References

[1] Autodesk. (2019). *Digital Prototyping.* Retrieved from https://www.autodesk.co.uk/solutions/digital-prototyping/wheel

[2] Boogaard, K. (2019). Need to Make a Tough Decision? A Decision Matrix Can Help - Toggl Blog. Retrieved 25 September 2019, from https://blog.toggl.com/decision-matrix/

[3] Bridger, R. (2008). *Introduction to ergonomics*. Crc Press.

[4] Dampney, Kit & Busch, Peter & Richards, Deborah. (2007). The Meaning of Tacit Knowledge. Australasian Journal of Information Systems; Vol 10, No 1 (2002). 10. 10.3127/ajis.v10i1.438.

[5] Department of Transport and Main Roads. (2013). *Evaluation of flashing school zone signs in Queensland.* Retrieved from QLD Government: https://www.tmr.qld.gov.au/-/media/Safety/roadsafety/Road-safety-research-reports/evaluation-flashing-school-zone-signs.pdf?la=en.

[6] Drury, G. (2019). Direct Observation. *Tools & Techniques.* Retrieved from: http://www.idemployee.id.tue.nl/g.w.m.rauterberg/lecturenotes/UFTdirectobservation.pdf

[7] Dumas, J. S., Dumas, J. S., & Redish, J. (1999). A practical guide to usability testing. Intellect books.

[8] Elmansy, R. (2015). *How to Evaluate Design Ideas.* [online] Designorate. Available at: https://www.designorate.com/how-to-evaluate-design-ideas/ [Accessed 13 Sep. 2019].

[9] Evans, B. (2017). Resources for Eliminating Bias in Design. Retrieved from https://www.uxbooth.com/articles/resources-for-eliminating-bias-in-design/

[10] Harvey, C., Stanton, N. A. D., & Young, M. S. (2014). *Guide to methodology in ergonomics: Designing for human use*. CRC Press.

[11]Helms, M. M., & Nixon, J. (2010). Exploring SWOT analysis - where are we now?: A review of academic research from the last decade. *Journal of Strategy and Management, 3*(3), p. 234.

[12] Hernandez, H. (2018). THE ART OF ASKING QUESTIONS IN USABILITY TESTING. Retrieved from https://www.akendi.com/blog/the-art-of-asking-questions-in-usability-testing/

[13] Lidwell, W., Holden, K., & Butler, J. (2010). *Universal principles of design* (Rev. and updated ed.). Beverly, Mass: Rockport Publishers.

[14] Martic, K. (2017). Pros and Cons of Group Interviews. Retrieved from https://medium.com/hr-blog-resources/pros-and-cons-of-group-interviews-f5d9b6bb85c7

[15] Queensland Government. (2016). *Benefits and Limitations of SWOT analysis.* Retrieved from https://www.business.qld.gov.au/starting-business/planning/market-customer-research/swot-analysis/benefits-limitations

[16] Ross, J. (2015). Which is Better for Analysis, Spreadsheets or Affinity Diagrams? Part 1 | Infragistics Blog. Retrieved 25 September 2019, from https://www.infragistics.com/community/blogs/b/ux/posts/which-is-better-for-analysis-spreadsheets-or-affinity-diagrams-part-1

[17] Tamperee Teknologia Department. (2019). Retrieved 25 September 2019, from http://www.cs.tut.fi/~katu/harkkakalvot/Practice9_2013.pdf

[18] Thornton, P. (2019). How to conduct user interviews. Retrieved 25 September 2019, from https://uxdesign.cc/how-to-conduct-user-interviews-fe4b8c34b0b7

[19] Tomitsch, M. (2018). Design. Think. Make. Break. Repeat. : a handbook of methods . Amsterdam, The Netherlands: BIS Publishers.

[20] Visser, F., Stappers, P., & Lugt, R. (2005). Contextmapping: experiences from practice. Retrieved from http://maketools.com/articles-papers/Contextmapping_SleeswijkVisseretal_05.pdf

[21] Wilson, G., Bhamra, T., & Lilley, D. (2015). The considerations and limitations of feedback as a strategy for behaviour change. *International Journal of Sustainable Engineering, 8*(3), p. 186-195, DOI: 10.1080/19397038.2015.1006299

Appendix

Figure 1

Ergonomics and Accessibility Testing

Activity 1

	MAGIC CROSSING	FLOW	THE DUCK	PENGATE
FIT Do people physically fit into your designed object? Have you taken multiples into account i.e. more than one person	**Yes,** the crossing pathway is designed according to the standard zebra crossing size to consider all sizes and accommodate different ways of travel e.g. bike ride. **Yes,** groups of students can fit into the crossing and cross together simultaneously. For the gesture motion, even though it only needs one person to gesture a push for the path to flow out, others can interact the same way for the pathway to send out a wave while it is activated.	**Yes,** the crossing pathway is designed to accommodate all times of pedestrians, regardless of what they are doing, carrying or method of travel.	**Yes** **Yes**	**Yes,** It will accommodate many children
STRENGTH Does your design require physical strength to operate it? Does your target group have the appropriate strength?	**No,** as it relies on gesture motion there is no strength required. **Yes,** as the concept does not rely on any strength skills.	**No,** No physical strength is required, just the individual's presence.	**No,** it's simply a touch screen **Yes,** as the concept does not rely on any strength skills.	**No,** not a lot of strength would be required so that it can be accessible to everyone
CLEARANCE Is there sufficient room between moving parts and people's bodies?	**Yes.**	**Yes,** there is plenty of room for all of the users.	**Yes**	**Yes,** there is enough room for seven kids but still plenty of room for others to watch and enjoy
REACH Can people reach? Do they need to extend their limbs continuously? Do they need to lift or support at full extension?	**Yes**, as it is just a gesture motion. Though, the gesture motion camera will have to be placed correctly to identify pedestrian's gestures at all lengths and reach so that the feedback of the crossing flowing out will be immediate. **No.**	**Yes.** The device requires no reaching at all as it is an automated process.	**Maybe,** the position of the touch screen will need to fit to their height. **Yes.**	**Yes,** The reach on this device would be minimal but would encompass the shorter 5% of the bell extreme
POSTURE Does the form of the object/space encourage a neutral posture? Does it take into account important anthropometrics?	**Yes,** it does as it acts on the extension of a pedestrian's walking action. **Yes.** The pressure sensor mats are very minute in thickness to take into account the small steps of school children of smaller sizes, yet the bigger sized kids are still able to walk aimlessly. The gesture cameras are positioned according to the average height of a school student.	**Yes.** Posture is based on how the students stand not the product.	**Yes,** the screen is based on the height of most kids. **However,** for some tall students, they might need to stoop to use the screen.	**Yes,** the screen may have to be slightly tilted to better support wrist movement
SIGHTLINES Can everybody see what is happening? Are the critical angles taken into account?	**Yes**, the signs and walking pathway are very clear. Also as the pathway is illuminated, it helps everyone to be able to see. **However,** it may be confusing to see what is happening in terms of how the pathway is activated (as it seems like it is already hard to see if users will know to gesture motion for the concept to work). **Yes.**	**Yes.** The positioning of the countdown timer is in a clear easy to read location. **However,** you require looking down to see the projections of the crossing status.	**No,** the touch screen may be out of reach for certain students who are younger/shorter. **Yes.**	**Maybe,** must be short enough so that kids can still see the road, or even have slits so that there is mutual vision between driver and child

Figure 2

TUTOR'S FEEDBACK

	MAGIC CROSSING	FLOW	THE DUCK	PENGATE
Main points that we took away from tutors feedback:	- Beyond ergonomics, social acceptance needs to be considered. MC does not resemble anything that we are familiar with (MAYA principle), so it will be hard for users to understand what to do when approaching the crossing - There is no visibility of the crossing path prior to activation. This combined with the digital sign may confuse users that this is a red-light crossing when it is actually meant to be an upgrade on a zebra crossing	- Does not include interactivity to make it stand out beyond just its functionality. Though the functionality is good, how can it improve the experience and make it more exciting?	- Might incentivise people to jaywalk - Some parts on the screen are quite similar to the existing products. Eg. the red warning is shown on the screen to tell the pedestrians to get back. - Is currently on a pedestrian zebra-crossing, needs to be changed to normal crossing.	The gate seems too mechanical and restricted. Users can feel too 'stuck' behind the gate and not really like the 'feeling' or 'atmosphere' it gives. Although there is interaction it 'does not feel good'.

Figure 3 - Focus Group Results

Goals: to gain opinions on whether or not our users required a more connective crossing experience for a more usable school crossing.

Participants - 6 kids, 1 parent, 1 teacher

How do you find the current school crossings to be? (Do you think there needs to be more, or do you see it as an aesthetic or unpleasing thing to look at?)

- **Child 1 -** For me, at the moment I find them boring. They are just there and we are used to them but that don't have anything to do.
- **Child 2 -** I believe that the zebra crossing near my school really needs an improvement both in looks and how obvious it is to drivers, it feels hidden away.
- **Parent:** I think they are alright. Like there is nothing too eye-catching or memorable about them right now, you know? I just use it when I have to, I don't really think much about it. In terms of if I think there needs to be more to the crossing … I don't really know aha!
- **Teacher -** They lack encouragement to use, especially in peak hour (school begins or finishes) when you are rushed to pick up your kid so parents run across the road or when kids are eager to get away from school, they want to jaywalk and take the shortest path. They need something to encourage them.
- **Child 3** - My current school crossing is a zebra crossing, which I find pretty plain and standard. I actually prefer it over having to wait for a green light to cross but it isn't really captivating to use. So I agree with *Parent* I don't really second-guess to think about the crossing. It's just something I have to do or something that is simply there.

What do you feel when looking at a basic school crossing?

- **Parent -** They definitely need to stand out more. Schools zones need to be clearer, especially the crossings within them.
- **Child 2 -**Sometimes I don't feel that the zebra crossing is that much safer than jaywalking, so when I look at it I just think, why bother?
- **Child 3 -** Unamused! I always think: eurgh, a crossing!
- **Child 4** - I don't really feel anything if I'm honest. I just wait when needed, and then cross when I can. It's a part of my journey that I don't really think about. So when I look at a crossing I just associate that with Oh ok it's time to cross.
- **Parent:** They need to be engaging for kids to stop them from jaywalking. I look at them and think that they need an upgrade. Not sure how you could do it but.
- **Child 5 -** I look at them and just wish they were a bridge or something so we didn't have to wait for cars at all. When it is busy, we have to wait for so many cars.
- **Teacher -** Yea I agree with what everyone is saying. I feel the crossings are really boring and simple to look at. Nothing is really special or really stands out about it. And for most of the times, especially if it is a zebra crossing, I just assess the road myself and cross early. I think it's because I just don't see the point to using the zebra crossing when I can just do it myself, you know? It's probably bad but I do look before I cross.

- **Child 6 -** Actually that is true! When I look at most crossings, I just think what is the point? There is no value? Unless it is on a busy road, then I'll use it to be safe.

Which type of current crossing infrastructures, out of these 4 mainstream ones (Zebra, Timer, Standard crossing, Island Crossing), do you feel more engaged/encouraged to actually use to cross the road and why?

- **Child 1 -** I enjoy the timer ones because it makes it feel less rushed compared to the rest.
- **Teacher -** The island crossing is what we have near the front of the school and it feels the most dangerous, so I think I would want to use a zebra or timer crossing.
- **Child 2 -** Zebra crossing is my favourite cause it is the easiest to use.
- **Child 4 -** I feel encouraged by a zebra crossing, but I don't feel engaged by any.
- Honestly, I don't think any of them make me feel either, you have nothing to do at both and it's just waiting and checking. I guess the island or zebra is the fastest if you only thinking about which is engaging, cause lets be real we just want to get across.
- **Child 6 -** I like the island crossing one and I feel I'd use it more, because it lets me judge for myself when I want to cross, and it gives me a place to stand in the middle of the road if there is a car that is suddenly approaching.
- **Parent:** For me I believe the timer crossing and standard crossing are the safest, so I would encourage my kids to use them the most to cross the road. I think they all lack engagement but.
- **Teacher:** I like the timer because I can actually see how long I have to cross. I'm not a big fan of waiting for a long time so that I can cross and the timer can start to countdown, but I like seeing the feedback.
- **Child 5 -** Zebra crossing for sure! I like being able to just know that I can use it to cross at any time without having to press a button and stand there on the side of the road waiting to go. Plus, the stripes on the road catches my eyes the most out of all the crossings.

Why do you think you didn't choose any of the other options?

- **Child 1 -** (Timer) I like how you know that you have a set time to safely cross, whereas the others don't tell you that information. You just know that you can cross, but it doesn't give you confidence that you can take your time to cross. Like if I'm using a zebra crossing, even though I know it's fine for me to cross, I sometimes feel rushed because i know cars are waiting for me to finish crossing.
- **Teacher -** (Zebra/timer) I would pick the zebra or timer cause unlike the island crossing they are safer and provide kids and drivers better visibility for when to cross. The timer crossing I picked just because it is a better version of the standard crossing
- **Child 2 -** (Zebra) The others involve, like, a lot of waiting as a pedestrian, which I feel like I'm just not wanting to wait so it isn't appealing to me and the island crossing seems

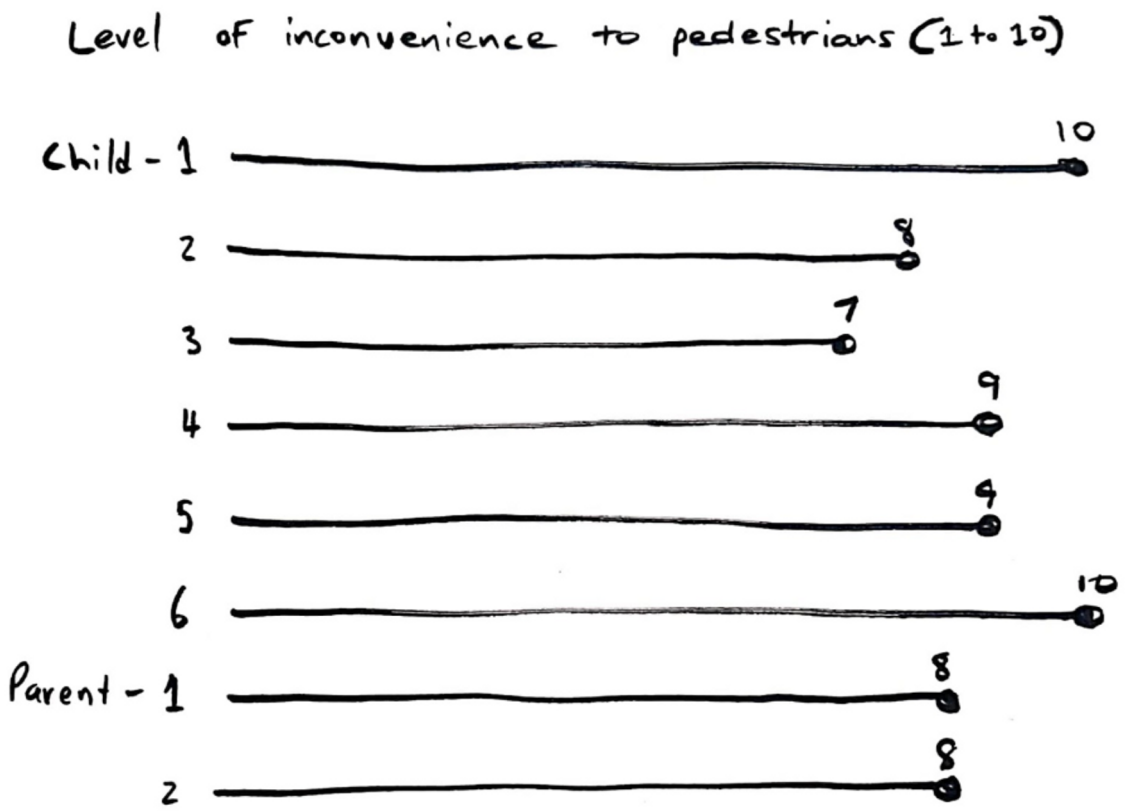
hard too because technically it isn't telling cars to stop to let you cross. It's just giving you space to safely wait when you choose to cross.

