about a natural thing.



Period Poverty & Education

Participant Consent Form

*Required

Terms and Conditions:

- I voluntarily agree to participate in this research study.
- I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind.
- I have had the purpose and nature of the study explained to me in writing.
- I understand that participation involves providing answer to a question, and completing the survey.
- I understand that I will not benefit directly from participating in this research.
- I understand that all participant identity will remain anonymous in the results.
- I understand that the data collected in this survey, may be referenced in reports and such research outputs.
- I understand that the data I provide will NOT be divulged to third parties without my consent.
- I understand that I am free to contact the researcher to seek further clarification and information.

Name of researcher: Carla Lima

Contact detail: Morenolc@lsbu.ac.uk

1. By checking the (Agree) box, I confirm that I have read and understood the terms and conditions and my rights written above. *

Tick all that apply.

- Agree
 Disagree

Terms and Conditions:

By checking the (Agree) box, I confirm that I have read and understood the terms and conditions and my rights written above.
16 responses



Menstruation Stigma & Gender Equality

Participant Consent Form

*Required

Terms and Conditions:

- I voluntarily agree to participate in this research study.
- I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind.
- I have had the purpose and nature of the study explained to me in writing.
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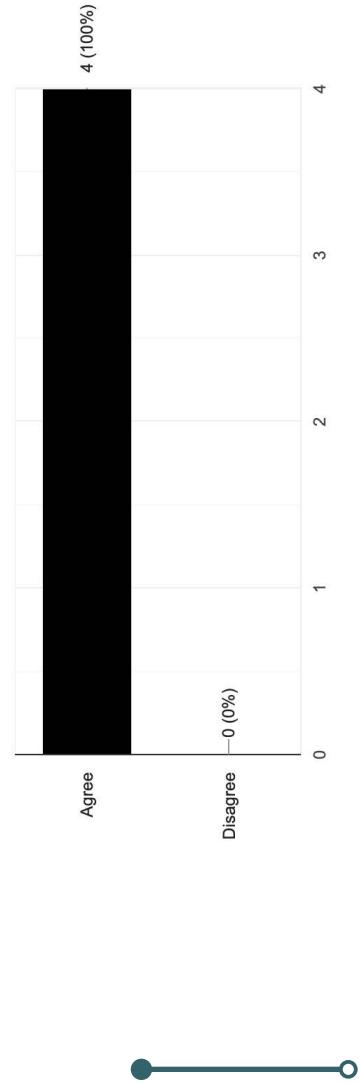
1. By checking the (Agree) box, I confirm that I have read and understood the terms and conditions and my rights written above.*

Tick all that apply.

- Agree
 Disagree

Terms and Conditions:

By checking the (Agree) box, I confirm that I have read and understood the terms and conditions and my rights written above.
4 responses



APPENDIX

5.3.2. Research Material

APPENDIX

5.3.2. Research Material

INTERVIEW QUESTIONNAIRE WITH BLOODY GOOD PERIOD

Questions

Q1:

Q1: What is your gender?

Short-answer text

Q2:

Q2: Do you work with any charities that promote gender equality or combat period poverty? What is your role within the organisation?

Long-answer text



APPENDIX

5.3.2. Research Material

INTERVIEW QUESTIONNAIRE WITH BLOODY GOOD PERIOD

Questions

Q3:

Q3: Why did this cause appeal to you?

Long-answer text

Q4:

Q4: Which projects has Bloody Good Period launched to help young women so far?

Long-answer text



APPENDIX

5.3.2. Research Material

INTERVIEW QUESTIONNAIRE WITH BLOODY GOOD PERIOD

Questions

Q5:

Q5: Who would you consider to be most vulnerable to experience period poverty?

Long-answer text

Q6:

...

Q6: How can period poverty impact individuals? Are there any statistics on how many people in the UK are affected by the issue?

Long-answer text



APPENDIX

5.3.2. Research Material

INTERVIEW QUESTIONNAIRE WITH BLOODY GOOD PERIOD

Questions

Q7:

Q7: Does the organisation promote sustainability through its products, and how?

Long-answer text

Q8:

...

Q8: According to news reports, the Period Products (Free Provision) (Scotland) Bill has been approved which will make menstrual products free for all in Scotland. What is your take on this? Will this impact the environment?

Long-answer text



APPENDIX

5.3.2. Research Material

INTERVIEW QUESTIONNAIRE WITH BLOODY GOOD PERIOD

Questions

Q9:

Q9: Do you think that period poverty prevents encourages gender inequality?

Long-answer text

Q10:

Q10: The lack of access to adequate menstrual tools does not only affect women. Do you agree with this and if so, what would be your approach to educate others.

Long-answer text



APPENDIX

5.3.2. Research Material

INTERVIEW QUESTIONNAIRE WITH BLOODY GOOD PERIOD

Questions

Q11:

...

Q11: Does Bloody Good Period plan on expanding its support for people in other regions?

Long-answer text

Q12:

Q12: Is there anything that you wish to add?

Long-answer text



Interview Questionnaire With Bloody Good Period

Interviewee Form

*Required

APPENDIX

5.3.2. Research Material

Interviewee Consent Form

*I confirm that I have read and understand the information sheet/project brief and/or the student has explained the above study and I have had the opportunity to ask questions.

*I understand that my participation is voluntary and that I am free to withdraw at any time, without providing a reason.

*I agree to take part in the above study.

Use of my information

*I understand my personal details such as phone number and address will not be revealed to people outside the project.

*I understand that my data/words may be quoted in publications, reports, posters, web pages, and other research outputs.

*My real name will not be used in the above.

*I agree for the data I provide to be stored (after it has been anonymised) in a specialist data centre and I understand it may be used for future research.

Name of researcher: Carla Lima

Contact detail: Morenolc@lsh.ac.uk

1. By checking the (Agree) box, I confirm that I have read and understood the terms and conditions and my rights written above.*

Tick all that apply.

Agree

Disagree



APPENDIX

5.3.2. Research Material

**School of
Engineering**

BSc FINAL YEAR PROJECT ETHICAL CONSIDERATIONS

YOUR DETAILS

Name of student: Carla Sofia Moreno Lima

Supervisors: Deborah Andrews & Robin Jones

Project title: Period Poverty

Main aim of project: Identify a topic to conduct in depth research and develop an appropriate solution. Presented for dissertation

CONTACT WITH OTHERS

Will your project bring you into contact with other people (e.g. via an online survey)?

Yes

No

If you answered "No", sign the section below and submit this page only to your supervisor for countersigning, otherwise complete the whole form prior to submission. Also, if you answered "No" then only this page needs to be included as an appendix to your dissertation.



YOUR SIGNATURE

Signature: _____

Date: 23/10/20

ETHICAL APPROVAL

(To be completed by your supervisor)

I have checked the above for accuracy and I am satisfied that the information provided is an accurate reflection of the intended study.

There are no ethical issues causing my concern

Signature: RPJ Date: 28th Oct 2020

Name (please print): Robin Jones - - -

APPENDIX

5.3.2. Research Material

RESEARCH PARTICIPANTS

Estimated number of research participants: **Minimum 50**

Who will the research participants be? **Students in the UK, Organisations, friends, online volunteers**

On the basis of which criteria will they be selected? **User demographics**

Where and how will data collection take place (e.g. location, by phone/internet, by post)? **Internet, UK, abroad, online meetings, Phone and emails**

Will any of the research participants be minors (people under 18) or vulnerable people accompanied by responsible adults (teachers, parents, carers etc) **YES / NO**

Will any of the research participants be unaccompanied minors (under 18)? **YES / NO**

If the answer is "yes" to this question please note the following:

You will need to obtain a disclosure at your own cost:

<https://www.gov.uk/government/organisations/disclosure-and-barring-service>

This ethics form, to which a copy of your disclosure must be attached, will need to be countersigned by the School's ethics officer.

Please tick the box to indicate that you have understood these requirements



METHODS OF DATA COLLECTION TO BE EMPLOYED

Paper-based questionnaire **Yes** **No**

Online questionnaire **Yes** **No**

Interview(s) **Yes** **No**

Focus group(s) **Yes** **No**

Other (please specify):

User Diaries

Ethnographic study

CONFIDENTIALITY

Requests for confidentiality can only be accepted on the understanding that the confidential material will not be included in the written report/dissertation. They cannot be accepted on the understanding that the report/dissertation itself will be confidential. British universities are public bodies, and all research carried out at undergraduate/taught Masters level is by definition available for public scrutiny.

Please tick the box to indicate that you understand the limits to confidentiality in relation to your research



APPENDIX

5.3.2. Research Material

POTENTIAL PARTICIPANT DISTRESS

Is there any possibility that any of the procedures in your study will cause discomfort, anxiety, stress or embarrassment for your participants? Yes No

If you have answered "Yes" please explain the details, and justify how you will seek to minimise any form of upset to your participants. Please use a separate sheet of paper, to be attached.

PLEASE ANSWER THE FOLLOWING QUESTIONS

Will you provide a written explanation of the project to the participants? Yes No

Will you ask the participants to complete a consent form? Yes No

Please be prepared to show the project brief to participants if asked.

Will you explain to the participants that you are a student undertaking degree level studies?

Yes No

Will you explain to the participants that they may not benefit from your study?

Yes No

Will you offer the participants the opportunity to decline to take part? Yes No

Will you offer the participants the opportunity to withdraw at any stage? Yes No

Will you offer anonymity? Yes No

Will you adhere to the provisions of the Data Protection Act 1998? Yes No

Please briefly explain how you will address the following on line and/or in person

- Data may only be used for the specific purposes for which it was collected. **online and in person**
- Data must not be disclosed to other parties without the consent of the individual to whom it relates, unless there is legislation or other overriding legitimate reason to share the information (for example, the prevention or detection of crime). It is an offence for other parties to obtain this data without authorisation. **online and in person**
- There must be no identifiable personal data relating to individuals anywhere in the dissertation, either within the main body or the appendices. **In person**
- Individuals have a right of access to the information held about them, subject to certain exceptions (for example, information held for the prevention or detection of crime). **In person**
- Personal information may not be kept for any longer than is necessary, and it must be kept up to date. **In person**
- Subjects have the right to have factually incorrect information corrected (note: this does not extend to matters of opinion). **In person**

In short, all data regarding or provided by research participants must be stored securely on password-protected and encrypted computers, memory sticks and so on, must not be divulged to third parties without the research participants' consent. Furthermore, data relating to any individual must be made available to that individual on request and corrected where wrong, and it must be destroyed when no longer required.

APPENDIX

5.3.2. Research Material

RESEARCH ETHICS FORM APPROVAL

YOUR OWN SAFETY	
Are there any aspects of your project which might have implications for your own safety other than those on the lab/workshop Risk Assessment	
Yes	No
If the answer is "Yes" please indicate how you propose to minimise any risk to yourself:	
CHECKLIST	
Please ensure you use these documents	
Participants' explanation form	Yes No N/A
Consent form	Yes No N/A
Questionnaire/survey will be checked by supervisor	Yes No N/A
Disclosure (if any participants are under 18)	Yes No N/A
YOUR SIGNATURE	
I agree to follow the Code of Conduct (see below)	
Signature:	
Date: 23/10/20	
Please write your name clearly in full here: Carla Sofia Moreno Lima	
ETHICAL APPROVAL	
(To be completed by supervisor)	
I have checked the above for accuracy and I am satisfied that the information provided is an accurate reflection of the intended study. I can confirm that the form contains all the relevant information.	
There are no ethical issues causing me concern	
XXXXXXXXXXXXXXXXXXXX	
Signature: RPJ Date: 28th Oct 2020	
____ Name (please print): Robin Jones _____	
If you have ticked the second option please liaise with your representative on the School's ethics officer.	



APPENDIX

5.3.2. Research Material

CODE OF CONDUCT

IDEO – from the HUMAN CENTRED DESIGN TOOLKIT and METHOD CARDS

Here are some principles that guide IDEO's interactions with participants:

- approach people with courtesy
- identify yourself, your intent, and what you are looking for
- describe how you will use this information and why it's valuable
- get permission to use the information and any photos or video you take
- keep all the information you gather confidential
- let people know they can decline to answer questions or stop participating at any time
- maintain a non-judgmental, relaxed, and enjoyable atmosphere
- offer to compensate participants if appropriate

RESEARCH ETHICS FORM APPROVAL

Appendix – further reading

Here are some good sources of information about ethical issues that may arise in the context of computing-related projects and careers (in no particular order):

- <http://www.bcs.org/category/6030>
- <http://www.theiet.org/about/governance/rules-conduct/index.cfm>
- <http://www.acm.org/about/se-code>
- <http://www.ibm.com/developerworks/rational/library/may06/pollice/>
- <https://www.computer.org/cms/Computer.org/Publications/code-of-ethics.pdf>



APPENDIX

5.3.2. Research Material

RISK ASSESSMENT FORM

Risk Assessment

Brief Guidance

Risk Assessment is a process by which the risks of work activities are assessed and controlled. Risk assessments are required by law before an activity begins. They are the responsibility of the manager/supervisor of the procedure creating the risk.

The task of risk assessment may be delegated to a person who possesses the necessary skills to carry it out and understands the risks; however, the manager/supervisor remains responsible for the findings and implementation of the assessment.

Any assessment carried out by a student must be endorsed by their supervisor (indicated by their signature).

A “Hazard” is something that has the potential to do harm. “Risk” is the chance of that hazard being realised. All significant foreseeable risks must be assessed. In order to prevent foreseeable risks causing harm, adequate controls must be put in place. The process is as follows:

1. People at risk from the hazards must be identified. Consider, for example, the experience, age & expertise of those involved.
2. The location of the work be identified and stated.
3. The foreseeable hazards posed by procedures, chemicals & working environment must be identified
4. Adequate controls must be put into place and implemented to prevent or reduce risk to individuals. Controls must eliminate, reduce, isolate or contain the hazard. PPE is used as a last resort.
5. The assessment must be signed and dated by the person responsible for generating the risk. These staff members must ensure that the work is covered by a safe system of work that is monitored to guarantee that the risk assessment controls are effective.
6. Risk matrix figures can be inserted as required

Risk assessments are working documents and should be available to people to consult in the course of their everyday activities.

Technical staff will provide risk assessments for the equipment and environment that they are responsible for to the Academics using their workspaces. The Academics will provide a risk assessment for the student activities they carry out in those work spaces. Assessments must be agreed between Technical and Academic staff prior to the activity taking place.

Risk Assessment Template

APPENDIX

5.3.2. Research Material

RISK ASSESSMENT FORM

Assessor	Deborah Andrews / Robin Jones	Date	23/10/20	
Procedure Title and Outline				
Period Poverty & Education - Risk Assessment – model and prototyping in LSBU workshops and laboratories for manufacture and assembly				
School	Engineering	Building	Borough Road	
Division	Mechanical Engineering and Design	Floor	Basement	
		Room No	B34/B10/B30/B31/B33	
People at Risk				
Employees	Y/N	Members of the Public	Y/N	Pregnant Women Y/N
Under Graduates	Y/N	Visitors	Y/N	Contractors Y/N
Disabled	Y/N	Other	Y/N	
Hazards (procedures and materials). Tick if COSHH applies □ 				
<ul style="list-style-type: none">1. Cutting machinery - Jigsaw/ Band saw2. Spray paint - Chemicals3. Cutting tools - Scalpel4. Wearable items - Student lanyard or long hair5. Workshop machines - Disc sanding machine6. Personal belongings - Bags on floor or workbenches				
Risks (prior to controls) Include Emergency situations if COSHH box ticked				

APPENDIX

5.3.2. Research Material

RISK ASSESSMENT FORM

1. Potential risks include injury to user and those around if hands slip into moving machine blade. Could result in minor injuries such as cuts on hands or in rare cases amputation
2. Work may be carried out in poor ventilated spaces could cause headaches, nausea, eye, nose and throat irritation
3. Excessive force may cause blade to dislodge from handle. Blade may also puncture skin, if it is contaminated it can cause infection
4. Wearables or hair are a risk as they can become tangled on machinery, e.g. rotating machines and cause serious injury to the wearer/student
5. Machinery left unattended when running can harm other workshop users
6. Bags left around the workshop floor can easily become a tripping hazard if unnoticed. People may also unintentionally inflict harm if carrying dangerous tools

Likelihood: 3-4	Consequence:3	Risk Rating: 12
-----------------	---------------	-----------------

Control Measures. Include Emergency situations if COSHH box ticked

1. When using sawing machines, students are to use push sticks to prevent close contact to blade and hand
2. Ensure that student is in well ventilated room when handling chemicals, wears gloves and paint away from an open flame
3. Before using cutting tools check that no damage is visible and use appropriate force
4. If necessary, remove wearables to stop them from getting caught. Secure the hair above neck.
5. When workshop machinery is no longer in use, turn off machine and place any guards provided
6. Store bags and other belongings away from work areas in the workshop

Residual Risk (after control measures have been applied)

N/A

APPENDIX

5.3.2. Research Material

Risk Matrix		5 x 5 Risk Matrix					RISK ASSESSMENT FORM																																																						
Likelihood: 0	Consequence: 0						Risk Rating: 0																																																						
		<table border="1"><thead><tr><th colspan="2">Likelihood (Probability)</th><th colspan="3">Consequences (Impact)</th></tr><tr><th>5. Almost Certain</th><th>5. Fatality</th><td colspan="3"></td></tr><tr><th>4. Probable</th><th>4. Major injury, resulting in disability</th><td colspan="3"></td></tr><tr><th>3. Possible</th><th>3. Injury Requires Doctor's or Hospital attendance</th><td colspan="3"></td></tr><tr><th>2. Possible (under unfortunate circumstances)</th><th>2. Minor injury, 1st Aid required</th><td colspan="3"></td></tr><tr><th>1. Rare</th><th>1. Minor injury, 1st Aid not required</th><td colspan="3"></td></tr></thead><tbody><tr><td colspan="2">Risk Rating</td><td>High</td><td>Medium</td><td>Low</td><td></td><td></td></tr></tbody></table>					Likelihood (Probability)		Consequences (Impact)			5. Almost Certain	5. Fatality				4. Probable	4. Major injury, resulting in disability				3. Possible	3. Injury Requires Doctor's or Hospital attendance				2. Possible (under unfortunate circumstances)	2. Minor injury, 1st Aid required				1. Rare	1. Minor injury, 1st Aid not required				Risk Rating		High	Medium	Low																				
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		<table border="1"><thead><tr><th colspan="5">CONSEQUENCES</th></tr></thead><tbody><tr><td>L</td><td>5</td><td>10</td><td>15</td><td>20</td><td>25</td></tr><tr><td>I</td><td>4</td><td>8</td><td>12</td><td>16</td><td>20</td></tr><tr><td>K</td><td>3</td><td>6</td><td>9</td><td>12</td><td>15</td></tr><tr><td>E</td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td></tr><tr><td>L</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>H</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>O</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>D</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr></tbody></table>					CONSEQUENCES					L	5	10	15	20	25	I	4	8	12	16	20	K	3	6	9	12	15	E	2	4	6	8	10	L	1	2	3	4	5	H	0	1	2	3	4	O	0	1	2	3	4	D	0	1	2	3	4		
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							Signature																																																						
							Assessment Date																																																						
							Review Date																																																						
							Student																																																						
							Signature																																																						
							Caption																																																						
							Date	23/10/20																																																					

APPENDIX

5.3.3 PDS (Product Design Specification)

PRODUCT DESIGN SPECIFICATION

**London South Bank University
London**

School of Engineering
Research Methods and Design Project

Major Project

Product Design Specification

Carla Sofia Moreno Lima

2021
BSc (Hons) Product Design

APPENDIX

5.3.3. PDS (*Product Design Specification*)

PRODUCT DESIGN SPECIFICATION

Introduction

ENOVA is a multi product concept involving tangible products as well as digital goods for state-maintained schools in England. Both the ENOVA Dispenser and the Application work as a system in order for the concept to serve its purpose, with the ENova Case being an optional additional product purchasable via the app.

