



Trendy Trousers

FUNCTIONAL WHEELCHAIR FRIENDLY TROUSERS FOR MALE
TEENAGERS

Emily Hollis | Scholarship Fabrics | 2020

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Introduction

At the beginning of this project, I wanted to help someone within my community, specifically my school community as my school is an inclusive school. When brainstorming ideas with my Fabrics Teacher, Mrs Teahan, multiple options of who to help came up, including the students within the Physical Assistance Centre (PAC) at my school. I didn't have any ideas as to what they would be in need of, if anything, so I reached out to the Head of the PAC and Head of Faculty Inclusive Education Facility, Mrs Richardson, to see if she would be interested in setting up a meeting. She was really on board, and this is where the ideas and enthusiasm stemmed from.

Identifying an Issue and Setting the Context

The first meeting I had in regards to this project was with Mrs Richardson, my teacher Mrs Teahan and myself. During this meeting, Mrs Richardson came up with many ideas. One idea was shoes with zippers, which she prefaced with the fact that she didn't think it would suit this project, but the idea was so that it was much easier to get them on and off for dressing and physical/occupational therapy. Another idea was a waterproof cover for wheelchair joysticks, so that when it was raining the joystick would last longer in wet weather. This was a great idea, and a possibility, however with the skills and experience that I have, I would have really struggled to come out with a suitable end result, along with it being a very small and fiddly project. The main idea that intrigued me the most were a pair of pants that were functional for toileting and dressing, along with also looking trendy and stylish.

In the end I decided to go with the adaptive pants, as out of all the issues spoken with Mrs Richardson, I felt that my knowledge and skills would suit that garment best. By having a better skillset and prior knowledge, I felt as though I had the tools to make the best solution possible.

Previously, I hadn't thought about this or understood why this would be useful. However, for students who have limited mobility, toileting and being dressed are not as easy as for ambulant students (students who have the use of their legs). Mrs Richardson explained that toileting can sometimes be very tricky depending on what the students are wearing, along with the students having to compromise the look of the pants for functionality.

The issue I have established is that there are no functional trendy pants available for young men/teenagers in wheelchairs. When I state 'trendy pants' I am referring to what my client thinks is trendy, and also what pants most other young men/teenage boys wear. However, these kinds of pants are not available with the functionality that these young men/teenage boys need, as they are sitting in wheelchairs. The pants on the market are not functional when it comes to going to the bathroom, when he requires the help of Teacher Aides.

Meeting with Potential Stakeholders

On Wednesday 26 February I had a meeting at the PAC with Mrs Richardson and the Occupational Therapist, Rachel Vernon-Rainey. The meeting was about a few questions that my teacher and I come up with as I was writing up the context, defining the issue and identifying key considerations that needed to be explored.

What happened during the meeting?

I initially updated Rachel on what I am doing as she did not know yet, then I got onto my questions that I had written up. The first one was regarding the correct terminology to call the students from the PAC, as I did not want to upset or offend any of them. There is not really a 'name' to call the students, as they are just regular students who operate out of the PAC, and the way they teach it to the students is that they have different abilities rather than disabilities. Another question about terminology, was about the terminology/name for lifting the students out of their wheelchairs, which is hoisting. Relating to specific terms, I asked what to call 'able bodied students' when referring to students who operate out of the PAC, which is just ambulant, or simply people who can walk/have the use of their legs.

From here, I started to ask more questions about the project in general, like whether there were any school policies or guidelines when working with students from the PAC. There are a few policies/guidelines that I need to follow, like sending out a letter/email to their parents/caregivers so that they know and I agree to what I am doing. If I am working with any junior students, I will also need a parent signature to use/take photos of the student, however if they are senior students they can sign off for themselves.

When asking about the causes of the students being in wheelchairs, there isn't really one answer as there are a range of different physical conditions that can result in being wheelchair bound. As there were too many to explain off the top of her head, Mrs Richardson was going to email me a list of conditions and a link to a website explaining a bit about the different conditions students in the PAC have.

We then moved onto the pants, I asked if there was one student in particular who would be interested in being my main stakeholder/client so that I could make it to fit one person to begin with. The student who originally came up with the idea was not interested in being my main client anymore, however he would have the opportunity to have input when looking at the design and functionality of the pants as a secondary stakeholder. During our discussion, Mrs Richardson and the Occupational therapist mentioned they would have a chat to the students about who would be interested, as they had a junior girl and a senior boy who they had in mind who may be interested.

Mrs Richardson and Rachel (the OT) also suggested they could do a PAC wide design that everyone had an input in, with the idea of it possibly becoming the official PAC Hillcrest High School Uniform, designed for both boys and girls in the PAC. Because at the moment those PAC students who are in school uniform cannot wear the shorts/skirts as their legs get cold very easily. This is because they are not being used as they are sitting in a wheelchair all day. So long functional school pants would be a real help to the PAC students. Instead of making both trendy and functional pants, I could make functional school uniform pants so in the future more students coming to the PAC, could buy their uniform like everyone else.

The last question I asked was about what activities the students do that would influence the functionality of the pants. Most students do not do PE, so there is not that to worry about, however they will need room for movement especially from the knee down. This is because during physical therapy, they need their ankles free so they can be moved around for stretches. Also, a few students need to put splits on during Physical or Occupational Therapy, so it was suggested to have a zipper or some type of opening down the side of the pants for the OT, PT, Teacher, and Teacher Aides to unzip the pants to put the splints on. But there would also need a bit of room for movement, as some students need to wear splints on a regular basis. However, the initial idea for the pants was the skinny look/style. This information really helped me when looking at designs of the pants, as I knew more what the functionality needs to be.

Near the end of the meeting, I also mentioned about the student who was going to be my primary stakeholder/client to form a mood board, or inspiration board of what they think trendy looks like and the style of pants they are interested in. Mrs Richardson and the OT liked the idea, and even suggested that if this could become a school uniform that the PAC could do this as a group, to get all the students input as they are the ones who would be wearing the pants. A few female students could give input for a female design as well.

How was I feeling about it all?

After the meeting I was definitely more excited, as I had a lot more information about the stakeholders, policies, terminology, and more of an idea of how I could design the pants. I was also intrigued by the idea of making these pants into a school uniform, as it would be so amazing to think I could change one person's school life, make it easier, and I might be able to affect many current and future students of the PAC.

What had changed?

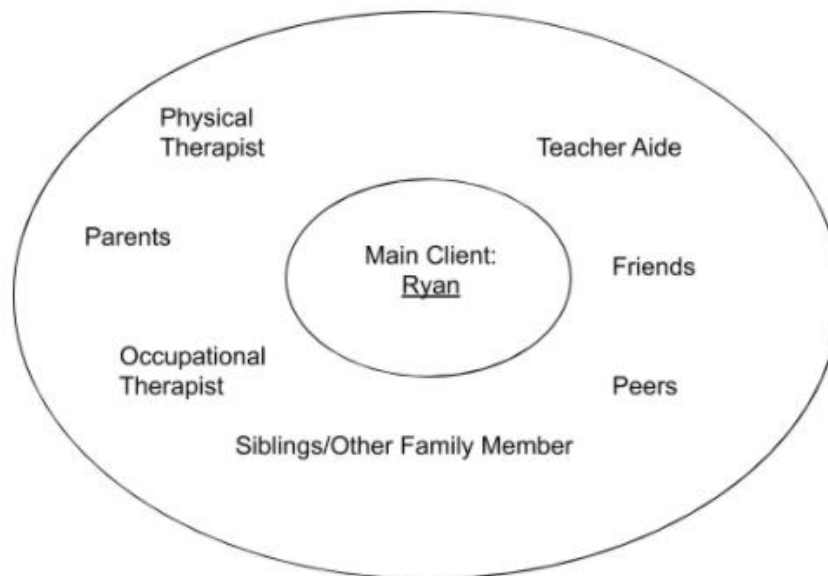
The main changes that would be made, are instead of making functional pants for a teenage boy/young man to look trendy, I could possibly design a female version that could be part of a future school uniform.

What were my next steps?

From here, I would write a letter/email that can be sent to the parents/caregivers, teacher aides, teachers, OT and PT to get their permission to take photos of them and the junior students, along with informing them what I would be doing to ensure ethical practices are being followed and cultural sensitivity is maintained. I also needed to write a few initial questions for my primary stakeholder and secondary stakeholders (parents/caregivers, teachers' aides etc. and also their peers) so that I could get an initial idea what everyone is thinking. Once Mrs Richardson had emailed me the list of conditions and links, I would research my client's condition to have a better understanding. I would never be able to understand completely as I am not a PAC student, but, I want to be more knowledgeable so I do not offend anyone during this process.

Stakeholder Identification

Ryan, my primary stakeholder will be my main client. He is the person who I will be customizing/fitting these pants for. My secondary stakeholders will also be important in regards to the broader sense of this project. I want a range of feedback so that I can make these pants as suitable as possible, especially with the chance of becoming a uniform option for the PAC. However, in the end my client will essentially have the final say in the final decisions and design.



About My Client

His Interests:

The following is a paragraph that my Client wrote about his interests:

“At school, my interests are Japanese, media studies and tourism

After school, I play games with friends like sekiro a very hard game but fun set in old fashion japan. I also like apex legends a shooter and final fantasy 14 online and fantasy world where you play with heaps of friends. I also like to watch anime like black clover, neon genesis Evangelion and full metal alchemist. On YouTube I watch smii7y gaming YouTube, bigjigglypanda gaming YouTube and mecha gaikotsu model kit reviewer. I like music with bands like survive said the prophet rock band, slipknot metal band and anther realm rock band

In the weekend my interests are the same after school but I might also go and watch movies like Jurassic Park, Akira and Pacific Rim with friends. Or I might hang out with friends at my house or go into town. “

His School Life:

The HOD, Mrs Richardson wrote a short blurb about my client’s day to day life at school is like, along with giving me a copy of his timetable shown below, showing when he has stretches etc:

He spends some intervals out with his peers in the mainstream areas and other times he stays in the PAC and his friends visit. He travels to all of his mainstream classes by himself as he has a power chair. He goes to the canteen or orders uber eats sometime. He has stretches (Physio) in the PAC three times per week. He plays power chair football on the weekends.

When he was a junior he attended all PE classes, now he uses PE as an extra study period in the PAC. In science he is able to use the “sit to stand” function in his wheelchair to reach the bench and conduct experiments.

Term	Week	Mon, 17 Aug		Tue, 18 Aug		Wed, 19 Aug		Thu, 20 Aug		Fri, 21 Aug	
3	5										
	Tutor	8:45 Tutor	HC D8	8:45 Tutor	HC D8	8:45 Tutor	HC D8			8:45 Tutor	HC D8
	Period 1	9:00 2TOU	KA C8	9:00 STUDY	PAC	9:00 2ENI	BG C7			9:00 2MES	KT C1
	Period 2	10:00 STRETCHES	PAC	10:00 2MES	KT C1	10:00 10JAP	AK D15	10:00 2TOU	KA C8	10:00 2SCI	TA E3
	Interval	11:00		11:00		11:00		11:00		11:00	
	Period 3	11:30 10JAP	AK D15	11:30 STRETCHES	PAC	11:30 2SCI	TA E3	11:30 2ENI	BG C7	11:30 2TOU	KA C8
	Period 4	12:30 2MES	KT C1	12:30 2ENI	BG C7	12:30 STRETCHES	PAC	12:30 2SCI	TA E3	12:30 10JAP	AK D15
	Lunch	1:30		1:30		1:30		1:30		1:30	
	Period 5	2:20 2ENI	BG C7	2:20 2SCI	TA E3	2:20 2TOU	KA C8	2:20 2MES	KT C1	2:20 STUDY5	

Duchenne Muscular Dystrophy:

After our initial meeting, Mrs Richardson informed me my client had a condition called Duchenne Muscular Dystrophy. This is one of the most common forms of muscular dystrophy and is a genetic disorder in which there is progressive muscle degeneration and weakness. This occurs due to the deficiency of the protein 'dystrophin' which helps keep the muscle cells intact. The symptoms of DMD can be seen in early childhood, usually between the ages of 3 & 5, and mainly affects boys, however it can also affect some girls. DMD affects approximately 1 in 5,000 male births and around 20,000 children are diagnosed each year.

The Duchenne Muscular Dystrophy gene is found in the X chromosome, meaning the disease primarily affects males, however some females can be carriers of the gene. Females are more likely to not know they have DMD as it is more common for males to experience symptoms, it is rare for female carriers to experience mild symptoms. DMD carriers are females who have a normal dystrophin on one of their X chromosomes and an abnormal on the other. The DMD gene is usually inherited through the mother, and as mentioned earlier, cannot be easily predicted to be inherited by their children as the mother may have it unknowingly.

In the early stages of DMD, the shoulder and upper arm muscles are affected first, along with the muscles around the hips and thighs. The degeneration of these muscles causes weakness and difficulty to do simple activities like climbing stairs, raising arms and maintaining balance. The muscle weakness worsens with age, and progresses to other parts of the body including heart and respiratory muscles which can cause other medical issues in teen years which can have serious complications and outcomes. Due to advanced cardiac and respiratory care, life expectancy for those with DMD is increasing and survival in early 30s is much more common which is so amazing. Unfortunately there is no cure for DMD, however medications and therapy can help manage symptoms and even slow the course of the disease.



The muscles which are affected by DMD first

Research of Existing Products

I initially did a lot of research before starting to gain a better idea of what was on the current market, along with ideas of ways to make the pants functional. I also tried to do some research on what was trendy for teenage boy's fashion, however I gained most of my feedback directly from Ryan and his friends, as the pants will be worn around his peers.

