

Appendix

Georgia Pocock – c1321692

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Appendix 1: Full Risk Analysis

Risk	Impact	Likelihood	Mitigation
Scope Management - not enough time to complete all elements in the given time.	Medium	Medium	Would not include any or some of the additional aims and objectives as these would not impact on the success of a prototype.
Illness	High	Medium	Will use the extenuating circumstances to arrange an extension if needed. Use my designated contingency time.
Requirements - unable to obtain usable requirements or feedback from beneficiaries.	High	Medium	Due to my experience working with people with learning difficulties and with Down's Syndrome specifically, I am hoping that familiarity can be used to my advantage as I know a variety of methods that will work to enable cooperation and understanding.
Productivity – due to the scale of the project in terms of both time and scope, it could get overwhelming. I could become demotivated, distracted or find it difficult to manage my tasks.	High	Low-Medium	Due to careful planning I will ensure that I am taking on a reasonable workload; allowing me to both complete my task, without overworking or neglecting my other priorities. I will have my supervisor to aid me, should I feel lost or overcome.
Technical knowledge and ability – I have limited knowledge with the languages that I plan to use. Therefore, functionality may take longer for me to code, as an amateur. There is also the possibility of me not having the ability to code certain features.	High	Medium	I plan to delegate myself a reasonable amount of time to focus on the initial implementation. I will incorporate contingency time into this to accommodate for any delays. I will concurrently use facilities, such as Code Academy and Bootstrap to aid in my understanding and progress.

Risk	Impact	Likelihood	Mitigation
Programming Language – due to my lack of technical knowledge, the chance of selecting an inappropriate language are increased. This could potentially prevent me from creating a e-learner to its full potential.	Medium	Medium	I will ensure to undergo research into the various languages and amenities available. I will have discussions with my supervisor and any colleagues to ensure I reach an unbiased, knowledgeable and reasonable decision.
Data Loss – system failures, damage to any hardware or simply losing hardware could all result in the loss of data. These would all be unforeseen circumstances that could result in a serious project progress hindrance as well as the emotional stress it could cause.	High	Medium	Using multiple backups and continuous saving this issue could be avoided. I plan on using my personal hard drive, memory stick, OneDrive and Dropbox facilities to obtain multiple copies of all work. I will ensure that it saves, either through implementing the auto-save feature or manually saving on a regular basis.

Appendix 2: Ethical Approval Form

School of Computer Science & Informatics

Ethical Approval Form

Student Projects (UG or PGT)

Must be submitted at least TWO WEEKS before the start of the project to:

Research Ethics Group (REG) – Contact: Dr Wendi Ivins

(comsc-ethics@cardiff.ac.uk) / Extension: 70248 / Room N/2.11 Queen's Buildings)

PLEASE NOTE BEFORE COMPLETING YOUR APPLICATION:

1. Illegible handwritten applications will not be processed so please type if necessary.
2. Do **not** submit an application to the REG if your research is with the NHS or NHS-linked – refer instead to NHS Local Research Ethics Committee.
3. You should **not** submit an application to the REG if your research involves adults who do not have capacity to consent. Such projects have to be submitted to the National Research Ethics Service (NRES) system: <http://nres.nhs.uk/>
4. Research with children normally requires:
 - 1) permission from the relevant institution
 - 2) consent from parent or guardian
 - 3) assent from the child, after being provided with age-appropriate information
5. The School Research Ethics web pages can be accessed via:
<http://www.cs.cf.ac.uk/research/researchethics/index.html>
6. Information on data management, collecting personal data, data protection act requirements, can be accessed via: <http://www.cf.ac.uk/cocom/index.html>
7. Information on Research Ethics (including Ethical Issues in Research – informed consent etc.) can be accessed via the University's Research, Innovation & Enterprise Services web pages: <https://www.cardiff.ac.uk/racdv/ethics/index.html>
8. A course on *Research Ethics 1: Research Governance* covers standard practice and recent changes in universities' ethics relating to research that investigates people and their data. The course is available online and should be completed **prior** to requesting ethics approval: <http://www.cardiff.ac.uk/humrs/training/programme/onlinemodules/>
9. Supervisors are responsible for the contents of information sheets and consent forms.

Title of project: Create a simple Prototype Mathematical e-Learner aimed at young adults with Learning Difficulties, focusing on disability specific HCI and end user testing.

Name of student(s): Georgia Pocock

Student No. c1321692

Ethics training completed:

☒ Yes ☐ No

Degree programme and level: Business Information Systems (Inc. Placement Year)

Signature of supervisor: M Morgan

Date: 6/2/17

Recruitment Procedures

		Yes	No	N/A
1	Does your project include children under 18 years of age? If "Yes", have you read and understood Cardiff University's Interim Guidance for researchers Working With Children and Young People which forms part of the Safeguarding Children and Vulnerable Adults Policy. The Interim Guidance is at Appendix 4, Page 28 of this Policy .	X		
2	Does your project include people with learning or communication difficulties?	X		
3	Does your project include people in custody?		X	
4	Is your project likely to include people involved in illegal activities?		X	
5	Does project involve people belonging to a vulnerable group, other than those listed above?		X	
6	Does your project include people who are, or are likely to become your clients or clients of the department in which you work?		X	
7	Does your project provide for people for whom English / Welsh is not their first language?		X	

Consent Procedures

		Yes	No	N/A
8	Will you tell participants that their participation is voluntary?	X		
9	Will you obtain written consent for participation?	X		
10	If the research is observational, will you ask participants for their consent to being observed?	X		
11	Will you tell participants that they may withdraw from the research at any time and for any reasons?	X		
12	Will you give potential participants a significant period of time to consider participation?	X		

Possible Harm to Participants

		Yes	No	N/A
13	Is there any realistic risk of any participants experiencing either physical or psychological distress or discomfort?		X	
14	Is there any realistic risk of any participants experiencing a detriment to their interests as a result of participation?		X	

If there are any risks to the participants you must explain in the box on page 3 how you intend to minimise these risks

Data Protection

		Yes	No	N/A
15	Will any non-anonymised and/or personalised data be generated and/or stored?	X		
16	Will you have access to documents containing sensitive ¹ data about living individuals?	X		
	If "Yes" will you gain the consent of the individuals concerned?	X		

Researcher Safety

		Yes	No	N/A
17	If relevant to your research, have you taken into account the Cardiff University guidance on safety in fieldwork / for lone workers?			X

Researcher Governance

		Yes	No	N/A
18	Does your study include the use of a drug? You will need to contact Research Governance before submission (resgov@cf.ac.uk)		X	
19	Does the study involve the collection or use of human tissue?			

¹ Sensitive data are *inter alia* data that relates to racial or ethnic origin, political opinions, religious beliefs, trade union membership, physical or mental health, sexual life, actual and alleged offences.

	You will need to contact the Human Tissue Act team before submission (hta@cf.ac.uk)		X	
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Prevent Duty

		Yes	No	N/A
20	Has due regard be given to the 'Prevent duty', in particular to prevent anyone being drawn into terrorism? https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/445916/Prevent_Duty_Guidance_For_Higher_Education_England_Wales_.pdf http://www.cardiff.ac.uk/public-information/policies-and-procedures/freedom-of-speech			X

If there are any other potential ethical issues that you think the Committee should consider please explain them in the box on page 6. It is your obligation to bring to the attention of the Committee any ethical issues not covered on this form.

Dissertation Summary

Please provide further information on your overall dissertation proposal below (200-300 words only).

From experience of working very closely with children, teens and adults with learning difficulties (mainly Down's Syndrome), I know that the ability to understand and apply maths can be a difficult task for some, if not most. This becomes a bigger issue when you consider most day-to-day activities such as shopping, transport and any other activity that requires money. I have witnessed people take advantage of this situation by short changing people with learning difficulties.

As independent living is becoming a main goal for most people with learning difficulties, gaining numeracy skills and the ability to apply them to financial situations is growing more imperative. To try and help prevent this obstacle from becoming a common issue, I am hoping to create a simple, yet effective Mathematical e-Learner with the design, usability and functionality aimed specifically at people with Down's Syndrome (further disabilities also, should time allow). The aim of this will be to have a variety of pages, each page focusing individually on addition, subtraction, multiplication and scenarios based on day-to-day money transactions.