The ENOVA app is designed to be compatible with iOS and Android operating systems, offering users two features – the Discover, which allows users to socialise, discuss, share stories and advice i.e tips, hacks, and receive daily facts around the topic of menstruation with other users registered to the app. It will be available to install on App Store for Apple users and Google Play for Android mobile device users.

Through the app, students will also have the ability to request a variety of period products provided by Phs Group to registered educational institutions in England. Users receive Quick Response Codes for each order and scan on the ENOVA dispenser to obtain the desired period product. The primary purpose of this concept is to help combat period poverty, ensuring that the education of students is not compromised because of their inability to afford period products. The Social application creates a safe community for young inexperienced people where they are able to eliminate the stigma surrounding periods. ENOVA is intended to operate alongside the The Department for Education's (DfE) free period product scheme for schools and colleges in England.

Each school registered with ENOVA has full access to modify features to better suit their school policies.

1. Performance

The multi column ENOVA dispenser will have the ability to store 22 types of period products from 3 different collection methods and 8 products subcategories. This includes:

Pads (Always, Bloomers & Nora, Lil-lets Brands)

Eco Friendly:

- Available in Regular (normal) with wings
- Available in Night (super) with wings

Reusable:

- Available in Mini with wings
- Available in Midi with wings

Teens:

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PRODUCT DESIGN SPECIFICATION

- Available in Day with wings
- Available in Night with wings

Normal:

- Available in Size 1 with wings
- Available in Size 2 with wings

Tampons (Lil-lets & Tampax Brands)

Applicator Cardboard:

- Available in Regular
- Available in Super
- Available In Super Plus

Applicator Plastic:

- Available in Regular
- Available in Super
- Available In Super Plus

Non-Applicator:

- Available in Regular
- Available in Super
- Available In Super Plus

Organic Non-Applicator:

- Available in Regular
- Available in Super
- Available In Super Plus

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PRODUCT DESIGN SPECIFICATION

Menstrual Cups (*Mooncup*)

- Available in Size A
- Available in Size B

Dispenser and App:

- 1.1. The QR Code reader (Dispenser unit) must be able to automatically scan the QR code in 0.1 seconds. This is the average time that a smartphone camera takes to capture and register a QR code.
- 1.2. The QR Code reader must have a scanning distance of 1.5-2.5 feet (45-75 cm) away.
- 1.3. The QR Code reader must not process a QR code when dispenser is not available (out of stock/not functioning)
- 1.4. The QR Code reader must scan a QR code size of 2.4-6.3 in (6-15.8 cm)
- 1.5. The application must generate all QR codes with quiet zone (The space around the QR Code, separating the QR Code's pixels from the other designs)
- 1.6. The application should generate QR Codes with a minimum size of 2cm x 2cm.
- 1.7. The unit must read and scan a QR Code that has been partially damaged e.g. less than 90%.
- 1.8. The QR Code reader must read codes in black & white
- 1.9. The unit must be anti-vandal, easily cleaned and durable.
- 1.10. The unit must display "Unavailable" if stocks run low. The minimum should be 5 products left in a compartment before displayed
- 1.11. The QR reader must not accept/process expired or used codes.
- 1.12. The specified unit compartments must open once QR code scanned and accepted.
- 1.13. The unit must open with a single generic lock key.
- 1.13. The wall mounted unit must withstand a load of 10kg.
- 1.13. The unit interior must be sterile to safely store products and prevent bacteria and mould.
- 1.14. The app must allow schools to edit number of products offered to individual users.
- 1.15. The application must store type of product of requested from users.
- 1.16. The unit must be powered using mains. Based on a similar existing product, the power requirement would be 100-240VAC, 50/60Hz, 1.4A.

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PRODUCT DESIGN SPECIFICATION

2. Environment

- 2.1. The unit dispenser unit will be placed within the schools premises (indoors). The recommended area is the special needs cubicle, in the washroom.
- 2.2. The unit will be placed in an area ventilated by a sufficient quantity of fresh or purified air. It should not fall below 5-8 litres per second per occupant.
- 2.3. In order for the unit's QR reader to function effectively, the environment must provide adequate light levels.

2.3. The environment for which the unit will operate in must have a relative indoor humidity level of around 50% and 20°C room temperature to prevent growth of bacteria. The ideal is between 45% and no lower than 30%.

2.4. The unit must not be installed near liquids such as water or where condensation is probable to avoid a short circuit.

2.5. The unit can be powered down on the mains to avoid unnecessary energy consumption.

2.6. The unit can be opened for users to easily clean and disinfect the product.

3. Life in Service

3.1. The purpose of the unit is to dispense a variety period products at the point of need upon request to ensure that users can continue to attend school safely and hygienically. The unit must dispense 22 products from each of the 8 compartments, a total of 140 before "Unavailable" sign is displayed to inform the school welfare office; the team in charge of hygiene products for students, that the ENOVA dispenser requires a refill.

3.2. The scanner is disabled once the unit dispenser becomes unavailable.

3.3. The LCD Module Display should have a lifetime of 50,000 hours - 5 years + of 24x7 usage at full power.

4. Maintenance

4.1. The unit will be designed for easy disassembly to allow the maintenance team (external contractors) to replace any faulty components without damaging the entire product.

4.2. Once a school purchases the ENOVA dispenser, installation will be offered by a team of specialised individuals with aftercare including any required technical maintenance.

4.3. The built-in durability of the dispenser material will reduce the need for long-term maintenance and cleaning costs.

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PRODUCT DESIGN SPECIFICATION

5. Target Product Cost

5.1. Smart menstrual care dispenser machines range from £220 to £750. The average price is at £218 per unit. This is based on market research of similar existing products and the formula of Product Cost = Direct Material Cost + Direct Labor Cost + Manufacturing Overhead Cost. See below.

5.2. The estimated cost of manufacture for the dispenser unit will not exceed. This is based on the formula of Product Cost = Direct Material Cost + Direct Labor Cost + Manufacturing Overhead Cost. Manufacturing overheads include all the indirect costs of production that are necessary to manufacture a finished good or create a service. See below:

Particulars	Amount
Production Volume (Pieces)	300
Direct Material Cost (Coloured acrylic ABS; Acrylonitrile butadiene styrene, plastic; Plexiglass, acrylic powder, vinyl)	£127.44
Direct Labour Cost (Average Field Service Technician Salary UK)	£28,988
Indirect Material Cost (Lubrication etc)	£8,646.41
Indirect Labour Cost (Security guard)	£20,053
Other Overhead Cost (Factory Rent and Utilities)	£7,500
Manufacturing Overhead Cost = Indirect Material Cost + Indirect Labor Cost + Other Overhead Cost Product Cost = Direct Material Cost + Direct Labor Cost + Manufacturing Overhead Cost Production Cost per Unit = Product Cost / Production Volume	£36,199.41 £65,487 £218

6. Competition

6.1 What existing products are there in the marketplace to compete with this one and What are the strengths and weaknesses?

In recent years, there has been more efforts to tackle the various challenges affecting millions. Gender inequality is a global issue that has been highlighted particularly by the media, which has helped reveal the ongoing issue of period poverty that is stagnating and preventing young girls from receiving equal opportunities worldwide. Designers are adopting technology more than ever to develop products able to effectively bring solutions to those that use them.

Competitor research analysis shows that there is a surge of companies worldwide redesigning traditional washroom hygiene products, including menstrual care vending machines, and integrating advanced technologies such as IoT.

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PRODUCT DESIGN SPECIFICATION 5.TARGET PRODUCT COST – TABLE

Particulars	Amount
Production Volume (Pieces)	300
Direct Material Cost (Coloured acrylic ABS;Acrylonitrile butadiene styrene, plastic, plexiglass, acrylic powder,vinyl)	£127.44
Direct Labour Cost (Average Field Service Technitian Salary UK)	£28,988
Indirect Material Cost (Lubrication etc)	£8,646.41
Indirect Labour Cost (security guard)	£20,053
Other Overhead Cost (Factory Rent and Utilities)	£7,500
Manufacturing Overhead Cost = Indirect Material Cost + Indirect Labor Cost + Other Overhead Cost	£36,199.41
Product Cost = Direct Material Cost + Direct Labor Cost + Manufacturing Overhead Cost	£65,487
Production Cost per Unit = Product Cost / Production Volume	£218



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PRODUCT DESIGN SPECIFICATION

6.2. Huge Inc - (Hooha)

HDQ Location: 45 Main St, 3rd Floor, 11202

Brooklyn, New York, United States

Tel: +17186254843

Website: <https://www.hugeinc.com>

Strengths:

The Hooha dispenser has an advantage as it is lighter in weight and smaller in dimensions than competitors but can has a capacity of up to 60 tampons at a time, 3x more than the industry average. The simple design and text element makes it relatively easy to use despite using smart technology which is a good selling point as it means that users that do not possess a smart phone or those with low proficiency of modern technology will not be excluded. (Text the number on the machine to dispense)

Weaknesses:

The machine is solely powered using a mains power adaptor which requires a socket outlet nearby. This could pose an issue especially because of the intended location for use ; public w/c, it could risk the health and safety of its users if liquids were to get on the electrical outlets and create a short circuit.

Another notable weakness is that the easily accessible products also makes the an easy target for ill intentioned actions. The lack of monitoring user limits means that people can excessively request the free tampons and illegally resell.

Additional information:

N/A

6.3. Strapt Inc - Strapt

HDQ Location: Greater Atlanta Area, East Coast, Southern US, United States

Tel:+1 470-869-0170

Website: <https://www.straptvending.com>

Strengths:

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PRODUCT DESIGN SPECIFICATION

Strapt has partnered with Lola to launch a smart dispenser branded Strapt that can hold 4x the capacity of traditional dispensers. The purchase of a dispenser enables free installation, maintenance, and restock, which is a unique selling point for the product. The product is adapted to the current virus pandemic considering user safety with its contactless operations.

6.4. PHS Group -

HDQ Location: Block B, Western Industrial Estate, Caerphilly,
United Kingdom, CF83 1XH

Tel: 029 2080 9098

Website :
https://www.phs.co.uk/?utm_source=google&utm_medium=PPC&utm_campaign=BrandBroad:PHS&utm_term=phs&gclid=Cj0KCQiwYZmEBnCpARIsALizmnpGkoc6lGGfEA795rRJK5Ro8WqDF2ZFrSGwKK2-wIRIKKrlq8X8aAnkiEALw_wCB

Product : UltraVend

Strengths:

The Ultra Vend machine is self-contained—Battery operated, does not require mains wiring. This feature makes it an ideal product to be installed in places with a high likelihood of vandalism such as educational institutions, transport, and other public spaces, since users will not be given the opportunity to tamper.

Weaknesses:

This product requires cash input in order to dispense products. The vending machine does not feature any stock status display, meaning that when the dispenser has run low on products and does not carry out the request users will have assume this and then select for the return of cash.

Additional information:

N/A

Product : Multi Column Vend

Strengths:

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The Multicolumn Vending machine is a fully serviced unit that is stocked by phs. This is particularly appealing to schools and businesses as they will not need to employ workers and will be able to cut costs on the products maintenance. The vending machine also has a modern and smooth design, with the ability to house a variety of consumables - unisex essentials, women's essentials and male essentials to suit the environment of the individual.

Weaknesses:

N/A

Additional information:

N/A

6.6. ChuanyiTech - Ebayar

HDQ Location: Guangzhou, China

Tel: 08602039148113

Website: N/A

Strengths:

This machine features a body Infrared (IR) sensor that activates the products automatic voice playback when the presence of human is detected. This is an advantage as it encourages connection between machine and user, removing the solely functional purpose of providing users with products. It allows interactivity makes the product more welcoming to users.

Weaknesses:

The added advanced technology within the product means that the price per unit will be higher, this may be a put off for buyers especially for application in public schools where the number of students will be higher and require a high quantity of dispenser to accommodate. It may be too costly for schools.

Additional information:

Ebayar machine has a digital screen to instruct users and advertise the product.

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PRODUCT DESIGN SPECIFICATION

6.7. HappyNari - HNSE 300

HDQ Location: Plot No. 28, E-51, Flatted Building, MIDC, Satpur,

Nashik – 422 007 (M.S.)

Tel: +91-253-2350899

Website: <https://www.happynaricare.com/index.php>

Strengths:

The HNSE 300 is a smart sanitary napkin vending machine that users can operate with a card provided to each school girl. Only users that have obtained a card are able to use the dispenser, which will help control the number of people requesting products.

Although the product consumes less than 5 watts, it can also be purchased to be battery operated as a power backup.

Weaknesses:

The dispenser only works with a card, meaning that if the user does not possess one at the time of need they will not be able to request any sanitary napkins.

Additional information:

Smart Card can be topped up with money.

6.8. HLL Lifecare Limited - Vendigo

HDQ Location: Mahilamandiram Road, Poojappura Thiruvananthapuram - 695 012

Kerala, India

Tel: +91-471 2354949

Fax : +91-471 2354949

Website : <http://www.lifecarehll.com/product/view/reference/202cb962ac59075b964b07152d234b70hYGF>

Strengths:

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PRODUCT DESIGN SPECIFICATION

The Vendigo sanitary napkin vending machine is programmable and has easy data retrieval electronically through USB port, eliminating manual errors in data (sales, cash collected etc) collection. The machine also has an LCD display to inform users when products are unavailable.

Weaknesses:

N/A

6.9. Initial - Period Poverty Vending, FreeVend, Dual Vend, Multi Vend

HDQ Location: CAMBERLEY, United Kingdom

Tel: 0808 256 3859

Website: <https://www.initial.co.uk>

Product: Period Poverty Vending

Strengths:

This particular product was designed to combat period poverty and encourage users to make use of products. Its slim and compact design makes it more practical for schools as it will be possible to install within toilet cubicles. This vending machine is coin free and very simple to use, not featuring any buttons or electrical components.

Weaknesses:

The small size means that the product will not be able to store a large stock, with its maximum capacity being 8 packs of Kotex or 11 packs of Tampax. This would not be an ideal choice for schools as it would mean that it would require frequent restocking.

Additional information:

The dispensable free sanitary products are stored in boxes.

Product: FreeVend

Strengths:

The FreeVend machine can hold a larger capacity than the Period Poverty Vending, offering two different products in boxes free of charge. Users can see the products stored within the machine and will know if the vending machine has run out of products.

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Weaknesses:

N/A

Additional information:

N/A

Product: Multi Vend

Strengths:

The product is available in ABS and a can come in a variety of colours. It has high security casings with alarms available for installation. Accepts a wide range of coins.

Weaknesses:

N/A

Additional information:

N/A

6.10. Sanmak

HDQ Location: 332G+CJ Chinniyampalayam,
Coimbatore, Tamil Nadu, India

Tel: +91 6379 909 200

Website: <https://www.sammak.in>

Strengths:

The machine has daily activity report available by SD card or by print out. This is beneficial as businesses can monitor user preference and daily demands. Automatic battery backup function can also be included, which is an advantage if power mains fail. Buyers have a choice to make the product more eco friendly and cut energy costs by making the machine operate on solar power.

Weaknesses:



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PRODUCT DESIGN SPECIFICATION

N/A

Additional information:

N/A

6.11 . Stree Sanman

HDQ Location: 332G+CJ Chinniyampalayam,
Coimbatore, Tamil Nadu, India

Tel: +91 6379 909 200

Website: <https://www.streesanman.com>

Strengths:

The Stree Sanman vending machine has a uv disinfectant light to keep products clean and safe for use. It can either be purchased as push button, coin or QR Code operated.

Weaknesses:

N/A

Additional information:

Storage capacity of 30, 50 or 99 products.