After doing some research, I found I had a better understanding of my clients' issues a lot more. I had a look at what was on the market for wheelchair friendly pants with Velcro down the sides, or something similar to make it easier for males to go to the bathroom. However, when researching I found that most of the trousers/pants fitting the functionality aspect, were marketed/aimed towards much older men in their 70s-80s. Not only were they marketed for older men, they were also a much older more simplistic style that I would not expect Ryan to wear. The pants came in very boring grey and brown colours, in only track pants, or dress pants, which I'm sure many young men or teenage boys would not feel comfortable, or confident wearing.

When doing this research I did come across a brand, Rollitex, which is a company known for its adaptive fashion. However, although Rollitex is marketed for younger buyers, from having a look at the website, they are for the 20-30 year old men, not suitable for teenage boys or young men. The adaptations that are made on the Rollitex Pants compared to regular Hallensteins pants would be useful for my client, as the elongated zipper makes it easier to get into the pants, the elasticated waistband would help keep the pants up, the higher back of the pants would make it more comfortable when sitting down. However these adaptations do not specifically assist with making it easier to go to the toilet, as there are no Velcro sides, or flaps at the front or back of the pants that would help. The look of the pants are quite plain and boring, and Rollitex only really sells Jeans, or track pants. The cost of these pants is another downside to this brand. Rollitex is based in Berlin, Germany, and the average price of one pair of pants would be around \$150 NZD, adding shipping, it could become up to \$200 NZD for one pair of pants. Therefore, trying to get a few different colours/types of pants would be extremely expensive, and not a sustainable option in the long run.



*Regular-Fit Stretch
Denim Jeans*

Easy Access Clothing is another website I came across when researching ways to incorporate functionality into the pants I am designing. This brand seems like it is aimed more towards older customers, however I was interested in their designs. The Interlock knit pants (as shown in the photo on the right) were especially interesting as they had an elasticised waistband for comfort, along with a higher rise at the back. The pants had wrist loops at the waist for easier fitting and dressing, and the pockets were patch pockets positioned high up on the front of the pants for easy access. The entire inside seam was able to open so that clients can be dressed whilst laying on a bed or open chair for easy access for carers as it reduces lifting. The crotch opening in the pants would also be great for toileting and other medical access. Overall these pants had many aspects that would help form my design process later on.



*Easy Access
Interlock Knit
Pants*

Easy Access Fleece Pants also gave me a few ideas for functionality. As well as similar attributes to the interlock knit pants, the fleece pants also had a mock fly front for style to normalize them a bit more. However, the feature that stood out to me most was the outside seam opening with a Velcro or zipper closure. This seam opening goes all the way down the side of the pants to allow them to lay flat and eliminate the lifting when dressing. I think this is definitely a feature I would like to research further for my designs if my client/stakeholders think it would work and be functional.

Everyhuman is another company that focuses on adaptive fashion for the younger market. It was recommended to me by Mrs Richardson and I was surprised that I didn't come across this site during my initial research. This company has every day and designer adaptive fashion for young kids to adults. Their stretch denim seated jean has many adaptive features that I found interesting, and may incorporate in my design. The pants have a longer fly with removable zipper pull for easy toileting, along with two front and no rear pockets for functionality and comfort. The pants also have a raised back with stretch in the waistband so that they are comfortable when sitting all day in a wheelchair. This is a great start to ideas for ways to add functionality to the pants I would be creating.



*Everyhuman Stretch
Denim Seated Jeans*

The Issue

Through my research I found that there was a lack of trendy wheelchair friendly pants marketed and suitable for young men. This has resulted in a few needs coming to light. The pants need to be comfortable as he spends most of his time in a wheelchair, but they also need to be stylish. In my research I found that style was usually compromised for comfort or vice versa, however these pants need to be both. They need to be trendy through the fabric colour and pattern, and trendy is what my client and his peers deem is trendy. These pants also need to be functional for everyday activities such as sitting in class, toileting and dressing.

Initial Brief/Constraints/Considerations

Health and Safety - I am making a garment for a PAC student, and need to consider the regulations around working with other students at my school in terms of their vulnerability, health and safety, photos etc.

- After speaking to Mrs Richardson I have decided to make a permission form for the junior students explaining to the parents what I am doing, and if I have their permission to take and use photos of their child. I will also send home a letter to the parents of senior students explaining what I am doing, however I do not need permission as they are over 16 years old.

Current Market - I need to consider the current market for adaptive clothing and whether there is anything that would meet the specifications of the student. But I also need to think about whether there is something on the market that I could easily adapt instead of making up my own pattern, designs etc.

- Before anything else I am going to research what is on the current market, and brainstorm/think about whether adapting already made clothing would be easier, and then go from there

Comfortable Fabric - If the students are sitting in their wheelchair all day then the fabric needs to be comfortable so that they do not feel discomfort during the day which could distract them from other tasks.

- I will be testing comfortability by letting the students, parents and teacher aides in the PAC feel all of the fabric options and see which option they think feels the best.

Durable Fabric - Because the students are in the wheelchairs most of the day, there would be no issue with wearing out in the thigh area due to rubbing. However, if the students are in and out of their wheelchairs for PT or OT for some reason, the pants

will be rubbing against the wheelchair. So in order for the pants to last a reasonable amount of time, the fabric I use needs to be durable

- During my fabric testing I will test durability by rubbing sandpaper over the fabric samples. This is to imitate the contact between the wheelchair and the pants.

Closures - As suggested by the PAC OT, and by some research that I have done, I am looking at having slits down the sides at the hips and calves, or a flap type thing at the top of the pants to help with toileting. However all of these ideas need closures, so I will need to figure out which closures are going to be best.

- To do this I will set up a bunch of closures such as metal domes, Velcro, zips, buttons etc. for the PAC students, staff and parents to get feedback on, along with testing durability and a few other things. This is so that I can see what the people using the pants would think is best, as they are the ones who will be using the pants, not myself.

Patterned/Coloured/Trendy Fabric - One of the needs of these pants are for the pants to look trendy and essentially not like the old men's pants that are currently on the market. So when looking at the types of fabrics I might want to make the pants out of, I also need to consider the colours, and patterns that that type of fabric can come in. Before this, I also need to talk to my client/PAC students about what they think is trendy/what they want the pants to look like in general.

- When fabric testing I will check the range of colours and patterns of the fabric types, and with the definition of Trendy I will ask the students to show me photos of what style and colour of pants they like, along with even drawing up their own ideas.

Warm Fabric - As the students are in wheelchairs, they are not ambulant, so therefore they probably do not participate in PE etc. so in order for their legs to keep warm, the fabric I choose will need to be able to retain warmth.

- After talking with Mrs Richardson and the OT, I have gained more insight around their day to day activities. It has confirmed to me that warmth is a good quality of the fabric I choose as they are not very active so do not warm up through walking. Also when in their wheelchair, if they are in the rain for a short amount of time, their clothes can get wet which can make them feel quite cold. I will test warmth through my fabric testing, and over a 20 minute period measuring the temperature of hot water in cups covered in fabric sleeves.

Cost - After doing a bit of research online for adaptive clothing currently on the market, they are quite pricey. Although I am not looking at making a cheap pair of pants, I want to consider cost because if these are going to be used and made regularly

for a range of students I want them to be affordable. This is because if the garment is not cheaper than what is currently on the market, there is no reason why they wouldn't buy those over mine.

- Over the course of the creation of these pants I will consider the price of the fabric, zips, notions etc. and record them so that I am not making them too expensive to make

Client Wellbeing - The Client Wellbeing relates to the idea that the pants are to make it easier for my client and other PAC students to do daily activities, including toileting which can be a personal and embarrassing topic. Also, I want the students to feel confident wearing them, and not uncomfortable or out of their comfort zone.

- Throughout the design process, the PAC students along with my client will be consulted every step of the way to ensure that I am actually making something that they want to wear, and would feel comfortable in.

Social and Physical Environment

Social Environment:

The social environment for the garment is who the garment will be worn around. During the week, the main social environment will be his parents, carers, peers, bus driver, Teachers, Teacher Aides, Physical Therapist and Occupational Therapist as those are the people he is around the most. Outside of school I think that the social environment for this garment will be his family and parents/caregivers along with any other friends and people he sees.

Physical Environment:

The physical environment is where my client will wear the garment I create. This could include his wheelchair, as it will be rubbing up against the garment every time that he is hoisted in and out of the wheelchair. During the week the main physical environment will be school, specifically the PAC, the bus and his classrooms. However the other main physical environment is at home when he is not at school, along with other places like the movies, the mall, power chair football and other places he goes outside of school.

The Materials Technology Fabrics room is where I will be constructing the garment.



Students working in the PAC

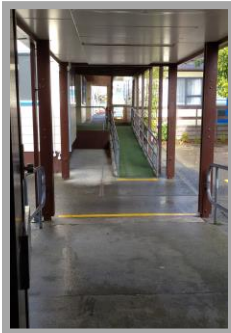


PAC Kitchen Area



Materials Technology Fabrics Room

Photos continued from Physical Environment:



Ramp leading into PAC



School Bus in use afterschool



School Bus

Revised Brief/Constraints/Considerations

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Comfortable Fabric - If the students are sitting in their wheelchair all day then the fabric needs to be comfortable so that they do not feel discomfort during the day which could distract them from other tasks.

I will be testing comfortability by letting the students, parents and teacher aides in the PAC feel all of the fabric options and see which option they think feels the best.

Durable Fabric - Because the students are in the wheelchairs most of the day, there would be no issue with wearing out in the thigh area due to rubbing. However, if the students are in and out of their wheelchairs for PT or OT for exercises and toileting, the pants can rub against the chair or the hoist used. If my client is going to the toilet multiple times a day this could add up to a lot of friction between the pants and the wheelchair. So in order for the pants to last a reasonable amount of time, the fabric I use needs to be durable

During my fabric testing I will test durability by rubbing sandpaper over the fabric samples. This is to imitate the contact between the wheelchair and the pants.

Warm Fabric - As the students are in wheelchairs, they are not ambulant, so therefore they probably do not participate in PE etc. so in order for their legs to keep warm, the fabric I choose will need to be able to retain warmth.

After talking with Mrs Richardson and the OT, I have gained more insight around their day to day activities. It has confirmed to me that warmth is an essential quality of the fabric I choose as they are not very active so do not warm up through walking. Also when in their wheelchair, if they are in the rain for a short amount of time, their clothes can get wet which can make them feel quite cold. I will test warmth through my fabric testing, and over a 20 minute period measuring the temperature of hot water in cups covered in fabric sleeves.

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Over the course of the creation of these pants I will consider the price of the fabric, zips, notions etc. and record them so that I am not making them too expensive to make

Quick Drying Fabric - As I mentioned earlier there are times when the PAC students are in between classes, or going from the bus to the PAC and if it is raining, their pants/clothes can get wet. By having a quick drying fabric, the pants won't stay wet all day and make the students cold and possibly sick. Also, at home when washing these pants, by having a quick drying fabric it will not take hours and hours to dry.

I am going to test this during my fabric testing by timing in 30 minute intervals how long it takes for a sample of fabric to dry after being washed.

Easy Stain Removal Fabric - Stain removal is an important quality, because if when eating something spills on the pants, they want to be able to remove that stain pretty easily, whether that's just wiping it off, or ensuring that it will come off in the washing machine. This is also important in how long these pants will last, because no one wants to be wearing pants to school that have a stain on them.

During my fabric testing process I will use tomato sauce and baby wipes to see how well each fabric sample reacts to stains, or how easy/difficult they are to remove.

Machine Washable Fabric - For the fabric to be machine washable is an important consideration. By having a fabric that is machine washable it is much more convenient in the long run, as the pants won't need to be hand washed which can take a lot of time and effort. Within the machine wash ability, not only am I looking at the delicacy of the fabric, but also whether the colours will bleed, how much fraying there is, and whether the fabric will shrink when washed.

I will test this during my fabric testing by cutting a large sample of each fabric, then washing them on a standard wash and once dry, compare them to the original sample to see if it has shrunk, frayed etc.

Patterned/Coloured/Trendy Fabric - One of the needs of these pants are for the pants to look trendy and essentially not like the old men's pants that are currently on the market. So when looking at the types of fabrics I might want to make the pants out of, I also need to consider the colours, and patterns that that type of fabric can come in. Before this, I also need to talk to my client/PAC students about what they think is trendy/what they want the pants to look like in general.

When fabric testing I will check the range of colours and patterns of the fabric types, and with the definition of trendy I will ask the students to show me photos of what style and colour of pants they like, along with even drawing up their own ideas.

Personal Space - As my client is a male, it is important that there are a lot of personal and social boundaries that I need to be aware of. I want my client to feel as comfortable as possible and because toileting is a sensitive issue I don't want to overstep any boundaries.

I will do this by respecting him and making sure he is always comfortable, and having teacher aides/OT/PT whenever there are try ons. Also, I won't be in the room while he is being changed for the different prototypes as that is something I don't feel comfortable with, so I would assume he also wouldn't like that as well.

Client Wellbeing - The Client Wellbeing relates to the idea that the pants are to make it easier for my client and other PAC students to do daily activities, including toileting which can be a personal and embarrassing topic. Also, I want the students to feel confident wearing them, and not uncomfortable or out of their comfort zone.

Throughout the design process, the PAC students along with my client will be consulted every step of the way to ensure that I am actually making something that they want to wear, and would feel comfortable in.