I will be conducting face-to-face interviews, where I ask questions and observe the participants using pre-existing mathematical e-learners. This will be to gain a better understanding of what they enjoy vs. struggle with. I will not be working directly with people under the age of 18.

After my first iteration is complete I will again conduct a face-to-face interview with the participants. This time asking questions and observing the usability of my own mathematical e-learner, which will incorporate the factors which they most enjoyed and succeeded in. Parents will have the option to sit in on any/all of the interviews and participants will sign a consent and have the ability to withdraw at any time.

Supervisor's declaration

As the supervisor for this student project, I confirm that I believe that all research ethical issues have been dealt with in accordance with University policy and the research ethics guidelines of the relevant professional organisation.

Date 6/2/17

Name

MATT MORGAN

Signature M Morgan

If any of the shaded boxes have been ticked the supervisor must explain in the box overleaf on this form how the potential ethical issue will be handled.

Please explain how the identified potential research ethics issue will be handled.

- 1. Face to face interviews participants who have learning difficulties will only be carried out after written consent has been obtained from those participants. Also, parents/carers will be invited to attend the interview.**
- 2. Georgia has her DBS checks in place that allows her to work with vulnerable adults and children under 18. She does this regularly, working with a charity called "The Down Syndrome Association" and SVC (Student Volunteering Cardiff).**

Appendix 3: Initial User Interviews Signed Consent Forms

Participant signatures have been blurred out, as mentioned in section 3.4 of the official report.

Consent for Participation in Interview Research

I volunteer to participate in a research project conducted by Georgia Pocock from Cardiff University. I understand that the project is designed to gather information about academic work of a Mathematical e-learner aimed at adults with Down's syndrome. I will be one of approximately 4 people being interviewed for this research.

1. My participation in this project is voluntary. I understand that I will not be paid for my participation. I may withdraw and discontinue participation at any time without penalty. If I decline to participate or withdraw from the study, no one on my campus will be told.
2. I understand that most interviewees will find the discussion interesting and thought-provoking. If, however, I feel uncomfortable in any way during the interview session, I have the right to decline to answer any question or to end the interview.
3. Participation involves being interviewed by a researcher from Cardiff University. The interview will last approximately 2 hours depending on how long the tasks take to complete. Notes will be written during the interview. An audio tape and video recorder will be also be used during the interview. If I don't want to be taped, I will not be able to participate in the study.
4. I understand that the researcher will not identify me by name in any reports using information obtained from this interview, and that my confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions.
5. Faculty and administrators from my university will neither be present at the interview nor have access to raw notes or transcripts. This precaution will prevent my individual comments from having any negative repercussions.
6. I understand that this project has been reviewed and approved by the Research Ethics Group (REG) for Studies Involving Human Subjects.
7. I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.
8. I have been given a copy of this consent form.

Participant's Signature

Date



16/02/2017

Participant's Printed Name



Signature of the Interviewer

Date

Georgia Pocock

16/02/2017

Interviewer's Printed Name

GEORGIA POCKOCK

For further information, please contact:

Georgia Pocock at: georgiapocock@hotmail.co.uk

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8. I have been given a copy of this consent form.

Participant's Signature

Helena Pocock

Date

18/02/2017

Participant's Printed Name

HELENA POCK

Signature of the Interviewer

Georgia Pocock

Date

18/02/2017

Interviewer's Printed Name

GEORGIA POCK

For further information, please contact:

Georgia Pocock at: georgiapocock@hotmail.co.uk

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8. I have been given a copy of this consent form.

Participant's Signature

[Signature]

Date

18/02/2017

Participant's Printed Name

[Printed Name]

Signature of the Interviewer

Georgia Pocock

Date

18/02/2017

Interviewer's Printed Name

GEORGIA POCKOCK

For further information, please contact:

Georgia Pocock at: georgiapocock@hotmail.co.uk

Appendix 4: Initial User Interviews Record – Results

Initial User Interview Record
Interview Information
Name of interviewer: Georgia Pocock Date: 16/02/2017 Interview Location: Participant's house Type of recording (video/audio/written notes): Video and written notes Consent for recording (yes/no): Yes
General Information of Interviewee
Interviewee number: 01 Age: 22 Living situation: Lives with family Interviewee experience: (qualifications, education, jobs, volunteering etc.) GCSEs, currently has a paid job at Specsavers.

Part 1: Icebreaker Information
Icebreaker answers: Spent the day at home. Spent yesterday out with friends and playing sports. Plays Basketball, cricket, and various other sports as hobbies.

Part 2: Mathematics Usage and Thoughts
General Mathematics Thoughts answers: Goes to the shop for parents sometimes but only ever takes exact money if they know how much it will cost or a note. Participant has to trust shop worker to return the correct amount of change. Mother states that they have sometimes returned shortchanged. Participant states they would like to get better with money so they can shop for more things.

Part 3: Observations
<p>Kid zone – Math Quiz http://www.kidzone.ws/math/quiz.html</p>
<p>Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)</p> <p>Observations:</p> <p>Pressed enter to go to next question. The lack of computer experience meant that they did not understand the tab instruction. Pressing enter ended the quiz so we had to restart. This showed all the answers as incorrect which user found discouraging.</p> <p>Using fingers as a visual aid to work the math out.</p> <p>Struggled to read instructions due to slow reading and amount of text. This lead to participant not knowing which button to click to end quiz.</p> <p>Question Answers:</p> <p>Did you like being able to choose the amount of questions you were asked? Yes</p> <p>Did you like having the Addition, Subtraction and Multiplication questions separate? Mixture, but understands addition more</p> <p>Did you like having to type the answer in using the keyboard, or would you have preferred the ability to click the numbers using the mouse? Would have preferred to be able to select on screen or drag the answer into the box.</p>
<p>BBC Schools – Teachers KS2 Maths Activities http://www.bbc.co.uk/schools/teachers/ks2_activities/maths/problem_solving.shtml</p>

Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)

Observations:

Good with reading. Read 'x' to close note as a method to escape the note which shows intuition and understanding of computer software.

Did not register they needed to buy the three cans stated in the note. Could have asked question a bit clearer.

Likes mouse and touchscreen.

You have to stay hovering over e.g. 'drinks' for the menu to stay open. participant kept moving the mouse to read and the menu would disappear resulting in obvious confusion and frustration.

Did not know what to do after he put cans into basket. Went back to note instead of the top message so confusion between which instruction list to listen to. Did not know to drag money into the green box.

If green box was empty it gave a message about the money not being exact instead of there is no money in the green box or more money need to be paid.

Need picture of real coins. Confusion on the cartoon ones on which was what.

Question Answers:

Did you find the writing on the 'note' (show note if necessary) difficult to read?
Yes, could not read some of the words properly.

If yes, what would have made it easier to read? (larger text, different font etc.)
The writing needs to be bigger.

How did you feel about the fact you could not progress to the next question until you had bought the item that cost the least amount of money? (Did it frustrate you? Did you like being challenged?)

Liked being asked to retry question as it meant they could have another go and get it right.

Did you like having pictures of the money on the screen that you could select or would you have preferred to type in your answer using the keyboard?

Found the pictures of the coins useful. Preferred cartoons.

How did you find having to drag the money to the correct place instead of clicking it?

Liked dragging instead of clicking but does not mind clicking.

Varsity Tutors – A-Plus Math Bingo

<https://www.varsitytutors.com/aplusmath/matho/addition>

Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)

Observations:

Went straight to how to play so this feature is obviously recognized and useful.

Likes mouse and touchscreen.

Vocalized that they did not understand the terms horizontally, vertically or diagonally. Visual aid to explain maybe?

How to play is too long. Text is confusing because there is too much of it. Participant states they do not want to read it all and does not understand.

Liked the difficulty option - changed it from medium to easy.

Confused and tried typing the answers. Prefers clicking but confused and thought you had to type. Too many answers on the board.

Very confused that multiple questions could have the same answer and tried re-clicking their previous answer (i.e. $3+1=4$ $2+2=4$ so tried clicking the same 4 instead of a different one). Did not register same number was on board twice.

If they kept getting the answers wrong. Nothing happened so felt like the game was never going to end. Observing obvious frustration.

Obvious elation when answers were correct because visual representation of ALL the answers they got right.

Question Answers:

Did you like being able to choose and change the difficulty level?

Yes

How did you feel about being timed?

Did not like it. Made him panic (pressure)

How did you feel about not being able to retry a question you did not get correct? (Annoyed you could not try again? Happy you could skip the question?)