- **Child 4 -** (Zebra) I agree with *child 2*. I don't want to wait, I just want to cross and get on with my life. So that's why the others aren't as likeable for me.
- **Child 6 -** (Island) I don't really like normal compared to the island, cause I am used to the island near my school and I don't have to wait when nothing is around.
- **Parent:** (Timer and standard) For me, I'm thinking more about safety for the kids. So a zebra crossing, let's say, is too reliant on making children decide for themselves when to cross. And with dangerous drivers out there, I don't know if I would like those types of crossings.
- **Teacher:** (Timer) The timer just logically makes more sense then the rest for safety and has I guess the most interaction even if it is just you looking at it. I allows you to feel less left just to wait, and more considered compared to the amount of time given to cars.
- **Child 5 - (**Zebra crossing) The others kind of don't seem very eye-catching. They seem very blocky to me? I know the zebra crossing is pretty basic, but I like how the big white stripes are familiar to me and I know that everyone understands you need to stop for us to cross.

Have you ever exercised signs of distracted walking whilst preparing/starting to cross the road? Why do you think you do this if you do?

- **Child 3 -** I think so. Don't tell my mum haha! But it's just because I kinda know when the crossing is coming up, so I'll just walk with my phone in my hand and I look at it and text my friends. I feel it's because the crossing is pretty standard. So like everyone has been bringing up how the crossings are boring, and I think it's probably why I don't pay attention to crossings too much.
- **Child 6 -** Mmm, I often listen to music if that counts as being distracted? Because I'm probably not able to listen to the cars honking or something ahah! But yeah, the crossing is just there to do one thing, so nothing engaging for me to focus on.
- **Teacher -** I actually was going to say I'm pretty good at walking safely when approaching the crossing. But actually, I'm like *Child 6*I do occasionally listen to music so I can see how it may be distracting. Though for me, it has nothing to do with the crossing. I just listen to music on my commute because of the entertainment behind keeping busy as you do something mundane, such as commuting to work.
- **Parent -** I'm probably guilty of checking my phone here and there when I'm walking to a crossing. It's definitely a habit. I do occasionally feel a bit bored when I walk, which is probably why I do look at my phone. But in saying that, don't do that kids!
- **Child 2 -** Yeah, I often will be looking down at my phone or sometimes Switch. I kind of rely on the standard crossings because of it, though I do look up when I need to cross the road when there is no crossing.

Can you rate the level of inconvenience to pedestrians that you think the crossings are to you, between a scale of 1 to 10?



***NOTE: Parent 2 = Teacher**

Can you share why you chose the specific ranking?

(there's just nothing to do while you wait as well…)

- **Parent -** I feel both in the car and outside of the car, current traffic lights can be very inconvenient. They don't manage well the traffic or people or cars, often in pick up times you can get stuck at a traffic light for a long time, but the kids are unable to cross in a way too due to the build-up. Not sure how to explain it but I feel they need to be more accommodating to kids, but more for cars when there are no kids around.
- **Teacher -** Personally I feel that the crossing near my school are inconvenient as they are nearly 5 minutes away, not only that but you have to wait at them on top of that just

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- **Teacher -** Personally I feel that the crossing near my school are inconvenient as they are nearly 5 minutes away, not only that but you have to wait at them on top of that just to cross the road. Many kids take this as a reason to jaywalk. So I think overall crossings at this time are seen as inconvenient by kids.
- **Child 1 -** I always have to wait before I cross. I understand that we have to be safe, but a lot of the times I'm just thinking that the wait time is too long? And I have things to do, I don't want to be boringly standing at the crossing doing nothing.
- **Child 2 -** Yeah I agree with that. I do always look at my phone when I'm waiting at a crossing that isn't a zebra crossing. It is a waste of time I feel.
- **Child 3 -** The wait time isn't too bad, but it does affect my time and my walking. Even at a zebra crossing, you may think there wouldn't be much waiting as you can usually just cross after checking. But sometimes, you see cars just driving and ignoring the fact that I'm clearly trying to cross. It happens on one of those longer zebra crossings, where the cars see that I'm just at the beginning of the crossing so they decide to just drive as waiting for me is too long for them, maybe. It annoys me because other cars behind them follow and then I end up having to stop in the middle of the zebra crossing to make sure that the next few cars can see me and are stopping so I can finish my crossing.
- **Child 4 -** I feel crossings should be designed more for us really. Why do we have to wait to cross? It's too much of a time-waster because I'm always so bored during those times.
- **Child 5 -** That is true, we always have to wait for the cars. Even though I know the cars also have to wait for us, but they are in a car and they probably are not as bored as us since they have comfortable seats, a radio to listen to and yeah. I don't know.
- **Child 6 -** Honestly they are just super annoying and boring, not really sure what else to say. I feel for me they are inconvenient.

Figure 4

SWOT ANALYSIS

Flow SWOT:

STRENGTHS - Simple to use and can cater to most individuals even with disabilities - Caters to busy roads - in attempting to disrupt drivers as least as possible while still prioritising students - Creates a better traffic flow for both cars and pedestrians - Countdown timer that is dynamic to the number of pedestrians	**OPPORTUNITIES** - Adding interactivity could increase usage. - Building upon existing traffic light set up so much cheaper to set up. - Addition of sound to make it more user-friendly for those who have sight issues.
WEAKNESSES - No interactivity - Does not draw in the users to use	**THREATS** - Due to the lack of interactivity, it is very similar to existing countdown traffic lights. - Also due to this, any other solution that offers interactivity is likely to be more engaging.

Pengate SWOT:

STRENGTHS - Interactive - Can't jaywalk - Very safe - Fun - Enjoyable	**OPPORTUNITIES** - Could provide marketing or informative information - Could be used for wayfinding - Could increase social play - Could draw people to crossings rather than jay-walking - Could be expanded upon in different areas, not just limited to schools - Could use games rather than paint
WEAKNESSES - Imposing - Can make people feel like cattle - Very reminiscent of obstructive architecture - Really expensive - Difficulties technology-wise - Could be a distraction	**THREATS** - In essence, it is very mechanical in nature, the main aspect of it is the gate. - Swinging motion of the gate could present both safety problems and delay problems - Sightline issue dependant on children's height both for drivers and children

The Duck SWOT:

STRENGTHS - Easy to implement with low cost - More straightforward to get pedestrians' awareness - Interactive - Fun and enjoyable for the target user group	**OPPORTUNITIES** - High accessibility which available to large group of people - Use audio clues which differentiate from most visual products.
WEAKNESSES - May incentivise pedestrians to not follow the traffic lights - May lead to unneeded shock potentially - Those tall adults/students may feel hard to use	**THREATS** - Several displays on the screen are similar to the existing warning signs

Magic Crossing SWOT:

STRENGTHS - Interactive - Fun & enjoyable for the target user group - Adapts around pedestrian needs rather than traffic needs, changing the traditional power dynamics of crossings - Increases visibility of pedestrian activity - Forces pedestrians to have to stop before crossing through the gesture motion activation	**OPPORTUNITIES** - Ability to encourage people to use zebra crossings rather than jay-walking - Adding sound could make it more user-friendly and accessible - Potential to increase the interactivity of the LED floor-crossing, making it more visible for drivers to see pedestrian activity and enhancing pedestrian enjoyment - Potential to add public collaboration
WEAKNESSES - Expensive to implement - Functions do not resemble anything we are familiar with (MAYA principle) - will be confusing to know what to do - Could be overused for play by students, putting them at more risk on roads - Relies on hand gestures, which may be problematic for those who aren't able to use their hands e.g. students carrying projects and heavy bags.	**THREATS** - The gesture motion may get overused, increasing the chance that pedestrians will slowly resort back to their old jaywalking habits for convenience - Doesn't address convenience, potentially meaning that jaywalking may not be decreased as it'll still be viewed as the easier choice - LED walkway may start to be too bright for the user's eyes if they keep using it over time - Risk of a security hack for the gesture motion camera

Figure 5

Setting up a Reliable Usability Test with the Right Goals

Before you get started, you will need a robust framework and some goals. You will want to define the following:

Magic Crossing

Scope: What are you testing?
• How participants react to the digital sign and how they interact with the zebra crossing
 	
Purpose: Why are you testing?
• To determine if our user target has the right skill to use Magic Crossing.
• To discover the likeability of Magic Crossing for our user target.
 	
Schedule & Location: Where will you perform it? How often will you test this iteration version (e.g. with 2 groups of 3 students etc.) Do you intend to test in multiple locations?
• Indoors in a Hall, so we can focus on testing the functions/interactivity of the concept in a controlled environment
• This first iterated version of MC will be user tested once with 6-8 users
 	
Equipment: What kind of technology, materials and resources will you require for this user testing?
• iPad/laptop screen to replicate the digital sign
  ○ Video of animated character - beckoning, demo etc.
  ○ White masking tape to be stuck on the floor to replicate the zebra crossing
  ○ Two torches on either side with colour cellophane covering it to replicate the LED strips flowing out
	Participants: Who are your target users? How will you source them?
	• Our target audience is Primary and High School students , particularly targeted at 10 - 15 year olds.
	• Participants are siblings and family friends kids.
	
	Scenarios: Who is the user in your user testing scenario? Why are they here? What goals do they have
	• The users will be acting as themselves (school students). They are here as they are walking to school and need to cross a road to get to their school entrance.
	• Goals for our users in this task include:
	  ○ To get to the other side of the road where the school entrance is
	  ○ To notice the digital sign and understand its instructions
	  ○ To activate the LED lights on the crossing
	
	Metrics: How will you measure your user's goals/activity for each scenario?
	• Successful task completion (if they are able to complete the task then this will be the measure of success)
	• A pre and post simple and quick multiple choice questionnaire/discussion about crossing zebra crossings before and after user testing

Pengate

Scope: What are you testing?

Testing both the participants understanding and interest in the flow of the concept.

- **Purpose: Why are you testing?**
  - Testing the products functionality in regards to its ability to draw attention and entertain pedestrians well enough for them to not jaywalk
  - These tests will be used to find any flaws in the product as well as help flesh out the device
- **Schedule & Location: Where will you perform it? How often will you test this iteration version (e.g. with 2 groups of 3 students etc.) Do you intend to test in multiple locations?**
  - It will be tested in a hall as the environment can be more controlled whilst providing less distractions to real drivers as this product could be quite distracting in its testing stage if tested on a real road
  - This will be tested by at least 4 high school students
  - It will just be tested in one location with all the participants individually tested
- **Equipment: What kind of technology, materials and resources will you require for this user testing?**
  - It will be replicated as close to the real product as possible, however it'll be low fidelity so it will only require:
    - Cardboard for the gate
    - Tablet for the mural drawing
    - Torch for the ground lighting
- **Participants: Who are your target users? How will you source them?**
  - Our target audiences are primary and highschool students with the average age being between 10-15 in these tests
  - The participants that will represent these target audiences will be sourced through acquaintances or family relatives
- **Scenarios: Who is the user in your user testing scenario? Why are they here? What goals do they have e.g. to activate the LED functionality of the crossing?**
  - Highschool students
  - To have fun with the product, and to be able to grasp the full effect of the product in its intended environment. Students will be the most used users if this product was to be implemented in the environment of school zones.
  - They must draw long enough to keep them from jaywalking, and to be occupied without being bored as they wait for the green light to show that they can cross. They must also be able to cross the road safely without and danger. A button on the gate can be pressed so that they can cross the road.
- **Metrics: How will you measure your user's goals/activity for each scenario?**
  - The user would first be shown the device and will play with it to see how they react to it on a first time basis. Then they would be given goals to fulfil and questions to answer. Their course of actions will be recorded(audio/video) or transcribed onto a document so that it can be referred back to when needed to analyse the data received and gathered.