Activities - This includes what they'll be doing in the chair that may influence the type of fabric that I end up making the pants out of. Some actions could include how much they are in and out of their wheelchair, or if there is a different material of seat that they use which I could test durability of.

When I met with Mrs Richardson and the OT, they mentioned that they do not do many activities such as PE as they can't really do it in their wheelchair. However, they do stretches in Physical Therapy so they need room to move so maybe an outer zip on the calf up to the knee, or higher would be good. This is because they sometimes need to unzip it for movement in exercises, and also for splints to fit (AFO), but still have that skinny look/fit as that is what they are looking for.

Closures - As suggested by the PAC OT, and by some research that I have done, I am looking at having slits down the sides at the hips and calves, or a flap type thing at the

top of the pants to help with toileting. However all of these ideas need closures, so I will need to figure out which closures are going to be best.

To do this I will set up a bunch of closures such as metal domes, Velcro, zips, buttons etc. for the PAC students, staff and parents to get feedback on, along with testing durability and a few other things. This is so that I can see what the people using the pants would think is best, as they are the ones who will be using the pants, not myself.

Different Functional Options - I think that it would be good to consider different options of having the same functionality so then my client/peers can pick which one they think would be most comfortable and look the best.

When I get to the design process and through my research I will find multiple ideas for ways of functionality and look, especially with toileting

Pants Length - Considering the option of whether I go with full length, shorts etc. with the possibility of these pants being used as uniform, having a shorts option for summer might be good.

Possibility of making full length, shorts, 3/4 length, or maybe even zip-offs, where there is a zip all the way around the leg to convert them from long pants to shorts. I will get feedback from PAC students on these options

Female Option - As there are also females in the PAC I need to consider the option of having a female version of the pants as well and also how easy it would be to adapt the pants so that they can fit females as well.

I did consider making them for females, however I decided it would be much more challenging doing both genders, so I will just stick with male at the moment, as that is who my client is. However, it is much easier to convert pants to fit males to females than the other way.

HHS PAC Uniform Option - The option of these pants possibly becoming uniform is definitely something to consider. This was brought up by Mrs Richardson during our second meeting, and I think it would be really cool if this project could help the PAC students long-term.

My project becoming a HHS PAC uniform is a great idea, and I will keep it in mind. However, to begin with I will focus on just my client, and once that is completed I will go from there and see how difficult it would be for sizing, sewing etc. Also, if these pants were to become part of the HHS uniform, it would restrict the pattern and colour etc. so the trendy aspect of this would not be able to be met

Stakeholders - My primary stakeholder will be my client, Ryan.

Along with Ryan, I also want a range of stakeholder feedback, so when I put out stakeholder feedback forms and questionnaires etc. I also want the PAC students to get involved, as well as any staff or parents/caregivers that work with them regularly.

This is so that I can get a range of feedback from different people that work with the students with different things, and have much more knowledge than I do.

Stakeholder Feedback - I will be getting my stakeholder feedback through questionnaires, surveys, interviews etc. on different parts of the process including design, style, colour, fabric choice etc.

Over the course of my project I will receive as much stakeholder feedback as I can so that I am keeping my client happy and making the right design and functional decisions

Social and Physical Environment - The social environment of my client's pants will be where they will be worn and the physical environment is where the pants will physically be in contact with

I need to consider the possible social and physical environment in terms of the wheelchair he uses, trendy fabric and the qualities of it, OT activities, functionality and HHS Uniform option so that when I make these pants I can make them suitable for any social and physical environment they may be in. I obviously cannot make them suitable for everything, but for my clients specific needs.

Stakeholder Feedback #1

The first round of stakeholder feedback I sent out was in the form of Google forms. I formed 3 different forms with similar, but adapted questions for the Students in the PAC, Parents/Caregivers of PAC students, and the PT, OR, Teacher Aides and some Teachers connected to the PAC. For example, for the Parents/Caregivers I asked what everyday tasks could influence the functionality in the pants, but I adapted that question for the PT, OT, and other school staff, and just asked about what could be some ideas to make their interactions/jobs with the student easier.

PT, OT, Teacher Aide, and Teacher Feedback:

In your words, what is the issue that I will be solving?

With this question I wanted to get what they thought I was going to be doing with this project. This is because there may have been miscommunication, or some may have different ideas of what I should be trying to solve, as well or instead of the initial issue. Although I only have 2 responses for the Google form at this point in time, both answers were essentially to make it easier for toileting and getting changed. I am pleased that this is what they think, as it is also what I am thinking of when working on this project.

What are your interactions with the student?

I think that this is a very important question to ask, as this survey/questionnaire was going out to a range of staff with different jobs within the PAC. Within those jobs there

are different ways that they interact with the students. The responses were day to day discussions and monitoring, and toileting, feeding, assisting with learning, stretches etc. These responses will definitely help me a lot, as I now I have a better understanding of different roles in the PAC, and how they help the students.

What are the struggles you face on a daily basis regarding clothing?

This question will help me understand what issues I will be trying to solve when designing the functionality of these pants. The responses were that there were many struggles with pants, as they are hard to get over the ankles/feet, and a lot of time is spent doing up buttons, zippers, and can be very difficult opening zips when the students are in wheelchairs. From these responses I have an idea of what closures I could use for the top, and the sides of the pants, as they need to be easily taken off, so not zippers or buttons. Also, they mentioned that the clothing was either too tight or too loose which made it hard to get on/off. The last struggle that they both mentioned, was the accessibility for toileting, or the lack thereof. Toileting is the main struggle, and can be time consuming, lengthy, complicated and possibly embarrassing for students. These were very informative questions, as I have a much better understanding of the specific issues that are faced daily regarding clothing. From here I can use this feedback and refer back to it when it comes to deciding which functional aspects I want to/need to include in these pants. Also, with the closures, as I was considering using zips or domes, however from this feedback I need to find others that will be easier and less time consuming to work with.

Select which pant options you think would be suitable:

With this question I had a list of lengths/types of pants including; Full length, shorts, 3/4 length, both (short and long), zip offs, or other, where they can let me know any suggestions they had. Both (short and Long) and wells as zip offs were chosen as options, which gives me an idea of the design of the pants. As although zip offs may not sound fashionable they are very functional and I can try and make them look trendy and like all pants on the market for ambulant men.

What are the most functional aspects that you think the pants need?

This question is similar to a previous one about the struggles that they come across, however I wanted to know from their struggles, what are the most important functional aspects that I should include in these pants. The one that was mentioned by the two people that responded was easy access to enable toileting. Many other things were mentioned that I am definitely going to take into consideration, as I hadn't really thought of them yet. For example, elasticated cuffed bottoms with zips so that the splints can easily be put on, but also just getting the pants on and off. Also, a flap at the front was suggested, maybe using Velcro, or metal poppers to use as closures, this is for easy access when toileting, and by not having zips, it should be less time consuming. Lastly, an elasticated waist was suggested which I think is a great idea, they added this as it would mean the pants would be less restricting, more comfortable, and meant that there was room to grow, as well as making it much easier

to get on and off. All of these suggestions are great, and I will be taking them all into consideration, as they are the ones that are helping the students with toileting.

How would a functional garment like this affect how you interact with the students?

Once again, the main answer was regarding toileting, and how it would make it much less intrusive and embarrassing for the student, and will reduce the time spent in the bathroom. One response was that if they had something more accessible, there would not be a lot of time spent fidgeting with buttons, and struggling with front zips very close to the students. Zip-offs were also mentioned, as it would make it easier for the students' pants to become shorts, instead of spending a lot of time having to fully change the student into shorts. This was something that I hadn't initially thought of, although I added zip-offs for the options of type of pants, I hadn't thought about it saving time, I just thought of it as '2 in 1'.

What do you think of the idea of making these pants into a PAC friendly HHS Uniform?

This idea came from my previous meeting a few weeks ago with Mrs Richardson, and the responses both came back positive. One mentioned that it is a good idea as it makes it easier if all students had them, this would mean they could dress themselves, or for their parents and Teacher Aides to dress them. They also mentioned that it would show unity as all the students would look the same or similar. However, surveying the students, as they suggested, is definitely a great idea as there is no reason or the staff within the PAC deciding to go ahead, if the students don't like the idea at all, as the students are the ones who would have to wear them.

Any other comments/ideas to add?

Instead of making pants from scratch, purchase in bulk, and then make adjustments, that way there could be spares for when new students come, and then they do not have to be made from scratch. This was one idea that was added, and I understand where they are coming from and what they mean, however in this case I think it would be much easier to make them from scratch. This is because if my pattern that I come up with becomes a uniform for the PAC, hopefully the uniform company that the school works with can be used, and there will be multiple different sizes for all the students. However, I do understand what they mean, as some students have different adjustments that need made, so I will consider it, however for the project that I am working on, I don't think it will be easy/useful due to the amount of adjustments I am planning on making compared to the pants on the market.

Student Feedback:

In your words, what is the issue I will be solving?

Along with other questions that talk specifically about the functionality of these pants, I think that this is quite an important question to ask the client, and his peers. If at the beginning there is not a mutual understanding of what I am solving/working towards, it is not going to satisfy my client, and meet his needs. The answers from the 3 students who have filled out the Google form, the answers were very similar to what I was thinking. They were making pants easier for people in wheelchairs to go to the toilet easier, to make it easier when changing clothes as some student's conditions make it hard to do so easily, and to make toileting easier. At this stage, although there are only 3 responses so far, I am glad there is a mutual understanding that I will be finding a solution to make it easier to go to the toilet and change clothes, when someone has a condition that hinders those tasks.

How does your condition affect your daily life?

I think that this question will help me gain a better understanding on how their condition physically affects the tasks/simple things in life that I may not have thought of, as I do not know first-hand what it is like. The responses were very useful, one of them mentioned that their condition means that their muscles are weakening, so the simple tasks of walking or standing for an ambulant person are impossible, and they cannot do 'normal' physical activities easily. When this student says 'normal' I am assuming that they are referring to someone without their condition, or just an ambulant person, who has the use of their legs. The other response was that their condition makes it difficult to relax sometimes. These responses are both very informative, and will help me when I move onto designing the pants, and what to be aware of when doing so.

What are the struggles you face/come across on a daily basis regarding clothes?

From this question, I was expecting there to be a lot of struggles in the responses, however there weren't too many. One of them was sizing the clothes, and that is something I will need to look into, especially as different conditions have different effects on the student's body. As I want to make something that will not only fit my client, but also his peers if they are in a similar situation. The other response was that it is difficult getting into shorts when they are tight, and cannot relax. To be honest, this was not something that I thought would come up, but I am glad it did, and that is why I am asking these questions. This is something else that I will need to research, and talk to them about, and how I may be able to make that easier, whether it is putting zips all along the side of the pants so you don't have to slip them off, or if they have any ideas that could help/improve that issue.

Which would you rather wear?

I gave the students a list of options, where they can check off as many as they like, and would honestly want to wear. The options I gave them were; Full-Length pants, Shorts, 3/4 length, both (Short and long), Zip offs (Full length but zip off bottom to make shorts), and out of the three responses, two picked the shorts, and one picked both (Short and Long). This question is very important, as there is no point designing long pants, when the client and their peers don't want to wear them. From here it shows that a favourite is shorts, and one is also interested in long pants. However, I can't come to a conclusion on what type/length of pants yet until I get more responses on my form, so that I can make a decision knowing what other classmates would prefer.

What are the most important functional aspects you think the pants need/should have?

This is one of the questions that I am very interested to see the answer to, as it gives me more and different ideas of how to make these pants fit the needs of my client and his peers. The responses were very helpful, one suggested a front flap, which is an option I had noted to look into for making toileting easier for guys, and another suggested zips on either side of the shorts, which is another option that I have been considering. Although these two suggestions were ones that I had already thought of, it was actually really helpful for them to put that down, so that they think it is a good idea, and are good options. The last response was to make them easy to take off and put back on, and also having pockets to be able to store things you don't want everyone to see. This is also a great suggestion, and I need to research and brainstorm ideas of how to add pockets that will be useful and easily accessible for those who are in a wheelchair. From here, I need to add these ideas to my brainstorm of functionality options for the pants, and how to do so, and then research and brainstorm how to make them work, and how I would test the different options.

How would this garment impact your daily life?

These responses were not as informative, however that is because two of the students responded that it wouldn't impact or help them as they do not need them. However, the third student responded that it would make their daily life better because it would make it easier on the people who change them. I think this is very informative because although it only impacts one of the students who has completed the survey so far, knowing that it would help make their daily life just a bit easier makes me feel like I am on the right track. It also makes me very excited to get further into this project, because I really want to do well and help out these people in my school community.

What do you think of the idea of making these pants into a PAC friendly HHS Uniform?

I think that this was a very important question, because the idea had been mentioned by Mrs Richardson, however getting the student's opinion on this is crucial, as they are the ones that will be wearing the pants, not the staff. The responses were useful,

two responded that it was a good idea, and it could be an option, so it seems like they are possibly open to the idea, but not too sure at the moment. This is completely understandable, as the PAC students all have different conditions that affect them differently, so although my client needs pants to make it easier to change and go to the toilet, not all students do. The last student said that it was a great idea for students as it would make toileting easier for the staff in the PAC.

Any other comments/ideas to add?

One student responded to this, and they said to make some cool designs. It may seem like a simple comment, but it is also very useful. This is because it tells me that they basically don't want plain boring pants, but cool designs, and maybe different colours or patterns. This is something that I will come back to, at the moment the colours and patterns of the fabrics are not too important, as I need to work on testing the types of fabrics, and then making the pattern before looking into how they will look aesthetically.