Liked being able to skip.

How did you feel about the e-learner telling you the correct answer?

Liked it telling them the correct answer

Coolmath4kids – Minus Mission

<https://www.coolmath4kids.com/math-games/minus-mission>

Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)

Observations:

Visual aids with the keyboard instructions were appreciated.

Likes keyboard for this one.

“Content range” was not good syntax - not clear on what it meant or did, causing obvious confusion.

Finds it confusing having the answer given and having to select the equation instead of the other way around.

You could use the arrow keys to move and then spacebar to shoot or use the mouse to move and click. When using the mouse participant thought clicking mouse would move it over one but instead it moved it to where you clicked and shot at the same time. This caused confusion and was not well explained.

Question Answers:

How did you feel about having to use the keyboard to direct the shooter and select your answer?
Enjoyed using the keyboard – “like the Xbox”

How did you feel about the maths having a video game approach?
Liked the shooter idea – “really fun”

BBC Bitesize – Igloo Shopping

<http://www.bbc.co.uk/bitesize/ks1/maths/money/play/>

Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)

Observations:

Chose to go full screen.

Likes mouse and touchscreen.

Volume on background music was too high so wanted the volume turned down. Have an option on game to do so, so help is not required.

Seems to understand better how much money they have already paid due to the visual aid at the top of screen showing them what they have already paid.

Bit confused with counting coins on top of each other (from a profile view) (Note: maybe have then next to each other or birds eye view)

Confused by the talking on hover over buttons so chose to turn sound off.

Question Answers:

How do you feel about the e-learner reading the questions to you? (Was it helpful or patronising?)

Very helpful. Useful. Understood it more because it was read to them.

How do you feel about the maths being focused on money scenarios?

Found the money ones useful. Liked them because he can practice for when you go to the shops.

Did you find having the ability to make the e-learner full screen useful?

Found making it full screen useful. It was easier to read and use.

Now you have completed all the e-learners:

Did you find the normal questions or the money based questions more useful?

Both maths and normal money were useful.

Did you prefer dragging your options to the correct places, simply clicking your answer or typing your answer?

Clicking was most useful over dragging and typing.

What was your favourite e-learner? Why?

Preferred slime blob. Because it was more fun and really interesting.

Later said preferred bingo one when we went through them all again. So, preferred bingo best remembered slime.

What was yours least favourite e-learner?

Liked them all.

Why?

N/A

Primary User Interview Record
Interview Information
Name of interviewer: Georgia Pocock Date: 18/02/2017 Interview Location: Participant's house Type of recording (video/audio/written notes): Video and written notes Consent for recording (yes/no): Yes
General Information of Interviewee
Interviewee number: 02 Age: 28 Living situation: Lives with family Interviewee experience: (qualifications, education, jobs, volunteering etc.) GCSEs, College twice (two different courses) 3 volunteer jobs, training for potential paid job.
Part 1: Icebreaker Information
Icebreaker answers: Spent the day working and then out with a friend. Has a friend staying overnight so having a night in with food and movies after the interview.
Part 2: Mathematics Usage and Thoughts
General Mathematics Thoughts answers: Goes to the shop for Mum quite often and deals with money in one of their volunteer jobs. Has to be supervised as money handling is a challenging task. Gets scared and nervous when working out money in front of people and often panics. Really wants to work on making their money better.

Part 3: Observations
<p>Kid zone – Math Quiz http://www.kidzone.ws/math/quiz.html</p>
<p>Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)</p> <p>Observations:</p> <p>Needs mouse and keyboard</p> <p>Did register the amount of questions and when I pointed it out did not know what it meant. Rephrase to how many questions do you want to be asked?</p> <p>Writing answer invisibly on the table. Maybe include some notepad thing they can write in or images they can use like pictures of hands they can use with different amounts of fingers on so they can work out better? It would become repetitive and they would remember by nature then.</p> <p>Question Answers:</p> <p>Did you like being able to choose the amount of questions you were asked? Liked choosing the amount of questions.</p> <p>Did you like having the Addition, Subtraction and Multiplication questions separate? Yes</p> <p>Did you like having to type the answer in using the keyboard, or would you have preferred the ability to click the numbers using the mouse? Liked using the numbers on keyboard.</p>
<p>BBC Schools – Teachers KS2 Maths Activities http://www.bbc.co.uk/schools/teachers/ks2_activities/maths/problem_solving.shtml</p>
<p>Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)</p> <p>Observations:</p> <p>It was too small. Needed to zoom. Could see better with bigger text and picture.</p> <p>Likes mouse and touchscreen.</p> <p>Clicked “buy” before putting money in. Was not clear on having to pay and how to pay.</p> <p>Participant did not notice the price was on the can so was guessing how much they needed to pay.</p> <p>Participant was extremely stuck and getting distress. I rephrased the question and they responded to the question better when I phrased it like if you were to give me 22p out of your purse what coins would you give me.</p>

Clicked help by accident and could not figure out how to close it.

When they paid, they had not selected the cheapest items (a pack rather than individual cans) when the error message said “you have not selected the cheapest option” participant got confused and thought that their calculation was wrong. Did not understand they were expected to go back to the shop to buy the cans for less money.

Did not realise the cans contained three in deal so put nine in basket. Need instructions to be clear.

Question Answers:

Did you find the writing on the ‘note’ (show note if necessary) difficult to read?

When asked how she found the handwriting text she said cannot read it properly. For the normal text said it was hard because too small. Until I zoomed in on e-learner.

If yes, what would have made it easier to read? (larger text, different font etc.)

Bigger text for handwriting.

How did you feel about the fact you could not progress to the next question until you had bought the item that cost the least amount of money? (Did it frustrate you? Did you like being challenged?)

Found it frustrating to find the deal. Would have preferred to just focus on the money.

Liked being able to redo the question. Helps them to learn and give the person the right amount of money.

Did you like having pictures of the money on the screen that you could select or would you have preferred to type in your answer using the keyboard?

Liked having the pictures to see the money.

How did you find having to drag the money to the correct place instead of clicking it?

Would rather use the money to drag rather than type answer.

Do not mind dragging money.

Varsity Tutors – A-Plus Math Bingo

<https://www.varsitytutors.com/aplusmath/matho/addition>

Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)

Observations:

Too much text in how to play. Does not know how to play after reading how to play.

Likes mouse and touchscreen.

Screen is too small

Question Answers:

Did you like being able to choose and change the difficulty level?

Liked being able to choose difficulty level.

How did you feel about being timed?

Timer would make you feel pressure. Makes it more difficult.

How did you feel about not being able to retry a question you did not get correct? (Annoyed you could not try again? Happy you could skip the question?)

Liked that you could skip the question. Too hard if you get the same one wrong.

How did you feel about the e-learner telling you the correct answer?

Liked telling how many missed in total.

Likes it telling correct answer at the bottom

Coolmath4kids – Minus Mission

<https://www.coolmath4kids.com/math-games/minus-mission>

Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)

Observations:

Shorter than e-learner text from previous e-learner. Prefer this length.

Prefers keyboard for directing shooter

Confused where the arrow keys are. Maybe an image of the keyboard so user knows where to find them.

Confused by what content range is.

Likes being able to ask what game speed.

Scared by noise. Jumped.

Found difficult to use as blobs moved too fast (on slow) so would prefer if blobs did not come toward you so you could figure out the answer in time.

Question Answers:

How did you feel about having to use the keyboard to direct the shooter and select your answer?

Found the keys easier to use.

How did you feel about the maths having a video game approach?

"I cannot lie. It was fun."

BBC Bitesize – Igloo Shopping
<http://www.bbc.co.uk/bitesize/ks1/maths/money/play/>

Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)

Observations:

Opted for full screen. Can see better.

Likes mouse and touchscreen.

Re-read the question after it being read out.

Confused by coin value. Thought 2p was 20p – needs clearer pictures.

Got question correct after getting it wrong – so redoing question proved beneficial.

Question Answers:

How do you feel about the e-learner reading the questions to you? (Was it helpful or patronising?)
Helpful to have the questions read out. (Note: even though observe re-reading after hearing – may a combination helped?)

How do you feel about the maths being focused on money scenarios?
Found it hard but useful. Good practice for when going to shop.

Did you find having the ability to make the e-learner full screen useful?
Useful having full screen easier to read and see.

