One Semester Individual, 40 Credits

CM3203

Initial Plan

Project Title: “Create a simple prototype for a Mathematical Problem Solver, aimed at young adults with Learning Difficulties, focusing on disability specific HCI and end user testing.”

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Special Provisions: None

Project Description:

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 is a difficult task. 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 Problem Solver. The aim of this will be to have a variety of pages, each page focussing individually on addition, subtraction, multiplication and scenarios based on day-to-day money transactions.

With the normality and accessibility to computer devices and the internet being at its peak, creating a Mathematical Problem Solver for the computer seems like the most convenient and efficient method. Therefore, after extensive research and requirement gathering to base my ideas around, I plan to design and implement an online prototype Mathematical Problem Solver. This will incorporate the usability heuristics and needs of people with learning difficulties to improve and support their method of learning. Whilst gathering the requirements to understand and incorporate said usability needs, I will also need to determine whether my system should be dynamic or static. Once this decision is made, I will use a combination of HTML, CSS and/or PHP to create the system.

There are many Basic Mathematical Problem Solvers currently available on the internet, however they are not designed specifically for people with learning difficulties. For the initial prototype the scope will be focussed on users with Down's Syndrome. However, I will expand to other disabilities, should time allow. Due to my intended audience, I must focus my user interface and design around usability heuristics that are aimed specifically at people with Down's Syndrome. After some in-depth research, I will understand whether that means including more visual aids, using specific colours or larger sized text. From my initial research alone I have discovered that: "vision is poorer in children with Down's Syndrome than in typical children of the same age."[1] This will already influence my user interface design.
I plan on using these existing Mathematical Problem Solver's as part of my requirement gathering process. I will investigate what my users like and dislike about them, allowing me to ascertain requirements that they may not think of. This will mitigate any potential risk of my users not being able to explicate their needs.

As my project will be based around people with Down's Syndrome, I should incorporate more end user testing phases. This will ensure maximum communication and interaction

[1] http://www.downs-syndrome.org.uk/news/vision-in-children-with-downs-syndrome-2/

with my users. This will be enforced to ensure that the system is understandable, usable and meeting the requirements for the intended user (I will also gather requirements from parents and carers to obtain requirements from varying perspectives). Due to the fact that my users have Down's Syndrome, I am aware that sometimes the ability to explicate their thoughts can be difficult. As a result of this, I will ensure that my requirements gathering with the beneficiaries is done face-to-face.

Project Aims and Objectives:

The following aims and objective will state what this project will allow me to achieve, based on my above description. These will be used to evidence the progress made throughout the project and will highlight the project's success on completion. There will be three categories to my aims and objectives; Essential (must have), are requirements that are needed in order for the project to be deemed a success, Desirable (Should have), are requirements that are not as imperative as the Essentials but are still considered necessary and Additional (could have), are requirements that are not necessary but would add value to the project if time allows for them to be implemented.

Essential:

- To effectively gather and analyse the **requirements** from both the parents and beneficiaries.
    - Gathering the parents' and beneficiaries' main requirements will enable me to uncover a concise and focussed aim. This will provide me with a greater focus and more attentive manner when carrying out my initial research and creating my initial design.

- Initial **research** must be carried out.
    - Research into various sites and similar applications will allow me to gather disability specific design and usability requirements, as well as potentially providing me with further ideas.
    - Research into HCI (Human Computer Interaction) and more specifically, Nielsen's Usability Heuristics.

- A personal objective is to reteach myself **HTML, PHP and CSS.**
    - This will enable me to create my prototype quicker, more efficiently and more effectively.

- The prototype must include pages to allow for the practice of **addition, subtraction, multiplication** and **money transaction specific scenarios**.
    - Ensuring that there are a minimum of 4 pages; one dedicated to each of the above categories will enable the prototype to develop the main areas of maths that are required in day-to-day activities.

- Must have **two phases** of **end user testing** and therefore at least **two iterations**.
    - Having multiple iterations will ensure end user testing is incorporated and completed.
        - End user testing will be focussed in two user pools; parents and beneficiaries. The parents will simply review the product and complete a questionnaire, as it is more time efficient and most parents have a busy time schedule. The beneficiary will have a physical end user test and will be interviewed; I will ask questions and they will provide the feedback, whilst I record their responses.

        - I have altered my testing methods to accommodate for the needs of the users. This ensures that I meet all requirements and obtain all opinions in a concise and clear manner.
    - Feedback is given and edits are made based on said feedback. This enables requirements to be adhered to and developed as the product is tested.

Desirable:

- End user testing to be completed by people who **have disabilities** as well as **those who do not**.
    - This form of testing would add a third user pool. The parents still review the system and give their feedback via questionnaire. However, we would add a second group of people, without learning difficulties, to physically test and use the product and provide feedback via a face-to-face interview. (These users will match the users with Down's Syndrome in age and gender).
        - This could demonstrate the essential differences required between users with and without learning difficulties.
        - It would highlight the importance of this project and the imperativeness of why requirements gathering, end user testing and general communications need to be altered to cater for users with disabilities.

- An additional section within the prototype that focuses on **division**.
    - As this prototype's aim is to teach the foundations of numeracy to allow for better financial ability, division is not essential. However, if there is time, it would be beneficial to include.