Parent Feedback:

So far I only have one response to the Parent Stakeholder Feedback form, so the reflections for each question will be smaller than the other two, however reflecting on the responses is still important.

In your words, what is the issue that I will be solving?

This is a question that I have also asked the students, and the PT, OT, Teacher Aides etc. because I want to see what each perspective on the situation views the issue that I will be solving. The parent responded that the issue to be solved is to make getting pants on and off easier. I am glad with this response, because although it is only one response, at least now I have the understanding that at least one parent thinks the issue is the same as I do.

How does your child's condition affect your daily life?

This question is for me to try and understand a bit of what the situation may be like at home, and how I can adapt these pants to make some of the simple issues in daily life go a lot smoother. The response was that it makes life very busy, as their child is unable to do anything for themselves. This shows me that on top of the pants being functional for toileting, and making them easier to put on, they need to be able to be put on quickly, easily, and without a lot of fidgeting around with dials or zips. So in the future I will need to test what closures are best.

At home, what tasks on an everyday basis could influence the functionality of these pants?

This is a very important question, because like the one above, it gives me a slight insight in what everyday life may be like at home. The response was toileting in

particular, so from this and the amount of answers from the previous two surveys have mentioned toileting, it is probably my number one issue. I knew this, however getting confirmation from these feedback surveys is really useful.

What are the struggles you face/come across on a daily basis regarding clothing?

The parents said that getting pants on and off easily, which is something I will really need to focus on when making the patterns for these pants, and designing the functionality aspects and closures etc.

Pick which pant options you think would be suitable:

The options I had were; full length pants, shorts, 3/4 length, both (short and long), and zip offs (full length but zip off bottom to make shorts). Although this is mainly for the students, and what they would feel most comfortable wearing, I also think it is important to know what the parents think would be most suitable. Especially in this case as they dress their child as their child is unable to do it themselves. The parent picked 3/4 length and shorts.

What are the most important functional aspects that you think the pants need/should have?

The response that the parent gave me was that they need to be robust and breathable. I have definitely thought that the pants would need to be robust and durable, however I hadn't thought about how they would need to be breathable. I think that this is a very good idea and suggestion, because if the client/students are sitting all day, a fabric that makes them quite sweaty is not good, as it will not be comfortable. If the pants are breathable, I think that comfort would also come with that.

How would this garment impact your daily life as their parent/caregiver?

When I wrote this question, I was hoping for the answer that it would help a lot, and the response I got was essentially that. They said that it would hopefully save time, and lessen the wrestling to get clothes on. I am really glad that that was their answer, as that is what I hope to achieve.

What do you think of the idea of making these pants into a PAC friendly HHS Uniform?

I think that getting a parent's perspective on this idea is important, as they would be the ones paying for it, and in this case, they are the ones who would also be putting it on their child. Their response was that it sounds like a good idea, I am glad, because although it is not set in stone that this will happen, I am glad that they are open to the idea in the future.

Any other comments/ideas to add?

The only comments that they had were that they think it is a great idea, and they are looking forward to seeing the result, and so am I. I am also glad that they think it is a great idea, because it is almost like parental approval of my project which I am very happy about.

Broader Sense:

The issue is that my client needs trendy pants that look like all the stylish clothing that is in trend for teens. However, as they are in a wheelchair, the trendy pants that are sold to an able-bodied male teen are not functional for the needs that my client requires for school and other everyday activities. He wants regular pants that he can go to school or to the movies. These pants would be a great transition from high school to University, polytechnic or any other after school pathway that my client is attending, as although they will be functional for easy toileting, and ease of getting the pants on, my aim is to not make the pants look obviously different. By having discrete functionality, the pants will be able to be worn anywhere and anytime as they will not draw attention. Also, by having the pants in a trendy style, colour or pattern, it will make my client feel like he fits in and is confident in what he is wearing.

Broader Sense - Uniform Idea:

After speaking with Mrs Richardson and the Occupational Therapist in the PAC, the idea of a uniform option came up. The idea was that the students in the PAC have different needs in terms of clothing in general, so this could make it much easier for both current and future students, rather than just helping one of many in need. One of the ideas with these pants is also to fulfil the PAC student's desire to fit in with the rest of the school. So instead of wearing the uniform top, and mufti trousers and feeling out of place, they can fit in with their own version of the HHS uniform. There is currently no option for the PAC students, and by making this a broader idea, it can benefit the students as they may feel more involved in the HHS experience, and also assist those students who gradually transition into wheelchairs as it is not an easy time. There is also the possibility of making the uniform pants in multiple colours for outside of school use, because if they are functional and comfortable then there is no reason why they cannot use the same style but in different colours/designs outside of school.

Broader Sense – Ethical Nature of Testing/Trialing Practices:

In regards to the ethical nature of testing/trailing practices I initially sent home a letter to parents/caregivers informing them of my project, along with getting photo permission for the junior students. I wanted to keep the parents/families informed so they were not left in the dark. Throughout the design and fitting process I respected my clients boundaries, I was not in the room whilst he was getting changes and respected his personal space during the fittings and checking sizing.

Initial Attributes

My initial attributes for these pants were very vague and brief as I did not yet know exactly what my client wanted or needed however I knew some of the basic specifications.

Pants:

I want the end product to be pants that he can wear on a daily basis, and wants to wear

Durable:

I want these pants to last at least 1-2 years so that they are useful and functional in daily life

Functional:

The pants need to be functional, and I will be testing this throughout the creation process, fitting them and getting stakeholder feedback regularly

Stylish:

In terms of my client's style, these pants need to be trendy and stylish so that he wants to wear them

Pockets:

Pockets are essential and also come under functionality, because by having pockets it allows my client to carry the essentials like his phone, Panadol, earphones etc. easily

Fabric Testing

Brainstorming:

Fabric:

Although I may not carry them all out, making a brainstorm shows my initiative and my thinking of what could be important to test when deciding on the type of fabric that I may use for my pants.

- Sensitive Skin
- Cost
- Comfortability
- Warmth
- Remove Stains
- Quick Drying
- Machine Washable
- Durability

Closures:

When testing these closures, I am checking to see how easy they are to undo and put back together. Also how discrete they can be, because unless it is a purposeful design, my client may not want it to be visible.

- Domes
- Velcro
- Zips
- Buttons

Toileting:

- Flap
- Elastic Waistband
- Velcro

Other:

- Elasticated cuffs with zips along the sides – for easy access with splints and getting pant leg over shoes
- Pockets

Test Explanations:

Water Resistant:

When coming to and from school in a wheelchair, the students travel in a van, but are dropped off around 50m from the PAC. So when it is raining, their pants/clothes get wet as it is quite inconvenient to use an umbrella. Also, the whole school is not sheltered, so there are times where students in wheelchairs need to go in the rain in order to get to class. If their pants or clothes get wet they would be very uncomfortable, and may not dry very quickly as they are not moving as much as ambulant students, so this could cause them to get sicker easier. By testing water resistance I am wanting to find a fabric that would resist more water than it absorbs so that it can be wiped off rather than seeping into the fabric.



*Corduroy Water
Resistance Test (During)*

To test the water resistance I used a cup, and a dropper of water. I placed a sample of my fabrics on top of a plastic cup, and place a few drops of water on top. I will then watch the fabric for 2 minutes to see how the fabric reacts to the water, it could absorb it fully, ball on top, or start to seep in slowly. The fabric that absorbs the least amount of water will be the best option for water resistance.

Durability Test – Sandpaper

When constructing a pair of pants, I want them to be durable enough to last around 1-2 years. By testing the durability I am testing whether the fabric will wear out easily. Although the student may not have an issue with the fabric rubbing against each other as they are not able to walk. However when being hoisted in and out of the wheelchair there may be some rubbing against the wheelchair seat. Also, in general over time pants wear out, as they are being put on, off etc.



*60/40 Polycotton Blend
Durability Test (After)*

I will be testing the durability of different types of fabric by rubbing sandpaper on the fabric 50 times. This is to simulate what may happen when the pants are being rubbed against the wheelchair or other items of clothing, or objects. I will ensure that I am rubbing the sandpaper in the same direction, and for the same amount of times on each sample of different types of fabric to ensure that I get fair results.

Machine Washable - Washing Machine

I am wanting these pants to be machine washable so that it is much easier for the owner/caregivers of the pants. By having the pants be machine washable, it makes it a lot easier to care for the pants, and there won't need to be any issues with hand washing, or if the owner/caregivers have time to hand wash in between everyday life. Also, to see if the fabric is prone to shrinking or discolouration, as that would affect whether I use the fabric, or which colour. Also, if it discolours, then it may leak into other clothes in the same wash, meaning that in the end it would not be very time efficient.

To test this, I will cut two large samples of each fabric I am testing. I will then put 1 sample of each of the fabrics into a laundry bag, before putting them into the washing machine. I will then put it on a standard wash, and once the cycle is done, hang them on the line. Once they are dry, I am looking for if they have shrunk, discoloured or worn out, using the second sample of the same size to compare.



Washing Machine Setting - Easy Care 40°C

Quick Drying - Hang it on the line

If the fabric that I make these pants out of takes a very long time to dry, it will be an inconvenience for caring for the garment. If they are quick-drying or reasonably quick drying it will make it a lot easier for caring for the garment, and not make it an inconvenience when in a rush and forget to wash/dry the pants. For example, if something is split on them, and they need to be washed for the next school day.

I will test this right after I have washed them in the washing machine for the machine washable test. I will take the samples out of the washing machine and then either hang them up inside, or outside in the sun. I will time from when they were put up on the line, to when they are dry, checking them at intervals to see if they are dry yet. From here I will compare the times that it takes to dry.

Comfortable/Sensitive Skin - Skin Check

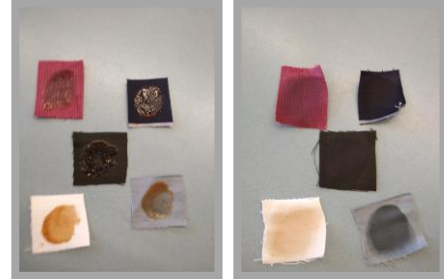
I think how comfortable the fabric is, and whether the fabric is too itchy or scratchy if they have sensitive skin are very similar tests. This is because the fabric cannot be comfortable if it is irritating their skin. Also, if they have sensitive skin, not only the composition of types of materials in the fabric may irritate the skin, but also the texture. For example, corduroy has bumps, so may be irritating or distracting.

I will test the comfortability of the fabrics by giving my client and his peers sample pieces of a variety of fabrics, with textures, and different compositions to see if he dislikes any, or whether they irritate his skin. Also which one they find the most comfortable to the touch.

Remove Stains - Tomato sauce and baby wipe

During everyday life, there are times when we get food stains, or sharpie, or drink spilled on us. To try to make these pants last for around 1-2 years, the fabric that the pants are made of will need to be able to remove stains reasonably easily. If the fabric keeps stains, and makes them difficult to remove, then taking care of the pants will become hard, and an inconvenience.

To check how well stains are able to be removed from different types of fabrics, I will carry out the tomato sauce test. This is where I will place a small dot of tomato sauce on a sample of fabric, and rub it in a little. After waiting 2 minutes, I will try to remove the tomato sauce stain by using a baby wipe 30 times, by doing this I will see which type of fabric is easiest to remove a stain from.



Stain Removal Test - Before (Left) & After (Right)

Warmth - Temperature of Water

I want to test how well the fabric keeps us warm. I want a fabric that will be able to keep the clients legs warm, because due to being in a wheelchair they do not move their legs as often as ambulant students.

I will test this by making sleeves of each fabric to go around a plastic or paper cup. When carrying out the test I will put hot/boiling water into the cups with the fabric sleeves on them, and then put a thermometer into the water, and every minute, I will record the temperature. I will do this for 20 minutes, draw up a graph with the results from each fabric, and from there, compare which fabric has held the warmth of the water the most, and least.



During Warmth Test

Cost - Comparing Prices

The cost is not a big issue in this project, but it is something I definitely want to be mindful of. For example, if just one pair of these pants is going to be quite pricey, then it is not really a sustainable or affordable option for them to be a PAC uniform. Also, if they are going to cost a lot, and also take a long time to make, there are other companies overseas that would be a lot easier to buy from.

I am going to research this by comparing the prices of the fabrics I am testing. For this test, the most cost effective is the fabric with the lowest price. However, when deciding what fabric to use in the end, I will consider the price, but I will be looking more at the comfortability, durability, and the results from the other tests, as they are more important in terms of my client, and the project.