Now you have completed all the e-learners:

Did you find the normal questions or the money based questions more useful?
Money ones were more useful.

Did you prefer dragging your options to the correct places, simply clicking your answer or typing your answer?
Clicking.

What was your favourite e-learner? Why?
Basket one (BBC Schools) was their favourite because of the money scenario.
Also likes the BBC Bitesize for the same reason but does not like the game logic – “should have a shopping basket not plate.”

Prefer the interactive ones more. Found quiz one boring and not active enough. Preferred games.

What was yours least favourite e-learner? Why?
Least favourite was the blobs. Because they came down fast. Better if blobs did not move.

Primary User Interview Record
Interview Information
Name of interviewer: Georgia Pocock Date: 18/02/2017 Interview Location: Interviewer's house Type of recording (video/audio/written notes): Video and written notes Consent for recording (yes/no): Yes
General Information of Interviewee
Interviewee number: 03 Age: 27 Living situation: Lives with family Interviewee experience: (qualifications, education, jobs, volunteering etc.) GCSEs, currently has a paid job at JoJo Bebe Maman.
Part 1: Icebreaker Information
Icebreaker answers: Had been out with Mum and sister. Staying over a friend's house for the weekend so was really excited for that. Had work after that.
Part 2: Mathematics Usage and Thoughts
General Mathematics Thoughts answers: Deals with money at work with customers (under supervision) and goes to the shop with family. Wishes she could work with money in her job independently. Confident in mathematical and money handling ability but also states that they do need to ask for help sometimes.

Part 3: Observations
<p>Kid zone – Math Quiz http://www.kidzone.ws/math/quiz.html</p>
<p>Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)</p> <p>Observations:</p> <p>Did not notice that you could choose amount of questions. Needed to be made more obvious.</p> <p>Keyboard and mouse.</p> <p>On this e-learner past answers are remembered and appear when you click to type, so participant got confused and thought that the displayed numbers were the only options they could put down. Therefore, they selected one of those previous answers instead of their initial answer.</p> <p>Liked that it told them the correct answer but did not like that it did not show the method of how to work it out correctly.</p> <p>Question Answers:</p> <p>Did you like being able to choose the amount of questions you were asked? Did not really mind</p> <p>Did you like having the Addition, Subtraction and Multiplication questions separate? Would have liked to have a mix of questions.</p> <p>Did you like having to type the answer in using the keyboard, or would you have preferred the ability to click the numbers using the mouse? Likes using the actual keyboard.</p>
<p>BBC Schools – Teachers KS2 Maths Activities http://www.bbc.co.uk/schools/teachers/ks2_activities/maths/problem_solving.shtml</p>

Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)

Observations:

Did not absorb that the note was the instructions on what they needed to buy. (Note: maybe needs to have summary like buy 3 cans continuously on the screen.)

Could not find how to close help when in the help section

Likes mouse.

Once items were in the basket the participant found it difficult to realise that you had to pay for the items and what the total cost was – (Note: maybe needs to have a total so they only need to work out what to give. Otherwise they get demotivated when they keep giving the incorrect money because the total was worked out wrong, not the calculation of money itself.)

Struggled with the hover-over, similar to participant 1 and kept losing the menu.

Needed the 'there is a cheaper option' rephrased, as participant thought the money was wrong not the items.

Found the feedback of “too much” or “too little” money useful.

Question Answers:

Did you find the writing on the 'note' (show note if necessary) difficult to read?

Yes. Prefers it when text is a bit bigger.

If yes, what would have made it easier to read? (larger text, different font etc.)

Note should have bigger and clearer writing.

How did you feel about the fact you could not progress to the next question until you had bought the item that cost the least amount of money? (Did it frustrate you? Did you like being challenged?)

Liked having the chance to have another go.

Did you like having pictures of the money on the screen that you could select or would you have preferred to type in your answer using the keyboard?

Liked having the picture of coins.

How did you find having to drag the money to the correct place instead of clicking it?

Does not mind dragging it.

Varsity Tutors – A-Plus Math Bingo

<https://www.varsitytutors.com/aplusmath/matho/addition>

Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)

Observations:

Chose to read the how to play.

Likes mouse and touchscreen.

Quite a bit of text. Struggled to read and understand it all.

Chose easy – obvious appreciation for the difficulty levels.

Similar to previous participants, confused that you can have the same answer twice. Got muddled and said "I have answered 7 already" until they noticed 7 was on board again.

Got confused again and spent time re-figuring out an answer because they could not find the same answer again on board. (It was there)

Does not understand concept of trying to cross out numbers in a row. Could have got a few 'bingo' lines but clicked the answer somewhere else on the board instead of in the line as game concept was not understood. Needs better instruction.

Question Answers:

Did you like being able to choose and change the difficulty level?

Like being able to choose difficulty level.

How did you feel about being timed?

Timer did not bother them.

How did you feel about not being able to retry a question you did not get correct? (Annoyed you could not try again? Happy you could skip the question?)

Thinks they should have been able to redo the question.

How did you feel about the e-learner telling you the correct answer?

Liked being told correct answer.

Found tick or cross easy to understand. Liked seeing ticks throughout game.

Coolmath4kids – Minus Mission

<https://www.coolmath4kids.com/math-games/minus-mission>

Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)

Observations:

Fine with amount of text in instructions and appreciated visual aids.

Prefers keyboard arrows for direction.

Confused by “content range” meaning so ignored it.

Did not understand subtraction and addition but when I rephrased to say take away and adding they understood.

Question Answers:

How did you feel about having to use the keyboard to direct the shooter and select your answer?
Found it easier with mouse.

Did not like using the keyboard because the “buttons were confusing”.

How did you feel about the maths having a video game approach?
Good and fun game but a little bit too fast.

BBC Bitesize – Igloo Shopping

<http://www.bbc.co.uk/bitesize/ks1/maths/money/play/>

Notable facts about this e-learner: (type of learning: reading and writing, kinesthetic, audio, and visual. Adaptable? Colourful? More than one use? Use Mouse, keyboard or touchscreen? General overview)

Observations:

Found full screen easier.

Chooses mouse.

The game cleared the money once the answer was wrong so participant had to start from scratch – they did not like it.

Participant stated that “they [the e-learner] should tell you it is too much or too little money like other game”.

Only gives up to 10p on medium level. Should have more coin options as all participants have wanted 20p.

Question Answers:

How do you feel about the e-learner reading the questions to you? (Was it helpful or patronising?)
Found it useful that it was read out but could read it as well.

How do you feel about the maths being focused on money scenarios?
Liked the maths being based on money. But liked all maths and money ones.

Did you find having the ability to make the e-learner full screen useful?
Liked making it full screen. Easier to read.

Now you have completed all the e-learners:

Did you find the normal questions or the money based questions more useful?
Liked all the scenarios and questions. However, they stated that the money one would help them more with life and shopping.

Did you prefer dragging your options to the correct places, simply clicking your answer or typing your answer?
Preferred clicking the options/answers.

What was your favourite e-learner? Why?
BBC Bitesize. Liked the fact that it told you the total you had to reach.

What was yours least favourite e-learner? Why?
Least favourite was BBC Schools because you had to get the deal. They had 3 cans but got it wrong because they did not have the cheapest 3 cans.
Also found the first one (Kid Zone) confusing because it gave you past answers.