Item	Description of Item/Feature or Requirement	Requirement ID	Requirement Description	Requirement Type	Acceptance Criteria	
					Test ID	Test Name
1	Push button	REQ-001	Push button to dispense product	Functional	TC-001	Push button to dispense product
2	QR code	REQ-002	Scan QR code to dispense product	Functional	TC-002	Scan QR code to dispense product
3	Coin	REQ-003	Insert coin to dispense product	Functional	TC-003	Insert coin to dispense product
4	UV disinfectant light	REQ-004	UV disinfectant light to keep products clean and safe for use	Functional	TC-004	UV disinfectant light to keep products clean and safe for use
5	Push button	REQ-005	Push button to dispense product	Functional	TC-005	Push button to dispense product
6	QR code	REQ-006	Scan QR code to dispense product	Functional	TC-006	Scan QR code to dispense product
7	Coin	REQ-007	Insert coin to dispense product	Functional	TC-007	Insert coin to dispense product
8	UV disinfectant light	REQ-008	UV disinfectant light to keep products clean and safe for use	Functional	TC-008	UV disinfectant light to keep products clean and safe for use
9	Push button	REQ-009	Push button to dispense product	Functional	TC-009	Push button to dispense product
10	QR code	REQ-010	Scan QR code to dispense product	Functional	TC-010	Scan QR code to dispense product
11	Coin	REQ-011	Insert coin to dispense product	Functional	TC-011	Insert coin to dispense product
12	UV disinfectant light	REQ-012	UV disinfectant light to keep products clean and safe for use	Functional	TC-012	UV disinfectant light to keep products clean and safe for use
13	Push button	REQ-013	Push button to dispense product	Functional	TC-013	Push button to dispense product
14	QR code	REQ-014	Scan QR code to dispense product	Functional	TC-014	Scan QR code to dispense product
15	Coin	REQ-015	Insert coin to dispense product	Functional	TC-015	Insert coin to dispense product
16	UV disinfectant light	REQ-016	UV disinfectant light to keep products clean and safe for use	Functional	TC-016	UV disinfectant light to keep products clean and safe for use
17	Push button	REQ-017	Push button to dispense product	Functional	TC-017	Push button to dispense product
18	QR code	REQ-018	Scan QR code to dispense product	Functional	TC-018	Scan QR code to dispense product
19	Coin	REQ-019	Insert coin to dispense product	Functional	TC-019	Insert coin to dispense product
20	UV disinfectant light	REQ-020	UV disinfectant light to keep products clean and safe for use	Functional	TC-020	UV disinfectant light to keep products clean and safe for use
21	Push button	REQ-021	Push button to dispense product	Functional	TC-021	Push button to dispense product
22	QR code	REQ-022	Scan QR code to dispense product	Functional	TC-022	Scan QR code to dispense product
23	Coin	REQ-023	Insert coin to dispense product	Functional	TC-023	Insert coin to dispense product
24	UV disinfectant light	REQ-024	UV disinfectant light to keep products clean and safe for use	Functional	TC-024	UV disinfectant light to keep products clean and safe for use
25	Push button	REQ-025	Push button to dispense product	Functional	TC-025	Push button to dispense product
26	QR code	REQ-026	Scan QR code to dispense product	Functional	TC-026	Scan QR code to dispense product
27	Coin	REQ-027	Insert coin to dispense product	Functional	TC-027	Insert coin to dispense product
28	UV disinfectant light	REQ-028	UV disinfectant light to keep products clean and safe for use	Functional	TC-028	UV disinfectant light to keep products clean and safe for use
29	Push button	REQ-029	Push button to dispense product	Functional	TC-029	Push button to dispense product
30	QR code	REQ-030	Scan QR code to dispense product	Functional	TC-030	Scan QR code to dispense product
31	Coin	REQ-031	Insert coin to dispense product	Functional	TC-031	Insert coin to dispense product
32	UV disinfectant light	REQ-032	UV disinfectant light to keep products clean and safe for use	Functional	TC-032	UV disinfectant light to keep products clean and safe for use
33	Push button	REQ-033	Push button to dispense product	Functional	TC-033	Push button to dispense product
34	QR code	REQ-034	Scan QR code to dispense product	Functional	TC-034	Scan QR code to dispense product
35	Coin	REQ-035	Insert coin to dispense product	Functional	TC-035	Insert coin to dispense product
36	UV disinfectant light	REQ-036	UV disinfectant light to keep products clean and safe for use	Functional	TC-036	UV disinfectant light to keep products clean and safe for use
37	Push button	REQ-037	Push button to dispense product	Functional	TC-037	Push button to dispense product
38	QR code	REQ-038	Scan QR code to dispense product	Functional	TC-038	Scan QR code to dispense product
39	Coin	REQ-039	Insert coin to dispense product	Functional	TC-039	Insert coin to dispense product
40	UV disinfectant light	REQ-040	UV disinfectant light to keep products clean and safe for use	Functional	TC-040	UV disinfectant light to keep products clean and safe for use
41	Push button	REQ-041	Push button to dispense product	Functional	TC-041	Push button to dispense product
42	QR code	REQ-042	Scan QR code to dispense product	Functional	TC-042	Scan QR code to dispense product
43	Coin	REQ-043	Insert coin to dispense product	Functional	TC-043	Insert coin to dispense product
44	UV disinfectant light	REQ-044	UV disinfectant light to keep products clean and safe for use	Functional	TC-044	UV disinfectant light to keep products clean and safe for use
45	Push button	REQ-045	Push button to dispense product	Functional	TC-045	Push button to dispense product
46	QR code	REQ-046	Scan QR code to dispense product	Functional	TC-046	Scan QR code to dispense product
47	Coin	REQ-047	Insert coin to dispense product	Functional	TC-047	Insert coin to dispense product
48	UV disinfectant light	REQ-048	UV disinfectant light to keep products clean and safe for use	Functional	TC-048	UV disinfectant light to keep products clean and safe for use
49	Push button	REQ-049	Push button to dispense product	Functional	TC-049	Push button to dispense product
50	QR code	REQ-050	Scan QR code to dispense product	Functional	TC-050	Scan QR code to dispense product
51	Coin	REQ-051	Insert coin to dispense product	Functional	TC-051	Insert coin to dispense product
52	UV disinfectant light	REQ-052	UV disinfectant light to keep products clean and safe for use	Functional	TC-052	UV disinfectant light to keep products clean and safe for use
53	Push button	REQ-053	Push button to dispense product	Functional	TC-053	Push button to dispense product
54	QR code	REQ-054	Scan QR code to dispense product	Functional	TC-054	Scan QR code to dispense product
55	Coin	REQ-055	Insert coin to dispense product	Functional	TC-055	Insert coin to dispense product
56	UV disinfectant light	REQ-056	UV disinfectant light to keep products clean and safe for use	Functional	TC-056	UV disinfectant light to keep products clean and safe for use
57	Push button	REQ-057	Push button to dispense product	Functional	TC-057	Push button to dispense product
58	QR code	REQ-058	Scan QR code to dispense product	Functional	TC-058	Scan QR code to dispense product
59	Coin	REQ-059	Insert coin to dispense product	Functional	TC-059	Insert coin to dispense product
60	UV disinfectant light	REQ-060	UV disinfectant light to keep products clean and safe for use	Functional	TC-060	UV disinfectant light to keep products clean and safe for use
61	Push button	REQ-061	Push button to dispense product	Functional	TC-061	Push button to dispense product
62	QR code	REQ-062	Scan QR code to dispense product	Functional	TC-062	Scan QR code to dispense product
63	Coin	REQ-063	Insert coin to dispense product	Functional	TC-063	Insert coin to dispense product
64	UV disinfectant light	REQ-064	UV disinfectant light to keep products clean and safe for use	Functional	TC-064	UV disinfectant light to keep products clean and safe for use
65	Push button	REQ-065	Push button to dispense product	Functional	TC-065	Push button to dispense product
66	QR code	REQ-066	Scan QR code to dispense product	Functional	TC-066	Scan QR code to dispense product
67	Coin	REQ-067	Insert coin to dispense product	Functional	TC-067	Insert coin to dispense product
68	UV disinfectant light	REQ-068	UV disinfectant light to keep products clean and safe for use	Functional	TC-068	UV disinfectant light to keep products clean and safe for use
69	Push button	REQ-069	Push button to dispense product	Functional	TC-069	Push button to dispense product
70	QR code	REQ-070	Scan QR code to dispense product	Functional	TC-070	Scan QR code to dispense product
71	Coin	REQ-071	Insert coin to dispense product	Functional	TC-071	Insert coin to dispense product
72	UV disinfectant light	REQ-072	UV disinfectant light to keep products clean and safe for use	Functional	TC-072	UV disinfectant light to keep products clean and safe for use
73	Push button	REQ-073	Push button to dispense product	Functional	TC-073	Push button to dispense product
74	QR code	REQ-074	Scan QR code to dispense product	Functional	TC-074	Scan QR code to dispense product
75	Coin	REQ-075	Insert coin to dispense product	Functional	TC-075	Insert coin to dispense product
76	UV disinfectant light	REQ-076	UV disinfectant light to keep products clean and safe for use	Functional	TC-076	UV disinfectant light to keep products clean and safe for use
77	Push button	REQ-077	Push button to dispense product	Functional	TC-077	Push button to dispense product
78	QR code	REQ-078	Scan QR code to dispense product	Functional	TC-078	Scan QR code to dispense product
79	Coin	REQ-079	Insert coin to dispense product	Functional	TC-079	Insert coin to dispense product
80	UV disinfectant light	REQ-080	UV disinfectant light to keep products clean and safe for use	Functional	TC-080	UV disinfectant light to keep products clean and safe for use
81	Push button	REQ-081	Push button to dispense product	Functional	TC-081	Push button to dispense product
82	QR code	REQ-082	Scan QR code to dispense product	Functional	TC-082	Scan QR code to dispense product
83	Coin	REQ-083	Insert coin to dispense product	Functional	TC-083	Insert coin to dispense product
84	UV disinfectant light	REQ-084	UV disinfectant light to keep products clean and safe for use	Functional	TC-084	UV disinfectant light to keep products clean and safe for use
85	Push button	REQ-085	Push button to dispense product	Functional	TC-085	Push button to dispense product
86	QR code	REQ-086	Scan QR code to dispense product	Functional	TC-086	Scan QR code to dispense product
87	Coin	REQ-087	Insert coin to dispense product	Functional	TC-087	Insert coin to dispense product
88	UV disinfectant light	REQ-088	UV disinfectant light to keep products clean and safe for use	Functional	TC-088	UV disinfectant light to keep products clean and safe for use
89	Push button	REQ-089	Push button to dispense product	Functional	TC-089	Push button to dispense product
90	QR code	REQ-090	Scan QR code to dispense product	Functional	TC-090	Scan QR code to dispense product
91	Coin	REQ-091	Insert coin to dispense product	Functional	TC-091	Insert coin to dispense product
92	UV disinfectant light	REQ-092	UV disinfectant light to keep products clean and safe for use	Functional	TC-092	UV disinfectant light to keep products clean and safe for use
93	Push button	REQ-093	Push button to dispense product	Functional	TC-093	Push button to dispense product
94	QR code	REQ-094	Scan QR code to dispense product	Functional	TC-094	Scan QR code to dispense product
95	Coin	REQ-095	Insert coin to dispense product	Functional	TC-095	Insert coin to dispense product
96	UV disinfectant light	REQ-096	UV disinfectant light to keep products clean and safe for use	Functional	TC-096	UV disinfectant light to keep products clean and safe for use
97	Push button	REQ-097	Push button to dispense product	Functional	TC-097	Push button to dispense product
98	QR code	REQ-098	Scan QR code to dispense product	Functional	TC-098	Scan QR code to dispense product
99	Coin	REQ-099	Insert coin to dispense product	Functional	TC-099	Insert coin to dispense product
100	UV disinfectant light	REQ-100	UV disinfectant light to keep products clean and safe for use	Functional	TC-100	UV disinfectant light to keep products clean and safe for use

7. Shipping

7.1. The product will be shipped directly by the producer/service provider.

7.2. This unit will only be made available to schools in the England via a website, where purchases can be made and will not be to be sold in stores to other businesses.

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PRODUCT DESIGN SPECIFICATION 6. COMPETITION – TABLE

Brand	Dimention (H)	Dimention (W)	Dimention (D)	Weight	Capacity	Commodity Type	Compartment Quantity	Installment Type	Type
Hooha	22" (558.8mm)	10" (254mm)	4" (101.6mm)	13 lbs (5.8967kg)	50	Tampon Tubes	1	Wall Mounted	Digital (Smart)
UltraVend (phs)	70cm (700mm)	35cm (350mm)	10cm (100mm)	17 kg	N/A	Reg Tampons & Winged Ultra Pads Female: Education, transport and leisure- Super Tampon, Ultra Winged Pad, Sensitive Bladder Pants, Tights, Anadin, Condoms, Imodium	2 (Dual Column)	Wall Mounted	Non Digital
Multi Column Vend (phs)	91cm (910mm)	37cm (370mm)	21.5cm (215mm)	32kg	N/A		9 (multi)	Wall Mounted	Non Digital
Ebayar – ChuanyiTech	850mm	550mm	210mm	30kg	140 units	Various Sanitary Napkins	4 Columns	Wall Mounted	Digital (Smart)
Happy Nari – HNSC 300	850mm	500mm	250mm	21kg	270 Units	Sanitary Napkin/ Mask	N/A	Wall Mounted	Digital (Smart)
Vendigo	650 mm	600mm	150mm	14kg	78 Units packed in a pack of 3's (thus total 26 packs)	Sanitary Napkin	2	Wall Mounted	Digital (Smart)
Initial – Period Poverty Vending	222mm	148mm	90mm	1kg	8 packs of Kotex or 11 packs of Tampax	Tampons & Pads	1	Wall Mounted	Non Digital
Initial – FreeVend	590mm	260mm	90mm	5.9kg	21 Kotex Maxi and 29 Tampax Super/Compact	Tampons & Pads	2	Wall Mounted	Non Digital
Initial – Dual Vend	735mm	366mm	107mm	N/A	N/A	Organic towels and tampons +	2 Columns	Wall Mounted	Non Digital
Initial– Multi Vend	1000mm	360mm	230mm	N/A	N/A	Organic towels and tampons +	N/A	Wall Mounted	Digital
Sanmak (Automatic)	655mm	700mm	140mm	25kg	100	Napkins	2	Wall Mounted	Digital (Smart)
Sanmak (Manual)	580mm	530mm	140mm	18kg	100	Napkins	2	Wall Mounted	Non Digital

Materials	Cost Per Unit	Operation	Comment
Plastic and Metal ?	N/A tbc	Mains Power Adapter	Fits standard vending tampon sizes
Metal– Powder-Coated Steel (White or Silver Finish)	N/A	Battery Operated	Push Buttons & High Security Lock
Metal– Powder-Coated Steel construct or ABS (plastic casting)	N/A	Battery Operated	Push Buttons & High Security Lock
Metal Plate & Plexiglass (Acrylic)	US\$450.00 - US\$1,000.00 (£322.46 - £716.57)	Mains Power Adapter	Human body IR sensor, Digital touch screen, Voice playback
Mild Steel Sheet Metal	N/A	Power Adapter with Battery Backup	Card Reader sensor & GSM Card Connectivity
1.2mm thick anti-corrosive powder coated steel	₹ 22,749 (£223.22)	Mains Power Adapter	Coin Operated, LCD display, Push Buttons, Paper Money, Coin Operated
Sheet Metal	N/A	NOT REQUIRED	Push Buttons
Sheet Metal	N/A	NOT REQUIRED	Push Buttons
Metal	N/A	NOT REQUIRED	Push Buttons
ABS Plastic	N/A	Mains Power Adapter	Coin Operated, High security casings / alarms available, wide variety of product configurations
Metal	N/A	Mains Power Adapter	LCD display, Battery Backup, machine can store transaction history in SD Card, vend napkins based on ID cards (optional)
Metal	N/A	NOT REQUIRED	

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PRODUCT DESIGN SPECIFICATION

7-3. A single product will be shipped in individual insulated cardboard boxes, however if schools purchase a batch, they are to be placed in master carton.

7.4. The product will deteriorate over a period of time if exposed to severe environmental conditions thus will not require any special storage, however as electrical components are included, it is advisable to store in an environment with low humidity levels to prevent the formation of liquids and rust.

7.5. The items will be stored in a freight facility, and processed and shipped on pallets with slip-sheets in transportation, upon request.

7.6 The unit will not disassemble for transportation

7.7. The cardboard packaging is rectangle to facilitate stacking on pallets and load onto truck. This helps to reduce the carbon footprint of shipping.

8 Packing

8.1. The packaging will consist of expanded polystyrene (EPS) foam in the interior, separating the product from the exterior packaging. These will be contained in a corrugated cardboard box for easy stack.

8.2. The product must be packaged in a well-designed packaging which is easily recoverable or reused, minimises environmental impacts and saves costs.

8.3. The packaging should provide protection against microbiological contamination.

8.4. The packaging will offer sufficient protection to prevent damage to the unit during transportation, such as vibration and compression.