Test Conclusions:

	Bull Denim	Wool Gabardine	60% Poly 40% Cotton	Corduroy	Cotton Drill	Sweat-Shirting
Cost	4	5	2	1	3	5
Durability	1	5	4	6	3	1
Warmth	6	5	1	3	4	1
Stain Removal	3	6	5	4	1	1
Machine Washable	4	1	2	5	6	3
Quick Drying	5	1	3	6	2	3
Water Resistance	5	1	2	3	4	6
Comfortability	3	4	4	3	2	1
TOTAL*	31	28	23	31	25	21

The Lower the number, the better qualities of the fabric

<p><u>Bull Denim (Black):</u></p> <ul style="list-style-type: none"> ○ Most Durable ○ Average Stain Removal ○ Average Comfortability ○ Average Cost ○ Average reaction to Machine Washing ○ Not very quick drying ○ Not very water resistant ○ Worst for retaining warmth 	<p><u>Corduroy (Maroon/Red):</u></p> <ul style="list-style-type: none"> ○ Best cost ○ Average water resistance ○ Average at retaining warmth ○ Average stain removal ○ Average comfortability ○ Not great reaction to machine washing ○ Worst durability ○ Longest to dry
<p><u>Wool Gabardine (Dark Green):</u></p> <ul style="list-style-type: none"> ○ Most water resistant ○ Quickest drying fabric ○ Best reaction to machine washing ○ Average comfortability ○ Higher cost ○ Not great durability ○ Not great for retaining warmth ○ Worst at stain removal 	<p><u>Cotton Drill (Red):</u></p> <ul style="list-style-type: none"> ○ Best at stain removal ○ Pretty comfortable ○ Low amount of time to dry ○ Average cost ○ Durability ○ Alright at retaining warmth ○ Alright at water resistance ○ Not great reaction to machine washing
<p><u>60/40 Polycotton Blend (Navy):</u></p> <ul style="list-style-type: none"> ○ Best at retaining warmth ○ Good cost ○ Good Water resistance ○ Good reaction to machine washing ○ Average comfortability ○ Average time to dry ○ Average durability ○ Not great stain removal 	<p><u>Sweatshirting (Purple):</u></p> <ul style="list-style-type: none"> ○ Most comfortable ○ Best durability ○ Best at retaining warmth ○ Best at stain removal ○ Average reaction to machine washing ○ Average time to dry ○ Not great cost ○ Worst Water resistance

Component Testing

I made a pin board that was filled with closures and different types of fabric to get feedback on from the PAC students, staff and caregivers. I gave out questionnaires relating to the closures for the pants, designs and types of fabric. Along with samples of the fabrics, I also provided them with a list/table with the results from my fabric testing so it could help them with their answers to a few of the questions. The aim of this board was so that the stakeholders could use the zips and closures and see which ones they found easiest to use. Overall I got 18 responses which were from students and staff as due to COVID-19 Level 2 restrictions, no parents were able to go inside and give me any feedback. However, I also got Mrs Richardson to send out the designs to the parents to get feedback, however only a couple of parents replied.



Pin Board Component Testing Set up in PAC

Stakeholder Feedback #2

This second round of stakeholder feedback is from the component testing that I carried out, where I explain and reflect on the results of the pin board/component testing questionnaire.

What zip do you like the look of best? (Style not colour)

This was the first question on the questionnaire, and the options were Dress Zip, Ladder Zip, Small Coil Zip, Invisible Zip, Chunky Plastic Zip, Metal Tooth Zip and Large Coil Zip. The results of this question were varied, with the most popular being the small coil zip and the chunky plastic zip, with 5 votes each. The second most popular were the ladder zip and the metal tooth zip, with 3 votes each. And the least popular were the dress zip, invisible zip, and large coil zip, each with 1 vote. Alone, this question is not as useful as it is not looking into the functionality of the zips, however I was able to gain an idea of what style/look they generally liked.

My client's vote for this question was the metal tooth zip, one of the second most popular.

What zip do you think would be the most functional?

For this question, they had the same zip options as above, and there was a much clearer favourite. The chunky plastic zip was by far the favourite with 10 out of 18 votes. This was followed by the large coil zip with 3 votes, the invisible zip with 2 votes, the dress zip and small coil zip with 1 vote each, and the ladder zip with no votes. This alone is very useful, as I can tell that the chunky plastic zip must have been

the easiest to use along with most functional in general. Also, when combining these results with the previous question, although the small coil zip was one of the two most popular zips, it was last in terms of functionality. Whereas Chunky plastic was both most liked in terms of look and functionality.

My client's vote was the large coil zip which was second favourite overall.

When combining the results of both of the zip questions, I can get an idea of overall which zip would be both most functional and look the best (trendy part of the brief). Out of the responses (keeping in mind they could pick more than one), the Chunky Plastic was the favourite by far, with a total of 15 votes. The next favourite was the small coil zip with a total of 6 votes, the metal tooth and large coil zip with 4 votes each, the ladder zip and invisible zip with 3 votes each and the dress zip was the least favourite with only 2 votes. From this I can conclude that I will most likely be using the Chunky plastic zip for the pants. I will talk to my client about this and see if he feels strongly about a different zip, but I think that the Chunk Zip would be the best.

Which fabric feels the most comfortable to you?

On the pin board I had samples of the fabrics that I did other testing on which were a 60/40 Poly Cotton Blend, Corduroy, Wool Gabardine, Cotton Drill, Sweatshirting and Bull Denim. The fabric that was voted as most comfortable was sweatshirting, with 8 votes. This was followed by cotton drill with 5 votes, Bull Denim and Corduroy each with 2 votes, and Wool Gabardine and 60/40 Poly Cotton Blend with only 1 vote each. This is very insightful, and was slightly predictable as the sweatshirting is very comfortable. I wanted to get feedback on comfortability as although a fabric may have great durability and warmth qualities, if it is not comfortable then they won't want to wear them. This question is both useful on its own, but also will work well with the next question to get an overall best fabric.

My client chose the Bull Denim as the most comfortable.

When looking at the test results of the fabrics (in clear file) which fabric do you think would be the most suitable for these pants?

In a Clear file I provided them with a table of the fabric testing results, and the options for fabrics were the same as in the above question. The results show that the 60/40 polycotton blend was the most popular in terms of functionality with 8 votes. This was followed by Sweatshirting with 6 votes, cotton drill and Bull Denim with 3 votes each, wool gabardine with 1 vote and corduroy with no votes at all. This shows that the 60/40 polycotton blend is the favourite in terms of the previous tests I have made for the overall functionality. When looking at the results from both questions, there is not as clear of a favourite as for the zips. However, the sweatshirting is definitely one of the most popular overall.

My client chose Bull Denim for the most functional fabric.

When combining the results from this question and the previous question I can determine which fabric would be the most suitable in terms of the functionality and comfortability. Out of all of the responses (keeping in mind they could choose more than one fabric for each question), sweatshirting is by far the most popular, with 14 votes. The sweatshirting is followed by the 60/40 polycotton blend with 9 votes, Cotton drill with 8 votes, Bull Denim with 5 votes, and corduroy and wool gabardine with two votes each. From this I can conclude that the most popular fabric was sweatshirting, however because **my client chose bull denim for both** that I will confer with him and try out with different fabrics.

Which closure method do you think would be best for the HIPS?

As well as zips I also added domes, Velcro strips, Velcro dots, small buttons and large buttons for the closure options. The most popular option chosen was zips, with 8 votes. This was followed by Domes with 5 votes, Velcro strip with 4 votes, Velcro dots and large buttons with 3 votes each and small buttons with 1 vote. **My client chose zips as the option for the hip closures**, and overall I think that zips would be the best as that was the majority vote, as well as my clients vote.

Which closure method do you think would be best for the CALVES?

The options for these are the same as the hips, however the results were a bit different. The top option was zips with 10 votes, this was followed by Domes, Velcro dots and Velcro strips all with 4 votes each. Both small buttons and large buttons had no votes. Although this is similar to the hips, as zips is the most popular, it is interesting to see the difference. **My client chose a Velcro strip for the calves**, which is different to the most popular, which was zips. When doing trials from now on I might test between zips and Velcro strips to see which one my client would prefer.

Patch Pocket or Post-box Pocket?

For the pocket I gave them two options, either a post-box pocket or a patch pocket, with examples on the pin board I created. The results of the responses showed that the patch pocket was the favourite with 11 responses, which was not much more than the post-box pocket with 7 responses. However, as **my client preferred the post-box pocket**, similar to the fabrics, I will try out the post-box pocket and see how he likes it and go from there.

Any Questions, Feedback, Comments, Suggestions?

I decided to add this to the end of the questionnaire as I wanted to make sure that I wasn't missing anything and to check that I was on track with all of the stakeholders' opinions. Some responses added that seasonal fabrics for shorts/long pants could be nice as it would affect how comfortable the students would be. The type of fabric along with the shorts option was the main response from this feedback. This was something I had initially considered and will look into further as a possibility.

Feedback on the pockets was if the side pockets are too low, that they could get caught on wheelchair sides when seated, along with adding extra room to the post-box

pocket so that it is not flat could make it much easier to use as they would be able to fit more. Lastly having a Velcro or dome closure could be easier than zips or other closures for a pocket.

Comments on the Hip closures, are that the larger domes than ones shown could work too and also the closure needs to be able to perform under high pressure/tightness as students in chairs can't always be positioned well to get the fastenings up. Also, that a zip would be good as it would work for both boys and girls in terms of toileting.

Lastly, the feedback for the closures at the calves are once again that they need to be able to perform under high pressure/tightness as student's chairs can't always be positioned well to get fastenings up. Along with the idea of Velcro dots with a faux zip, so it looks like a zip, however is a much more functional fastening.

Final Brief

I am going to be creating a pair of pants that is trendy and functional for a teenage male who spends most of his time in a wheelchair, because currently there are no suitable option on the market. The functionality of these pants is going to include making it easier to go to the toilet and getting dressed, along with everyday comfort. These pants are going to be durable to last at least 2 years, comfortable when seated for long periods of time and able to have stains removed easily, along with the resources used being cost effective. On a day to day basis, my client travels by himself to all his classes using his power chair, and has stretches in the PAC almost once a day, along with travelling in the PAC school bus to and from school.

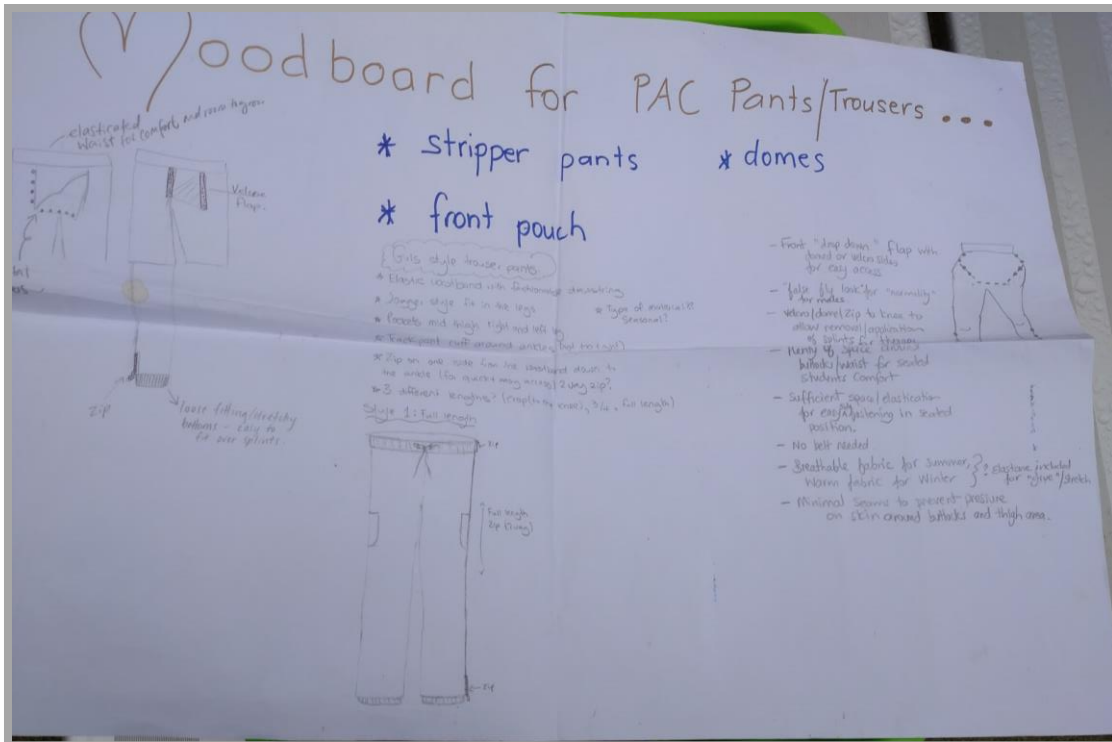
Final Specifications

<p><u>Pants:</u></p> <ul style="list-style-type: none"> ○ Elasticated Waistband ○ Elasticated Cuffs ○ Bull Denim Fabric ○ Cotton Pocket ○ Fit Well 	<p><u>Pockets:</u></p> <ul style="list-style-type: none"> ○ Easily Accessible pockets when in wheelchair ○ 15cm Chunky zips to close the post-box pockets ○ 2 post-box pockets on top of the pant leg, just below the crotch
<p><u>Durable:</u></p> <ul style="list-style-type: none"> ○ Last 1-2 years ○ Robust Fabric 	<p><u>Stylish:</u></p> <ul style="list-style-type: none"> ○ Trendy Designs
<p><u>Functional:</u></p> <ul style="list-style-type: none"> ○ Opening around hips – zip down sides ○ Opening at calves – zip down sides ○ Raised Back ○ 40cm Chunky zips to close the sides at the hips ○ 35cm Chunky zips to close the sides at the calves 	