Appendix 5: Full list of Functional and Non-Functional Requirements

Functional Requirements				
Requirement ID	Requirement	Description	Acceptance Criteria	Priority
01	Incorporate a randomised shopping list for users (acting as the question)	A shopping list should be present on the screen at all times with a random combination of the items available in the menu.	The shopping list should always be present. It should give a different combination of items after the previous list is successfully calculated.	Essential
02	User should be able to select the requested items (shown in the shopping list)	There should be a menu visible on screen that contains all the shopping list items. The user should be able to successfully identify and select the item they choose. Once the item is in the basket, you should be able to remove it also (in case of error).	The menu should include all the items that could be displayed with the shopping list. There should be an image accompanying the item text to aid in them finding the correct item. Once selected the item should appear in the basket. When in the basket, the user should have the ability to click on the item to remove it from the basket.	Essential
03	Include a "Total"	Once all items have been selected, the e-learner should calculate the total cost and display it on screen.	The correct total sum of the selected items should be displayed. It should display the total of the selected items, not the correct items (if the wrong items are selected).	Essential
04	Ability to select the coins you require for payment	When you click on a coin, the money should be added to the payment section. This allows the user to view all the money they have currently paid in one place before confirming payment. Should have the ability to remove a coin from the paid money also.	Money should appear in a given area. It should be understandable and communicate effectively to the user what coins/notes they have currently paid with. When the user clicks on a coin in the paid money section, that coin should be removed.	Essential

Functional Requirements				
Requirement ID	Requirement	Description	Acceptance Criteria	Priority
05	“How to Play”	Include a concise, illustrative and comprehensible “How to Play” functionality.	Should be obvious to access and close. Demonstrate clearly and simply the aim of the game and how to play it.	Essential
06	Auditory Assistance	Include the ability to have any text heavy sections read aloud. (as my participants do not require auditory assistance it can be moved to future work if time runs out.)	Any text visible on the screen that is verbose should be able to be read aloud.	Desirable
07	Clear phraseology	Keep the phrasing of questions and feedback clear, understandable and simple.	The feedback and questions are understood and result in the correct actions being taken.	Essential
08	Realistic game logic	Keep the logic of the game realistic. The game should resemble a real-life scenario to maintain its understandability.	The game has a logical and natural flow to the process and is understood by the users.	Essential
09	Keep relevant instructions visible	To ensure that the operation of the game is understood, the main instructions should be useful, concise and always visible.	There is an evident and beneficial section dedicated to explaining the main directions.	Essential
10	Incorporate helpful error messages	Anytime the user does something wrong or answers incorrectly, there should be informative feedback to help the user move forward, without discouragement.	When the user carries out a task incorrectly, a helpful, concise and encouraging error message should appear.	Essential

Functional Requirements

Requirement ID	Requirement	Description	Acceptance Criteria	Priority
11	Ensure good interaction throughout	feedback and design should allow for continual motivation and learning. Even if the user carries out a task correctly, there should be feedback to indicate this to the user. This will allow for continual motivation and understanding.	When a user completes a task, even if correctly, a message should appear to inform and encourage them. This message should also tell them what to do next, if appropriate (i.e. try the next shopping list).	Essential
12	Cross-Browser	The e-learner should be able to be used across all browsers.	The e-learner should work, at a minimum, on Google Chrome and Internet Explorer.	Desirable

Non-Functional Requirements				
Requirement ID	Requirement	Description	Acceptance Criteria	Priority
13	Usability (ease of use)	The e-learner should be simple, habitual and intuitive to use.	Users can understand and operate system with minimal assistance.	Essential
14	Interface	The interface should be intuitive, concise, communicative and professional.	Navigation and layout is simple and logical. All functionality and expectations are obvious and/or clearly explained.	Essential
15	Stress Free Environment	As previously mentioned, the e-learner is intended to be stress free to encourage my participants to continue using the e-learner.	When using the e-learner the participant is obviously not stressed and therefore continues to play the e-learner.	Essential
16	Maintainability	E-learner should allow for easy modification and maintenance to permit efficient future development/iterations.	Documentation, code commenting and any other form of maintainability is completed thoroughly and to a high standard.	Desirable
17	Reliability	The e-learner should be used with no errors or glitches.	The e-learner should without error or fault for all my users.	Essential
18	Scalability	Additional features and functionality, identified in the later rounds of end user testing, can be added without interrupting current functionality (allowing for the creation of the latter iterations).	Current functionality is not compromised when new features are added (this includes the user interface).	Desirable
19	Make the game adaptable	Mouse or touchscreen, choose amount of questions, ability to make full screen, ability to hear questions, volume control.	There should be an option for all the functionalities mentioned in the description to be controlled and used should the user wish.	Desirable

Appendix 6: All Test Cases

Requirement ID:		01			
Test ID:	Description:	Test Steps:	Predicted Outcome:	Actual Outcome:	Pass/Fail:
01	Randomised shopping list should be present.	Open e-learner.	Shopping list should be present on screen with a minimum of 1 to a maximum of 3 items.	Shopping list is present on screen with a minimum of 1 to a maximum of 3 items.	Pass
02	Shopping list should refresh automatically when user selects "yes" for another turn.	Find and select current shopping list items.	When user clicks "Yes, please!" the page should automatically refresh and you should have a new shopping list.	When user clicks "Yes, please!" the page does automatically refresh and the user does have a new shopping list.	Pass
		Using the "Total" pay the cashier the money using the coins.			
		Click the "Pay" button when you have paid the cashier all the money.			
		If the money is correct a message should appear saying "Well done" and asking if you would like another go. Click "Yes, please!".			
03	Shopping list should always be present and visible on screen.	Open e-learner.	Shopping list should remain present and visible in each stage (throughout game).	Shopping list does remain present and visible in each stage (throughout game).	Pass
		Go through each stage of game – start to finish.			

Requirement ID:		02			
Test ID:	Description:	Test Steps:	Predicted Outcome:	Actual Outcome:	Pass/Fail:
04	A menu should be present containing all potential shopping list items.	Open e-learner.	Menu should be present on the e-learner page. All items should be visible within their category.	Menu is present on the e-learner page. All items are visible within their category.	Pass
		Select menu category.			
05	Each item should have a correlating image to aid in the user's understanding.	Open e-learner.	Each item within each category should have an image representation of itself. (e.g. milk should have a picture of milk adjacent to the text).	Each item within each category does have an image representation of itself. (e.g. milk does have a picture of milk adjacent to the text).	Pass
		Select menu category.			
06	When an item is selected it should appear in the trolley.	Open e-learner.	On selection, the item should appear in the basket.	On selection, the item does appear in the basket.	Pass
		Select menu category.			
		Select item.			
07	When an item within the trolley is selected it should disappear from the trolley.	Open e-learner.	On click the item should be removed from the trolley.	On click the item is removed from the trolley.	Pass
		Select menu category.			
		Select item.			
		Click on item in the trolley.			

Requirement ID:		03			
Test ID:	Description:	Test Steps:	Predicted Outcome:	Actual Outcome:	Pass/Fail:
08	A "Total" should be included to inform the users what the total amount of money all their items add up to.	Open e-learner.	When an item is added to the trolley its price should appear in the total. If multiple items are added the total should accumulate the prices and displays the total amount. The total should also reflect a decrease in price if an item is removed.	When an item is added to the trolley its price does appear in the total. If multiple items are added the total does accumulate the prices and displays the total amount. The total does reflect a decrease in price if an item is removed.	Pass
		Select menu category.			
		Select item(s).			

Requirement ID:		04			
Test ID:	Description:	Test Steps:	Predicted Outcome:	Actual Outcome:	Pass/Fail:
09	A user should be able to click on a coin to add it to their "paid money"	Items have been identified, found and placed in the trolley.	Coin should appear in the "paid money" area.	Coin does appear in the "paid money" area.	Pass
		User clicks on a coin			
10	Once a user selects a coin(s) they should appear in a single area to improve the understanding and usability (they know how much money they have currently given).	Items have been identified, found and placed in the trolley.	All coins should appear in one area but do not overlap. Allowing the user to view all the money they have currently paid.	All coins appear in one area and do not overlap. Allowing the user to view all the money they have currently paid.	Pass
		User clicks on a coin(s)			
11	A user should be able to click on a coin in the "paid money" area to remove it.	Items have been identified, found and placed in the trolley.	Coin should be removed from the paid money area.	Coin is removed from the paid money area.	Pass
		User clicks on a coin(s) and it appears in "paid money" area.			
		User clicks on a coin within the "paid money" area.			

Requirement ID:		05			
Test ID:	Description:	Test Steps:	Predicted Outcome:	Actual Outcome:	Pass/Fail:
12	Include a "How to Play".	Open e-learner.	A visual and text demonstration on how to play should appear. User should be able to go through it at their own pace.	A visual and text demonstration on how to play appears. User is able to go through it at their own pace by clicking the next and/or previous arrows.	Pass
		Click "How to Play" button.			