Figure 6 - Iteration 1 Magic Crossing Preparation Notes

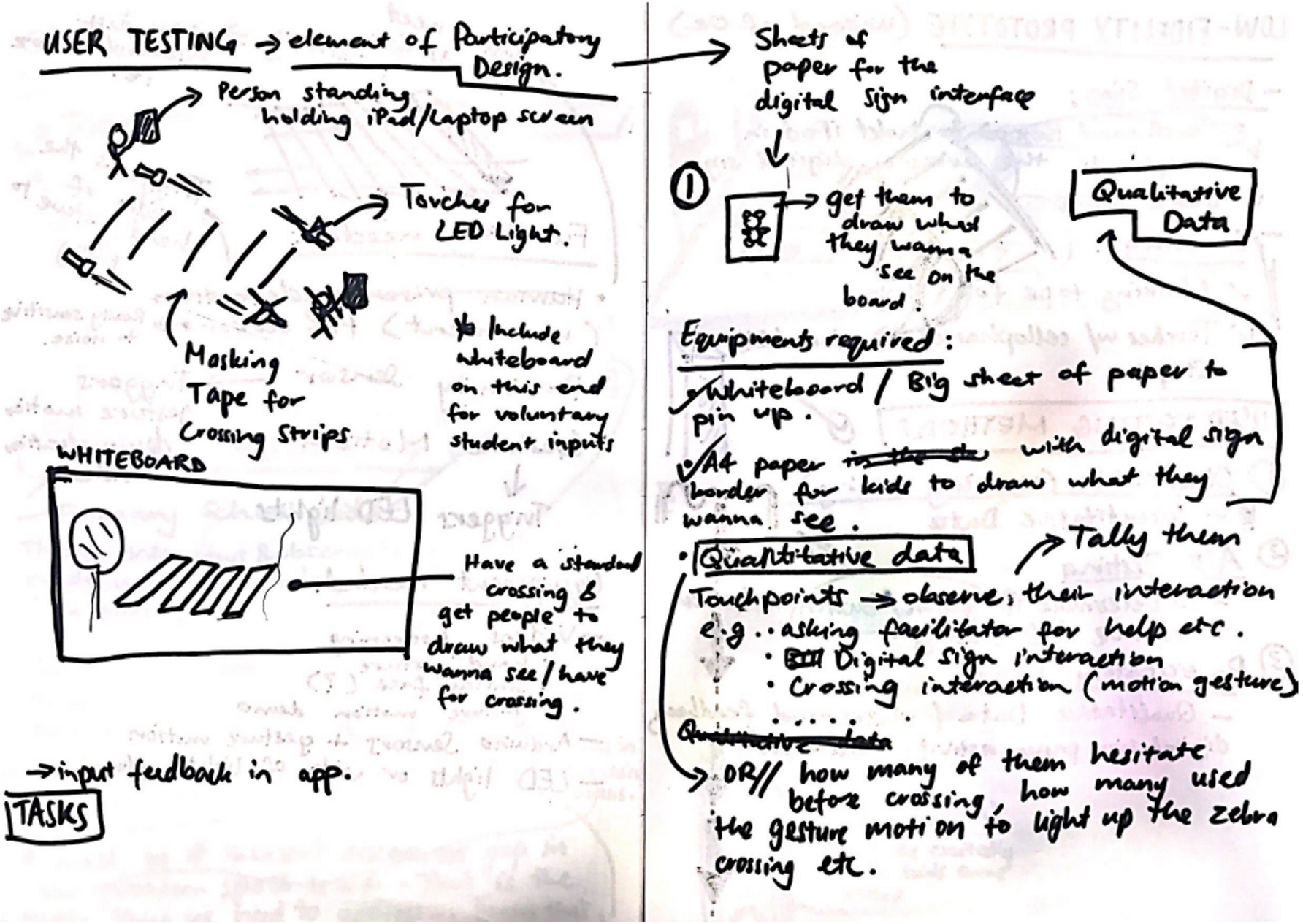


Figure 7 - Further Iteration 1 Magic Crossing Preparation Notes

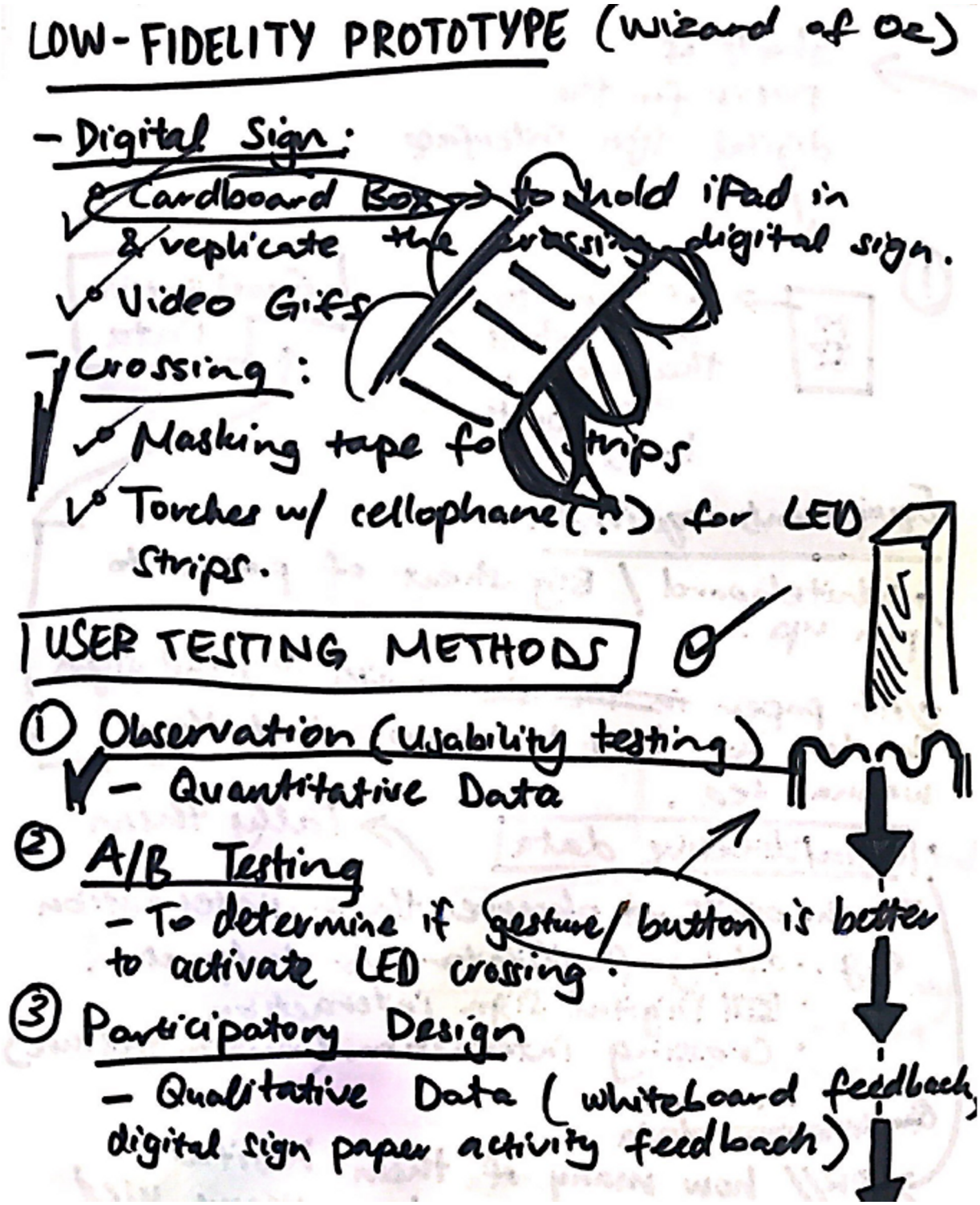


Figure 8 - Iteration 1 Magic Crossing Concept Sketches

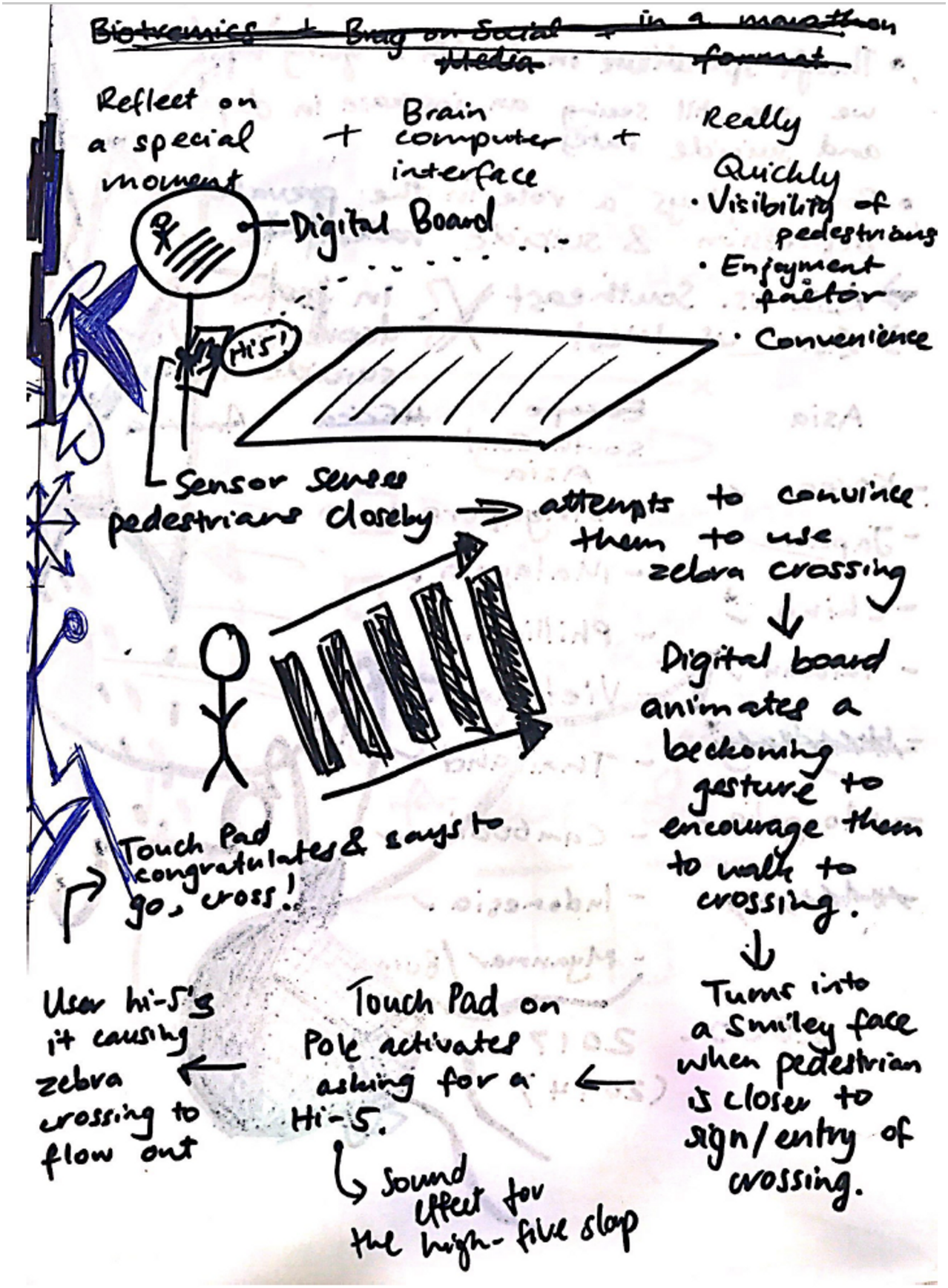


Figure 9 - Observation Notes
Magic Crossing Iteration 1

Observations notes: MAGIC CROSSING ITERATION 2

- All of the kids were interested in the animation though some got side distracted trying to attempt crossing or just copied and laughed at the gestures.
- 9 of them came up directly and gathered around it the other 3 stood back a bit.
- One kid copied the beckoning gesture laughing to everyone else, some joined in.
- Two kids called out and asked if they could touch it and if it would do something.
- One kid attempt to just cross and was waiting for something to happen but nothing did as it was a zebra crossing.
- Most of the kids were confused by the stand a push action, 5 stood together and copied it together whilst the others went to cross.
- When the light turned on and the colour swapped, the remaining kids tried to push down on the crossing and see if it would do anything. They seemed disappointed when nothing happened
- 3 of the kids walked back and forth on the crossing not wanting to get off of it.
- One kid attempted to Jaywalk and found the animation for awkwardness and calling out to him funny. Some of the other attempted it then, watching (the tester) swap between awkward animation and beckoning animation
- Overall most just copied the next user most of the time.

*Note will put it set things to observe for in Iteration 3 cause it was hard to keep up with the amount of kids actions and test as one person.

Figure 10 - Magic Crossing
Iteration 1 Interview Transcripts

MAGIC CROSSING

(12 kids, 1 board member, 1 teacher, 2 parents)

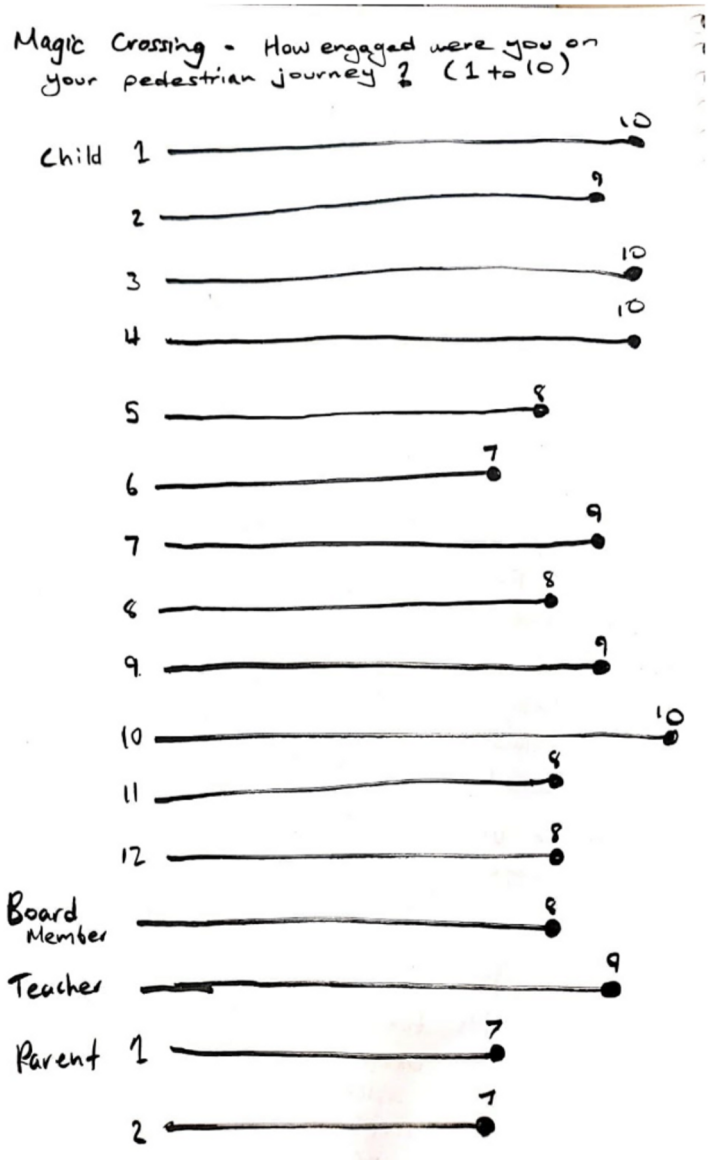
1. How likely would you want to go on this crossing and tell your friend about it, between a score of 1 to 10?