Quantity

9.1. According to research on annual quantity manufacturable, the sanitary napkins segment of the feminine hygiene products market, washroom and pupil quantity in educational institutions, the product should be batch produced with an average of 39 units being readily available per school. There are more companies developing modern sanitary product machines to help eliminate the charge of washroom products and bills created to encourage businesses to offer free period products. This market is large and expected to

APPENDIX

5.3.3. PDS (*Product Design Specification*)

PRODUCT DESIGN SPECIFICATION 9. QUANTITY – TABLE

Secondary/ 6th Form State + Academy School UK					
School	Type	Age Range	Number of Students	Maximum Capacity	Eligible Free School Mealers
Winchmore School + 6th Form	Community	11-19	1,638 (2021)	1,433	15.30%
Highlands School	Community	11-19	1,531	1,589	10%
Broomfield School	Foundation	11-16	732	1,000	19.80%
St Anne's Catholic High School For Girls	Voluntary Aided	11-18	1,034	1,089	12.40%
St Thomas More Catholic School	Academy Converter	11-18	1230	1260	17.70%
Woodford County High School	Community	11-18	1154	1,215	5.50%
Beacon High	Community	11-16	493	900	42.80%
Meridian High School	Academy Sponsor Led	11-18	614	960	47.20%
King Henry School	Academy Sponsor Led	11-19	1,627	2,050	24.10%
Bentley Wood High School	Academy Converter	11-18	1,236	1,304	14.80%
The Camdem School For Girls	Academy Aided	11-18	1,043	1,000	20.90%
Dame Allice Owen's School	Academy Converter	11-18	1,440	1,416	3.60%
Fortismere School	Foundation	11-18	1,783	1,655	6.90%
West London Free School	Free School	11-18	871	890	18.50%
Grey Court School	Academy Converter	11-18	1,415	1,398	8.20%
The Henrietta School Barnet School	Academy Converter	11-18	792	779	1.90%
Holland Park School	Academy Converter	11-18	1,389	1,430	17.70%
Lady Margaret School	Academy Converter	11-18	739	538	9.60%
Newstead Wood School	Academy Converter	11-18	1,100	955	4.10%
Sacred Heart High School	Academy Converter	11-19	1,093	793	9.20%
The Tiffin Girls' School	Academy Converter	11-18	1,190	1,001	2.20%
Twyford Church of England High School	Academy Converter	11-18	1,499	1,372	6.90%
Wallington High School for Girls	Academy Converter	11-18	1,497	1,460	4.90%
Woolwich Polytechnic School	Free School	11-16	232	1,200	15.10%
Wembley High Technology College	Academy Converter	11-19	1,399	1,330	11.60%



APPENDIX

5.3.3. PDS (*Product Design Specification*)

PRODUCT DESIGN SPECIFICATION 9. QUANTITY – TABLE (CONTINUED)

Eligible Free School Mealers	Number of Female Students	Number of Male Students	Legal Number of fixtures Required	Quantity of DORHER.VITA Dispensers Required Per 20 Females	Schools Median
15.30%	803	835	82	40	
10%	781	750	77	39	
19.80%	337	395	37	17	
12.40%	1,034	0	52	52	
17.70%	567	677	62	28	
5.50%	1,154	0	58	58	
42.80%	173	325	25	9	
47.20%	295	319	31	15	
24.10%	781	846	81	39	
14.80%	1,236	0	62	62	
20.90%	1,043	0	52	52	
3.60%	749	691	72	37	
6.90%	892	892	89	45	
18.50%	436	436	44	22	
8.20%	608	807	71	30	
1.90%	792	0	40	40	
17.70%	708	681	69	35	
9.60%	739	0	37	37	
4.10%	1,100	0	55	55	
9.20%	1,093	0	55	55	
2.20%	1,190	0	60	60	
6.90%	794	705	75	40	
4.90%	1,497	0	75	75	
15.10%	232	0	12	12	
11.60%	672	727	70	34	



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5.3.3. PDS (*Product Design Specification*)

PRODUCT DESIGN SPECIFICATION

9. Manufacturing Facility

9.1. what are the proposed manufacturing options, and where might these take place?

9.1.1. The manufacturing process for the unit will take place in a single hired factory to batch produce the units.

9.1.2. The factory must be producing goods or products that are very similar to the unit, in order to better understand the target market.

9.2. Are there any components that will be bought in from other manufacturers?

9.2.1. Electrical components used in the unit, will be purchased from external manufacturers.

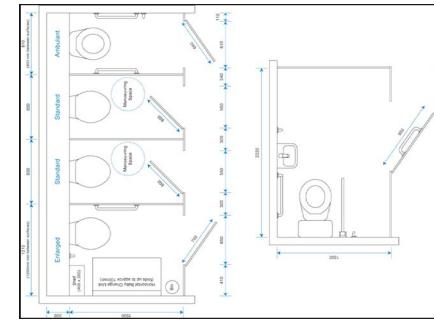
10. Size

10.1 What are the factors that dictate size requirements and how will these be defined?

10.1.1. The actual size of the dispenser is 410mm x 485mm x 285mm (W x H x D), however, it must be able to store the 22 products that come in different sizes and electrical components. kept as small as possible to fit in with the environment in which it is to be used.

10.2. What is the required product size?

10.2.1. To ensure that the dispenser can fit the recommended environment for use; Enlarged, Standard, Wheelchair Accessible Toilets and Ambulant washroom cubicles, the overall size of the unit must not exceed: 800mm x 2100mm x 250mm (W x H x D).



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5.3.3. PDS (*Product Design Specification*)

PRODUCT DESIGN SPECIFICATION

11. Weight

11.1. What are the factors that dictate weight requirements and how will these be defined?

11.1.1. The unit will be installed behind the rear panel of a cubicle usually made from either laminated Melamine Faced Chipboard (MFC), High Pressure Laminate (HPL) or Solid Grade Laminate (SGL) and mounted onto the wall.

11.1.2. The weight limit of drywall depends on the size of the panel and the distribution of weight, hardware and technique. With the correct selection, drywall can hold up 45kg. Plasterboard wall may hold up to 40kg.

11.2. What is the required product weight?

11.2.1 Based on the weight of similar existing products when empty, the unit must not exceed a total weight of 18kg.

12. Aesthetics, Appearance, and Finish

12.1. What is the intended aesthetic and design language of the product?

12.1.1. To show that the ENOVA Dispenser and the ENOVA App are under the same brand, the dispenser will follow the same shape as the ENOVA App buttons; displaying three round edges and a single 90 degree edge, however this will be in 3D.

12.1.2. The dispenser exterior will display laminated stickers for brand and product instructions.

12.1.4. The design must be modern, sleek and ergonomic to make the product more appealing to its intended users and provide accessibility.

Are there any customer expectations or preconceptions regarding aesthetics?

12.2.1. The dispenser will be designed with a range of unisex pastel colours that represent neutrality and are able to emit a sense of tranquility. Darker as well as softer pastel colours were chosen as it ensure that different user such as girls, non binary, and trans boys, are included and are able to make a connection with the product. Pastels have become especially popular amongst young people and commonly used in feminine products- with softer colours.

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5.3.3. PDS (*Product Design Specification*)

PRODUCT DESIGN SPECIFICATION

13. Materials

13.1. What are the range of materials that might work for this application?

13.1.1. Materials selected for the dispenser must abide to regulations in place and product standards to guarantee safety and legal product distribution. For example, plastics must undergo testing and conform to certain flammability ratings in order to acquire an approval.

13.1.2. The unit will be primarily made from 1.2mm powder coated 304 antibacterial stainless steel external, to reduce opportunity for vandalism. This material is ideal for high traffic areas and unsupervised school spaces such as student washrooms. Powder coating, improved product durability and finish, and reduces environmental impact in comparison to other alternatives e.g. paint.

13.1.3. The powder coating will be thermoplastic for additional durability and eliminates chemical bonding to make the coating reversible and reusable.

14. Product Life Span

14.1. What is the shelf life of the product?

14.1.1. As for the units' electrical components, it is estimated that Liquid Crystal Displays (LCDs) can remain functional for 40,000 to 60,000 hours because of the energy-efficient backlighting - LEDs.

14.1.2. With the additional coating of powder to provide a protective barrier that helps prevent corrosion, reduces the need for maintenance as it is more chip proof and the robust external material should withstand acts of vandalism.

14.1.3. Properly cared for and cleaned stainless steels result in a low maintenance cost. When not exposed to saline or chloride environments, this material grade lifespan is estimated to be around 20 years, with some extending to centuries.

14.2. What happens at end-of-life / disposal?

14.2.1. Stainless steel is one of the most sustainable and valuable commodities in the metal market. The appliance's powder coated material can be removed chemically and physically, and recycled in an electric arc steelmaking.

14.2.2. The simple assembly of the dispenser means that it can be easily taken apart and turned to scrap metal. Chromium, nickel and molybdenum are highly valuable elements that can be recovered from materials and recycled.

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PRODUCT DESIGN SPECIFICATION

15.1 Are there any national or international standards to which the product must conform?

15.1.1. The dispenser must conform to relevant BSI and international standards: International Standards (Northern America: UL and FCC. For Europe it is TUV and CE) - ISO 9001:2015

16. Ergonomics

16.1. What are the customer requirements in terms of ergonomics? What user / operator features are desirable and/or essential?

16.1.1. The dispenser unit should be designed with ergonomics. The Case slot should be positioned correctly in terms of height so that the intended user may insert the ENOVA Case with ease.

16.1.2. The product will be designed, to require as little space possible whilst maintaining its functionality and to be easily installed in any standard washroom cubicle.

16.1.3. The dispenser will not require any physical input from the end user.

16.1.4. The location of the components such as the scanner, must be placed at the appropriate distance from each other for the users to navigate with ease.

16.1.5. All essential components for user input must be visible and easily recognisable.

16.1.6. The power adapter on the unit, and other cables placed on the rear of the unit, to prevent students from handling.

17. Customer and user

17.1. Who will buy this product and why? List all potential classes of customers.

17.1.1. The product stands out from similar existing products in the market as it combines various elements from social media, which is popular amongst adolescents, and smart tangible products. The dispenser will attract users that experience period poverty as well as those that are more affluent.

17.1.2. Potential expansion could see this multi product or the physical unit being used not just in educational spaces, but also in businesses, transport, retail and leisure spaces.

17.1.3. Ideal companies that could potentially adopt the product into their lines of similar product would be Phs Group and Initial, as they currently provides schools with various services and products. An international company could be Happy Nari.

17.2. Is there a new segment of the market that you can tap into?

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17.2.1. By 2027, the feminine hygiene products market is estimated to reach 31.51 Billion USD. The Dispenser could tap into the market of smart feminine care or feminine hygiene as it is experiencing a high demand, due to development of innovations. This segment is projected to see significant growth- at a CAGR of 6.5% from 2020-2026.

18.Quality and Reliability

18.1. What level of reliability can you expect for this product?

Reliability Standard:

18.1.1. The reliability of the product will have high standard as to ensure that it can carry out its purpose, making period products easily accessible to students in an effort to tackle period poverty.

18.1.2. The unit must be designed and maintained to conform to the ISO 9001 standard.

Quality Standard:

18.1.3. The product will undergo various standard tests to guarantee quality, and ensure that the device will perform its required function when subjected to expected conditions.

18.2. Are there any legal requirements for reliability? How will you regulate or check quality on bought-in components?

18.2.1. Reliability of bought-in components will be verifying that companies meet reliability goals numerically rather than qualitatively to make sure that the electronics are being managed and are able to provide reliability specifications.

19.Shelf life (storage)

19.1. For how long is the product expected to be stored before use?

19.1.1. The product does not have any issues regarding its shelf life. Acceptable storage procedures must be carried out to minimise the chance of the packaging and the product getting damaged.

20.Processes of manufacture

20.1. Does the manufacture require new production processes to be developed?

20.1.1. The stainless steel material will be sourced from external manufacturers. The manufacturing process will include melting the raw materials, casting, forming, heat treatment, descaling, cutting, finish and powder.

20.1.2. Each unit must pass a quality control before being stored for dispatched.



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5.3.3. PDS (*Product Design Specification*)

PRODUCT DESIGN SPECIFICATION

21. Time scale

21.1. What is the timescale of the project? List key milestones: design freeze, pre-production prototype, implementation of manufacturing process, sales agreements, investment phases.

21.1.1. This project was launched in September 2020 and is aimed to be completed by June 2021. Research, ideation, initial prototyping, testing, manufacturing and final prototyping are processes to take place during the 9 months.

Timescale:

- 22 September 2020 - Project Launch
- 22 September – 22 October 2020 - Research
- 17 November 2020 – February 2021 - Ideation
- 5 March 2021 – Design Freeze
- February 2021- Initial Prototyping
- April 2021 - Testing
- 28 May - Final Prototyping
- June 2021 - Graduation

22. Testing

22.1.What will be the testing requirements and procedure?

22.1.2. The product must be able to receive a Design Qualification (DQ) to show that it works as intended in all respects.

22.1.3. The electronic dispenser must be CE certified.

23. Safety – including standards

23.1. What are the potential sources of product liability legislation?

23.1.1. Product liability legislations for England and Wales include:

Product Liability Statute e.g.

- Part 1 of the Consumer Protection Act 1987 (CPA) – EU Directive 85/374/EEC on liability for defective products (Product Liability Directive).
- Consumer Rights Act 2015 (Consumer Rights Act)

Consumer Protection Statute e.g.

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If the dispensers are not of satisfactory quality or fit for purpose when purchased, customers may be entitled to:

- Within 30 days of delivery, full refund
- Within six months of delivery: repair or replacement, or full refund
- Over six months from delivery to six years: repair or replacement within a reasonable time.

Liable parties

23.2. Are there any potential operator / user hazards?

23.2.1. Potential hazards to the user include liquids coming into contact with the dispensers' electronic components which may cause the product to break down, but very minimal harm to users.

23.2.2. When restocking, the dispenser must be deprived of its power source as to prevent parts moving unexpectedly.

23.2.3. Refer back to heading (15) for additional units safety specification.

23.2.4. The case slot on the dispenser must not allow users to place their hands in the machine to prevent fingers from getting caught in moving parts.

23.3. Are there any manufacturing and assembly hazards?

23.3.1. There should not be any manufacturing hazards of the electrical components because external manufacturer must follow the required safety standards and provide reliability specifications to ensure that products are safe for utilisation and assembly.

23.4. What is the potential for misuse and/or abuse?

23.4.1. The dispensers must be installed away from flammable substances and objects such as radiators as to not melt the components and external shell causing a short life span.

23.4.2. users must not attempt to pry open the machine with sharp or conductive objects as to not cause injury.

24. Company Constraints

What are the limitations of the company as it is at the moment? How can these be overcome?

24.1.1. Limitations would include introducing a new company that needs to expand in size and imprint its brand in the market. This may be difficult with other bigger established companies currently operating and offering its products and services to the same target users. To overcome this, it may need to partner with other more well known companies, manufacture the dispensers but allow the products to be sold by those companies in Australia.

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25. Market Constraints

25.1. Who is buying this type of product?

- 25.1.1. Smart period product dispensers are not common products in state funded educational institutions in England.
- 25.1.2. Currently these smart dispensers are being not a popular choice for bigger businesses or washrooms in public spaces because the larger the company, the more the number of required dispensers would increase. By opting for non smart, lower cost dispensers, companies are able to purchase a more.

25.1.3. The

26. Political and social implications

26.1. Are there any forecast political or social implications of this product?

- 26.1.1. The positive social implication is that the product may help close the gap between female and male student school attendance as well as students from lower income household and students from wealthier backgrounds opportunity.
- 26.1.2. No political implications can be drawn from the introduction of the product at this point.

27. Legal

27.1. What are the legal issues around a product of this nature?

- 27.1.1. Improper use of electrical products by consumers can raise serious legal implications, especially if user health is compromised.

28. Installation

28.1. Is a professional required for installation?

- 28.1.1. As stated previously, the unit will not be designed to disassemble for transportation, but will be designed to be easily taken by professionals apart in the case that it requires replacement pieces and repair.
- 28.1.2. Educational institutions will not be expected to carry out the product installation, however a manual will be provided with each dispenser. Rather, a professional employee will be dispatched to perform this process to ensure that it is properly fitted.
- 28.1.3. Once the product has been installed, the only task for the user is to register and sync the dispenser to the school administrator ENOVA app account in order to obtain control and receive dispenser stats. The user will also need to stock the dispenser with the products provided by Phs Group.

29. Documentation

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5.3.3. PDS (*Product Design Specification*)

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30.1.1. Alongside the dispenser, a complete set of product manuals, both for the user and for service engineers will be provided.

29.1.2. The user's guide will provide instructions for the user operating the unit. It must contain details of how to register and sync the dispenser, and safely utilise, dispose and clean the product.

29.1.3. The service manual will provide instructions for the engineer. It must contain details of how to install and start up the scanner (power) and how to repair the dispenser.