Requirement ID:		06			
Test ID:	Description:	Test Steps:	Predicted Outcome:	Actual Outcome:	Pass/Fail:
13	Any text that is verbose should have auditory assistance available.	Use e-learner.	Any section of the e-learner that has sentences or heavy text should have an auditory assistance option.	All sections of the e-learner with sentences or heavy text have an auditory assistance option.	Pass

Requirement ID:		09			
Test ID:	Description:	Test Steps:	Predicted Outcome:	Actual Outcome:	Pass/Fail:
14	The main instructions to working the game should be visible always.	Open the e-learner.	A summary "How to Play" should be on screen always providing the essential instructions.	A summary "How to Play" is on screen always providing the essential instructions.	Pass

Requirement ID:		10			
Test ID:	Description:	Test Steps:	Predicted Outcome:	Actual Outcome:	Pass/Fail:
15	Error messages should appear to help a user understand that they have done something wrong and what they have done wrong.	Use e-learner and make a mistake – place wrong items in the trolley, pay too much or too little money.	An error message should appear informing the user how they did something wrong.	An error message appears informing the user how they did something wrong.	Pass

Requirement ID:		11			
Test ID:	Description:	Test Steps:	Predicted Outcome:	Actual Outcome:	Pass/Fail:
16	Messages should also appear when a user does something correctly. All messages should be encouraging and directional (e.g. have another go!)	Use e-learner and make a mistake or pay the right amount of money.	A message should appear with motivational, constructive criticism or encouraging congratulations.	A message appears with motivational, constructive criticism or encouraging congratulations.	Pass

Requirement ID:		12			
Test ID:	Description:	Test Steps:	Predicted Outcome:	Actual Outcome:	Pass/Fail:
17	E-learner should be able to be used across all browsers	Open and use e-learner on Chrome, IE, Firefox.	E-learner should be fully functional and visually appealing in all browsers.	E-learner is fully functional and visually appealing in Chrome. It is fully functional in Internet Explorer in that all the interaction works. However, the majority of the images are not visible and so it is not usable. Firefox is visually appealing except for a small scrolling issue when the menu expands.	Fail

Requirement ID:		16			
Test ID:	Description:	Test Steps:	Predicted Outcome:	Actual Outcome:	Pass/Fail:
18	All coding should be thoroughly commented	N/A	Each block of code for a functionality or design should be documented/commented accordingly.	Each block of code for a functionality or design is documented/commented accordingly.	Pass

Requirement ID:		17			
Test ID:	Description:	Test Steps:	Predicted Outcome:	Actual Outcome:	Pass/Fail:
19	The e-learner should run error free.	Open and use the e-learner.	The e-learner should run from start to finish with no functional errors. (user errors are expected)	The e-learner runs from start to finish with no functional errors.	Pass

Requirement ID:		19			
Test ID:	Description:	Test Steps:	Predicted Outcome:	Actual Outcome:	Pass/Fail:
20	The e-learner should be adaptable to the user.	Open and use the e-learner.	User should be able to use the mouse or the touchscreen to operate the e-learner, choose amount of questions, make it full screen, ability to hear questions, volume control, auditory assistance on hover for those who cannot read and more.	Although the e-learner does have auditory assistance and is operable using both the mouse and the touchscreen. It does not reach the other criteria. It was built to fit a full webpage but cannot go to full computer screen. It does not have volume control or the ability to have continuous auditory assistance on hover (e.g. hover over milk and it would say "milk").	Fail

Appendix 7: Browser Statistics



Appendix 8: End-User Interviews Signed Consent Forms

Participant signatures have been blurred out, as mentioned in section 3.4 of the official report.

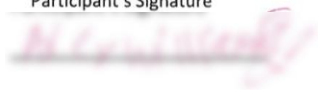
Consent for Participation in Interview Research

I volunteer to participate in a research project conducted by Georgia Pocock from Cardiff University. I understand that the project is designed to gather information about academic work of a Mathematical e-learner aimed at adults with Down's syndrome. I will be one of approximately 4 people being interviewed for this research.

1. My participation in this project is voluntary. I understand that I will not be paid for my participation. I may withdraw and discontinue participation at any time without penalty. If I decline to participate or withdraw from the study, no one on my campus will be told.
2. I understand that most interviewees will find the discussion interesting and thought-provoking. If, however, I feel uncomfortable in any way during the interview session, I have the right to decline to answer any question or to end the interview.
3. Participation involves being interviewed by a researcher from Cardiff University. The interview will last approximately 2 hours depending on how long the tasks take to complete. Notes will be written during the interview. An audio tape and video recorder will be also be used during the interview. If I don't want to be taped, I will not be able to participate in the study.
4. I understand that the researcher will not identify me by name in any reports using information obtained from this interview, and that my confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions.
5. Faculty and administrators from my university will neither be present at the interview nor have access to raw notes or transcripts. This precaution will prevent my individual comments from having any negative repercussions.
6. I understand that this project has been reviewed and approved by the Research Ethics Group (REG) for Studies Involving Human Subjects.
7. I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.
8. I have been given a copy of this consent form.

Participant's Signature

Date



07/04/17

Participant's Printed Name

ALEX WILLIAMS

Signature of the Interviewer

Date

Georgia Pocock

07/04/17

Interviewer's Printed Name

GEORGIA POCOCK

For further information, please contact:

Georgia Pocock at: georgiapocock@hotmail.co.uk

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7. I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.
8. I have been given a copy of this consent form.

Participant's Signature

[Signature]

Date

12/04/17

Participant's Printed Name

[Printed Name]

Signature of the Interviewer

Georgia Pocock

Date

12/04/17

Interviewer's Printed Name

GEORGIA POCOCK

For further information, please contact:

Georgia Pocock at: georgiapocock@hotmail.co.uk

Consent for Participation in Interview Research

I volunteer to participate in a research project conducted by Georgia Pocock from Cardiff University. I understand that the project is designed to gather information about academic work of a Mathematical e-learner aimed at adults with Down's syndrome. I will be one of approximately 4 people being interviewed for this research.

1. My participation in this project is voluntary. I understand that I will not be paid for my participation. I may withdraw and discontinue participation at any time without penalty. If I decline to participate or withdraw from the study, no one on my campus will be told.
2. I understand that most interviewees will find the discussion interesting and thought-provoking. If, however, I feel uncomfortable in any way during the interview session, I have the right to decline to answer any question or to end the interview.
3. Participation involves being interviewed by a researcher from Cardiff University. The interview will last approximately 2 hours depending on how long the tasks take to complete. Notes will be written during the interview. An audio tape and video recorder will be also be used during the interview. If I don't want to be taped, I will not be able to participate in the study.
4. I understand that the researcher will not identify me by name in any reports using information obtained from this interview, and that my confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions.
5. Faculty and administrators from my university will neither be present at the interview nor have access to raw notes or transcripts. This precaution will prevent my individual comments from having any negative repercussions.
6. I understand that this project has been reviewed and approved by the Research Ethics Group (REG) for Studies Involving Human Subjects.
7. I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.
8. I have been given a copy of this consent form.

Participant's Signature

Date

12/04/17

Participant's Printed Name

Signature of the Interviewer

Date

Georgia Pocock

12/04/17

Interviewer's Printed Name

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Participant's Signature

Date

[Signature]

13/04/17

Participant's Printed Name

Georgia Pocock

Signature of the Interviewer

Date

Georgia Pocock

13/04/17

Interviewer's Printed Name

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Participant's Signature

Date

14/04/17

Participant's Printed Name

Signature of the Interviewer

Date

Georgia Pocock

14/04/17

Interviewer's Printed Name

GEORGIA POCOCK

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Participant's Signature

[Signature]

Date

14/04/17

Participant's Printed Name

HELEN POCK

Signature of the Interviewer

Georgia Pocock

Date

14/04/17

Interviewer's Printed Name

GEORGIA POCOCK

For further information, please contact:

Georgia Pocock at: georgiapocock@hotmail.co.uk

Appendix 9: End-User Interviews Record – Results

Primary User Interview Record
Interview Information
Name of interviewer: Georgia Pocock Date: 07/04/2017 Interview Location: Participant's house Type of recording (video/audio/written notes): written notes Consent for recording (yes/no): Yes
General Information of Interviewee
Interviewee number: 01 Age: 22 Living situation: Lives with family Interviewee experience: (qualifications, education, jobs, volunteering etc.) GCSEs, currently has a paid job at Specsavers.

Part 1: Icebreaker Information
Icebreaker answers: Preparing for a filmed interview with Specsavers. Watching the basketball with friends and going to London next week.