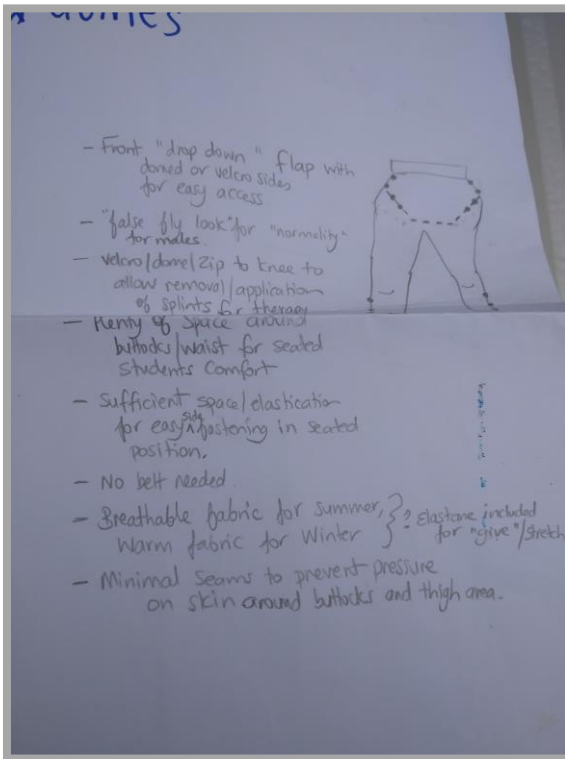
Design

Research:

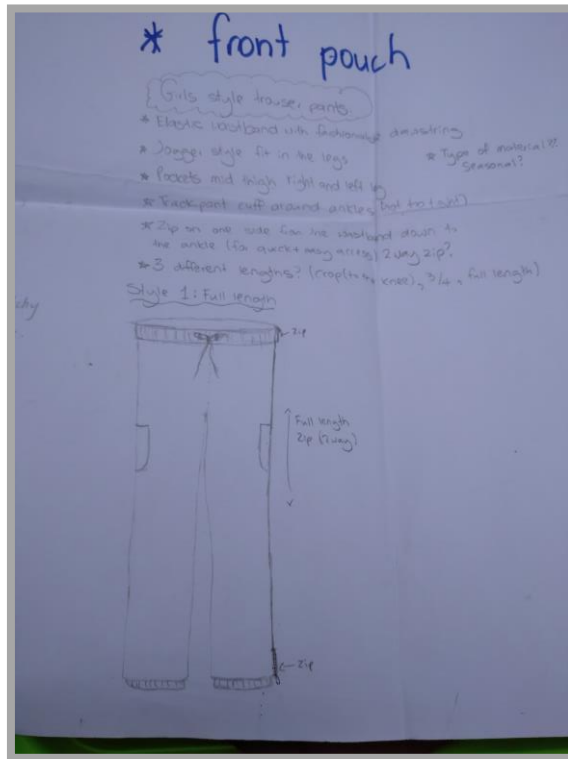
My Research for the design of these pants was very stakeholder based. I asked Mrs Richardson to get my client and some of his peers to show me a few photos of the trendy pants that he/they like. The following four photos are what they found online, along with drawing up a few designs with functionality options added too.



Mood Board Created by PAC Students



Male Design by PAC Students



Female Design by PAC Students

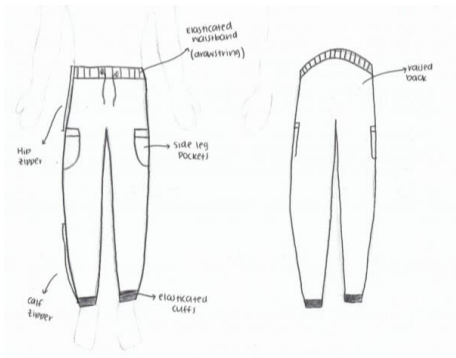
From here, I am going to use these pants as a guide and research of some designs that I will draw up. I will also use the current HHS Male Uniform pants as a guide for a possible PAC Uniform design. The current HHS Male Uniform pants are shown to the right.



Current HHS Male Uniform Pants

Sketches:

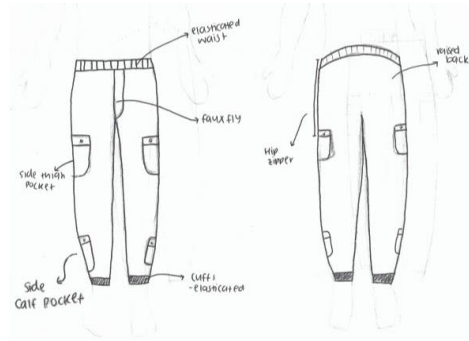
Design 1:



- Elasticated Waistband
- Hip Zipper
- Side Leg thigh Patch Pockets
- Calf Zipper
- Elasticated Cuffs
- Raised Back

○ **8 Votes**

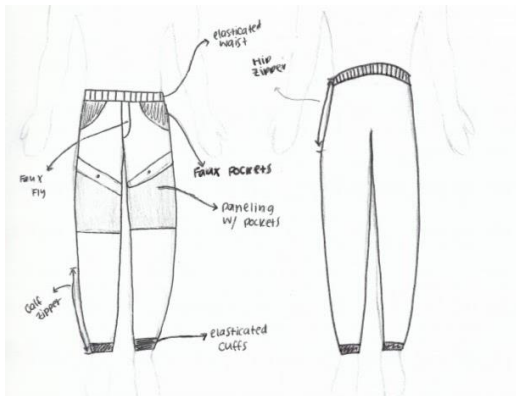
Design 2:



- Elasticated Waistband
- Faux fly
- Side Leg thigh patch pocket
- Side Leg calf patch pocket
- Elasticated cuffs
- Hip Zipper
- Raised Back

○ **0 Votes**

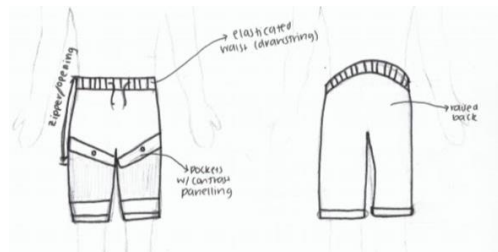
Design 3:



- Elasticated Waistband
- Faux fly
- Faux Pockets at waistband
- Paneling design with pockets
- Calf Zipper
- Hip Zipper
- Elasticated Cuffs
- Raised Back

○ **4 Votes**

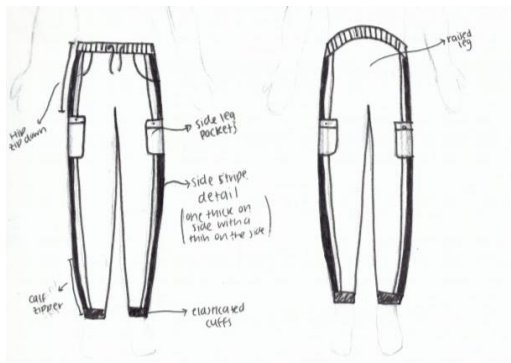
Design 4:



- Shorts option
- Hip Zipper/opening
- Elasticated Waistband with drawstring
- Paneling design with thigh pockets
- Raised back

○ **1 Vote**

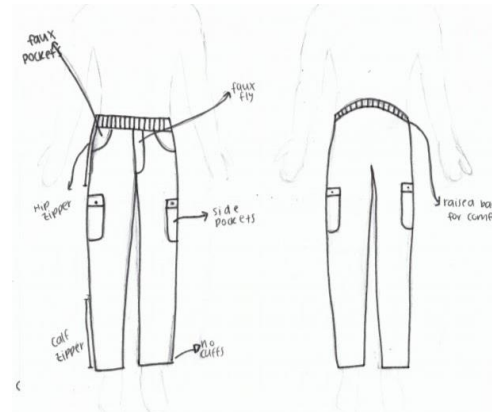
Design 5:



- Hip Zipper
- Calf Zipper
- Elasticated Waistband with drawstring
- Side leg thigh patch pockets
- Side stripe detail (one thick with a thin stripe either side)
- Elasticated Cuffs
- Raised Back

○ **3 Votes**

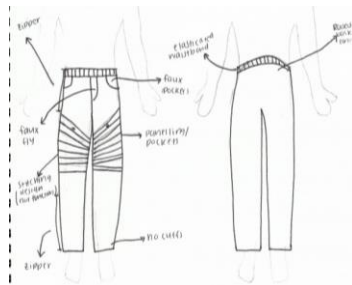
Design 6 (Uniform Style):



- Elasticated Waistband
- Faux hip pockets
- Faux Fly
- Hip Zipper
- Calf Zipper
- Side leg thigh patch pockets
- No cuffs
- Raised Back

○ **5 Votes**

Design 7:



- Hip Zipper
- Elasticated Waistband
- Faux hip pockets
- Faux Fly
- Paneling with post-box pockets
- Top-stitching design on paneling
- Calf Zipper
- No cuffs
- Raised Back

○ **1 Vote**

Stakeholder Feedback:

I gained further feedback from the selections on my pin board with all of the other components, as I also gave them my seven designs. I wanted to know which one they liked best, and if they would add or change anything to make them even better. As mentioned previously I had eighteen responses which were very helpful. I wanted this feedback so that I can improve/collate them to produce a final design.

Anything you would add or change to these designs?

I added this because my designs were only a base idea, and the stakeholder responses will have a much better idea of designs. There was the most feedback for design 1, especially around the placement of the pocket. Ideas were suggested to make the pockets on the front of the pants and have them up a bit higher as the position they were in could get in the way. The addition of a faux fly and instead of having a tie waistband have a zip, and also considering the width of the waistband as too thin or thick could be uncomfortable. Lastly, the other suggestions for design 1 were to add functioning zips in the right places (hips and calves) and that the possibility of a shorts option could be a good idea. I will particularly be taking into consideration the pocket placement and pocket idea, along with the waistband and faux fly. In terms of the placement of the pocket I hadn't thought too much about them being on the side being an inconvenience, so I'm glad I did this questionnaire to get some good feedback to take into consideration.

Design 3 also had suggestions/additions for the design. The suggestions were to change the faux pockets at the hips to real ones, which I was surprised by because I thought they would be less inconvenient due to sitting all the time. However it is good to know that, there were also comments that the design was perfect in terms of style and functionality, and that there were functioning zips in the right place.

Design 4 only had the suggestion of adding more pockets, which is pretty easy to add so it is some good feedback.

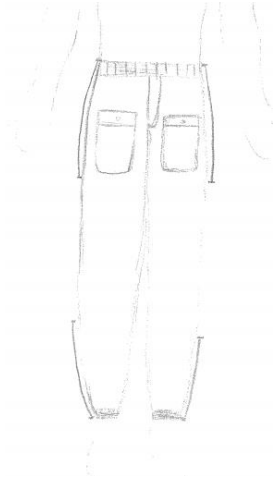
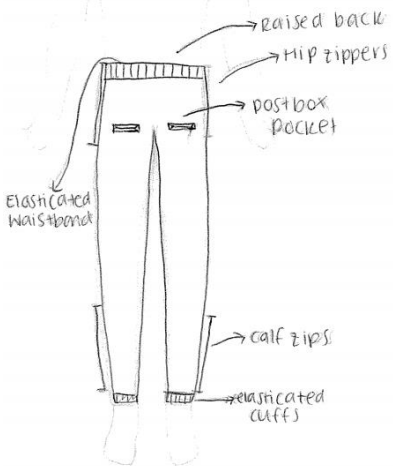
Design 5 had a few comments/suggestions including that the stripe detail along the side of the pants would only look good for certain fabrics. Along with this adding a faux fly was another suggestion. These are something to consider which I can use to adapt the pattern if wanted by my client.

Design 6 had the suggestions of adding elasticated cuffs, and also adding the pockets on top of the thigh so that the things in the pockets don't squish against the wheelchair sides. I hadn't thought of this as much, so it is very useful feedback.

Final Design

Thursday 27 August – Trouser Meeting:

Today I had a meeting with Ryan, one of his friends, Mrs Richardson along with Mrs Teahan to try to draw up a final design. Before I went to the meeting I used the results/stakeholder feedback from my pin board testing to form a refined design. I drew up an adapted version of design 1 to change the pocket placement and size, added a faux fly and also elasticated cuffs. From the meeting, we discussed the design, and he was pretty happy with it. He would prefer post-box pockets with zips, so I have added them instead of the patch pockets. He likes the elasticated cuffs, and although he didn't initially put down chunky plastic zips, he would rather them for the closures for the hips and calves along with the pockets. Although sweatshirting was the overall preferred fabric from the questionnaires, he wanted to try out denim. As Bull Denim did not perform well in the testing for comfort, Mrs Teahan suggested to Ryan during the meeting the possibility of sweatshirting on the back of the pants for comfort, and Denim on the top for the look. He didn't like the idea to begin with, so when I get to the point of constructing a suitable mock-up I will make them in Dull Denim so Ryan can wear them for a day and give me feedback. Overall I think the meeting went well, and we are one step closer to getting the finalised design and specifications.

Refined Design:	Final Design:
	
<ul style="list-style-type: none">○ Elasticated Waistband○ Elasticated Cuff○ Hip Zipper○ Calf Zipper○ 2 Patch Pockets on thigh○ Raised Back○ Faux Fly	<ul style="list-style-type: none">○ Elasticated Waistband○ Elasticated Cuff○ Hip Zipper○ Calf Zipper○ 2 Post-box pockets on thigh○ Raised Back○ Faux Fly

Denim Cotton Fibre Research

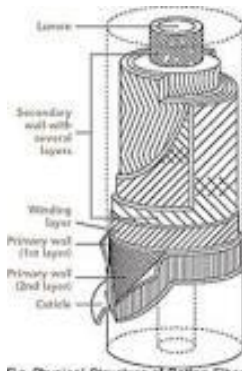


Fig Physical Structure of Cotton Fiber
Physical Structure of Cotton Fibre

The six parts that make up the cotton fibre are the Lumen, the Secondary Wall, the winding layer, the 1st and 2nd layers of the primary wall and the cuticle. The innermost part of the cotton fibre, is lumen. The Lumen is a hollow channel that runs through the centre, and the length of the fibre. Due to the Lumen being hollow, it can suck up a lot of moisture which is perfect for if the students get a little damp in the rain. The secondary wall has several layers within which is composed of multiple layers of cellulose. The winding layer is similar to the primary wall and consists of other molecules and 50% cellulose. The fourth and fifth part of the cotton fibre, are the first and second layers of the primary wall. The primary wall is composed of tiny threads of fibres that are in a criss-cross pattern to provide more strength for the fibre. The strength of this fibre allows it to be a very durable fabric which is one of the main attributes I am looking at for these pants. The final part of the cotton fibre is the cuticle, which is the outside 'skin' layer of the cotton fibre that contains a mixture of cellulose, fats, waxes, and resins.