29.1.3. A product note will also be included to inform the user how the product will be recycled, after its shelf life.

30. Disposal and End-of-Life scenarios

30.1. Does the product constitute an environmental hazard when disposed of? Can parts of it be effectively recycled?

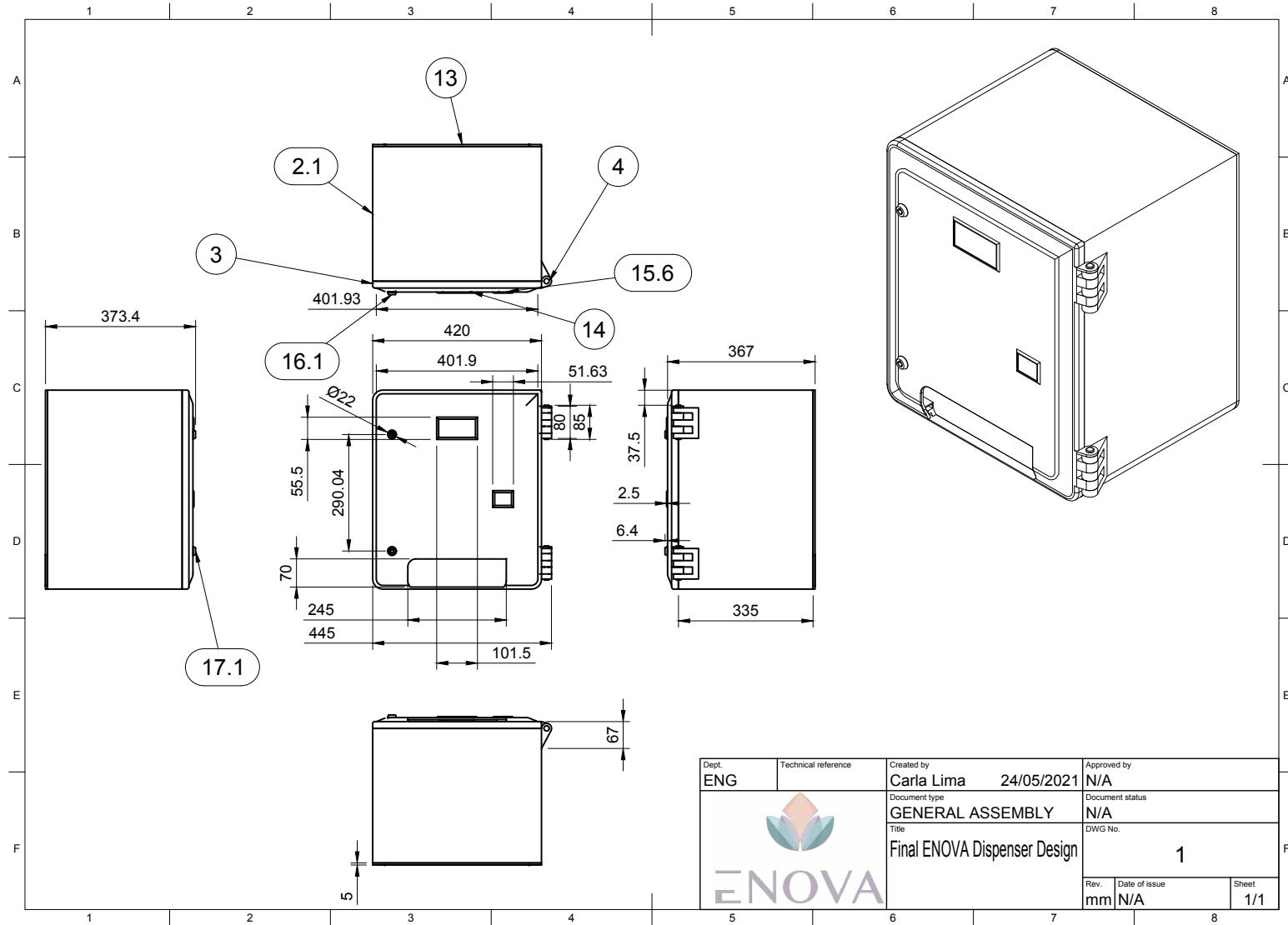
30.1.1. The user recycle the dispenser or return it to the company to ensure that the product will be disposed properly and taken to a furnace.



APPENDIX

5.3.5. Technical Drawing

ENOVA DISPENSER TECHNICAL DRAWING – ASSEMBLY



APPENDIX

5.3.5. Technical Drawing

ENOVA DISPENSER TECHNICAL DRAWING – ASSEMBLY PARTS LIST

Parts List				
Item	Qty	Part Number	Part Name	Description
2	1	Body	Body	Dispenser
2.1	1	Box Shell	Box Shell	Dispenser
3	1	Door	Door	Dispenser and Door Hinge
4	2	Pin	Pin	Dispenser compartment
6	1	Coll compartment	Coll compartment	Vending compartment
		v12 (1)	v12 (1)	
6.1	3	Tray body (1)	Tray body (1)	Vending compartment
6.2	3	Spring Coll (1)	Spring Coll (1)	Vending compartment
6.3	3	Servo Motor (1)	Servo Motor (1)	Vending Electronics
6.4	2	Board 1 (1)	Board 1 (1)	Vending Electronics
6.5	1	Board 2 (1)	Board 2 (1)	Vending Electronics
7	1	Coll compartment	Coll compartment	Vending compartment
		v12 (2)	v12 (2)	
7.1	3	Tray body (2)	Tray body (2)	Vending compartment
7.2	3	Spring Coll (2)	Spring Coll (2)	Vending compartment
7.3	3	Servo Motor (2)	Servo Motor (2)	Vending Electronics
7.4	2	Board 1 (2)	Board 1 (2)	Vending Electronics
7.5	1	Board 2 (2)	Board 2 (2)	Vending Electronics
8	1	Coll compartment	Coll compartment	Vending compartment
		v12	v12	
8.1	3	Tray body	Tray body	Vending compartment
8.2	3	Spring Coll	Spring Coll	Vending compartment
8.3	3	Servo Motor	Servo Motor	Vending Electronics
8.4	2	Board 1	Board 1	Vending Electronics
8.5	1	Board 2	Board 2	Vending Electronics
9	1	Tray Suspender	Tray Suspender	Vending and Dispenser body
13	1	Back	Back	Dispenser
14	1	ENOVA Dispenser	ENOVA Dispenser	Vending and Door Electronics
		2 Design_LCD	2 Design_LCD	
		Module	Module	
15	1	ENOVA Dispenser	ENOVA Dispenser	Vending and Door Electronics
		2 Design_QR	2 Design_QR	
		Scanner v3 v1	Scanner v3 v1	
15.2	1	Cam	Cam	Scanner Components
15.3	1	Ball	Ball	Scanner Components
15.4	1	White 1	White 1	Scanner Components
15.5	1	White 2	White 2	Scanner Components
15.6	1	Component88	Component88	Scanner Components
16	1	LongCam Lock v2	LongCam Lock v2	Door Lock
16.1	1	Main Body (1)	Main Body (1)	Cam Lock Components
16.2	1	Lock Plate (1)	Lock Plate (1)	Cam Lock Components
16.3	1	Nut (1)	Nut (1)	Cam Lock Components
17	1	LongCam Lock v2	LongCam Lock v2	Cam Lock Components
		(1)	(1)	
17.1	1	Main Body (2)	Main Body (2)	Cam Lock Components
17.2	1	Lock Plate (2)	Lock Plate (2)	Cam Lock Components
17.3	1	Nut (2)	Nut (2)	Cam Lock Components
18	1	Cam lock locker 1	Cam lock locker1	Dispenser Cam Lock Holder
19	1	Cam lock Locker2	Cam lock Locker2	Dispenser Cam Lock Holder
20	1	ROD 1	ROD 1	Dispenser Cam Lock Holder
21	1	ROD 2	ROD 2	Dispenser Cam Lock Holder
23	1	Plexiglass1	Plexiglass 1	Door Scanner Protective Layer
24	1	Plexiglass2	Plexiglass 2	Door Scanner Protective Layer



APPENDIX

5.3.4. Design Show Banner

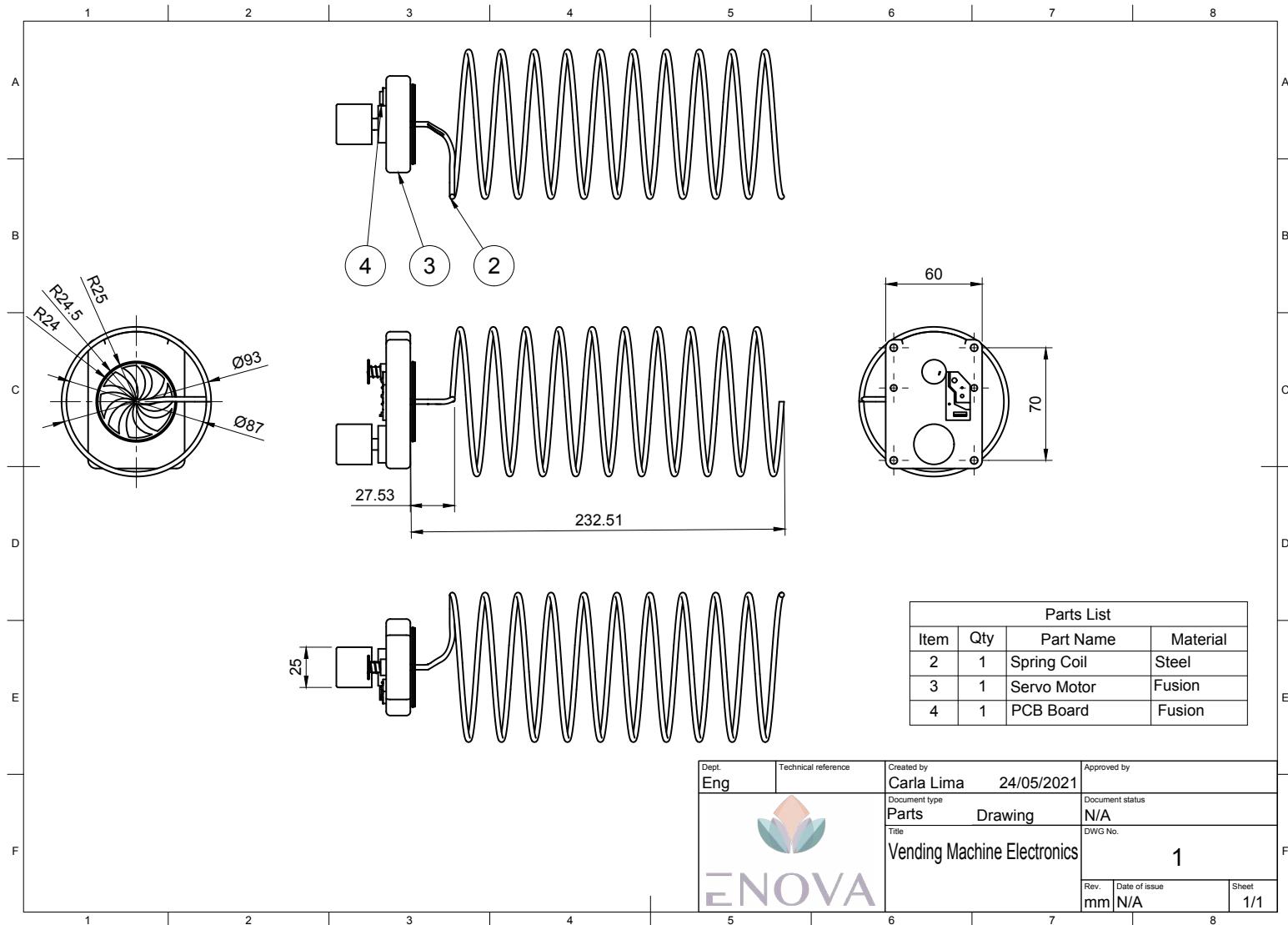
See Figure 66: Draft Banner



APPENDIX

5.3.5. Technical Drawing

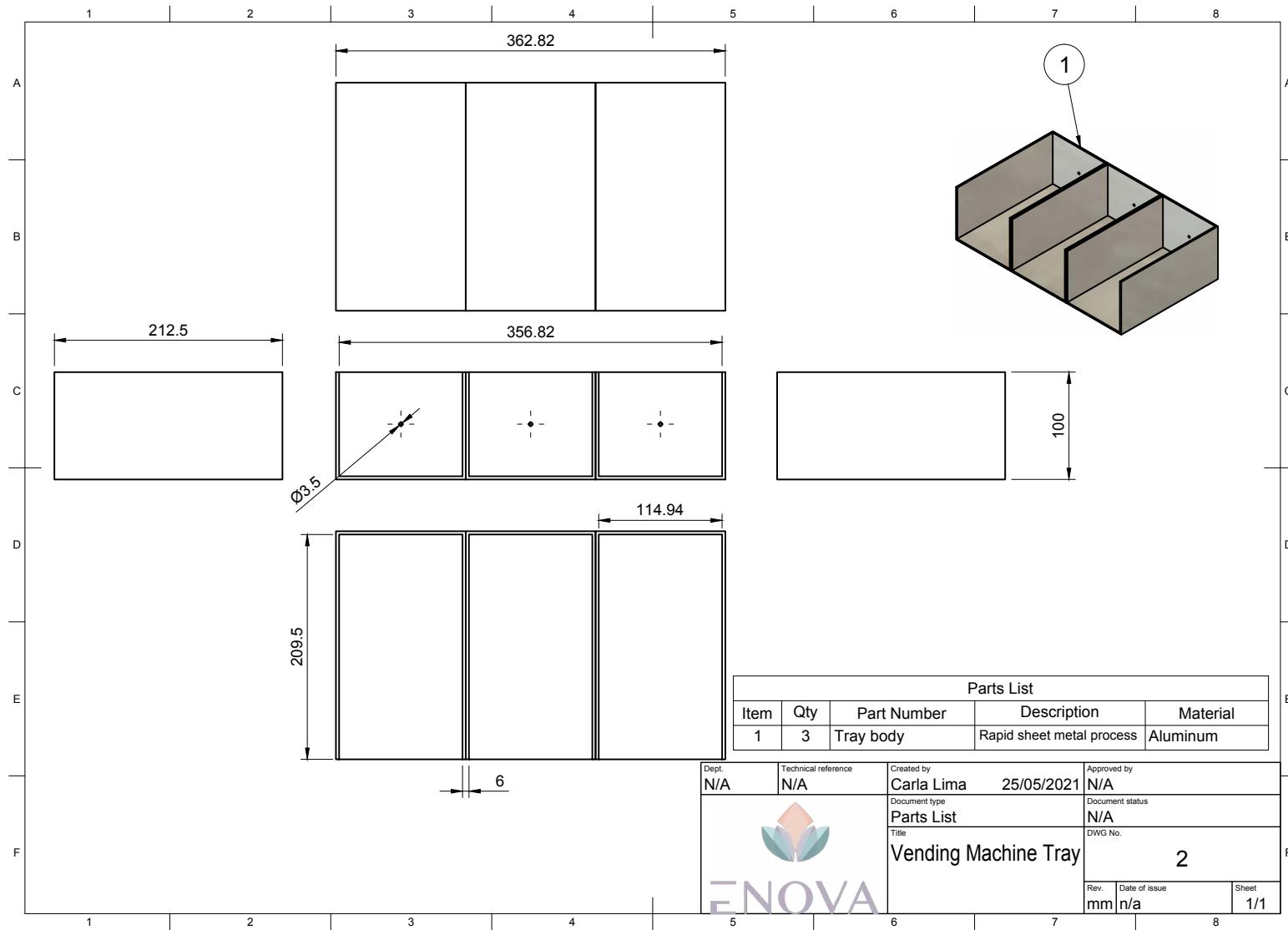
ENOVA DISPENSER VENDING MACHINE ELECTRONICS