Part 3: Observations
Georgia Pocock – Shopping e-Learner
file:///C:/Users/georg/OneDrive/Documents/Dissertation/e-learner%20code/index.html#
Observations: <ul style="list-style-type: none">• Read the shopping list before the instructions, noted own confusion, took a proper look at e-learner and then noticed and read the instructions.• Removed the wrong item from the trolley by themselves (click to remove works well).• Found all of the required items well. No apparent confusions or frustration with categorization.• Slight confusion between the total and the prices shown on the shopping list. Participant seems confused about which one they need to pay.• Celebrated when they received the “well done” message with big smile and clapping/high five!

- Got confused when the “How to Play” restarted and continued reading without realizing they were back at the beginning.
- Prefers touchscreen.

Question Answers:

How did you find the e-learner to understand and use? Easy? Hard? A Max? (Usability)

Easy

How did you find the look of the e-learner? How did you find using the different functions like the menu and the money? Difficult? Easy? Confusing? Fine? (Interface)

Good – likes the pictures and the colours, especially all the colours in the item images.

Did you find the e-learner stressful at any point? (Stress free environment)

Did not feel stressed at all throughout the e-learner.

How did you find the feedback and instructions? Useful? Confusing? (Clear phraseology)

Found it useful, likes that there is not too much text.

How did you find the shopping theme? Did you think the order of the game was ok? E.g. reading the shopping list, picking the items etc. (Realistic game logic)

Really enjoys the shopping theme as it’s good practice.

How did you find having the main instructions and the shopping list always on the screen? Useful so you could remember or annoying and you would like to have been able to hide it? (Keep relevant instructions always visible)

Liked the instructions being visible because “When I click an item it tells me what to click and what to click next”.

How did you find the error messages, telling you that you had paid too much, too little or had placed the wrong items in the basket? (Helpful error messages)

Useful because they tell them what they have done wrong.

How did you find the “Well done” message when you paid the correct money? (Good interaction throughout)

Again, useful! Favourite interaction is the “well done” message.

Primary User Interview Record
Interview Information
Name of interviewer: Georgia Pocock Date: 14/04/2017 Interview Location: Participant's house Type of recording (video/audio/written notes): written notes Consent for recording (yes/no): Yes
General Information of Interviewee
Interviewee number: 02 Age: 28 Living situation: Lives with family Interviewee experience: (qualifications, education, jobs, volunteering etc.) GCSEs, College twice (two different courses) 3 volunteer jobs, training for potential paid job.

Part 1: Icebreaker Information
Icebreaker answers: Started a new job, so excited about that. Having a meal tonight and again tomorrow night! Birthday is soon so talking about plans for a birthday meal. Worries that they will not be able to work the e-learner.

Part 3: Observations
Georgia Pocock – Shopping e-Learner file:///C:/Users/georg/OneDrive/Documents/Dissertation/e-learner%20code/index.html#
Observations: <ul style="list-style-type: none"> • Works game well but pays the wrong amount of money on the first attempt. • Pays too much money and receives the correct error message. Reads the message, closes it and immediately starts recalculating the money. • Obvious elations at “well done” message when they get the correct answer. • Verbally appreciates the shopping list and states it’s their favourite part as it stops them forgetting what they need to buy. • Likes touchscreen and mouse.
Question Answers:

How did you find the e-learner to understand and use? Easy? Hard? A Max? (Usability)

Easy to use but found calculating the money difficult. Found the images of the money and items useful.

How did you find the look of the e-learner? How did you find using the different functions like the menu and the money? Difficult? Easy? Confusing? Fine? (Interface)

All easy to understand and think the colours and images make it look more fun.

Did you find the e-learner stressful at any point? (Stress free environment)

Found the maths stressful but the game fun.

How did you find the feedback and instructions? Useful? Confusing? (Clear phraseology)

Found feedback useful so that they knew where they went wrong and could have another go.

How did you find the shopping theme? Did you think the order of the game was ok? E.g. reading the shopping list, picking the items etc. (Realistic game logic)

Liked the game logic because they could place the items in the trolley "like at Tesco's".

How did you find having the main instructions and the shopping list always on the screen? Useful so you could remember or annoying and you would like to have been able to hide it? (Keep relevant instructions always visible)

Likes having the instructions visible. Would not choose to hide the instructions because then they would not be able to keep going back to read them.

How did you find the error messages, telling you that you had paid too much, too little or had placed the wrong items in the basket? (Helpful error messages)

Same as 'Clear phraseology' section.

How did you find the "Well done" message when you paid the correct money? (Good interaction throughout)

Useful, again, the favourite interaction is the "well done" message.

Primary User Interview Record
Interview Information
Name of interviewer: Georgia Pocock Date: 12/04/2017 Interview Location: Participant's house Type of recording (video/audio/written notes): written notes Consent for recording (yes/no): Yes
General Information of Interviewee
Interviewee number: 03 Age: 27 Living situation: Lives with family Interviewee experience: (qualifications, education, jobs, volunteering etc.) GCSEs, currently has a paid job at JoJo Bebe Maman.

Part 1: Icebreaker Information
Icebreaker answers: Getting their nails done so was asking my advice on what pattern to get. Looking forward to a family meal and a long Easter weekend.

Part 3: Observations
Georgia Pocock – Shopping e-Learner file:///C:/Users/georg/OneDrive/Documents/Dissertation/e-learner%20code/index.html#
Observations: <ul style="list-style-type: none"> Got confused by the money being on the shopping list as they hadn't spotted the total. Tried paying the amount on the list but could not correctly figure out the total. Once I pointed out that a total was already available no more difficulty was had. Prefers working on the touch screen. Tried reading the text on the "How to Play" screenshots.
Question Answers: How did you find the e-learner to understand and use? Easy? Hard? A Max? (Usability)

Easy to use. Easy to understand the money because the images are there to help you recognize them.

How did you find the look of the e-learner? How did you find using the different functions like the menu and the money? Difficult? Easy? Confusing? Fine? (Interface)

Good – likes the shopping list as it tells you what to buy and also states that they like having the instructions there to refresh their memory.

Did you find the e-learner stressful at any point? (Stress free environment)

Did not feel stressed whilst playing.

How did you find the feedback and instructions? Useful? Confusing? (Clear phraseology)

Found feedback useful and liked being able to hear the text as well as reading it.

How did you find the shopping theme? Did you think the order of the game was ok? E.g. reading the shopping list, picking the items etc. (Realistic game logic)

Liked the game theme. Likes the shopping list and being able to place the items into the trolley. Found the total useful once they knew it was there as it ensured that they had the correct total, meaning that if the answer was incorrect they knew it was because they gave the wrong money instead of calculating the wrong amount.

How did you find having the main instructions and the shopping list always on the screen? Useful so you could remember or annoying and you would like to have been able to hide it? (Keep relevant instructions always visible)

Like having them visible so they could refresh their memory.

How did you find the error messages, telling you that you had paid too much, too little or had placed the wrong items in the basket? (Helpful error messages)

Useful because it told you what you did wrong and you could have another go.

How did you find the “Well done” message when you paid the correct money? (Good interaction throughout)

Useful, again, the favourite interaction is the “well done” message. Also liked how the items in the menu change colour or got bold when you hover so they knew which item they were hovering over for definite.

Primary User Interview Record
Interview Information
Name of interviewer: Georgia Pocock Date: 12/04/2017 Interview Location: Participant's house Type of recording (video/audio/written notes): written notes Consent for recording (yes/no): Yes
General Information of Interviewee
Interviewee number: 04 Age: 35 Living situation: Lives with parents Interviewee experience: (qualifications, education, jobs, volunteering etc.) GCSEs and now attends Vale Plus [1]

Part 1: Icebreaker Information
Icebreaker answers: Spent the day baking Easter cupcakes with Mum. Going to Vale Plus tomorrow and watching soaps tonight.

Part 3: Observations
Georgia Pocock – Shopping e-Learner
file:///C:/Users/georg/OneDrive/Documents/Dissertation/e-learner%20code/index.html#
Observations: <ul style="list-style-type: none"> • Struggles to read the instructions so opts to have them read out – audio assistance was a bit too fast so participant asks me to read them out as well. • Seriously struggling to operate the computer and mouse. Struggling to see the mouse. • Works a lot better with touchscreen but swaps between the two – touchscreen for selecting the items and then flicks between touchscreen and mouse for selecting money. • Seems to understand process very well. • Obvious happiness when receiving the “well done” message. • Did not realise that there were multiple slides in “How to Play” as the next and previous arrows were not obvious.