Denim is tightly woven twill weave which makes it extremely durable. In the past, denim has been used for men's work wear. This shows the durability as when men are working in mines, they need a durable fabric so it does not wear out quickly. Even though denim is tightly woven, it is still a breathable fabric. This research backs up what my fabric testing has concluded, as Denim was the most durable fabric I tested.

Life Cycle, Maintenance and Disposal:

Cotton is a natural fibre made from the cotton plant, and has a regenerated cellulose fibre. The tight weave of the fabric means that it can withstand machine washing and will not be high maintenance. The durability of the fabric also influences the maintenance and disposal of the garment as the pants are going to last a long time and therefore won't need new ones every season. In terms of the disposal of this garment, if my client grows out of the pants there are other students in the PAC who have a similar condition and would benefit greatly from them.

Key Body Measurements

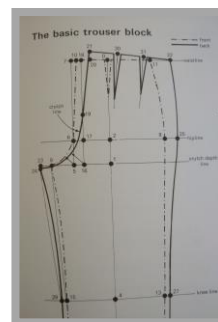
These are my client's key body measurements that I will use to make the pattern block:

MEASUREMENT:	RYAN'S MEASUREMENTS:
Hips	114cm
Waist	110cm
Waist to Hip	21cm
Waist to Floor	105cm
Body Rise	29.2cm
Trouser Bottom Width	23.5cm

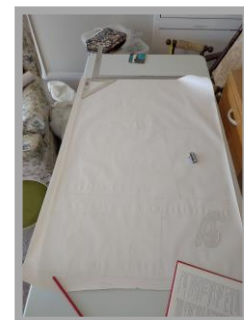
Pattern Block & Fittings

First Draft:

For the first draft of my pattern, I followed the instructions from the Winifred Aldrich, Metric Pattern Cutting book, using the measurements that Ryan's mum had sent through during lockdown. This basic trouser block is just to gauge the sizing, and from here I will look at whether we got the sizing right. I was concerned as to whether they would fit as I wasn't able to take the measurements myself due to being in lockdown. When constructing these pants, I left a 30cm gap along the side seams so that they would be easier to put on, and also if I got the sizing wrong then they would still hopefully fit.



Book Guide Photo



Pencil Pant Leg Block

First Fitting – Friday 22 May

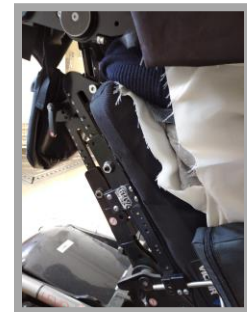
Today I went to the PAC to get Ryan to try on my first mock-up of the pants. The main objective of today was to check the sizing of the pants that I had quickly made up, and see if he, or Mrs Richardson had any suggestions or comments on the sizing.

When I got to the PAC, I met Ryan, and while Mrs Richardson was helping him into the pants, I sat with another teacher aide, and a student. The other student that I was with mentioned about the option of having these pants as shorts, or whether that would be too hard. I noted this down because although I have had a few people answer my first stakeholder survey, only three students have, so it's always great getting a student's opinion on this. Mrs Richardson also showed me the fabric on the pants he was wearing, as she thought they were pretty cool. They were long pants, and they looked like regular pants on the outside, but on the inside they were actually really fleecy and warm. This will be something that I will look into when I start researching the type of material I want to make these pants out of.

When Ryan first tried the pants on, they looked like a pretty good fit. He mentioned that he doesn't really like the straight leg look, and definitely prefers cuffed pants, which would trap air, keeping his legs warmer. I noted this down for future reference. The pants overall seemed to fit pretty well, however the bottom of the pants were a little big, so I noted that down and measured the bottoms of Ryan's pants that he was wearing which were 18cm across so that I had a reference when I changed the pattern. When talking about the bottoms of the pants, the type of changes I would make came up. Maddy, another teacher aide who was helping Mrs Richardson mentioned that she thought Velcro would be the best, as zips can get very fiddly, however looking into the durability would be important. She also mentioned that a few guys in the PAC like the zips on the bottom of the pants, but they are not very functional, so an option could be having a faux zip that is just for looks, but the Velcro is the functional aspect. And if there were going to be zips (faux or real) that having them on the side of the leg instead of the back, as she has found that with some pants with zips along the back can rub and cause blisters on the ankle.



First Fitting



Side Seam at Hip

To get an idea of the hip/waist sizing, and possibly how high we need to make the back for when he is sitting, Mrs Richardson helped him back into his wheelchair. With him in his wheelchair it gave me a better idea on sizing, as this is the position he will be in most of the time when wearing these pants. He mentioned that the pants were

very high waisted, and would like them to be shorter - to around the bottom of the front darts - as he usually wears his pants on his hips.

Lastly I looked at how much I might need to raise the back of the pants for them to be comfortable when he is sitting. With his pants that he was wearing today, the waistband digs in a little in his back, and that was noticeable, also that his pants are usually pulled up very high when he is dressed in the morning, but they fall down at the back of his chair during the day. Mrs Richardson's idea for solving this was to have a big curve at the back of the pants, so that it would be a lot more comfortable for Ryan when he is sitting, but you won't be able to tell from front on. This is something that I am going to research a lot as I want these pants to be comfortable as well as functional.

Overall, this visit to the PAC was very useful. From here I will adapt the pattern for the pants so that the waist is a lot lower, and taper in the bottom of the pants so they are not so flared. I am also going to research types of fabrics that I could use for these pants, and also about how I can make the rise at the back of the pants not so noticeable. Today I did not go in with my teacher as she was busy, so next time I will try to see if she can come to check that these look like they are fitting well, as I cannot tell, especially around the waist, as I left a 30cm gap to ensure that the pants would fit originally.

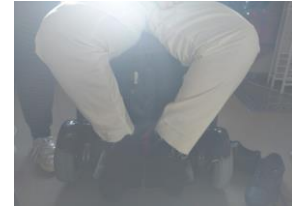
Second Draft:

For the second pattern draft, I first cut off 8cm from the top of the pattern. The original darts were 10cm long, however by only taking off 8cm I can check if that is a suitable height, or if Ryan still wants them lower. I then re added the darts, so that there was still shaping in the pants. On the front pattern piece I added one dart, in the original place that was 8cm long, and 2cm wide. On the back pattern piece, I added two darts in total, in their original placing along the waist. One was 8cm long and 2cm wide, and the other was 10cm long and 2cm wide, this is within the same length ratio as the original pattern. Once I had adapted the pattern, I unpicked the darts on the original mock-up, so that I could cut, and trace on the darts to construct the second mock-up.

I also made the bottom of the pants 4cm smaller (2cm from each side of the pattern). I did this by measuring 2cm from each side of the bottom of the pant pattern piece. Then slowly tapering it from around the knee point which is the line 4 across on the original pattern. I did this for both the front and back pattern blocks, then unpicked up to the knee point on both pant legs on the original mock-up. From there I lined up the pattern, cut them, and sewed the legs back together.

Tuesday 2 June - Second Fitting

The fitting went pretty well today, the ankles fit really well from where I narrowed them, and the pants sit really nicely on his hips like he wanted. I kept the edges at the hips open, and when he is sitting they can be pulled together, but it is a bit of a squeeze so I measured 5cm to each side. Even if I add too much, I can always bring it in a bit later on. Overall, the fitting went really well, and the only other suggestion/idea from this was to maybe add covers over the zips on the sides so then they are not as easily seen. For my next mock up I will add 5cm to the sides of the front and back pattern, along with adding the side zips, and a waistband.



Second Fitting Ankle Sizing

While we were in the PAC, one of the parents was in there and recommended looking into Waterproof material. This is because when the students are travelling from cars/the school bus to the PAC, they can get very wet during winter/when it rains. Other suggestions that came up during the fitting were front pockets, so that the students can keep their phones, and Panadol etc. with them, have the front fold down make it look like a faux fly, but it just pulls down for easy toileting. Velcro was also suggested for the closure at the hips which I will have a look into and test durability and how long it might last etc.



Second Fitting Leg Sizing

Third Draft

For the third draft I began by adjusting the front pants pattern piece. I needed to add 5cm to the sides of the pattern piece, so I traced around my second draft, and added 5cm to the top of the side. When adding the 5cm, I tapered it down 30cm so it was a gradual addition. That was all I needed to do for the front pattern piece, and repeated that for the back pattern piece. Once I had added to the back pattern piece, I then went ahead and added 10cm to the back. This is to form a raised back for comfort at the back of the pants, and I did this by messing 10cm up on the 'centre back' of the back pattern piece, and curved it across to the side of the pattern. I didn't know how much to raise it by, so I started with 10cm and will gradually increase/adjust if I need to.

I also decided to add a waistband to this draft, so I used the front and back pant pattern pieces to roughly measure the length of the back and front waistband sizes. I am going to make two separate pattern pieces as I will eventually be adding zips into the waistband, so I cannot have one full pattern piece. After measuring the pattern pieces I drew up waistband pattern pieces that would end up 3.5cm wide, and 66cm long for the front, and 64cm long for the back, these measurements are without seam allowance. With seam allowance, the pattern piece for the front waistband would be 68cm x 9cm, and the back waistband would be 66cm x 9cm.

Tuesday 28 July - Third Fitting

For this fitting, I went into the PAC with pants that looked a lot more like pants. I added a waistband with elastic that I will adjust during the fitting, and I added an extra 5cm to the sides of the pants, along with finishing them with zips like they might be in the end.

The pants are really starting to come along, the length is pretty good, so next time I think I will add cuffs, and then see if I need to take them up a little bit. The elastic in the waistband was quite big, so I adjusted the elastic by 6cm in the back and 5cm in the front, and will note that down for my next mock up. Around the hips, the pants were quite big, so I will take off 1.5cm from the back pattern piece, which is a total of 3cm taken in. It is quite hard to get constructive feedback from Ryan at this stage as the pants are not yet looking too much like pants at the moment. Although hopefully the next mock-up will look a lot more like pants to get some better feedback on.



Fitting 3 - Legs

Fourth Draft - Added one cuff and one cuff zip

For the fourth draft I added the cuff, cuff zip, along with adjusting the back waistband and back pants. I began with adjusting the waistband, adding 12cm to the length of the waistband to make it 76cm x 3cm without seam allowance. This makes the back waistband pattern piece 78cm x 9cm in total. I then adjusted the back pant pattern, starting with taking off 1.5cm from the side as they were too baggy. Once I had taken off this gradually, I then added 8cm to the top of the pattern piece which would in turn make the raised back higher. After finding the 8cm point, I then gradually sketched it to the edge of the pattern piece, making in a nice rounded shape.

I also added cuffs to this mock up, so to find the measurements for the cuffs, I measured along the bottom of the front and back pant pattern pieces. This gave me measurements of 23.75cm for the front cuff, and 24.5cm for the back cuff. These measurements are with seam allowance, as there is already seam allowance added to the pants. I want the cuffs to be the same width as the waistband in the end (3cm) so I made the pattern pieces 9cm wide. Overall the front cuff pattern piece is 23.75cm x 9cm, and the back cuff pattern piece is 24.5cm x 9cm.



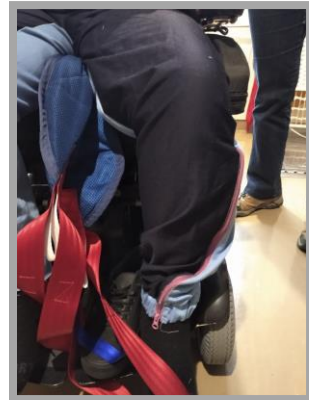
Draft 4 - Adding a higher raised back

Tuesday 11 August - Fourth Fitting

Each time I go into the PAC for a fitting, the pants I come in with are looking more and more like the final product. This time I added a cuff and calf zipper to one leg so that Ryan could get a better idea of what that would be like and whether it would actually be useful. I only did this to one leg just in case the cuff did not fit as I guessed the elastic. This mock-up was also made out of Cotton Drill instead of Calico, so it could also give him an idea of a possible fabric.

Overall it looked like it fit well, and Ryan thought so too. The waistband fits nicely since I adjusted the elastic measurement and he likes how the back is raised and is at a good height so that it is comfortable. The teacher aides along with Ryan liked the zips and think they worked well including the cuff. The cuff fit really nicely, and the elastic was just the right size. I thought that the cuff may have made the pants a bit too long but when he was sitting in his chair they seemed to be a nice length and Ryan agreed also.

When looking at the pants with the calf zipper one of the Teacher aides mentioned the possibility of adding a tie so that for the students that do get quite hot, they could roll up the pants to the top of the zipper and tie them to become shorts. This is something to consider if they were to become a uniform, however I am not going to add it into this design as I think it would get quite complicated, and Ryan didn't seem as interested as he could just open the zippers if he was too hot. Overall I think the fitting went really well and the pants are starting to come along nicely.