APPENDIX

5.3.5. Technical Drawing

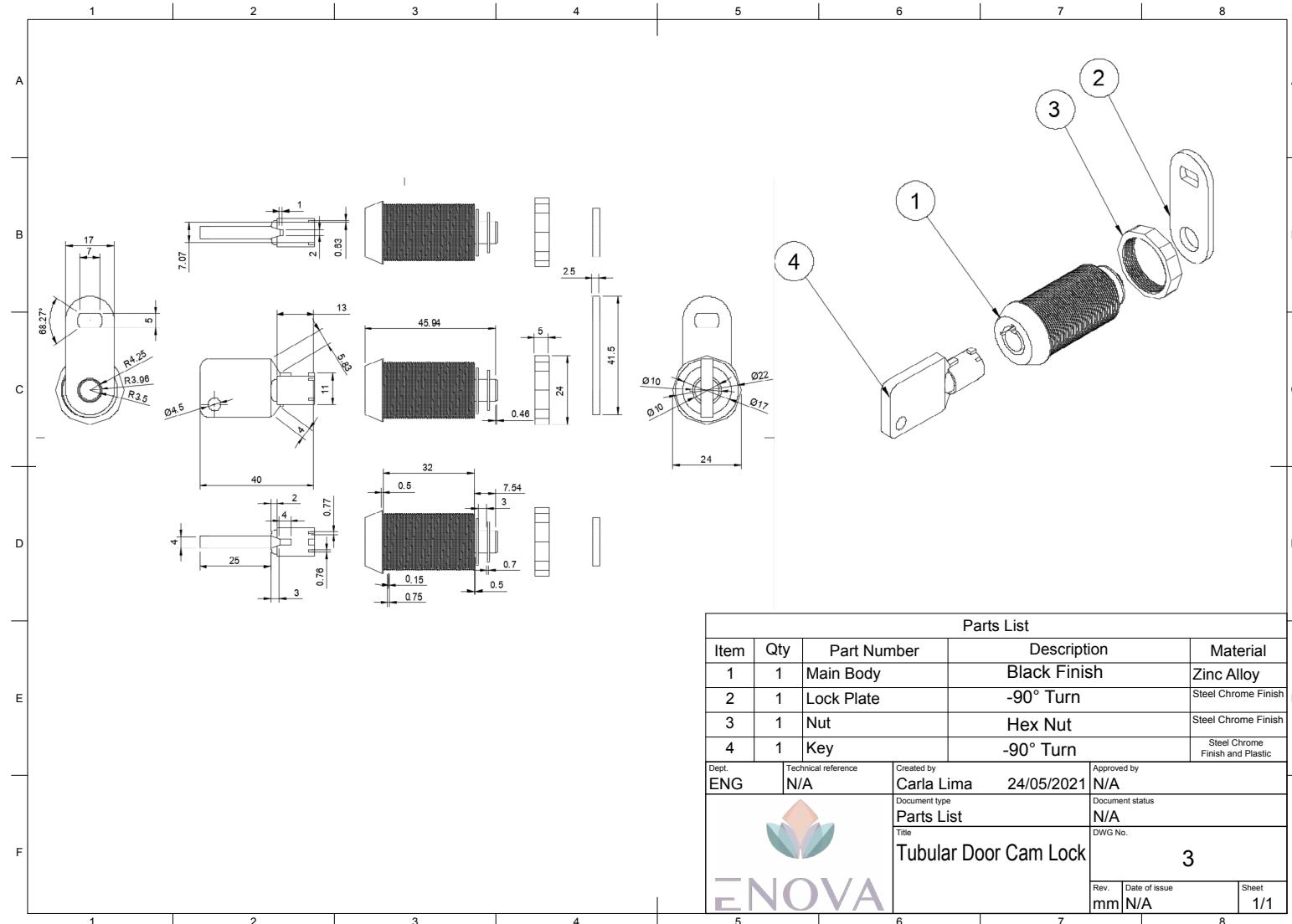
ENOVA DISPENSER VENDING MACHINE PARTS



Appendix

5.3.5. Technical Drawings

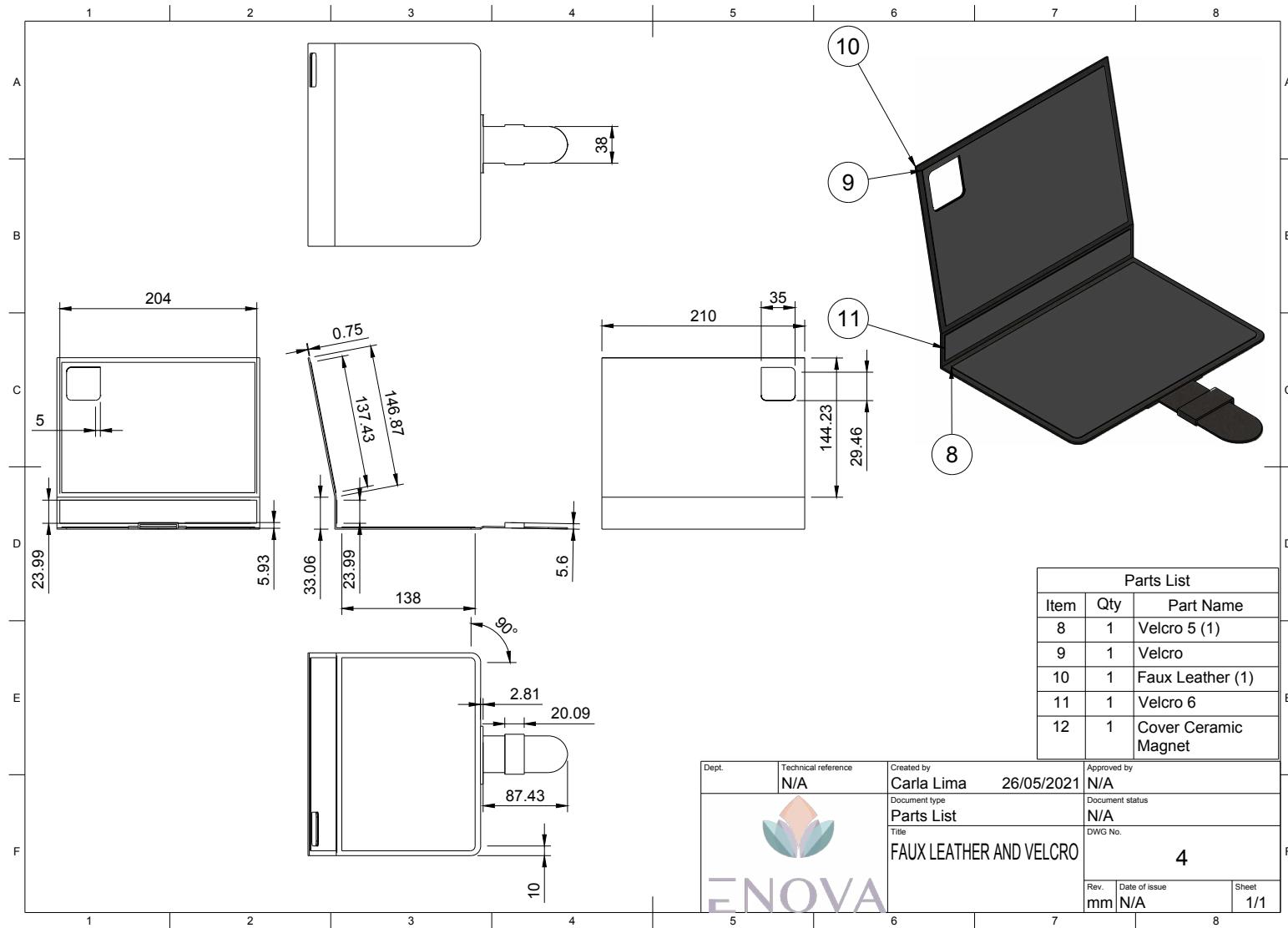
ENOVA DISPENSER DOOR LOCK PARTS



Appendix

5.3.5. Technical Drawings

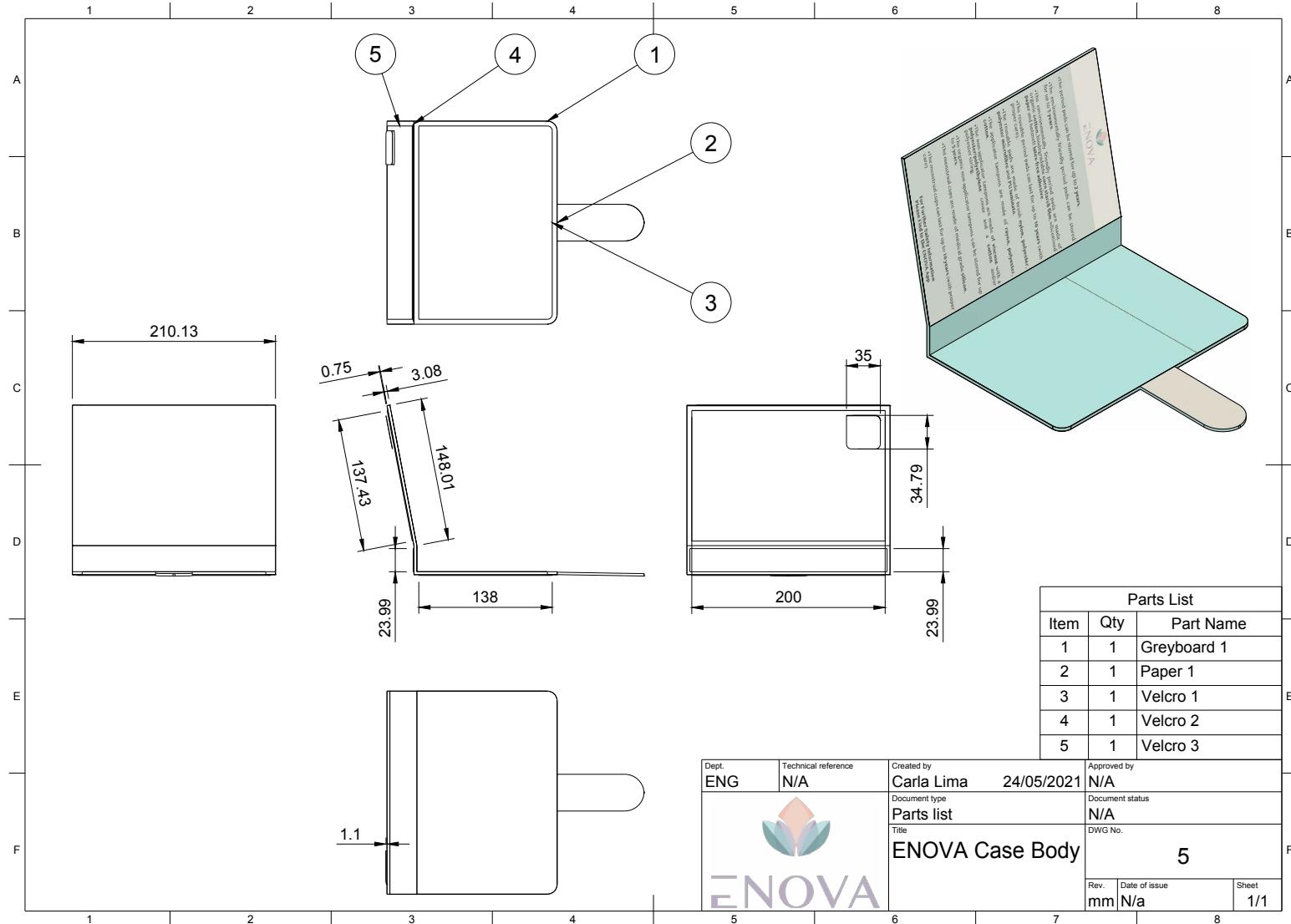
ENOVA CASE ENGINEERING DRAWING PARTS



Appendix

5.3.5. Technical Drawings

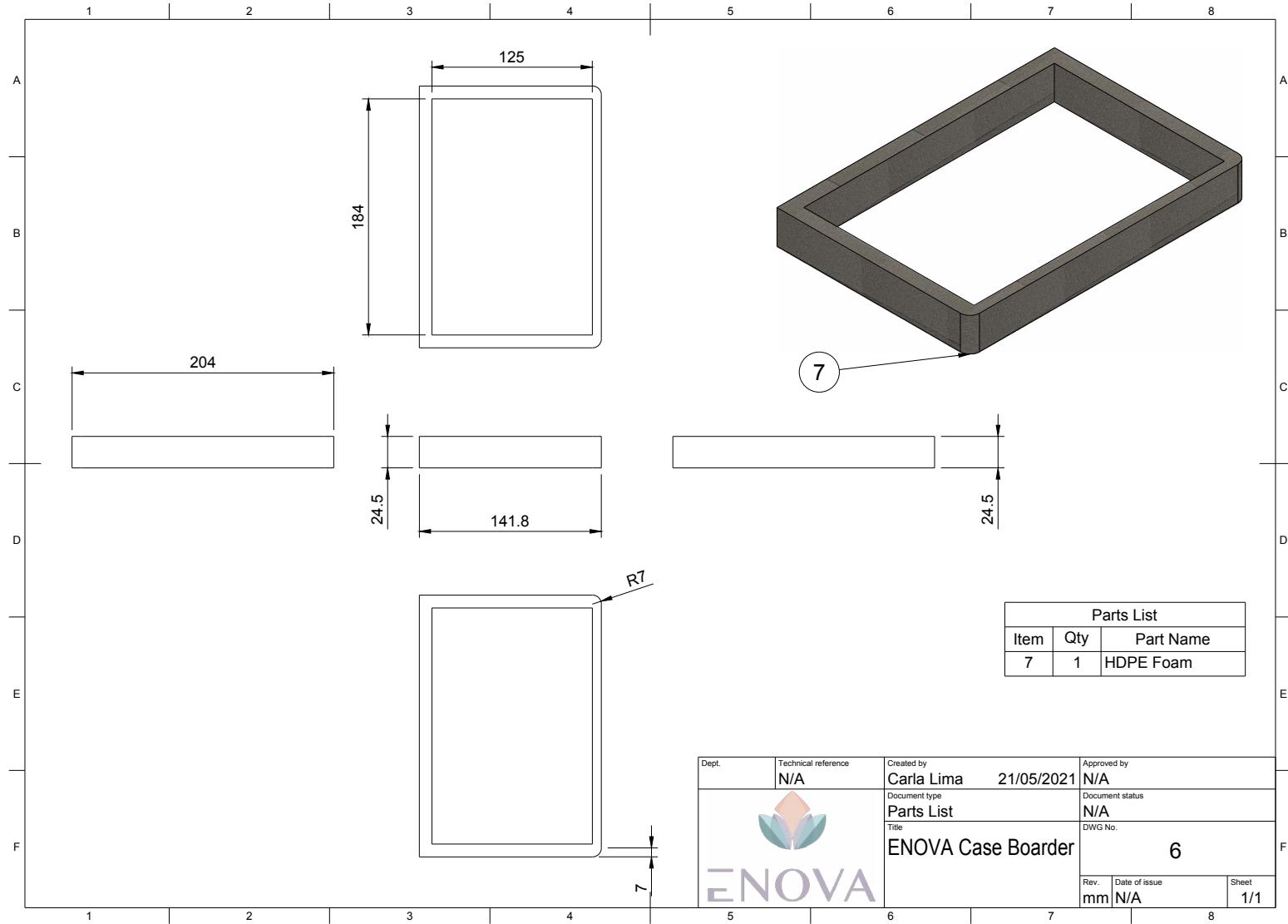
ENOVA CASE ENGINEERING DRAWING PARTS



Appendix

5.3.5. Technical Drawings

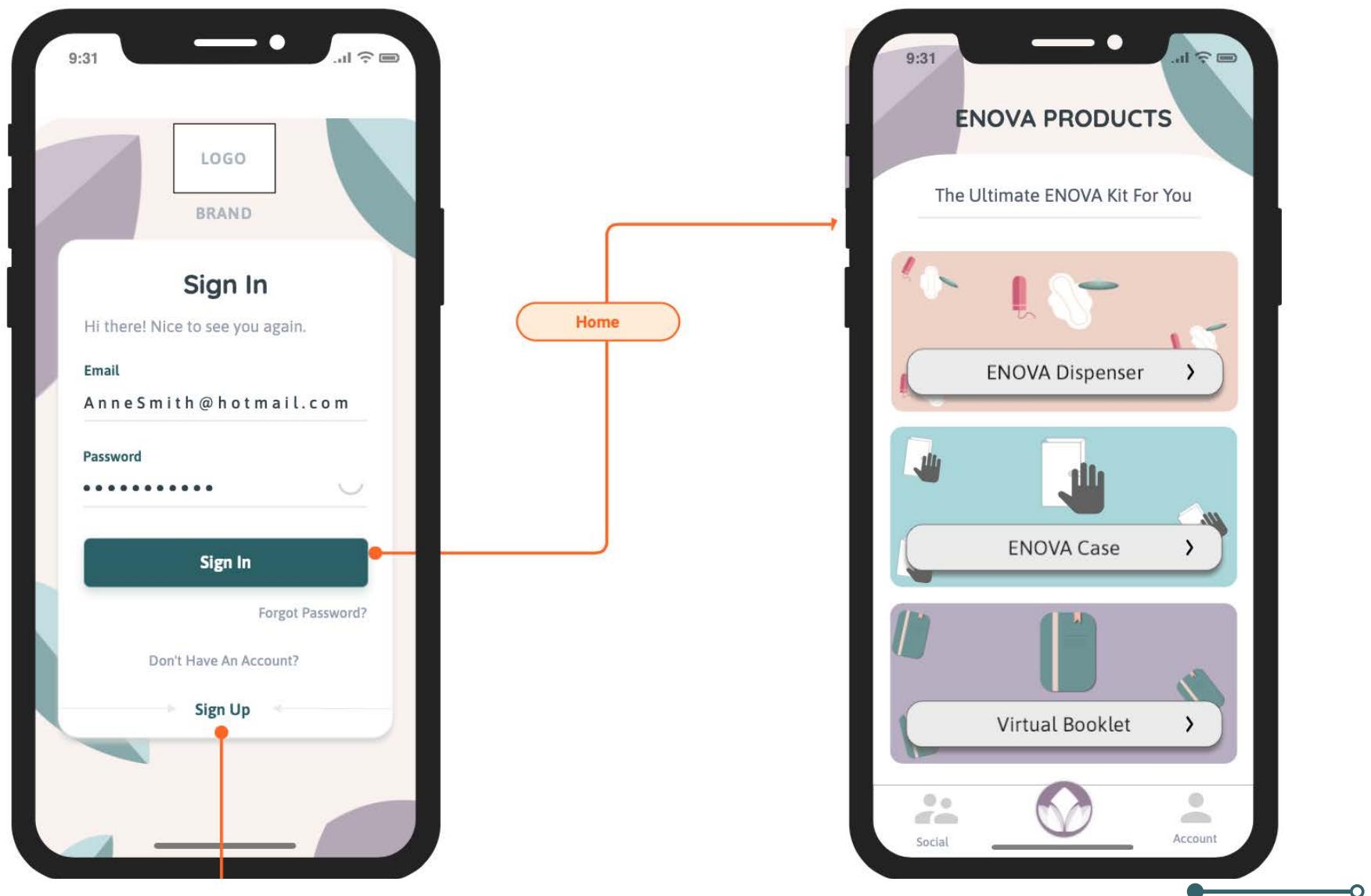
ENOVA CASE ENGINEERING DRAWING PARTS



APPENDIX

5.3.6. Other

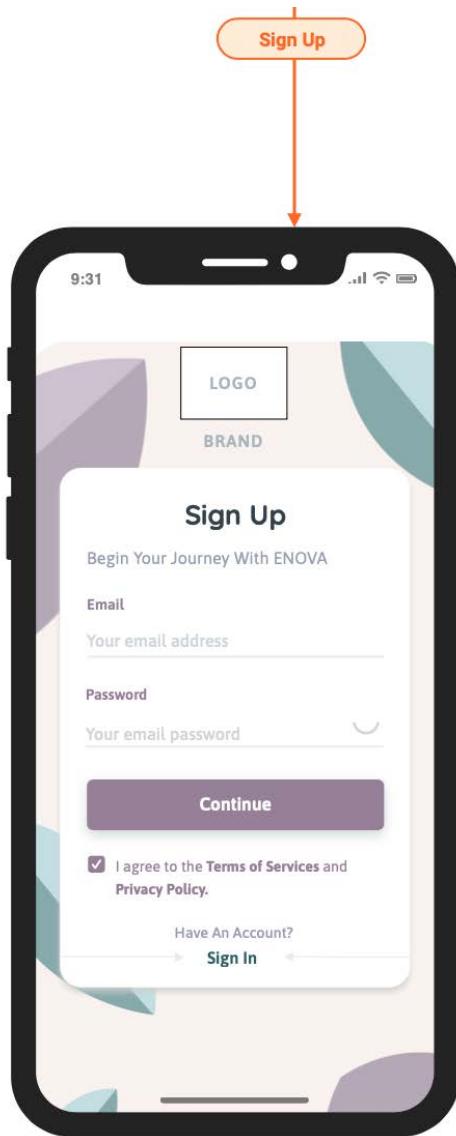