Question Answers:

How did you find the e-learner to understand and use? Easy? Hard? A Max? (Usability)

Easy to use.

How did you find the look of the e-learner? How did you find using the different functions like the menu and the money? Difficult? Easy? Confusing? Fine? (Interface)

Looks good, really likes the trolley and found the images useful.

Did you find the e-learner stressful at any point? (Stress free environment)

Did not get stressed. (does not mention stress from operating computer)

How did you find the feedback and instructions? Useful? Confusing? (Clear phraseology)

Understood the text but benefited greatly from the audio assistance although states that they wish the audio assistance had been slightly slower.

How did you find the shopping theme? Did you think the order of the game was ok? E.g. reading the shopping list, picking the items etc. (Realistic game logic)

Really enjoys the shopping theme as it's like real life and means they can practice.

How did you find having the main instructions and the shopping list always on the screen? Useful so you could remember or annoying and you would like to have been able to hide it? (Keep relevant instructions always visible)

Would not choose to hide the instructions because then they might "lose them" and not know what to do.

How did you find the error messages, telling you that you had paid too much, too little or had placed the wrong items in the basket? (Helpful error messages)

Found the messages useful because it told them what they had done wrong. Stated that they like the fact you could hear the messages as well.

How did you find the "Well done" message when you paid the correct money? (Good interaction throughout)

Thought that the interaction was good because they understood game process. Favourite message was the "well done" text.

Primary User Interview Record
Interview Information
Name of interviewer: Georgia Pocock Date: 13/04/2017 Interview Location: Participant's house Type of recording (video/audio/written notes): written notes Consent for recording (yes/no): Yes
General Information of Interviewee
Interviewee number: 05 Age: 24 Living situation: Lives with parents Interviewee experience: (qualifications, education, jobs, volunteering etc.) GCSEs, college, works two volunteer jobs and currently touring the UK and parts of Europe with a theatre group.

Part 1: Icebreaker Information
Icebreaker answers: Having a week off from touring. Saving chocolate up for Easter Sunday. Went bowling a Tuesday and meeting with friends later today.

Part 3: Observations
Georgia Pocock – Shopping e-Learner file:///C:/Users/georg/OneDrive/Documents/Dissertation/e-learner%20code/index.html#
Observations: <ul style="list-style-type: none"> • Read instructions first and seemed to understand them. • Attempted to drag the items into the basket instead of clicking on them. Says they usually “drag stuff” so they are not used to clicking. • Tries clicking on the main menu row rather than the text and confused at first as to why it will not work. • Visual excitement at “well done” message. • Prefers working in tablet mode (touch screen). • Receives the paid “too much” message and immediately closes message and removes 50p. Demonstrates that the message was clearly understood. • Again, the “How to Play” was an issue with the text on the screenshot and user not realising that the “How to Play” had re-started.

- Stated that they did not want to play it again because it reminds them too much of school. When I explained that it would help them with understanding money and going to the shops they were happy to continue.
- Therefore, participant would play again and stated that their favourite part was putting the items in the trolley.
- Requested that more items should be available as they go shopping for DVDs and video games.

Question Answers:

How did you find the e-learner to understand and use? Easy? Hard? A Max? (Usability)

Found the game itself easy to use but found figuring out the money need challenging.

How did you find the look of the e-learner? How did you find using the different functions like the menu and the money? Difficult? Easy? Confusing? Fine? (Interface)

Really liked the interface and stated that they found the shopping list, menu and all of the images good as it made it easier to understand, Having images of the coins helped the participant identify the coins and remember which ones they needed.

Did you find the e-learner stressful at any point? (Stress free environment)

Found the maths stressful because they do not enjoy maths, but practicing money made it better. Did not find the game itself stressful because it was “easy to use”.

How did you find the feedback and instructions? Useful? Confusing? (Clear phraseology)

Really liked the feedback because it told them what they did wrong and said “have another go” which was encouraging.

How did you find the shopping theme? Did you think the order of the game was ok? E.g. reading the shopping list, picking the items etc. (Realistic game logic)

Thought the game logic was good because it was like going shopping with their mum, but wished there was the option to purchase DVDs and video games.

How did you find having the main instructions and the shopping list always on the screen? Useful so you could remember or annoying and you would like to have been able to hide it? (Keep relevant instructions always visible)

Liked the instructions being there all the time for referral. Would not hide them if they had the option.

How did you find the error messages, telling you that you had paid too much, too little or had placed the wrong items in the basket? (Helpful error messages)

Same as phraseology answer.

How did you find the “Well done” message when you paid the correct money? (Good interaction throughout)

Really liked the “well done” message and liked the fact that he could actually pay for the items.

Primary User Interview Record
Interview Information
Name of interviewer: Georgia Pocock Date: 14/04/2017 Interview Location: Interviewer's house Type of recording (video/audio/written notes): written notes Consent for recording (yes/no): Yes
General Information of Interviewee
Interviewee number: 06 Age: 33 Living situation: Lives with parents Interviewee experience: (qualifications, education, jobs, volunteering etc.) GCSEs, college, works in a job with Mencap. [2]

Part 1: Icebreaker Information
Icebreaker answers: Just completed a project recently and currently working hard on another project. Going for food with friends tonight and going to enjoy a glass of wine of cocktails. Really nervous for interview as they do not think they are going to do well.

Part 3: Observations
Georgia Pocock – Shopping e-Learner file:///C:/Users/georg/OneDrive/Documents/Dissertation/e-learner%20code/index.html#
Observations: <ul style="list-style-type: none"> • Visibly nervous when starting interview and dubious about what to do and whether they will do it right. • Reads instructions and then re-reads them one bullet point at a time completing each step as they go. • Seems to understand the flow and process well. • Verbally announces that the total should be larger or more central as they did not spot it until I pointed it out to them. • Does not struggle with any feature obviously. • Forgets to pay the money on third go so receives error message.

- Straight away realizes they forgot to pay the money and so goes back and starts selecting the required coins.
- Would play again because “each time you play it you will get better/ It pushes you because you have to think about what items you need, where they are and what you have to pay!”.

Question Answers:

How did you find the e-learner to understand and use? Easy? Hard? A Max? (Usability)

“really, really clear” shopping list being there made the instructions on what to purchase a lot easier to remember. Really likes the visual aids as it makes the e-learner easier to understand and use and actually seeing the things you click appear somewhere and react improved the communication making it clearer to use and comprehend.

How did you find the look of the e-learner? How did you find using the different functions like the menu and the money? Difficult? Easy? Confusing? Fine? (Interface)

Really good. Appreciates the bright colours as it makes it friendlier and fun to use. The size of the items are good as you can tell what they are but they do not dominate the page. Total could do with being increase in size or moved somewhere that catches your eye more. Images of money were useful as participant “recognises the shape of the money rather than the denomination”.

Did you find the e-learner stressful at any point? (Stress free environment)

Did not find the e-learner stressful because it was clear and had visual aids.

How did you find the feedback and instructions? Useful? Confusing? (Clear phraseology)

Good – as they forgot the step where they paid the actual money the message helped them to remember that step so they could go back and correct their mistake.

How did you find the shopping theme? Did you think the order of the game was ok? E.g. reading the shopping list, picking the items etc. (Realistic game logic)

Really good process. Clear menu due to main menu having titles like “fruit” and “drinks” made the categories obvious. Process was clear from instructions and because it follows real life.

How did you find having the main instructions and the shopping list always on the screen? Useful so you could remember or annoying and you would like to have been able to hide it? (Keep relevant instructions always visible)

Useful because the first time they could work through it step-by-step and then they could later refer to it when needed. If it disappeared or was hidden you might not know how to play or could “lose your thread”. “Useful for a situation like when [this participant] forgot the ‘pay money’ step.”

How did you find the error messages, telling you that you had paid too much, too little or had placed the wrong items in the basket? (Helpful error messages)

Same as phraseology.

How did you find the “Well done” message when you paid the correct money? (Good interaction throughout)

“For it to say “well done” is really good as it is motivating the user”. The error messages were useful as you could recognise and correct your mistakes.

References

- [1] "Vale Plus," [Online]. Available: <http://www.valeplus.org.uk/>. [Accessed 04 2017].
- [2] "Mencap," [Online]. Available: <https://www.mencap.org.uk/>. [Accessed 04 2017].