Fourth Fitting - Leg with zip and cuff

Final Design – Pattern & Fitting

Fifth Draft:

For the fifth draft I had to make a few adjustments as the cuffs/waistband did not line up well when constructing. I started with adjusting the waistband measurements, where I took 3cm off the length of the front waistband leaving the pattern piece 65cm x 9cm. I then moved onto the back waistband where I took off 13cm from the length, leaving the pattern piece at a final size of 65.5cm x 9cm.

I then moved onto the cuffs, where I took approximately 1.5cm off both the front and back cuff pattern pieces. This leaves the front pattern piece to be 22.5cm x 9cm, and the back pattern piece to be 23cm x 9cm, with all measurements including seam allowance.

For this draft I am also adding a post-box pocket to both front pattern pieces, so I need to make the pocket pattern piece, along with the placement on the front pants pattern piece. My Client wants to be able to put at least his phone and Panadol in these pockets so by using my phone, I made an approximate size for the pocket, which would be 15cm wide and 18cm long. To make the pattern piece I started by drawing my 15cm x 18cm box, doubled it so that I would be able to fold the piece in half when constructing, and then added 3cm around the edge of the doubled rectangle. To sketch out the placement on the front pants, I used the grainline, and measured across from the crotch to make a starting point and made it centred, 5cm down from the crotch. I showed my placement by drawing a 1 cm x 15cm box with indents to represent a zip would be there.

Friday 25 September – Fifth Fitting

I have made this mock up out of Bull Denim as that is the fabric that Ryan was wanting, to ensure that Bull Denim is actually the fabric that he wants for the final product and whether the design is actually functional. He is going to wear it for a full day doing all of his everyday activities. The idea behind this ‘fitting’ is more looking at the design and the fabric, rather than the sizing as we have mainly got that right. I went in in the morning and took some photos of him in the pants, and he was saying that they were pretty comfortable, and he liked them. His one comment at this point was that the pockets were a great size, but they needed to be much further up, otherwise his phone sticks out at his knee and it looks a bit odd. So putting the pocket around 5cm up it will allow him some room. I asked him to email me his feedback after he has worn them for the whole day, and this is what he said. He really likes the look/design of them, however they are a bit too big around the waist and he feels like they could possibly slip down, and as mentioned above, the pocket placement was a bit low. His carer and parents really liked the fact that there were a bunch of access points with zips for undressing and dressing, and overall really good functionality.



Bull Denim Fitting

From this feedback I will make up another pair of pants with adjustments to the pocket placement and sizing around the waist/waistband. The feedback I received is very useful, especially from Ryan’s mum as I had not had any from her previously. Also, due to wearing the pants for an entire day I have a lot more confidence in the comfortability and functionality of the pants overall.

Finishing Changes to Pattern

Sixth/Final Block:

After my final mock up, my client gave me feedback around the placement of the pocket, and also that it was too big around the waist. I started by moving the pocket placement up by 5cm so it lines up with the crotch line.

I then took in the pants from by 2.5cm from the front side which will reduce the overall pants by 5cm. I removed this where I initially added space at the start of my pattern making process. 2.5cm was taken off at the top and I tapered it down to the 30cm mark. Due to reducing the front pants pattern and it not fitting during the mock up, I also needed to change the size of the front and back waistband. I started with the front waistband, re-measuring completely by measuring the length from just before the faux fly and to the edge of the pattern piece. The front waistband pattern piece ended up being 67cm x 9cm. I also remeasured the back waistband length completely, measuring the top edge of the pattern piece and removing 2cm (excess seam allowance). The back waistband pattern piece measurements were 74cm x 9cm.

Final Changes:

As I was making up my final product, I once again found that the waistband was too long and did not fit correctly. I was very confused as to how this happened because, as mentioned above, I thought I had calculated everything accurately and correctly. However, I only then realised that the reason my waistband measurements were so up and down were because of the darts. I was measuring the pattern pieces, which included allowance for the darts, two in the back and one in the front. So I took off 2cm from the front waistband and 4cm off the back waistband and everything fit well. It was a bit frustrating to only figure this out at the end but it all makes a lot more sense now. I folded over the waistband pattern piece and cut off where the edges joined so that the notches could still sort of line up, however I moved some 1-2 cm closer to the centre waistband to line up.

Fabric Layout

To calculate how much fabric I needed for my pants, I put down two measuring tapes and laid out all of my pattern pieces with the grainline all facing the same way. The place that I will purchase the Bull Denim from has a width of 1.5m so in my layout my width is 75cm as I will need to fold over my fabric to cut out two of most pattern pieces. This will mean I am being economical with my time.

With the layout below I will need to purchase 2.2m of Black Bull Denim with a width of 1.5m.



Fabric Layout

Construction Plan

Throughout the construction of the garment I took photos of the process. During the construction I backstitched and overlocked all raw edges to ensure the durability of my final garment.



The pictures to the left are from when I was constructing the pockets. I sewed a patch pocket just above the crotch line with a 20cm chunky plastic zip.



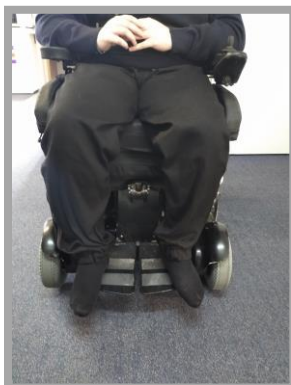
This picture to the right is from when I sewed the elastic to the cuff. From here I then ironed it in half and carefully finished it by topstitching.

The picture to the left is of my pant leg with the zip just before I finished off topstitching the cuff.



Final Product

The photos below are photos of my client wearing the final product. I am very pleased with how they look and how they seem to fit. Below is also the feedback that I received from my client and other stakeholders.



Client seated



Client Seated side angle



Client in standing position



Client Seated with leg Guards

Client Feedback:

The following is the feedback I received from my client after wearing the final product for a day at school:

The pants overall were good and the material had some stretch but was firm so my stretch wouldn't be stopped or making them uncomfortable. The waistband was stretchable but was tight, so didn't ride down and were comfortable all-round, the zips made it easy to take the pants down when sitting and to turn them into shorts.

Thanks

Stakeholder Feedback:

The following is feedback from some of my secondary stakeholders:

It was exciting to see Ryan wearing his new pants. He was stoked that he was wearing jeans, this is no mean feat as he had not been able to wear jeans since he was 10 years old. The pants were trendy looking and comfortable. He was proud to show them off and he willingly used the sit to stand function on his wheelchair to stand and show his peers and the PAC staff his new pants. He found them comfortable and trendy.

When Ryan needed to go to the bathroom, he found the pants very easy to undo and then do up so that he could use his bottle independently. His carers were heard remarking how functional the pants were as well. His carers work with a number of different disabled people in the community and they are used to toileting people in a variety of different scenarios and vicinities. They really appreciated the functionality of the pants in that the number and placement of zips made them multi-functional so that people who wore splints could easily be dressed and undressed. So too, the pants could be used for females as well as males. His fellow students in the PAC were also pleased with the functionality and look of the pants, all of them stated that they would wear a pair.

Here is a paragraph from the perspective as HOD PAC and HOF Inclusive Education Faculty:

I have been very pleased with the professionalism of Emily Hollis in her endeavor to improve the daily life of the students that I work with on a daily basis. The students that I work with are like typical teenagers and they are fashion conscious and they want to also be like everyone else. Hillcrest High School has a uniform for students in Y9 - 10 which is referred to as the junior uniform and then the senior uniform for Y11-12. In Y13 they wear mufti. In the PAC students in wheelchairs are required to wear the school uniform. Currently there are no skirts, shorts or pants that the students in the PAC can wear. They wear the relevant shirts, jerseys and jackets but they chose the appropriate mufti pants for their bottom half. This is dependent on their physical

needs. The pants that have been designed by Emily for Ryan to wear are multipurpose. These pants are in fact unisex, enabling staff and carers to readily toilet students who need assistance and they can be used by more independent students. In fact, due to the overall modern, trendy look of the pants even the Y13 students said that they would wear them as part of their mufti. I would really like to use these pants as a prototype to be used as a HHS uniform for students that mainstream and disabled students can use.

Reflection on Feedback:

Reflecting on my Client's feedback after the final design and pair of pants I created I am really pleased. At times it has been hard to tell how much he likes them and whether or not he would wear them, but it is really nice and cool to see written down that he likes them and thinks that they are comfortable.

Getting the feedback from the PAC/Mrs Richardson is also very eye opening. Throughout this process there were times where I didn't think that they would be useful at all, but seeing that she as HOD is interested in putting them forward as a HHS Uniform option is quite amazing. I am so glad that both Ryan and Mrs Richardson love the concept and final product and I am interested in seeing where it goes in terms of the Uniform in the future.

Evaluation

The final product of the pants that I created are both fit for purpose in terms of the functionality and style. Due to the large input my client had with these, he finds them trendy and stylish and not like many other pants he has ever worn. They are functional in both the social and physical environment which can be seen with photos of him wearing the pants throughout the PAC, where he spends a lot of his time. They



Client Seated with leg Guards – Final Product

are also functional in the physical environment, in close contact with the wheelchair daily, after wearing the pants for a day or two for testing there were no signs of initial wear.

I needed the fabric to be durable due to the friction that it would create between the pants and the wheelchair so I tested fabrics by rubbing sandpaper on them to find one of the most durable fabrics, along with backstitching and over locking when constructing to increase durability of the pants. I also researched cotton once Ryan had made his choice and found the structure of the fibre is incredibly durable due to the twill weave.

I also wanted the pants to be cost effective in terms of the fabric and notions so that if these pants did get used as a prototype for a school uniform, it would give an idea of the cost of the pants. Overall, with the zips and fabric, the pants cost \$70.89 however this does not include the cost of my time. The cost of my time and labor spent constructing these pants could have a huge impact as to whether or not they become a uniform. This is because if they are very fiddly and long to make, then a small mass production of them would be difficult, therefore resulting in much more expensive uniform pants.

I did want to invest more time into looking into the Uniform aspect of this project, however due to the COVID-19 lockdown part way through the year, it cut out a few months of work and delayed a lot of my steps. Instead of half-completing both aspects of the issue, I wanted to complete the pants for my main/initial issue and idea, and then from here I can work with the HOF outside of this project to start the Uniform process.

In terms of how trendy these pants are, it all links back to my client. The design that I have produced has been heavily influenced by what he likes and thinks is trendy. The all-black look means that it can be paired with anything, and the zips that are also functional add a difference in style. Overall, I have met my clients brief for a pair of trendy but functional pants.

Pockets were an important part of the design process. Although my client is in a wheelchair and has his bag with him most of the time, he prefers to have pockets on the front of the pants. This is because they are easily accessible and he can carry around his main essentials including his phone and Panadol. In the component testing I gave the option of post-box and patch pockets, and in my revised design I added patch pockets as they were the most popular pocket option. However, I changed to post-box pocket as that is what my client preferred. When I made my first mock up in Bull Denim I also size-tested the pocket, I measured a size by using my own phone and giving a bit of space. After the first Bull Denim mock-up I moved the pocket up higher as it was at an awkward place where his phone would stick out at his knee. For my final product, I moved the pocket up higher and he much preferred it.



*Client in standing position
- FinalProduct*

In terms of the functionality of my final pants, I have added a high back, used zips, a waistband and cuffs. I used zips at the hips and calves as closures for the openings I added. These openings were for easy access when toileting along with making it easier for dressing and other stretches the PT and OT do with my client. I also have zips on my post-box pockets to close them so my client can keep his belongings safe and they won't fall out. I have raised the back pants up for comfort when seated in a

wheelchair all day. Alongside the raised back I also have an elasticated waistband which traps warmth along with keeping the pants up around his hips. However, the waistband is not too tight as it can get uncomfortable. I also have elasticated cuffs to trap the warmth within the pants, similar to the waistband if all openings are closed



Elasticated cuff with zip

off to the skin the warmth can stay within the pants and keep my client warm. Overall, I have used a range of features to produce a completely functional garment for my client.

Due to COVID-19, I had many disruptions and added issues come up. First of all during lockdown I was not able to measure my client to start my pattern block, so instead his mother measured it for me. I was very nervous as to whether or not the pants would fit as I had no idea as to whether he was measured correctly. The lockdown also limited what I was able to do as at that point I was getting more into the practical pattern making and fitting stage.

When we came out of lockdown I got straight to work, however it was a lot harder as the PAC had some high-risk students so when getting stakeholder feedback there were not as many students available. As I was starting my component testing we went into Level 2 so no parents and some students were unable to be in the PAC to give feedback. I overcame these issues through the use of technology and building great relationships with Mrs Richardson, and using her strong relationships with the PAC students' families. It made me more aware of Health and Safety and I came out with a great end product.

The Uniform aspect of this project has started to get underway. Mrs Richardson the Head of the PAC had received an email from a business that sells accessible gear and are keen to sell my pants. She would also be interested in having the pants I made for my client as a unisex option for the PAC uniform in the near future. This is very exciting and surprising, I am very excited that my scholarship project could go a lot further than just helping my school community.

At first, I was very nervous that I would not get these completed to a high enough standard due to my delays from COVID-19. I tried to manage my time efficiently to get everything done on time to a high standard as I was concerned that there would be more delays due to COVID-19. I am very pleased with my final product, and even more pleased that my stakeholder really likes them along with the HOF/HOD. This gives me a lot of pleasure, as the HOD has many years of experience.

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