INITIAL APPLICATION PLAN—WIREFRAME



APPENDIX

5.3.6. Other

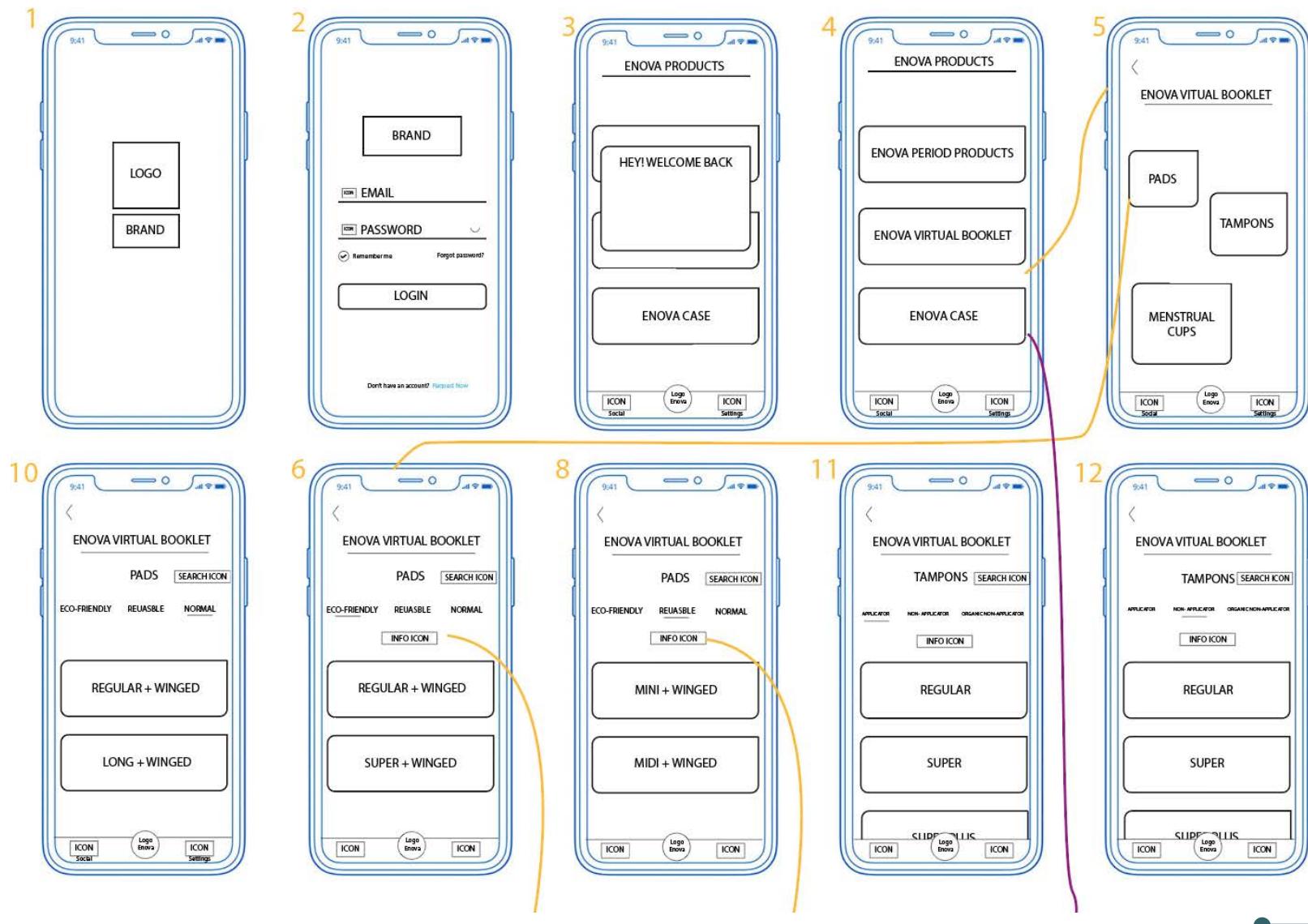
INITIAL APPLICATION PLAN—WIREFRAME



APPENDIX

5.3.6. Other

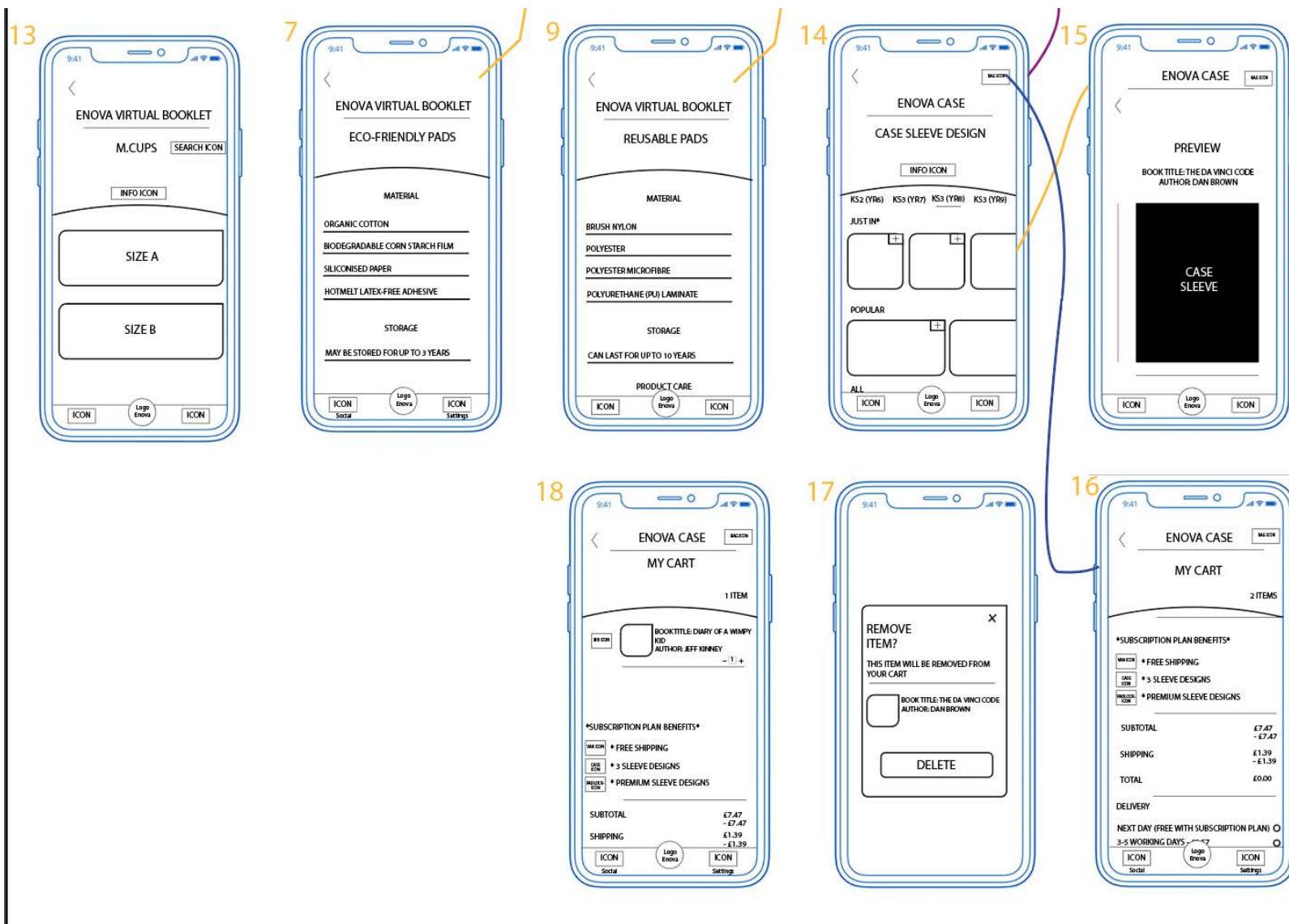
FINAL APPLICATION PLAN–WIREFRAMES (PART I)



APPENDIX

5.3.6. Other

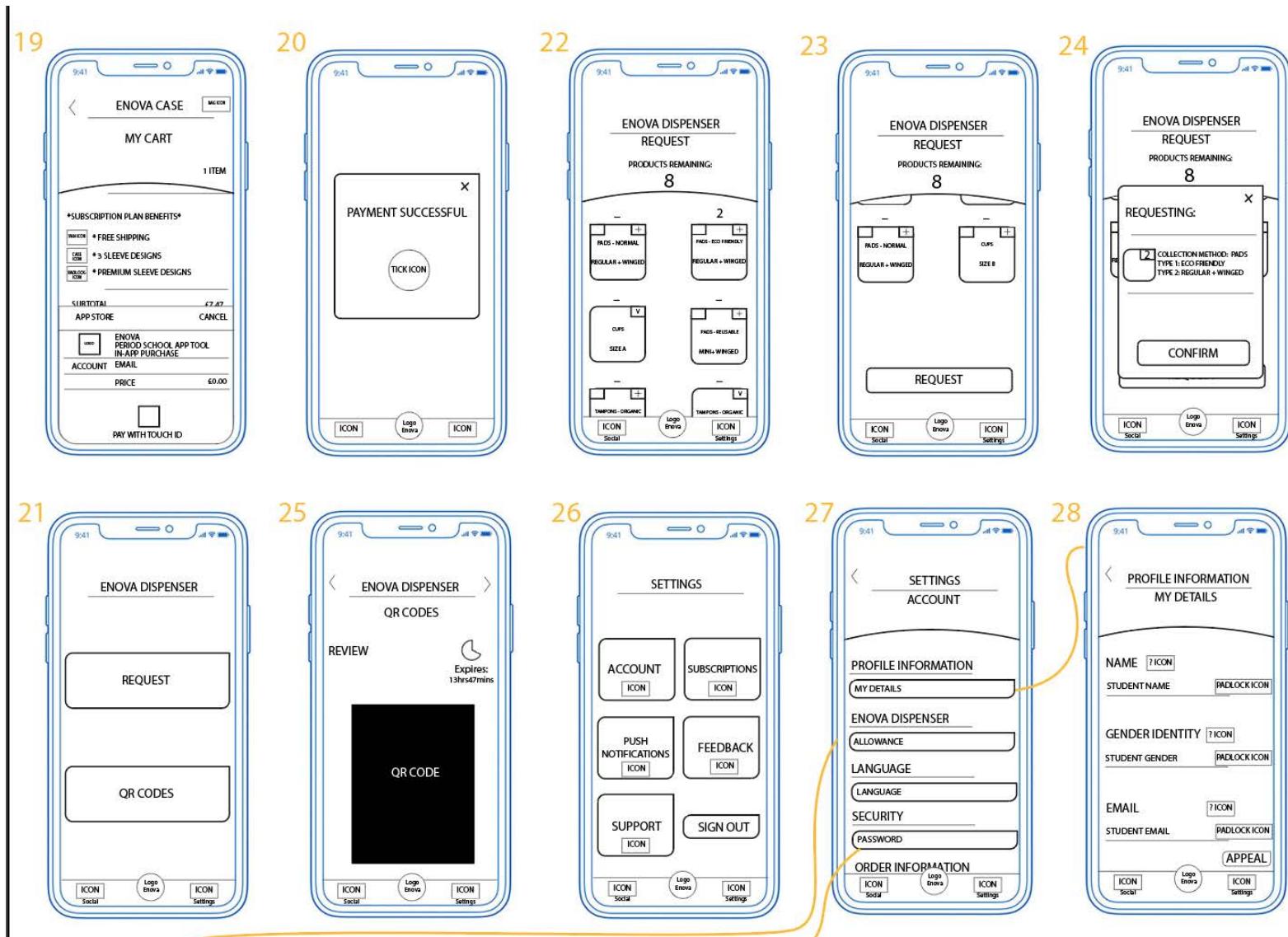
FINAL APPLICATION PLAN–WIREFRAMES (PART 2)



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5.3.6. Other

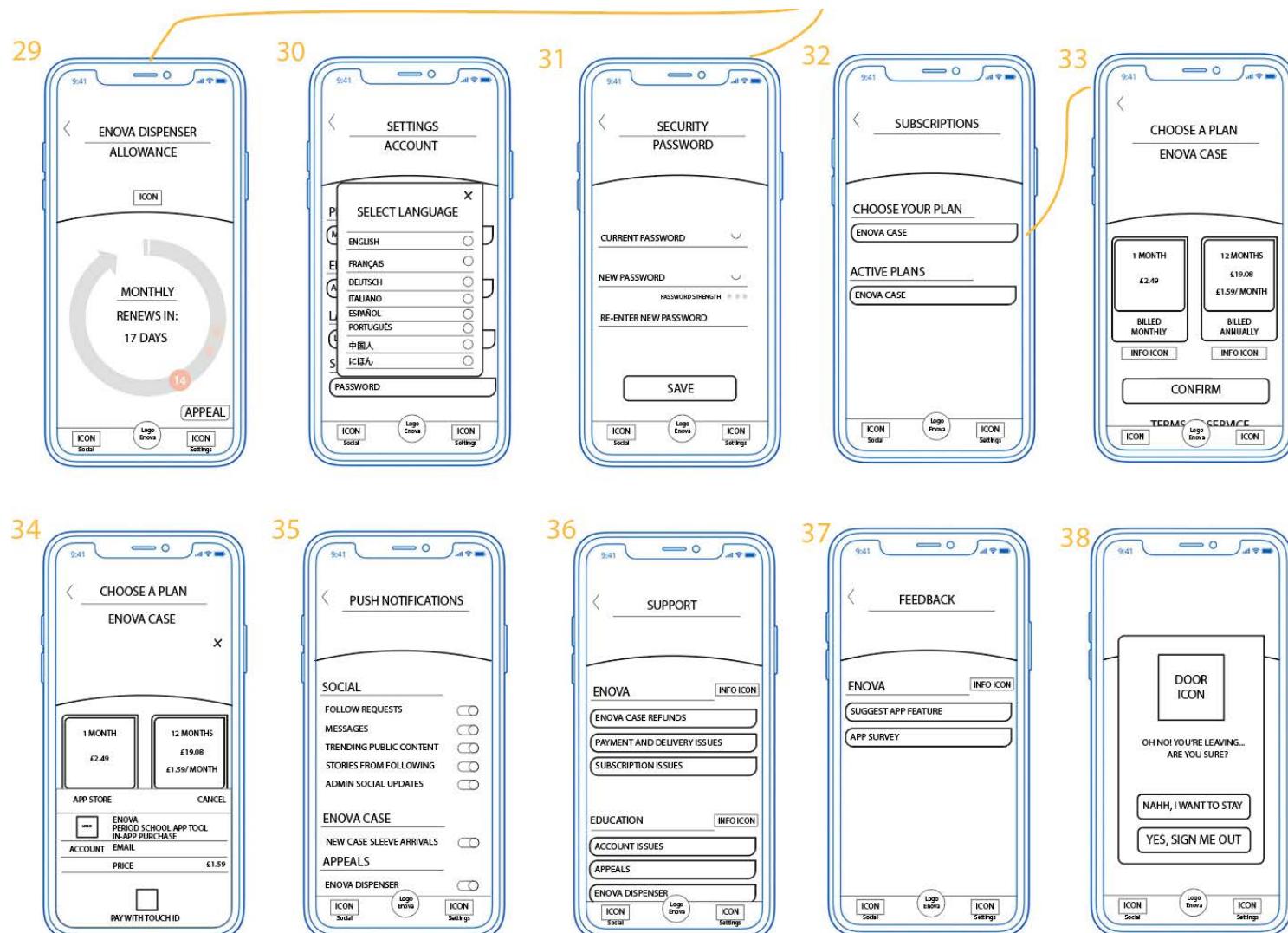
FINAL APPLICATION PLAN–WIREFRAMES (PART 3)



APPENDIX

5.3.6. Other

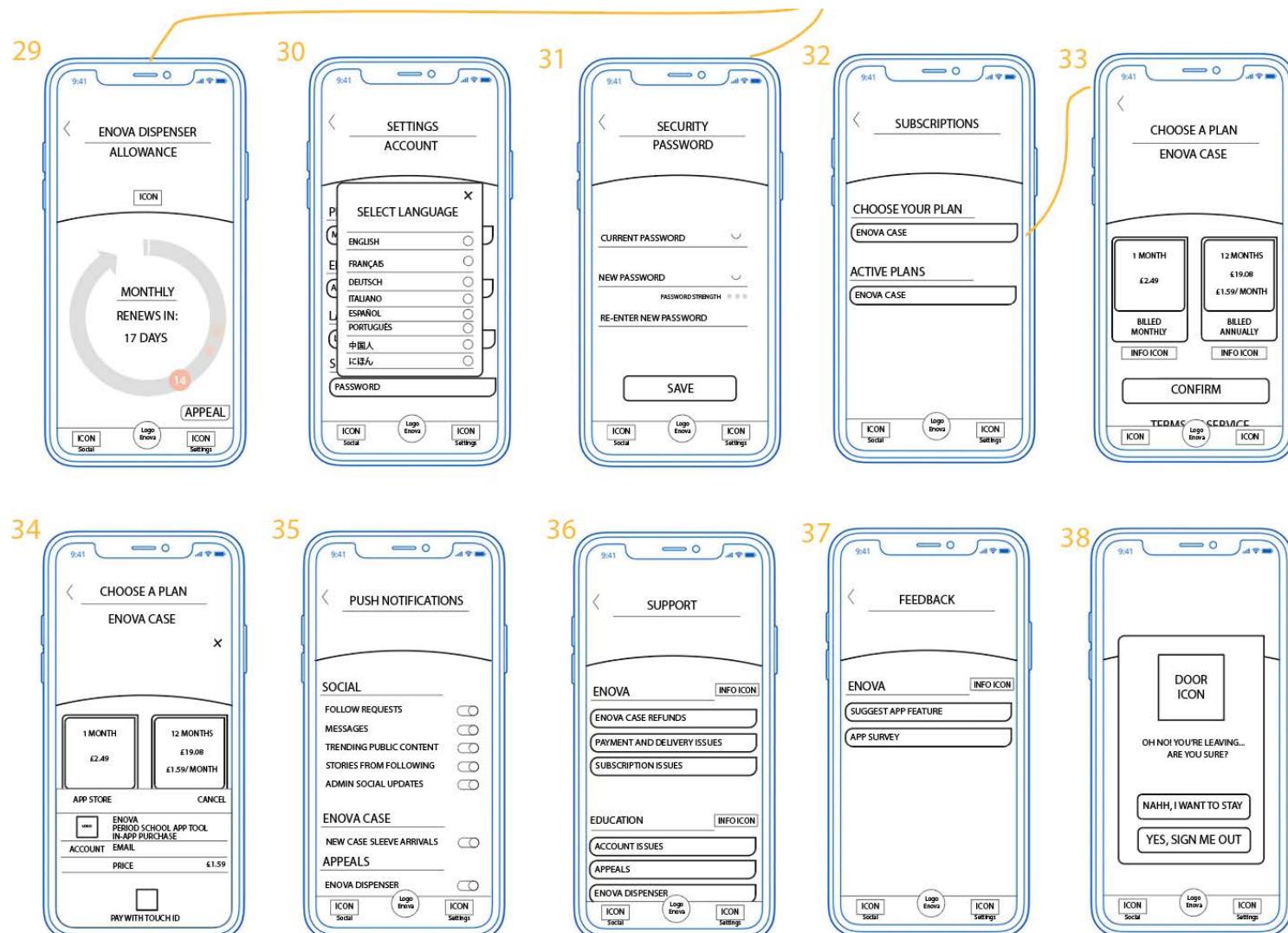
FINAL APPLICATION PLAN – WIREFRAMES (PART 4)