- **Child 1 - [10]** I'd tell all my friends about it! The panda was so cool! I'd even bring my friends to that crossing so we can see it together and use it!
- **Child 2 - [8]** I would mention it to my friends in a conversation, just randomly. I love how it interacts with you. I actually wanted to use the crossing for once.
- **Child 3 - [10]** I enjoyed the whole experience and it was very different, so I'd bring it up to my friends and tell them all about how I made a whole crossing appear before me. That's pretty awesome!
- **Child 4 - [9]** Yeah I agree with everyone. It would be hard not to tell people unless they already knew about it haha.
- **Child 5 - [8]** The panda was really cute! If there were more variations and different characters, everyone would be talking about it. It's like having a friend greet you at your school crossing every day.
- **Child 6 - [7]** It is so different and unique, and I like how we control the path in a way. But it does seem expensive to make, so I'd tell my friends about how cool the crossing was but I'd also mention how I think it probably is too expensive to actually make.
- **Child 7 - [10]** The lights are so attractive and I love how it responds to our actions! I'd try to convince all my friends to come and see this new crossing. I can definitely see myself wanting to use it to go to school.
- **Child 8 - [7]** I would use this crossing, but maybe over time I may change my mind? Only because only one person can really make the crossing lights turn on, and then after that, no one else can really do much with it. So it may get boring for the rest of us. I would tell my friends about it though.
- **Child 9 - [9]** I LOVED IT! THE PANDA IS INCREDIBLE! I want to be friends with the panda so I would go back and use the crossing every day! I'd go home and tell my parents and brother and sister about it.
- **Child 10 - [9]** I would definitely tell my friends like what everyone else has been saying. I agree with *child 8* because in the testing I didn't get a turn to play with the lights. That was a bit sad. But I did get to see the panda, that was funny and awesome so I guess I would go back to use it again.
- **Child 11 - [8]** I would love to use this crossing! I can't imagine why I wouldn't want to use it. I'd tell my friends about the panda for sure!
- **Child 12 - [9]** I got to play with the lights on the crossing, which i thought was cool. Cars can see me and I get to watch the lights flow out. Too cool! The panda and the fact that I controlled the crossing lights just by pushing into the air would be what I tell all my friends about!
- **Board member - [8]** I think it is a really smart and neat way of encouraging and engaging kids to use the crossings. Though I'm a bit apprehensive of how safe this idea is so I'm not sure I'd want kids to be using it too much. But the way that the panda interacts with the children as they walk … I really think there is a lot of potential behind that idea. I'd tell my friends about it I reckon. It is as the kids have been saying, pretty amazing!
- **Teacher - [9]** I'd tell all my friends about this! How cool of an idea is it that there is this panda that greets and engages young students to come to the crossing, and then have them 'magic' a pathway out so that they can cross! What an interesting concept! I'd want to use it for myself haha!
- **Parent 1 - [8]** I don't know if I'd use the crossing personally because I do know that some of the kids and I were a bit confused on that motion gesture part of the testing. But once I kind of understood what was going on, I did realise how amazing it felt for me as an experience to have these lights flow out for me to cross. I'd tell my friends and my children about the panda! That was the standout part.
- **Parent 2 - [8]** It is something that I think all 3 of my children would enjoy a lot! I'd tell them, then they'd tell their friends, so it would be so effective. Even though some of the adults have mentioned safety issues, I think I'd still be encouraged to use it. Why not!

2. What is the biggest obstacle or issue you encountered with this product?

- **Parent 1 -** I think while I was using it, I did kind of question the light strips on the side of the crossing. I was just thinking that even though it is for pedestrians, as it lights on when we gesture out, if I was a driver I'd be so confused. I'd think the green strips were maybe for me to drive past the crossing because of the way it is facing me. I think that was my biggest issue.
- **Teacher -** The biggest issue for me would probably have to be the gesture part of the crossing. I like the out of the box thinking with it, because I feel it would really attract school children so it's perfect. But it was so confusing to me. I didn't know how to do it and when I was finally understanding what to do, I felt a bit unnatural doing it? It could just be me because I'm an adult, I don't know if the kids would agree with me there.
- **Board member -** I can see what you mean. That was also the main issue I experienced. I felt a bit weird poking my hand out haha! But if I was with friends or my kids, I feel I wouldn't be as reluctant to try something like that. It was just when I was by myself trying to activate it that I kind of felt a bit out of place.
- **Child 4 -** Wouldn't someone try to spray paint the panda on the board? That would be a bit of a problem!
- **Child 2 -** But that didn't happen to you!
- **Child 4 -** Yeah but wouldn't someone spray paint it? That would be so funny though haha!
- **Child 10 -** Ooh I think I'd purposely jaywalk just to see the panda react to me disobeying the rules! Is that a problem?
- **Child 12 -** Just don't do it then! I think if the panda spoke to me, I'd like that. Because at one point when I was pretending to walk up to the crossing, my phone made a noise so I pulled it out of my pocket to look at it and I nearly kicked the laptop [which was prototyping as the panda digital sign]. So that was the issue I experienced.
- **Child 8 -** Well like I said, my biggest issue was that I didn't get to play with the crossing lights because I wasn't the first one to arrive, so I didn't get to turn the crossing on.
- **Child 10 -** Oh yea, that was a problem for me too! Also, because I was heading to the crossing with like 5 other people, I couldn't see the panda properly at some points. There was a glare on the laptop screen.

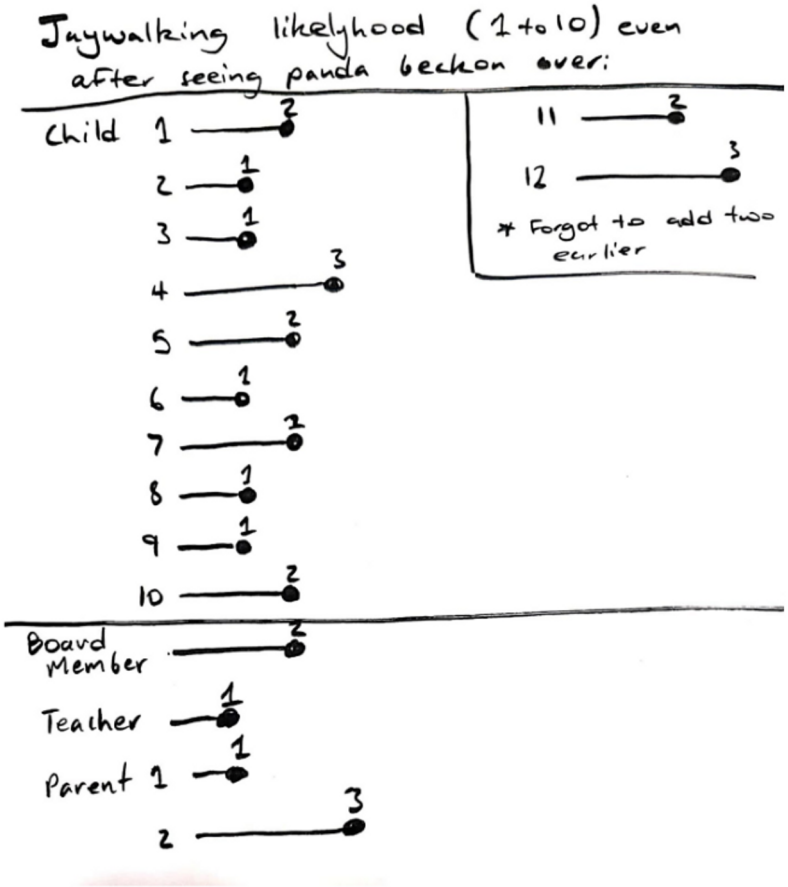
3. How engaged were you on your pedestrian journey on a scale of 1 to 10?



4. When did you feel the most engaged and connected?

- **Child 8 -** When I saw the panda wake up! OMG That was too cute!
- **Child 12 -** OMG YEAH! I laughed when I saw the panda getting up and then trying to get me to come over!
- **Parent 2 -** I loved having the panda change and react as soon as I got closer to it! That was engaging!
- **Child 1 -** I really did feel connected throughout the whole thing. Every stage, there was some sort of fun thing that I could look forward to.
- **Child 3 -** My most engaging moment was with the Panda, but I also enjoyed the lights. Though if it did animate a bit more, I think it could be just as entertaining as the panda.
- **Teacher -** I really enjoyed the panda. It was very cute, I was very focused and engaged on it and I chuckled a bit when I was watching the Panda.
- **Child 2 -** The sleeping Panda for me was the winner! I really felt like that was a mood, and it made me feel connected to the Panda. So I did want to go closer and listen to it telling me to use the zebra crossing.
- **Child 7 -** I actually liked the gesture thing of the crossing. I felt quite cool doing that, so I felt very engaged.
- **Child 11 -** I felt the most disengaged in that gesture thing though! Only because I didn't get to really be the one to activate the crossing, and also I was confused on how to even do the gesture thing until I saw someone else do it. But for me, I loved watching the lights flow out when I saw them turn the crossing on, that made me feel engaged and I wanted to use the crossing for that.

5. If there were no cars on the road, and you just wanted to cross quickly, how likely on a scale between 1 and 10 would you jaywalk - even after seeing the [panda] beckon you over/the interactive game screens?



6. What would you add to make this experience better?

- Though the push idea is fun, maybe make the concept have more animations and people still walk pretty quickly across.
- Make the light-up road have more colours
- Have a bigger animation screen so you can see it from further and more people can see it as once.
- The light up strips may need to be removed or changed as to not confuse drivers
- The lights on the crossing should animate cool patterns!
- I think you should make it so that more than one person is able to have fun with turning the crossing on
- If there was sound from the Panda, that would be more engaging! It could scream out "YEET!"

Figure 11 - Observation Notes
Pengate Iteration 1

Contextual observation (updated):

Do they find the gate entertaining?
~~IIII~~

Do they seem engaged in the gate?
~~IIII~~

Are they using the gate incorrectly?
III (One tried opening the gate while two thought it was objective-based)

Do they find it confusing?
III

Do they find the gate ergonomic?
III (the ones that found it to be not ergonomic were also the taller ones in the test)

Are they uncomfortable drawing on the gate?
III (One was too nervous to draw with fear of being judged yet still drew as they when they were encouraged by people who were watching. The other two were unsure of what to draw and as a result hesitated)

Contextual observation:

- Bending over, not ergonomic, thought it was challenged based
- Can't cover the whole crossing
- Confused, surprised at the outcome, a bit nervous to draw
- Thought it was objective based
- Tried opening it, tried objectives, was reluctant to draw, a bit uninterested.
- Hesitated and couldn't think of what to draw
- Most students were focused on the drawing aspect and treated the gate aspect as a secondary

Figure 12 - Pengate Iteration 1 Interview Transcripts

1. How likely would you tell a friend about this, between a score of 1 to 10?

	1	2	3	4	5	6	7	8	9	10
Jordan						x				
Jack						x				
Esther									x	
Daniel						x	x			
Tony			x							
Ahmed						x				

2. **How did you feel when interacting with this product in its' 'intended' environment?**

- **Student 1:** It felt good, it felt fun, just using the creative mindset and having no limitations.
- **Student 2:** Good, Interesting, but a little mad cause its in my way of getting home
- **Student 3:** Amused, because it was something you don't expect, it's just a black screen and all of a sudden there's all these colours , surprising
- **Student 4:** It looked cool and felt pretty good it was alright
- **Student 5:** Uhhh, I'd feel confused because why in the world is that there. Like theres no point having a gate if there's a traffic light, it's a waste of money and government spending when it can go for money on health or timers on traffic lights
- **Student 6:** I feel like its good, time consuming

3. **How effective is this product in making students cross roads safely and not jay-walk? Why?**

- **Student 1:** It is pretty effective for people who like to draw to be honest, people with a creative mindset
- **Student 2:** It depends on the day, if im in a rush I won't but if not then I prob will
- **Student 3:** 3 or 4 out of 10 because it's a one time thing, it's interesting but it won't keep me there for long, I like how there's colours and what not but its not permanent, it has to grab my attention long term. But if it's permanent it would be 8. I don't think id cross the road at that point, then it should be that it stops once it's a green light
- **Student 4:** It's alright, half half, It was confusing
- **Student 5:** No, not safe at all because knowing students they would go around the gate or try to break it, and if its implemented in many places then it will cost a lot of money, people jaywalking wouldn't care at all, especially if they're busy so it's honestly useless and what if it malfunctions, theres like no way to cross the roads
- **Student 6:** 8/10, some people can just ignore it but I found it effective

4. **Does this device capture your attention?**

- **Student 1:** Yes, It's not something you see in day to day life
- **Student 2:** Yeah, It's something different
- **Student 3:** I think there should be a bit more of a this is here sort of thing and an explanation. Lights around the border.
- **Student 4:** Yeah, it's just there though
- **Student 5:** I'd go up to it because it's obviously be curious even if it's the only route and then id criticise the people that use it because it's a waste of money
- **Student 6:** Yes, the interactivity was engaging

5. **Would you use this if you were waiting for the crossing?**

- **Student 1:** Yeah
- **Student 2:** Yes
- **Student 3:** Yes, rather than being on my phone this would be a better solution
- **Student 4:** I would use it out of curiosity
- **Student 5:** Id just jay walk, why? Cause I have no time, people are busy.
- **Student 6:** Yes

6. **Is this device entertaining?**

- **Student 1:** Yeah
- **Student 2:** Yeah, Doing something while waiting is entertaining
- **Student 3:** Yes, the fact that im able to, instead of being on my phone, use my time for something else, I like that it starts off as a black screen and then there's all these bright colours
- **Student 4:** Not really, it's just really basic, just the drawing
- **Student 5:** No, straight up no because it just opens and closes, it's just an automated door and what if theres a black out and there door cant open
- **Student 6:** Yes

7. What are your thoughts on the whole function and system of how this product works with the gates and interactivity to create a more safe crossing for students?

Student 1: Its an interesting idea and the concept of it is really good, but if It comes down to teenagers I don't think itll work because teenagers are too engaged with their phones
Student 2: Its interesting, It could work, Just people who break it
Student 3: How did you originally put it. Id give it a 7, I wouldn't know what it is, and as a result id find a way around it, not unless I already knew that I could draw
Student 4: I mean it works and its interesting, I would probably only use it a few times, but other than that I would just cross but I would use it for fun if I just see it
Student 5: Super shit, fcking stupid, why would you implement a gate into society where there are people who don't give a shit about jaywalking, theres no need for it and people would break it
Student 6: I found it good and helpful

8. What is the biggest obstacle or issue you encountered with this product?

Student 1: What if it doesn't work. Or if it jams, Height wise should be adjustable
Student 2: I don't mind bending down for me it was alright
Student 3: Confusion, I was just confused as soon as I saw the gate and I didn't know it would open up once it was green light, I didn't know I would wait for the green light and draw while I wait
Student 4: I see no problem
Student 5: The automated gate, just have it as a push gate
Student 6: I didn't find really anything

9. What is the biggest reason as to why you enjoyed this product?

Student 1: There was no limitations and you could do what you want – creativity
Student 2: Drawing
Student 3: Creativity, its creative how you can entertain users and grab attention, id be fascinated if I was just drawing and the gate opened
Student 4: I enjoyed the fade out.
Student 5: Because its stupid, down right stupid and a waste of money
Student 6: It distracted me

10. Are there any changes you'd apply to this product to make it better?

Student 1: Not right now, gate aspect can be confronting at first
Student 2: Nah I like it
Student 3: Yes, add an explanation on the gate, red lights outlining the gate that change to green when its green. Sign has to be main attention
Student 4: Its smooth, I wouldn't change much about it, I said its basic but I like basic, I personally like it
Student 5: Yes a lot, don't implement the gate
Student 6: Not really

11. How likely would you like to see this product be implemented in school crossing zones? Why?

Student 1: Yes
Student 2: I don't know, maybe
Student 3: It would an 8 out of 10, it's an useful idea an issue would be that if they see the gate closing some students would feel the need to run and could cause injuries and its not like the gate would stop. I would like a way to separate both path ways coming and going.
Student 4:I think some school would, I think it would cause its basic and simple, don't want too much complex things in schools
Student 5: Honestly, its probably not gonna happen and if so then itd be in the rich schools like northern suburbs, cause rn we have teachers who try to stop vehicles but kids will still jaywalk anyway
Student 6: Yes