Additional:

- **Cross platform abilities**.
    - Allowing for access to the solver always; not just when on a computer or laptop at home.
    - This would involve making it accessible on phones, tablets, smart wear etc.

- A **variety of solvers** that can be **aimed at different disabilities and abilities** to enable maximum learning.
    - Every disability is different, and therefore usability and interface design must be tailored to those specific needs.
    - As with anyone, people with disabilities have varying abilities. That means that some people, for example, may be unable to read and may need a voice functionality to read the questions out loud for them.

Ethical Issues:

As I am going to be working closely with vulnerable adults, I am conscious that there are definite ethical guidelines I am to be aware of. Due to this I am currently having conversations with my supervisor. I am in the process of arranging a meeting with the school's ethical officer to discuss my project, to gain ethical approval and the guidelines I need to follow.

In the meantime, I am DBS checked and have worked closely with my end users for several years, through my volunteering activities.

Work Plan:

The table below demonstrates my current thought process of when I would like to achieve the aforementioned aims and objectives. You can identify the timeline through the week or dates provided (first two columns), the aims and objectives are highlighted within the 'Task' column and the deliverables/milestones that I expect to achieve are stated in the 'Deliverables' column.

Throughout the course of my project I will have weekly meetings with my supervisor to discuss my progress (assuming nothing untoward happens to prevent or postpone a meeting). In the unlikely case that a meeting in cancelled, or should I need to communicate with my supervisor in between meetings, I will also have contact through email.

My research and the gathering/editing of requirements will be continuous throughout the project; the more I observe and learn through my work and end-user testing, the more I will recognise and realise corrections or improvements. This will enable me to consistently develop my understanding and knowledge, as well as keep on top of new material that may surface.

Week:	**Commencing:**	**Task:**	**Deliverables:**
1	23/01/2017	• Carry out **background research** into disability and possible affects it could have on design and usability. • Edit and complete **Initial Project Plan.**	• Complete **Initial Project Plan**
2	30/01/2017	• Continue with **research**, going more in depth and focussed. • Start **requirement gathering** with both parents/carers and beneficiaries.	• **Requirement gathering/analysis.**
3	06/02/2017	• Begin watching YouTube videos, and accessing various sites such as W3C to teach myself and practice HTML and CSS. • Make **edits** to **Requirement analysis** based off feedback.	• **Understand HTML and CSS** at the required level (future reference to said sites will probably be needed). • Completion of **Requirements analysis**.
4	13/02/2017	• Make a **start** on the **creation of my prototype Mathematical Problem Solver.** (This will be based on the gathered/analysed requirements.)	

		• **Incorporate** and **continue** with **research**. Focussing on each of Nielsen's main 10 heuristics individually.	
5	20/02/2017	• **Continue** with the **prototype,** taking into account supervisor advisories.	
6	27/02/2017	• **Complete first iteration** of prototype . • Start **incorporating simple CSS**.	• **First iteration of Mathematical Problem Solver prototype.**
7	06/03/2017	• **Complete** my first round of **end user testing.** • **Obtain feedback.** • **Compare and contrast** the **feedback** and **usability** from both beneficiaries and testers who do not have disabilities.	• **End User testing results, comparisons and outcomes**.
8	13/03/2017	• Start **implementing the changes** requested or stemming from the feedback. • Continue to work more on **CSS**. • **Edit** and **finish results analysis** and conclusions.	• **Completion of end user testing results, comparisons, outcomes and conclusions analysis.**
9	20/03/2017	• **Continue with prototype work** from previous week, making **finishing touches** for the second phase of end user testing.	• **Complete second iteration of prototype.**
10	27/03/2017	• **Complete** my second round of **end user testing.** • **Obtain** second round of testing **feedback.** • **Compare and contrast** the **feedback** and **usability** from both beneficiaries and testers who do not have disabilities. • **Compare and contrast** to the **difference in feedback between iteration 1 and iteration 2** now that beneficiaries'	• **End User testing results, comparisons and outcomes.** • **Comparison between iteration 1 and iteration 2 feedback.**

		feedback and improvements from iteration 1 have been implemented.	
11	03/04/2017	• Start **implementing the changes** requested or stemming from the second iteration feedback. • **Edit** and **finish results analysis** and conclusions.	• **Completion of end user testing results, comparisons, outcomes and conclusions analysis** • **Completion of iteration 1 and 2 feedback comparison.**
Easter Break	10/04/2017	• **Get final End User Testing Complete.** • **Summarise final user test feedback.** • **Review** everything. • Work on **outstanding edits**. • **Complete outstanding work.**	• **Complete everything to a submission standard.**
12	01/05/2017	• **Review** entire project **with supervisor** and work on **edits**.	• **Complete project and submit.**

Project Risk Assessment

Risk	Impact	Likelihood	Mitigation
Not enough time to complete all elements	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.
Unable to obtain usable requirements or feedback from beneficiaries.	High	Medium-High	Due to my experience working with people with learning difficulties and with these people 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.
After discussion with Ethical Officer some of my work is not ethically right and cannot be completed.	High	Low	I will ensure that my meeting is as close to the beginning of the project as possible to ensure minimum time and effort is wasted, and that quick action can be taken to change my plan to allow for my ethical responsibilities to be adhered to.