APPENDIX

5.3.6. Other

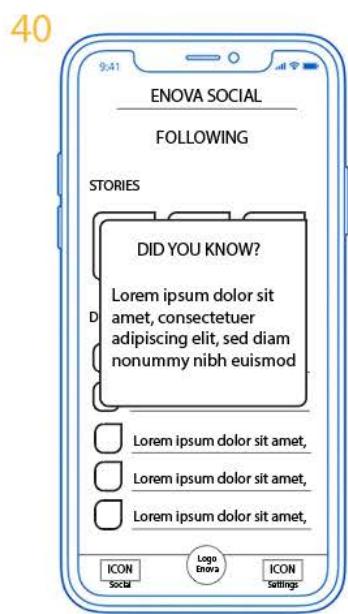
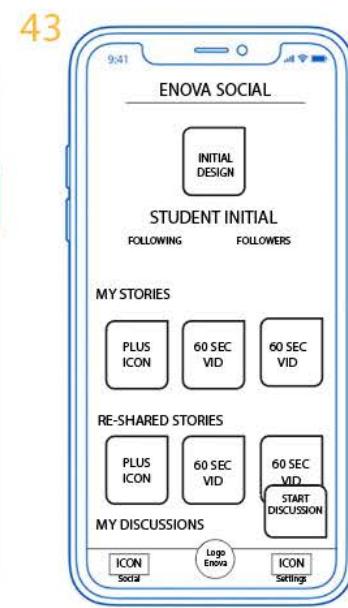
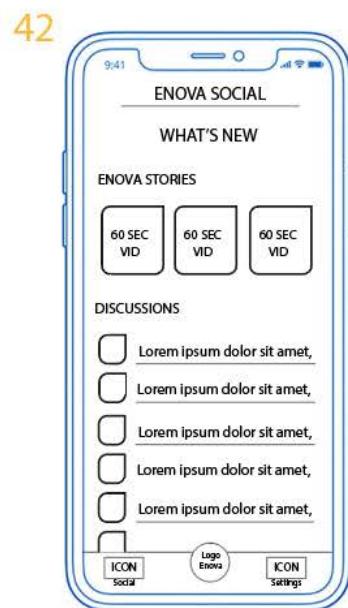
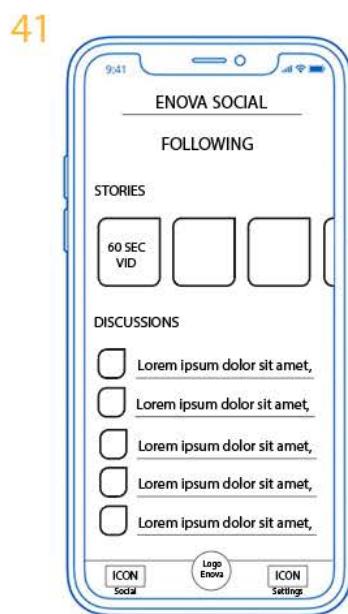
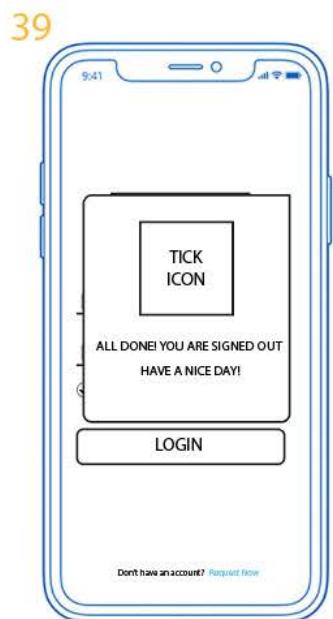
FINAL APPLICATION PLAN–WIREFRAMES (PART 5)



APPENDIX

5.3.6. Other

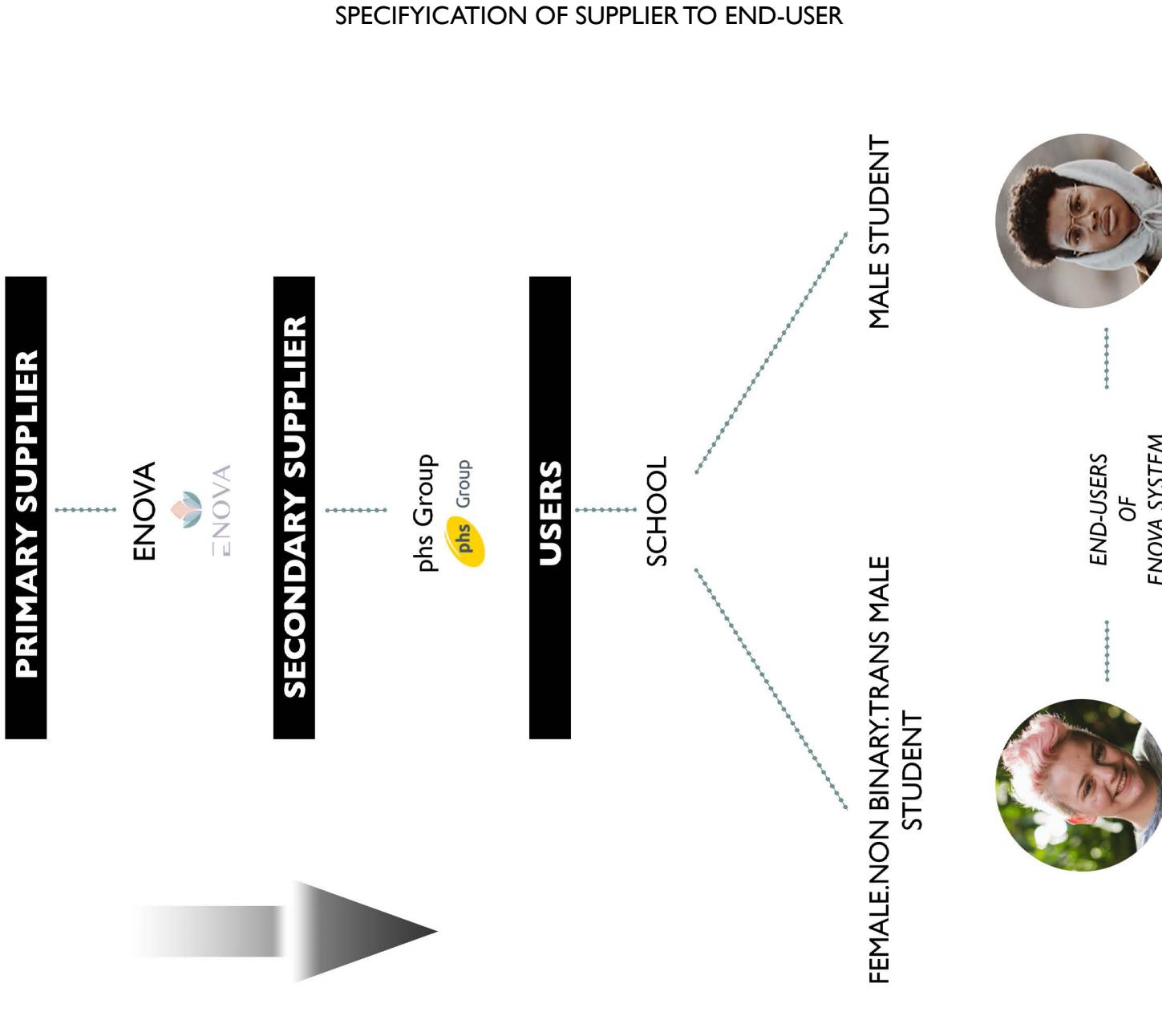
FINAL APPLICATION PLAN–WIREFRAMES (PART 6)



APPENDIX

5.3.6. Other

ENOVA DISPENSER AND APPSYSTEM



APPENDIX

5.3.6. Other

CONCEPT 3 DEFINE WITH 5WIH METHOD

WHAT?

A service system offered to schools where students are able to socialise i.e. discuss, share ideas/ advice and useful hacks on the topic of menstruation through the application.

An additional feature can be accessed by girls, non-binary and transgender learners who have periods. This allows students to request a variety of period products for free. Which they will be able to collect via the DORHER.VITA dispenser located in the school.

The app is designed to allow each school to manage student activity in the community forum and tailor features to conform to its requirements.

The application is a tool to help eliminate the stigma present around the topic of menstruation. By creating a place where both females and males can learn more about periods as a community, it can encourage the formation of a supportive system within the school and change student attitudes towards the topic of menstruation i.e. normalising, thus facilitating the lives of those that experience it.

WHO? (App)

Students, regardless of gender/sex should be encouraged to use the app. Each school has the ability to customise and adjust the available service in order to be in accordance with its policies.

Students aged 11-18 (KS 3 - KS 5) are offered this service system.

Future expansion, may see primary schools in the UK offering this service system to its older students- KS2, 7-11 years as numerous research has shown that there is a surge of number of young girls starting puberty before the average age of 12. As early as 8 years of age. In primary schools, admins may opt out of social feature for safe guarding minors.

WHY?

Before the new government scheme in 2020, offering free period products for all learners who need to access period products, many schools in the UK required students to purchase period products in school.

Typically students would need to request period products through first aid or medical staff who demands approx 50p per sanitary napkin. When analysing the quantity against the price, students are being charged more compared to if they were to obtain the product at a regular store. The high cost and face to face encounter with school nurses, deter many from requesting products as it suggests that periods are an illness and students may feel embarrassed, and students in poverty may struggle to afford the products.

WHEN?

The application can be used by students anywhere and at anytime. Students must not request for a barcode to be generated to be used the following day as it will expire. If a student requests outside school hours e.g. 9 pm, the application will inform the student that the barcode will only be available for 2hrs59mins before expiration, to which the student can confirm or cancel.

WHERE?

This service system is to be executed in state secondary schools in England. Students will need to install the application on their mobile phones in order to request use the dispenser.

HOW?

Schools register to DORHER.VITA. Schools will then provide each student with an account. Male students only have access to the social feature, therefore if disabled by the school, the application will no longer be usable for the students who identify as male in the school.

Individual state schools are responsible for managing and monitor student social activity.

Schools will receive an overview of student (not individually) product preferences stats, which will help schools understand what their students demand and aid in selecting the appropriate products via phs account – the government scheme school website.

Students considered to be living in poverty or that struggle financially (decided by their school) may have monthly available product increased.

APPENDIX

5.3.6. Other

CONCEPT 3 DEFINE WITH 5WIH METHOD



WHAT?

A floor standing or wall mounted (TBC) machine with the purpose of storing and dispensing a variety of period products upon request. The dispenser has the ability to unlock and open to display numerous designated compartments for school staff to easily restock. It is compact and appropriate for school restrooms due to limited space available and safety of students. The smart dispenser is integrated with a QR code scanner to allow students to scan the code generated to the student in the app mobile phone (TBC). Material of the dispenser may include plastic or metal.

WHO? (Product)

Secondary schools have a duty to enable girls and non-binary learners, including transgender boys who may have periods to use the dispenser as well as the application.

WHY?

The introduction of the DORHER.VITA dispenser eliminates the need for students to interact with medical staff to request period products. This removes the indication that periods are a medical condition (illness) and eliminates the chance of embarrassment felt by students. Students are given more control over their needs and will not be required to seek permission from a member of staff (male and female) to obtain products in order to manage their period.

Period products are a undeniable necessity like any toilet product e.g. toilet paper and should be available to those that need it at all times. Many students may not be aware that the school provides pupils with these products and may continue to struggle without them.

DORHER.VITA dispenser in the toilets also means that users that have come on their period unexpectedly will not experience anxiety because they are forced to travel to the medical staff room to acquire a product.

The dispenser ensures that the education of students is not compromised because of their periods.

WHEN?

DORHER.VITA dispenser is available 24/7. However for as long as schools remain closed, students are not able to access the machine. A digital screen will inform if the compartments need to be restocked. Designated staff member must refill the compartment to ensure that it is able to perform its function and that products are always readily available.

WHERE?

The most appropriate location for the dispenser to be installed in would be in the special needs toilets because of the more space available. ISS Regulation 23A also states that these toilets may also be used by other pupils, teachers and others employed at the school, and visitors, whether or not they are disabled. This means that students that identify as transgender/non binary are still able to access the product without the need to use gender specified toilets.

The special needs restrooms ensure privacy for the DORHER.VITA dispensers users as many may feel embarrassed to utilise the service available because of the aim of the product –provide people with free period products, particularly those that may struggle financially.

HOW?

Once the student has customised their request (Eco friendly/ period pads, Reusable pads, applicator tampons, non-applicator tampons or menstrual cups) and amount required [limits of how many users can request per day], the user may scan the QR code on the dispenser scanner.

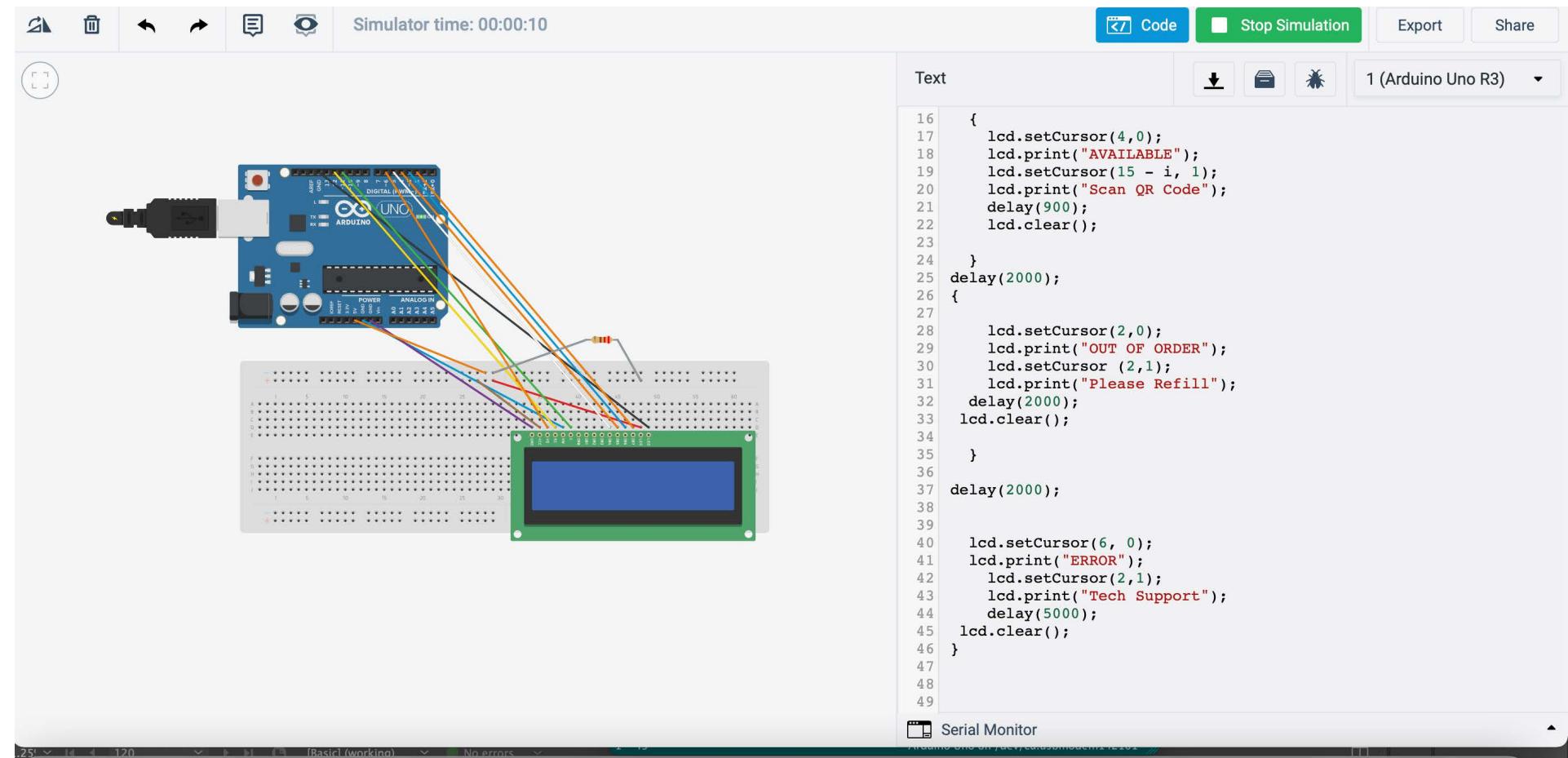
The code is recognised by the machine and the desired product compartments unlock to release into the users book case box (reusable A5 size box that students can request for storing and transporting period products. The design imitates a book to make the case blend with the items in a students bag.



APPENDIX

5.3.6. Other

DIGITAL MODELMAKING: DISPENSER LCD 1602



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