12. What did you think of the gate?
Student 1: Stupid, waste of money, cause no ones gonna wait for the gate, waste of time waiting for the gate and maintenance costs
Student 2: Effective

Figure 13 - Magic Crossing
Iteration 1 Participant Tally

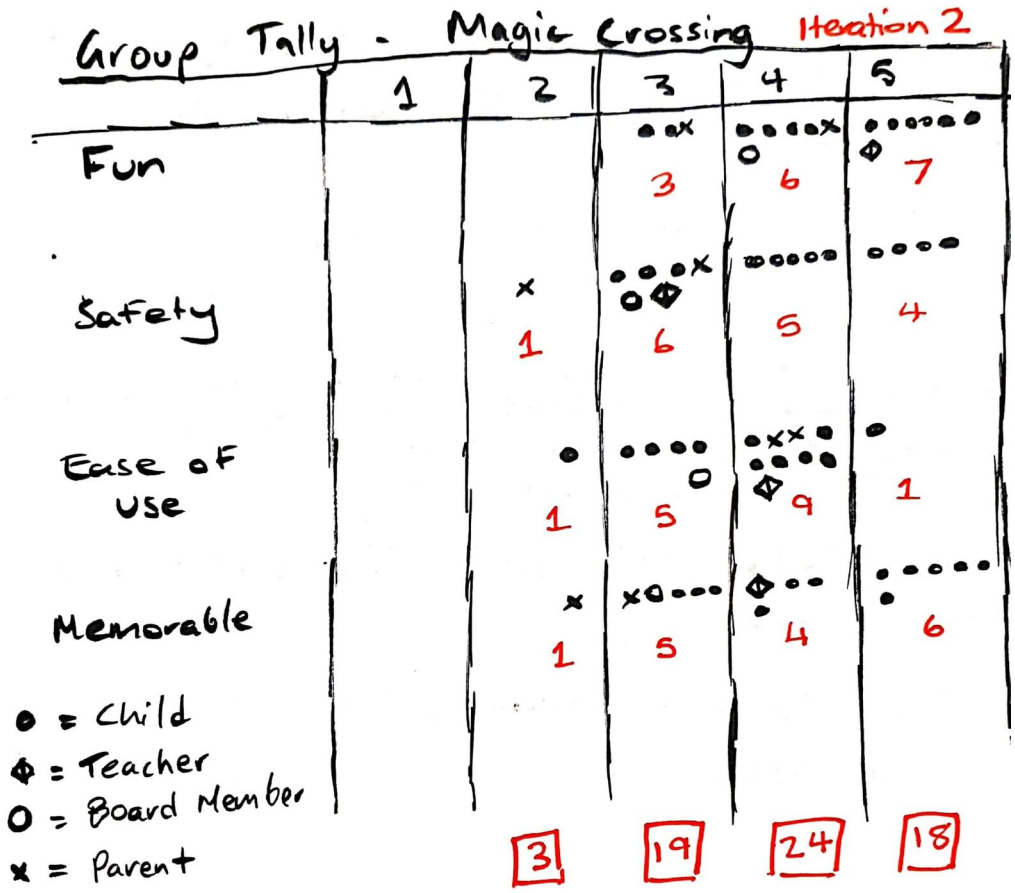


Figure 14 - Pengate Iteration 1
Participant Tally

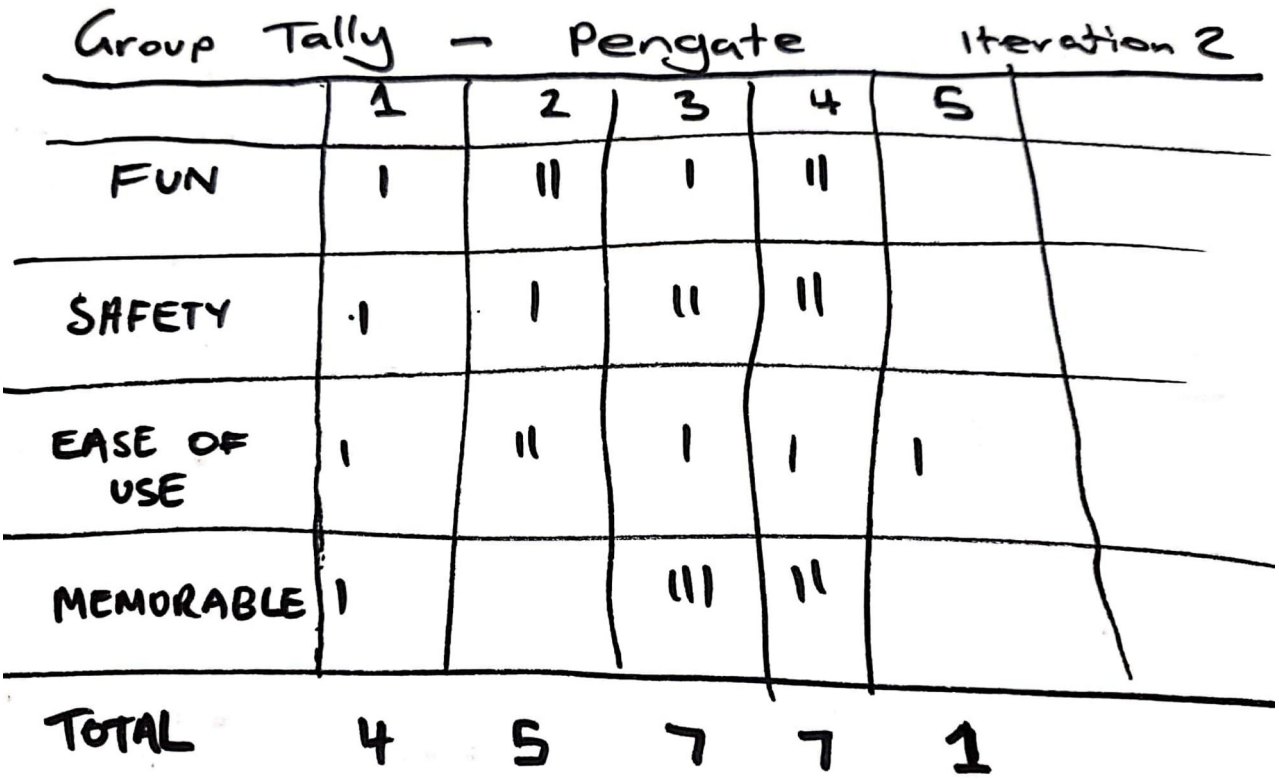


Figure 15 - Magic Crossing Iteration 1 Affinity Diagram

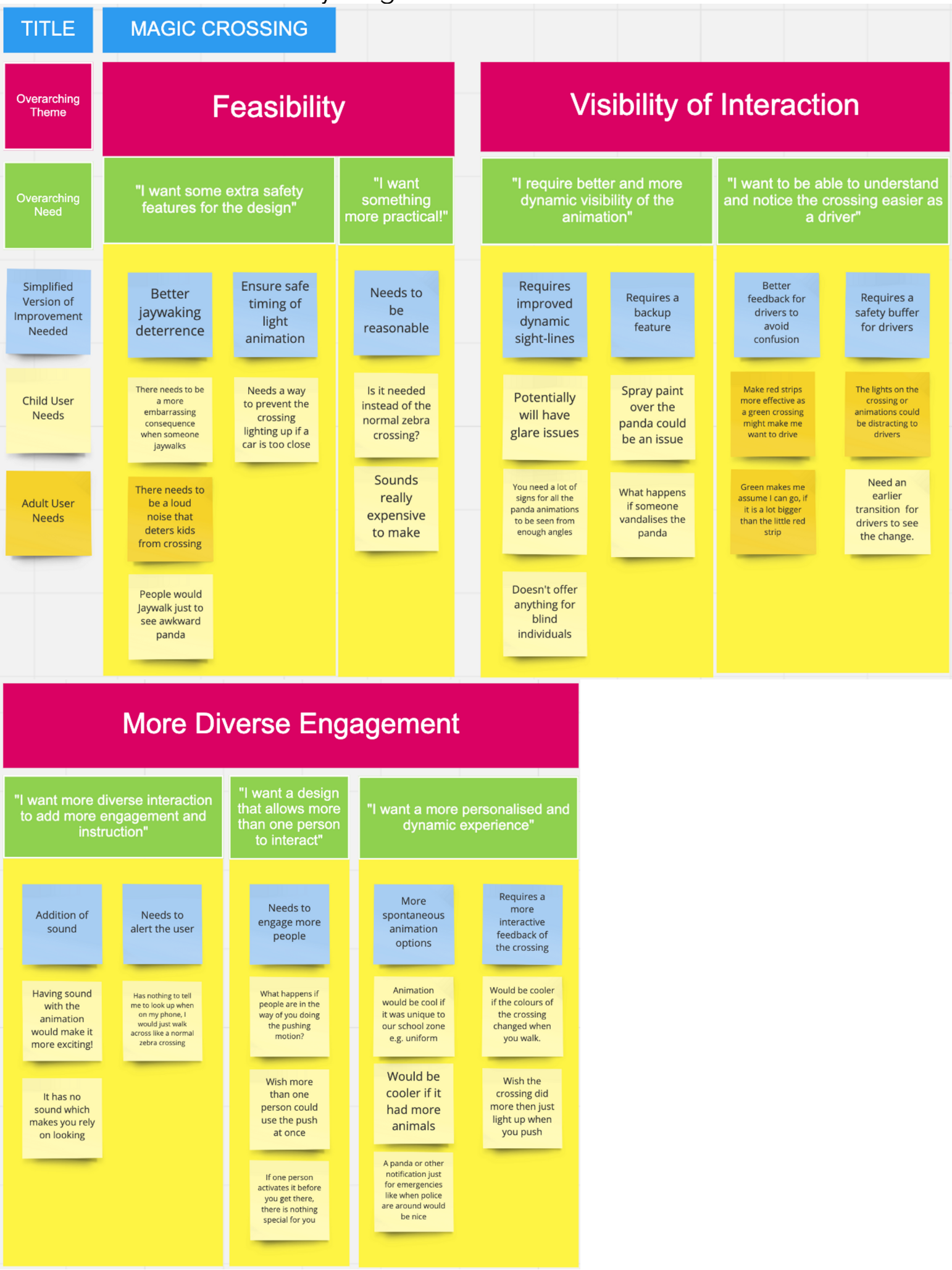
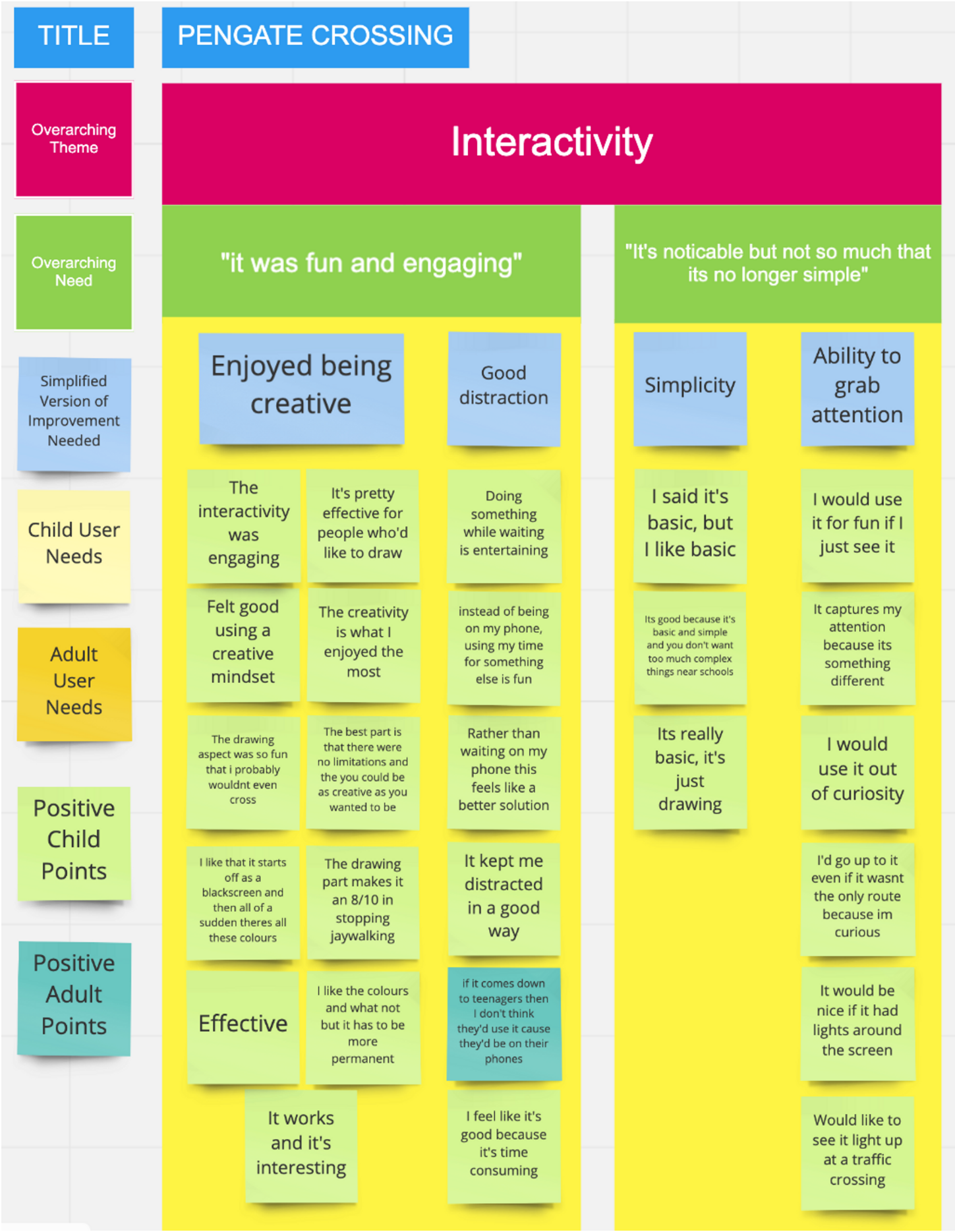


Figure 16 - Pengate Iteration 1 Affinity Diagram



Communication

"I didn't know what to do or when it would end"

Confusing

- I'd feel confused because why is it even there
- It was confusing
- It's amusing since its just a black screen at first then all of a sudden theres colours
- Thought it was objective based
- some thought it was challenge based
- Confused and surprised at the outcome of using it
- It should have more explanations or instructions
- Add an explanation of some sort

Lack of Feedback

- Add some sort of light that reflects the traffic light so we know when its gonna let us cross
- Would like to see a TV at a traffic crossing
- It needs a timer
- It would be cool to see a way to seperate each path going to and from
- Would really like to see a clock at a traffic crossing
- Would really like to see a timer at a traffic crossing

"I'd rather not draw anything and just cross"

Nervous Drawing

- Was reluctant to draw
- A bit nervous to draw
- Hesitated and couldn't think of what to draw

Jaywalking Mentality/ Span

- There are teachers in my school that try to patrol and stop jaywalking and even then we still find ways to jaywalk, so I dont think a gate will fix that, you need to capture their attention enough
- I'd use it depending on if im in a rush that day
- People jaywalking wouldnt care at all especially if they're busy
- I would probably only use it a few times but other than that i'd just jaywalk
- I would try find a way around it unless i knew i could draw on it
- I'd just jaywalk, why? cause i have no time
- It wont keep me there for long
- In effectiveness to tackle jaywalking i'd give it a 3/4 out of 10

Obstruction

"The gate could be dangerous and because it blocks me I would try to find a way around it"

Problems with the physical gate

- I would be pretty surprised if i was drawing and leaning on it a bit and all of a sudden it opened and i fell
- The gate part feels useless and what if it malfunctions then cant move
- The gate might be taller than some kids making it hard for drivers to see them
- it's a waste of money to make the gate when you can just spend it on timers
- Theres no need for it and people would just break it
- Some children had to bend down which isnt ergonomic
- You cant cover the whole crossing especially if its on a corner
- Its not safe at all, knowing students, they would probably try to break it
- It's just an automated gate, just make it a push gate
- It's an useful idea but one problem is if students can see the gate closing they might run to catch up to it
- Tried opening the actual gate
- No its not that great because its straight up just a door
- The gates stupid
- It's pretty bad, why would you implement a gate when there are people who dont care about jaywalking and would just cross
- like theres no point in having a gate if theres a traffic light
- No one's gonna wait for a gate to open
- A little mad because its in the way of getting home
- waste of time waiting for a gate and waste of money on maintanence costs
- The gate aspect can be confronting at first
- If the gate is closing I don't imagine it stopping either and it could end up closing on some kid
- Dont implement the gate
- It could work, its just people who might break it
- What if theres a black out, then the door cant open or close

Figure 17 - Magic Crossing Positives Mindmap

Figure 18 - Pengate Positives Mindmap

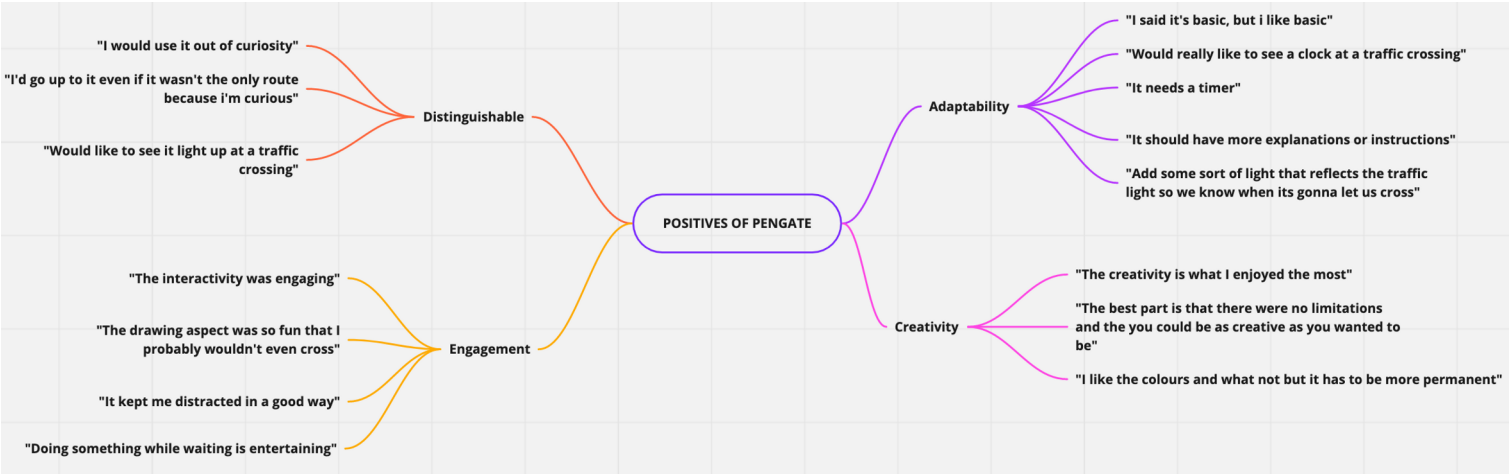


Figure 19 - Magic Crossing Decision Matrix

MAGIC CROSSING

Criteria	Weight	1	2	3	4	5
Feasibility	3					
Functionality	3					
Longevity	3					
Interaction	3					
Memorability	3					
Safety	3					
Engagement	3					
Accessibility	2					
Social Acceptance	2					
Intuitive	2					
Immersive	2					
Multiplayer	2					
Confrontational	1					
Suitability	1					
Total		113/165				

Figure 20 - Pengate Decision Matrix

PENGATE						
Criteria	**Weight**	**1**	**2**	**3**	**4**	**5**
Feasibility	**3**					
Functionality	**3**					
Longevity	**3**					
Interaction	**3**					
Memorability	**3**					
Safety	**3**					
Engagement	**3**					
Accessibility	**2**					
Social Acceptance	**2**					
Intuitive	**2**					
Immersive	**2**					
Multiplayer	**2**					
Confrontational	**1**					
Suitability	**1**					
Total	91/165					

Figure 21 - Observation Notes
Magic Crossing Iteration 2

Observation Notes:

Magic Crossing

Confusion of iteration: (animation)

- No signs of confusion for the major animations all felt they knew when to approach and when to cross.
- Two users showed they misunderstood the angel panda trying to get them to come closer before the next animation.

Urge to use:

- One user ran forward to try if it was touch screen
- All were keen to approach it and see what was next
- the younger kids 7 & 9 copied the Panda's actions
- One user called over another after the beckon animation.

Pressured to cross:

- They all hurried across to see a final animation, stating they were curious what was going to happen
- One user joined the panda in encouraging everyone not to cross
  - ↳ They all seemed to follow and wait. Was good to see it spark that interaction

Confusion of iteration: (Lights on crossing)

- The lights took a little explaining.
- The older users 14-15 understood whilst the younger asked about if it is changing with their steps or the panda just made it change.
- One said they liked how it faded away!

Magic:

Did they notice the animation first?

~~IIII~~ I

Do they approach the animation straight away?

~~IIII~~ I

Did they react with the animation changes?

IIII

Did they follow the instructions all the way through till the crossing lights up?

~~IIII~~

Did they hesitate to cross at all?

I

Did they enjoy the final animation after crossing?

~~IIII~~ I

Did they hurry across the crossing or stay on it?

Hurry	Stay
IIII	II

Figure 22 - Interviews
Magic Crossing Iteration 2

MAGIC CROSSING

(6 kids, 2 parents)

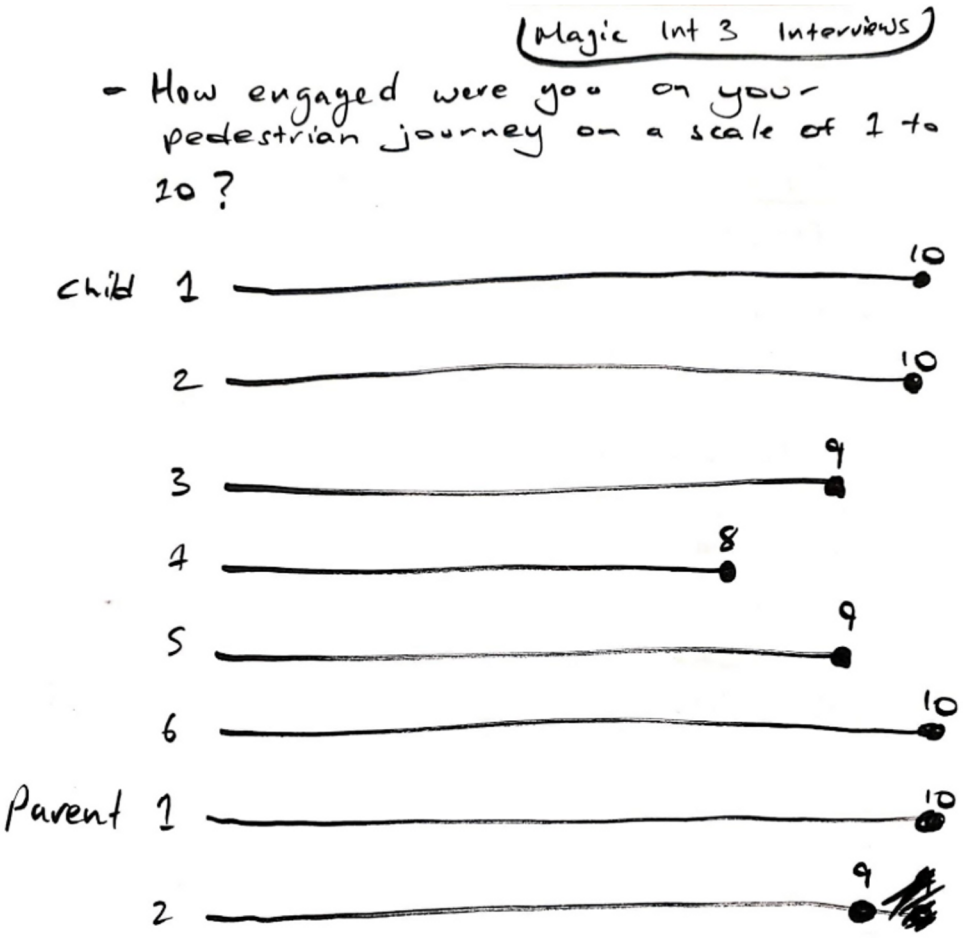
How likely would you want to go on this crossing and tell your friend (or kid) about it, between a score of 1 to 10?

- **Parent 1- [9]** It is an excellent example of how technology could enhance safety and entertainment in the community! Definitely would recommend to my friends and I can see that this would improve my own, as well as others, commuting journey.
- **Parent 2 - [10]** I find it super entertaining and really original, so I want to go on it for sure. I think having the animation really would be entertaining so I would want to tell my friends and check it out every day to see what is up there next.
- **Child 1 - [9]** I wanted to facetime my best friend and show him the cool panda! I would feel like I have to go on the crossing and use it, just because the panda is so convincing! How can you say no to it waking up and beckoning you over?
- **Child 2 - [10]** I honestly am obsessed with this panda, and Santa and other characters on the screen! I did not expect to see it interacting with me and guiding me to come use the crossing. It's a pretty smart idea that I'd tell my friends about.
- **Child 3 - [9]** Everyone is mentioning the characters, which I also think is heaps cool! But what about the crossing lights! Damn! I love how the panda makes the lights appear on the crossing and that there are patterns! I'd tell my friends about that part.
- **Child 4 - [10]** I'd definitely tell my friends about this and want to come back and use it! I love how the panda looks out for us and tells us to wait for a short time before the crossing lights up for us to cross. I feel like there is a guardian angel watching over me.
- **Child 5 - [10]** It would be hard for me to forget about this. I'd come to school after using it and tell my friends immediately and ask them if they also used it to get to school.
- **Child 6 - [10]** So amazing! I would love to see this at the front of my school. It would definitely brighten up my day and I'd easily go home and tell my parents and other friends about this.

What is the biggest obstacle or issue you encountered with this product?

- **Parent 1-** Personally I feel the band at the top has to be a little more clear for drivers in terms of timing. Otherwise, I think it is a great idea, just might be a bit confusing for cars.
- **Parent 2 -** I believe that the idea is really good, and I am glad kids are coming to use it. That said if I was walking as an adult I would not use it and wait for the crossing to light up.
- **Child 1 -** I feel by the time you get to the crossing unless there is a car about to cross the crossing, it should light up for you. You can watch the animations as you approach but it does not stop your crossing speed unless you want it too. I feel if it is a little faster then it would be great I guess is how to summarise it.
- **Child 2 -** I didn't really understand one of the two of the animations (the jaywalking & angel) but the audio sounds did make it a lot more clear!
- **Child 3 -** As long as there are quite a few animated animals I am happy, though I just think the biggest obstacle is staying interested.
- **Child 4 -** It is way too big and expensive. You could make it is a lot smaller so that it is likely to actually be used (implemented). Like still be able to see it from a distance but not be as big as you. I do think the large scale panda is very funny, but realistically it could not be made. Maybe it could have advertisements when no one is around to help pay for it.
- **Child 5 -** Mmm yeah I feel it could be too big, the animation. It could block the way for people on the other side, and also I think it would be cuter if it was a bit smaller. Because when I was doing the whole experience thing, I think the animation just took up too much room and space and I didn't get to admire it as much as maybe I may have if it was smaller.
- **Child 6 -** I think for me the only thing about it I would dislike is if it was loud and in your face every day. For a short time it would be fun but we look at screens all the time. I feel sometimes you might want a break from it, but I do really enjoy it compared to a normal zebra crossing.

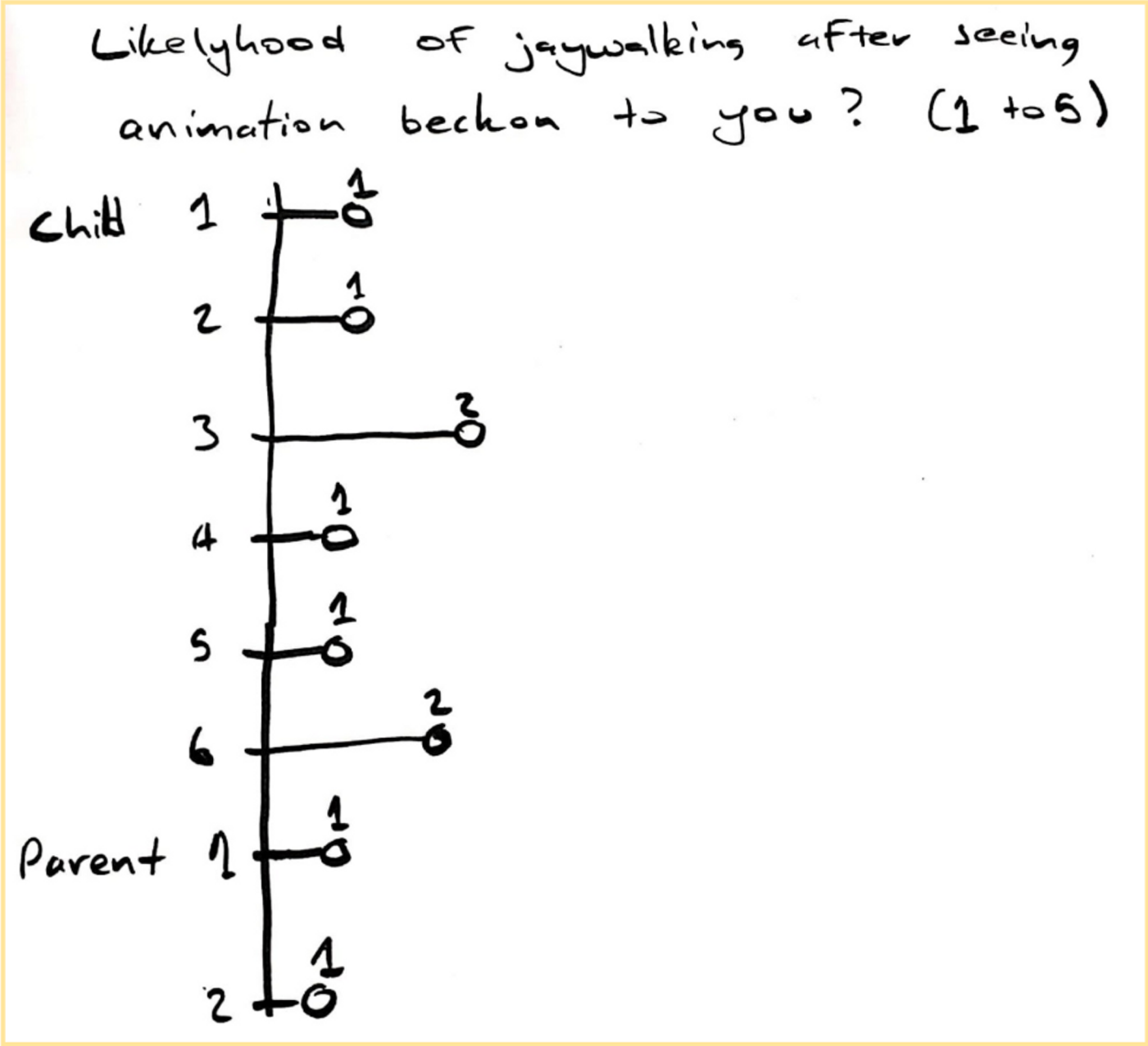
How engaged were you on your pedestrian journey on a scale of 1 to 10?



When did you feel the most engaged and connected?

- **Child 1 -** I really felt the most engaged when I was close to the panda and it waved its magic wand! Because then the whole zebra crossing lit up one by one. So cool!
- **Child 2 -** I sooo agree with that! That was literally so cool.
- **Child 3 -** I was engaged throughout the whole process from when the character was sleeping, to when it tried to get me to come over and then it told me to wait so that it could light up the pathway.
- **Child 4 -** I agree with everyone! The way the character waved their wand and then the lights showed really cool patterns that were smooth and nice to watch. I was definitely giving my whole attention to everything that was happening at that point.
- **Child 5 -** I liked watching the panda telling me to stop, and then the lights on the top of the screen flashed red to tell the cars to stop. That was cool to see.
- **Child 6 -** I did feel very happy and enjoyed the whole thing. But I especially loved the part where I walked across the zebra crossing after it was lit up. The nice flowing pattern was amusing and made it feel so cool as I walked across the road.
- **Parent 1 -** I feel for the kids this is an amazing opportunity to be excited with a group of friends to cross the road. I could imagine my youngest child also trying to drag me over to see it, so I do think it is engaging and connects you not only to the concept but to safety and the school more. Hopefully, something like this could be made as it would help make the streets more interesting too.
- **Parent 2 -** As a parent anything that makes my kids excited to cross the road is valuable and I think engaging. I definitely feel the moment you see it in the distance you would want to go over to see it. I believe the animation waking up and responding to you is the highlight. It might get annoying as **Child 6** said if it was everywhere. I feel to prevent this you could potentially make a more natural feeling solution and reduce the need for screens like they said.

If there were no cars on the road, and you just wanted to cross quickly, how likely on a scale between 1 and 5 would you jaywalk - even after seeing the [panda] beckon you over/the interactive game screens?



What would you add to make this experience better?

- A lottery of a lot of animals and different seasons (though you did state it would be there)
- I would like something more natural to look at. The screen and animations are nice, but maybe something that isn't a screen but still has charm would be good.
- Still needs personal animation or you could put school announcements, I know it would be a big help at our school where they do it by hand.
- Might need to be clearer to drivers with the flashing animation at the top in terms of timing.
- Maybe make it less demanding is size so people don't stop too long and not cross, could be distracting.
- Make it more compact and less in your face so it lasts longer overall and doesn't get annoying.

Figure 23 - Observations
Pengate Iteration 2

Observation Notes:

3 on each side

Pengate

Confusion of Iteraction: (touch screen pictionary)

- Everyone but the youngest user understood how to use it
- Most adapted super quickly
  ↳ one said it is simple like an ipad

Urge to use (wanting to play)

- Everyone wanted a go (due to limitations of testing only one could draw at a time but.
- Everyone wanted to play again (saying 2 users they would be tempted to hang around and keep playing - everyone agreed)

Pressured to cross:

- 4 out of 6 wanted to keep drawing so waited.
- 2 crossed like normal

Interesting in the other drawing:

- 2 crossed keen to see the artwork on the other side
- When the other 4 found out about final image they rushed over to see the other teams drawing

Pengate:

Were they drawn instantly to the screen?

~~IIII~~ I

Did they attempt to touch the screen?

~~IIII~~

Did they understand what was happening?

YES	NO
IIII	II

Did they attempt to actually draw the challenge?

~~IIII~~ I

Did they rush over to the other side to see how the other team did?

~~IIII~~

Figure 24 - Interviews
Pengate Iteration 2

Pengate

(6 kids, 2 parents)

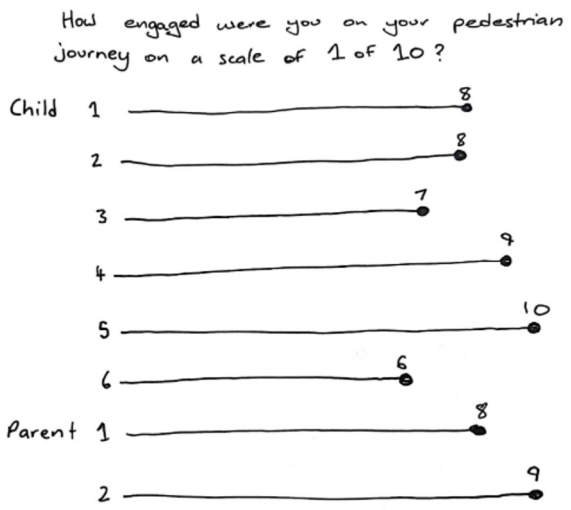
How likely would you want to go on this crossing and tell your friend (or kid) about it, between a score of 1 to 10?

- **Parent 1- [8]** I would tell my kid about as I think the idea is very novel and would be fun for students to play while waiting for the crossing.
- **Parent 2 - [9]** My daughter loves drawing so she would be extremely excited about it. The idea itself is great.
- **Child 1 - [7]** Good idea but not sure how inclusive it would be. I think I would play with my friends a few times but.
- **Child 2 - [8]** Yeah I would show my friends and challenge them in it. I like that I wouldn't think of it as a crossing anymore as it would be fun.
- **Child 3 - [7]** Not really something I would play but have a lot of friends who would! So yes would tell them!
- **Child 4 - [10]** YESSS! I would really like this in my school zone with my friends. Would be fun each afternoon to play, love Pictionary.
- **Child 5 - [10]** 100% would play all the time with my friends so would tell them to join me and play it.
- **Child 6 - [6]** I would struggle to play it most the time so would get pretty bored, might ask friends, maybe if they could help me play. I don't like drawing that much but.

What is the biggest obstacle or issue you encountered with this product?

- **Parent 1-** I am not 100% sure if my oldest son would play it, probably have a go of it but I myself think for younger children it would be great. I feel one obstacle but is potentially kids wanting to stay and play it rather than cross the road.
- **Parent 2 -** For me personally there wasn't really any obstacle though I did imagine a situation with my daughter as she is quite young, wouldn't really be able to come over and have a go. I think she would love drawing on it but would worry if older students were already using as she can be quite shy around them.
- **Child 1 -** I like the idea but I feel like maybe people would hog it and want to keep playing with their friends and other kids wouldn't get a go.
- **Child 2 -** Nothing wrong with it for me, but what happens if you struggle to the type or write. My friend (**Child 6)** has dyslexia and they couldn't play the functionality of it.
- **Child 3 -** Would be awesome if you were playing but would be boring if you were not. Then it would be the same as a normal crossing. Plus I think you would struggle to play it or even watch it if there was a lot of people.
- **Child 4 -** Such a good idea. I have no issues with it, just think maybe it will cost quite a bit.
- **Child 5 -** I like it a lot so not any issues. Would be really cool if it had music and stuff playing from it but, or an epic announcement of a drawing battle.
- **Child 6 -** Drawing sounds super fun, but I would need help with the writing part. So if I was alone I could not play the write the word or read the word part very well.

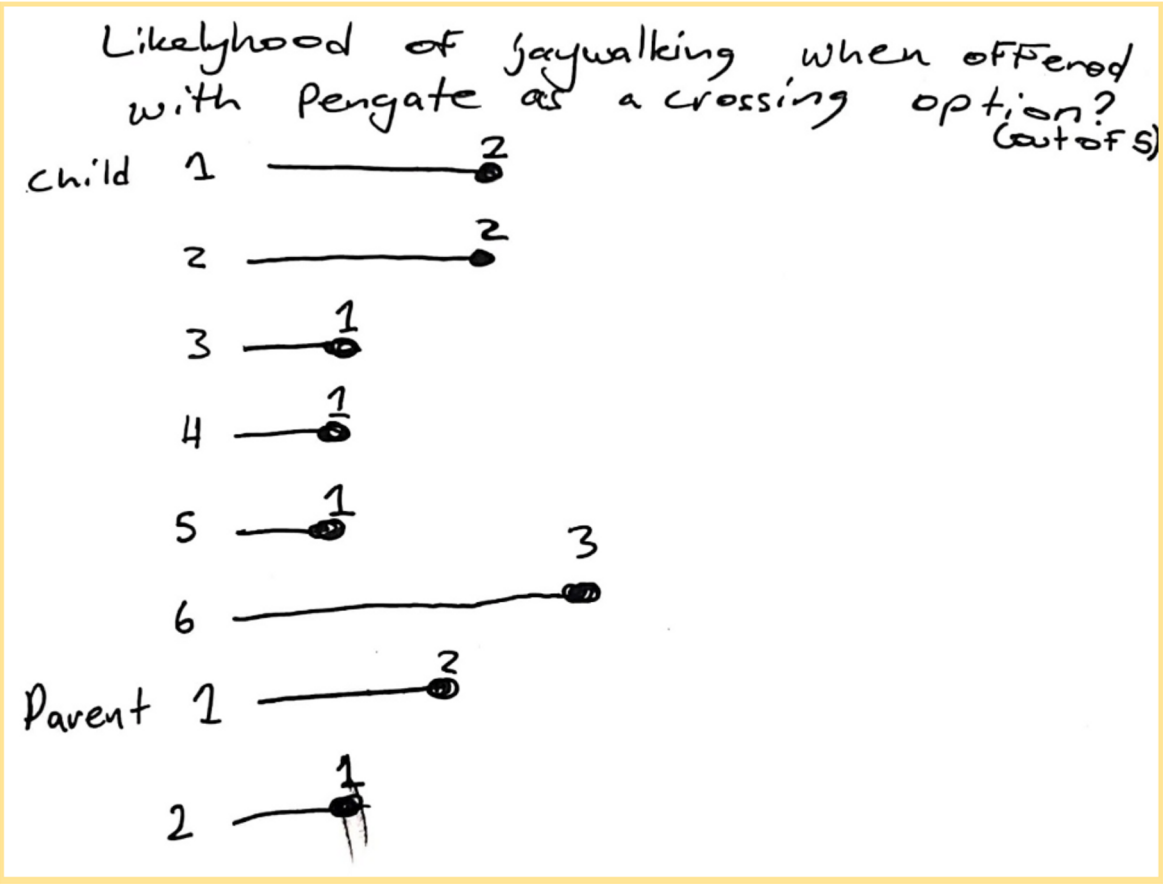
How engaged were you on your pedestrian journey on a scale of 1 to 10?



When did you feel the most engaged and connected?

- **Child 1 -** Definitely feel most engaged when playing over watching. It does feel connecting playing with a friend.
- **Child 2 -** I think the best part is actually going and having a look at other people's works actually. It is a really cool idea and would make we want to cross even if I didn't get to play. Hopefully, I can see it in "peak hour" but.
- **Child 3 -** Definitely when you get a chance to play it, that is the most engaging part.
- **Child 4 -** Probably either playing it or going and seeing the other person's work. It is fun to try to draw something in a very limited amount of time.
- **Child 5 -** Having the ability to play against a friend is the most connecting and fun part about it.
- **Child 6 -** For me, it is the drawing part I like best.
- **Parent 1 -** I think it is just engaging for the kids because they can see each other draw and compete. I think the competitive aspect of it might be the most connecting and engaging part about it.
- **Parent 2 -** Not too sure to be honest! I just know that it would be engaging for kids.

If there were no cars on the road, and you just wanted to cross quickly, how likely on a scale between 1 and 5 would you jaywalk when offered with this interactive crossing?



What would you add to make this experience better?

- Maybe another screen or a way to observe at least what is happening.
- Definitely the music and sound suggestion I made earlier! Would capture an audience.
- I think unlike the others, I believe that it is too distracting and can allow people to hog it. Maybe a cool down or something to notice a new player. No idea how that would work but.
- Make something cheaper and maybe make the drawings more permanent somehow.

Figure 25 - Magic Crossing Participant Matrix Iteration 2

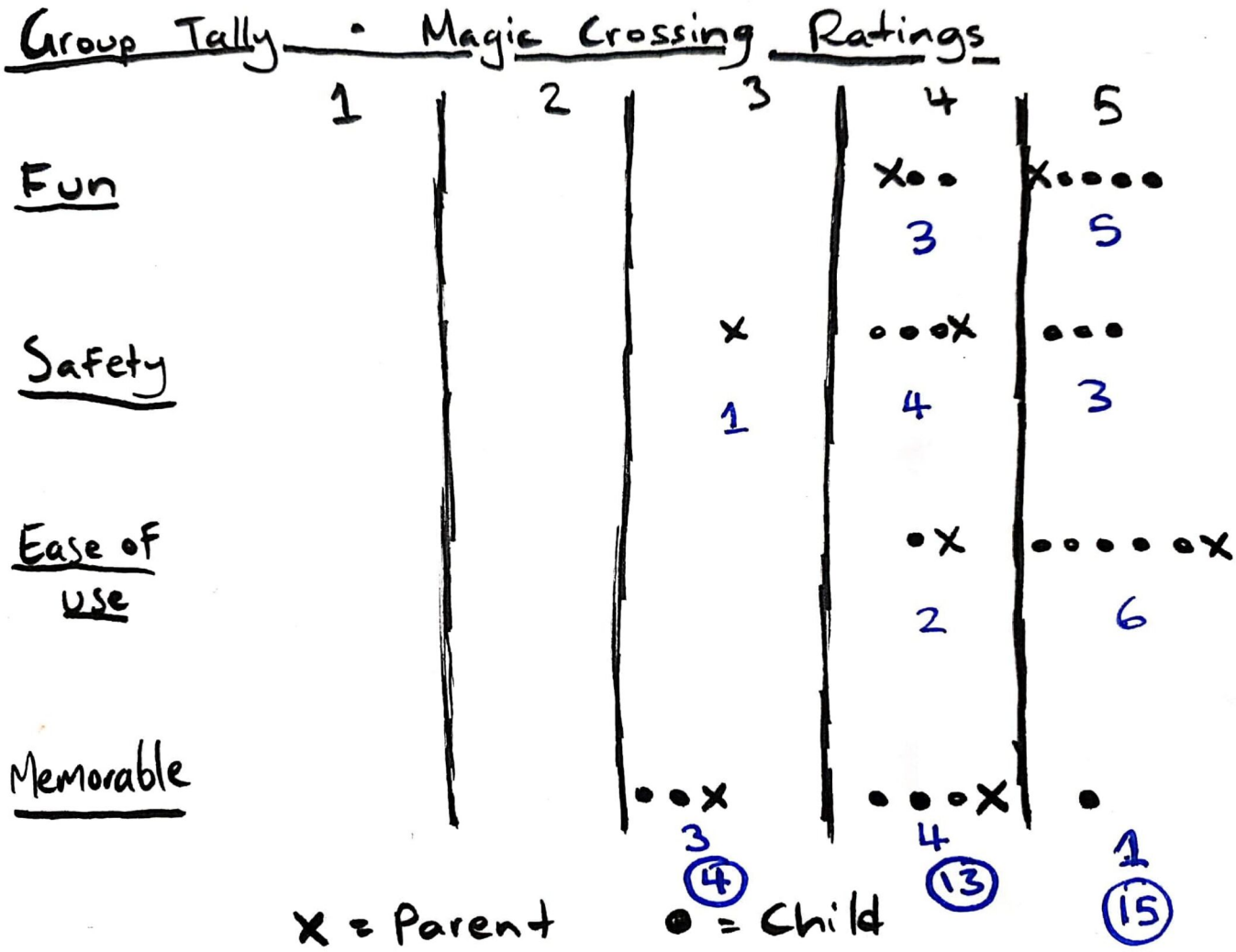


Figure 26 - Pengate Participant Matrix Iteration 2

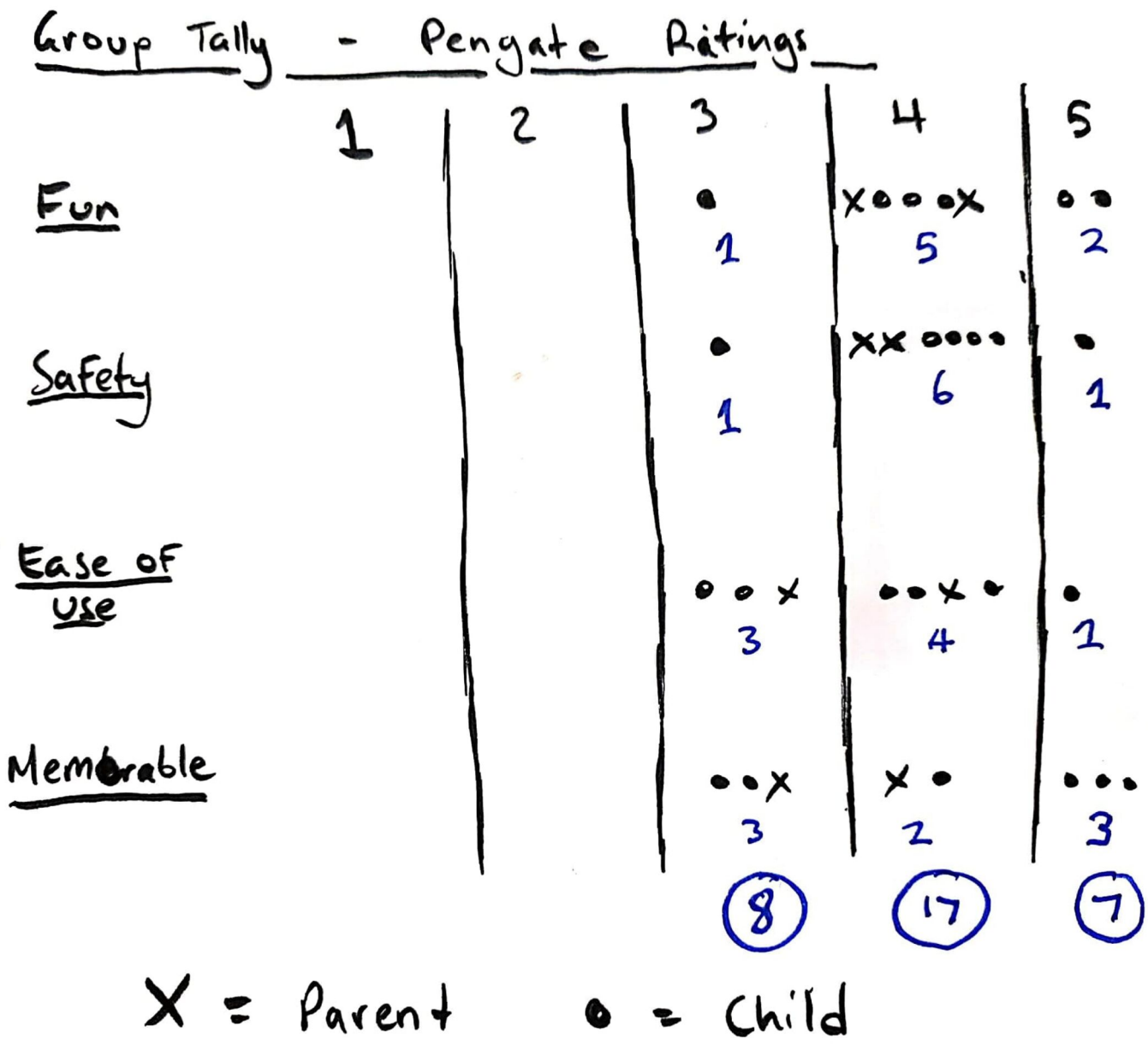


Figure 27 - Magic Crossing Affinity Diagrams Iteration 2

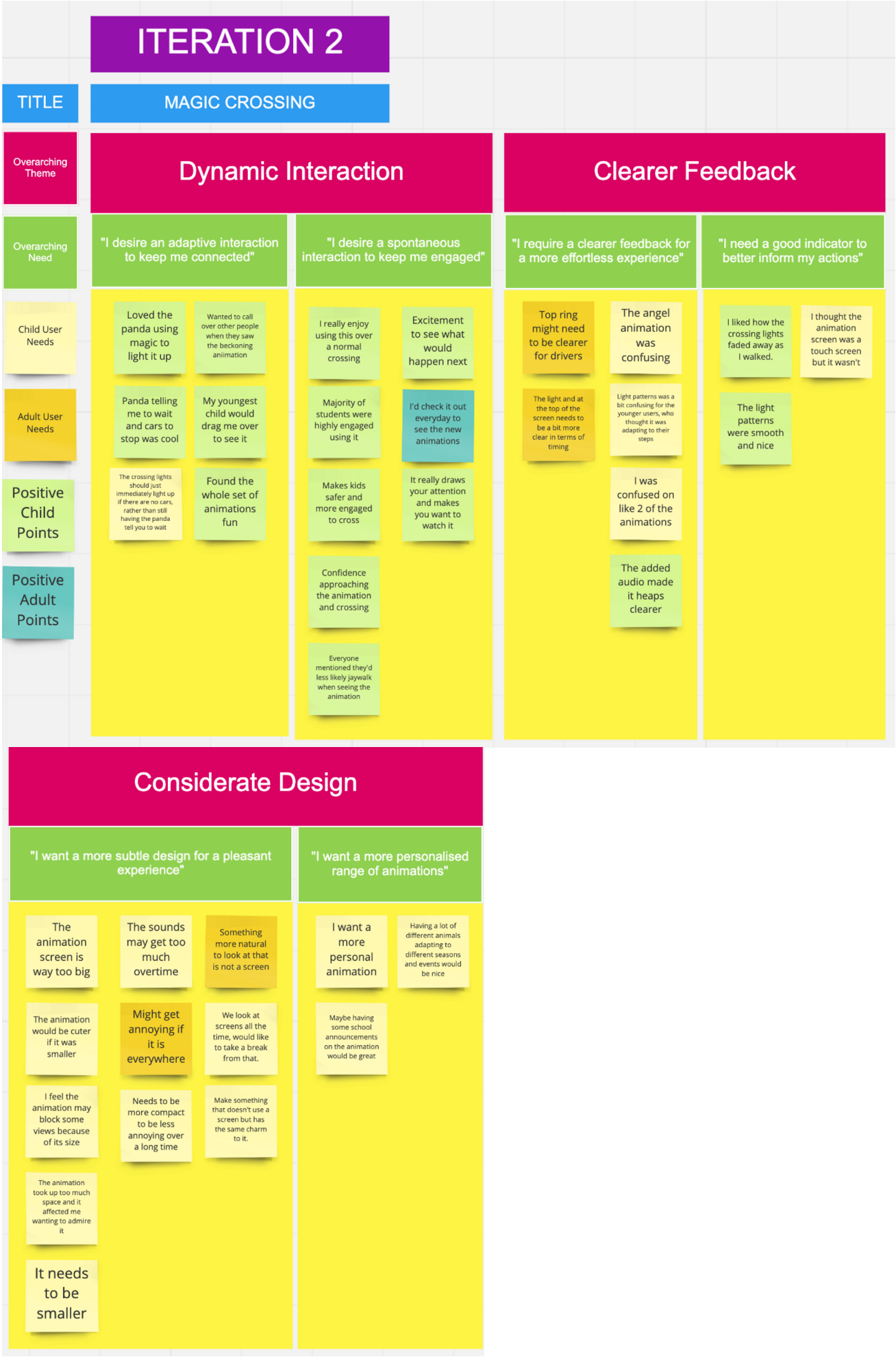


Figure 28 - Magic Crossing Affinity Diagrams Iteration 2

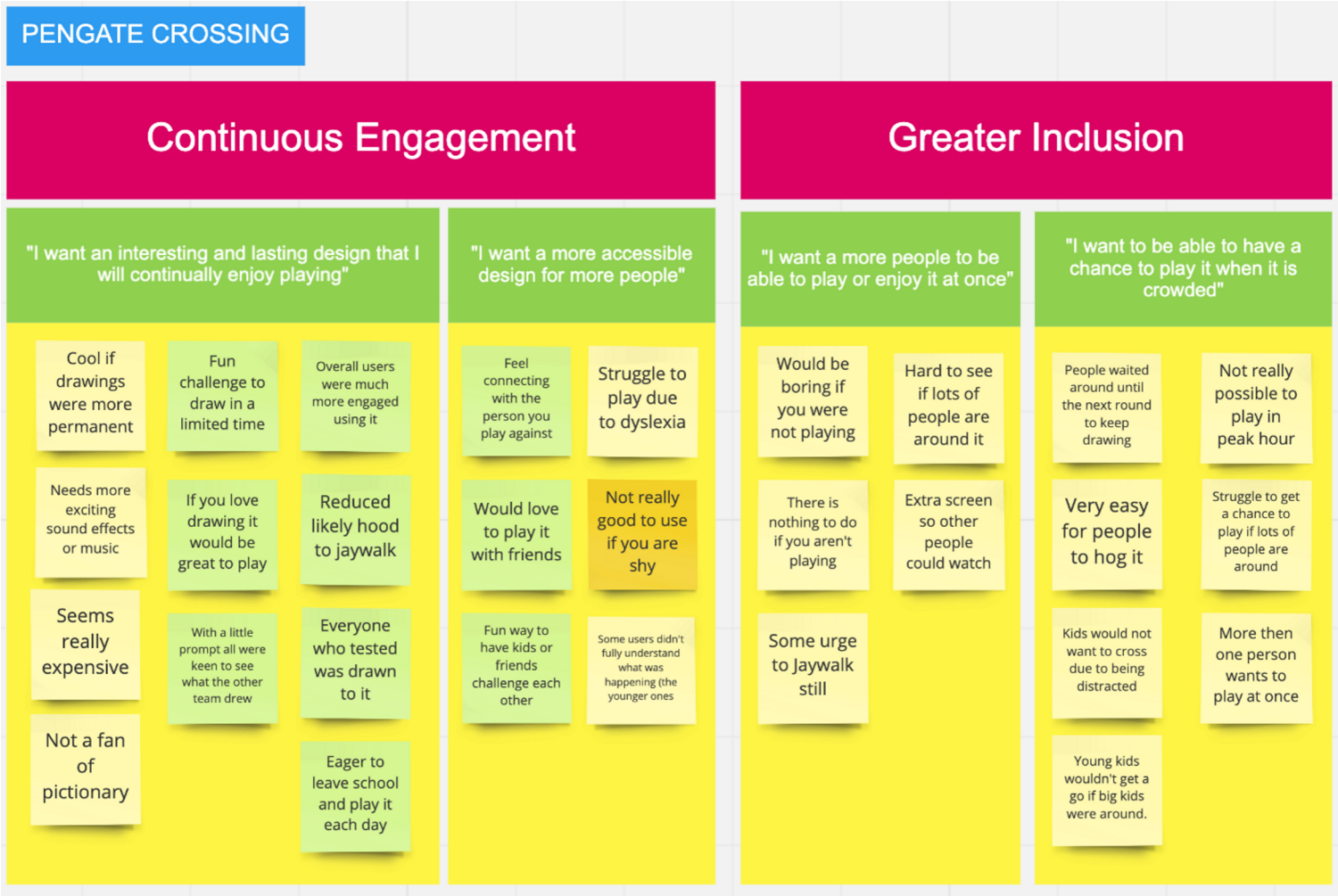


Figure 29 - Magic Crossing Decision Matrix Iteration 2

MAGIC CROSSING						
Criteria	**Weight**	**1**	**2**	**3**	**4**	**5**
Feasibility	**3**					
Functionality	**3**					
Longevity	**3**					
Interaction	**3**					
Memorability	**3**					
Safety	**3**					
Engagement	**3**					
Accessibility	**2**					
Social Acceptance	**2**					
Intuitive	**2**					
Immersive	**2**					
Multiplayer	**2**					
Suitability	**1**					
Total	139/160					

Figure 30 - Magic Crossing Decision Matrix Iteration 2

PENGATE						
Criteria	**Weight**	**1**	**2**	**3**	**4**	**5**
Feasibility	3					
Functionality	3					
Longevity	3					
Interaction	3					
Memorability	3					
Safety	3					
Engagement	3					
Accessibility	2					
Social Acceptance	2					
Intuitive	2					
Immersive	2					
Multiplayer	2					
Suitability	1					
Total	123/160					