

CA357 Human Computer Interaction

Final Report – Deliverable Two

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Contained is a report on the developing of our HCI second submission which includes a working prototype of our Leaving Certificate Points Calculator. In this, we document the various stages of our prototyping development cycle. We also include our findings of a heuristic evaluation of our user interface.

Before we started the second phase of our assignment, we as a group met up to discuss how we would go about designing our prototype to incorporate our user requirements. We started this by reviewing our findings from our first submission. Upon review we divided up our aims to first implement a low level prototype covering the core objectives of our findings and from this, develop it to achieve our other non-critical aspects of the site.

Low Fidelity Prototype

We started the design process by sketches. During a team meeting we sketched out a rough design of the layout of our interface. The main purpose of this was to all agree on the design layout and configuration of buttons and text. Again we insured we kept in mind the main objectives of this phase which was a clean and simple interface for the users.

After this we then moved on to a more graphical UI prototype. We used the prototyping application JustInMind to aid us. Having done sketches prior to using this tool it helped us to design a basic UI of our design concept. This showed us a more realistic prototype as we were able to add the buttons and text fields to our interface. After using this interactive tool we rearranged our forms around to unclutter the screen. We asked some of users for feedback about our improved design to ensure we kept to the standards we aimed to meet at the start of the design process. We surveyed them after to get their opinion about the design and layout of the interface. The feedback we received and the users experience with the interface was positive.

High Fidelity Prototype

After the low fidelity stage we were confident we could meet some of our other aims and objectives set out in the requirements gathering phase these included;

- Use of a cache manifest to avoid unnecessary assets downloads
- Use of local storage to save user data locally so it can be used again
- Store subjects and grades to save entering them every time one visits the site
- Have a default template for compulsory subjects e.g. (English, Irish, Mathematics and four empty subjects)

- Blank template, user only adds the subjects they wish

To implement these features into our interface we moved from the prototype stage to a HTML and CSS based platform. This would allow us to properly interact with our interface and let us input real values into fields in order to develop it further. Having already defined our design from earlier prototyping stages it really helped us in getting started with the next phase of our development. We developed a simple design that included the subjects being listed and calculating the grades of these subjects accordingly. We decided that we should use a JavaScript Framework to build this prototype as we could then code the web application to do everything in browser. We picked AngularJS as some members of the team was familiar with it, it included easy to implement accessibility modules, and it uses a two way binding system making it extremely easy to handle the subjects and users choices. Apart from the required AngularJS files we only had one JavaScript file for the site, this stored all the original data for both the subjects and the default boxes that are shown to the user. It also initializes the AngularJS application, loads the ngAria module which is used for accessibility and the code to store and read the subject and boxes arrays to and from localStorage. In the file were all the functions used in the application including those that calculated the points by getting the appropriate marks for a subjects depending on grade level and subject and calculating the points to be displayed to the user.

Regular User Feedback

Again we went back to our target market to get their feedback and ensure we remained true to our aims and objectives for this project. We did this so we could make certain that the layout and process was clear and simple. Having developed the fundamental operations of our site we then moved on to include the next set of features in our interface.

High Fidelity Prototype Cont'd.

By implementing localStorage on supported web browsers we were able to store the set of subjects and grades a user entered so they wouldn't have to enter the subjects each time they visited the site. This was one features that we wanted to include as users constantly gave poor feedback in our competitive evaluation

phase of other interfaces where they needed to enter the subjects each time. We addressed this by storing the compulsory subjects in an array and then loading this onto the page this way it would help users get their results faster. When a user entered their choice of subjects and grade each subject and grade was stored locally, so when they came back to the website their choices would be there just as if they had never left.

We also developed a blank template button at the top of the site. This allowed a user to clear their choices if they wished to and not have the compulsory subjects loaded. They would instead click the add subject button which spans the width of the page. Every time the user clicked this button a set of subjects would appear and the buttons for level and grade for the given subject chosen. Upon every subject and grade entered the points total would add accordingly. This was displayed in the footer of the page.

As mentioned earlier we planned to implement a cache manifest, this was so we could inform the browser to cache certain assets to avoid the unnecessary download of assets by the user. As the application is built entirely on HTML, CSS and JavaScript it can run completely in browser without any need to contact the server so a cache manifest which tells the browser to cache the main assets, means the user will only need to re-download assets if they have changed. It also means that as long as the browser's cache hasn't been cleared a user can view, and perhaps more importantly fully utilize the site while offline, or where internet is poor.

After this we carried out a heuristic evaluation following certain principles to identify if there are any usability problems in our design.

Having studied and looked over Ben Shneiderman's 8 golden rules we knew we could evaluate our design and interface by ensuring these principles were met. The most important for our project are mentioned below.

Strive for Consistency

We evaluated whether our site was consistent in its layout and design. We have a single font family throughout the design. Buttons are labelled and capitalised in an orderly and consistent manner. All buttons behave in the same manner and are

sized appropriately. With this consistency there is less chance of confusion when a user goes onto the site.

Cater to Universal Usability

We recognised early on that our target market would include people who are less savvy than the typical school going student therefore we ensured the layout of our interface was simple and everything was labelled. For example if no subjects are on the screen text appears prompting the user to add subjects by clicking the 'add subject' button below. This implementation enriches our interface and improves the overall quality.

We were also aware that the buttons and font needed to be of adequate size such that even people with reading difficulties would be able to navigate our interface. The colour scheme of our interface was also important. We didn't chose red or green colours for the fact the people with red-green colour blindness may have a different experience on our site than others. We chose a blue and grey colour scheme for the interface. While choosing our colour scheme we tested our site using the Chrome App "Spectrum", which allows us to instantly see how the application would look to people with different types of colour blindness. Interestingly we found that the colour blue psychologically evokes a trustworthy, calming and positive effect on both male and female users. It also is a colour that helps dyslexic people read, because it focuses the eyes on the text as there is less of a contrast between the two colours. We went back to our design and made adjustments keeping in mind this principle.

Obviously, we were also very focused on the accessibility of the site for users who had visual impairments that required the use of screen readers and other assistive technologies. With this in mind we included the ngAria module in our application to automatically update elements in the application based on AngularJS directives. We also included WAI-ARIA outside of the module to add functionality where the module fails, we included an aria live region that informs the user of their new total points when it updates and aria-labelledby tags so screen readers know what is labelled by what. During this stage of the development we tested the site using the Chrome Accessibility App "Chrome Vox", which is a screen reader, this ensured that we could view and use the site the same way as users who use screen readers.

Offer Informative Feedback

We ensured that for every user action there was a feedback from the interface. Minor actions included the CSS3 hover selector over buttons. This conveyed to the user that this is a button that can be clicked on. Other actions included adding up the user's points total for every subject they entered a grade for. The user would see this in big clear text in the footer of the page.

Support Internal Locus of Control

This principle refers to the extent an individual believes they can control events affecting them. This was an important principle for us as we wanted the interface to respond to the user's actions and we wanted them to feel like they are in control. We did this by employing localStorage to save the users subjects and grades for when they return to the site. This avoided the tedious task of constantly entering subjects every time and getting frustrated with the system. If the user wished to have a blank template the interface would remember this for the next time they returned to the site. This feature allowed the user to feel as if they are in control of the interface and from feedback this was a very positive unique aspect of our interface compared with competitors.

Conclusion

Having gone through several development stages of this project from requirements gathering through to prototyping. We were able to develop an interface that was responsive, addressed our user's needs and a step up from similar products on the market.

What helped us achieve this was a structured plan. We were able to first define our market, understand our users and gather requirements. From this we then went through several prototyping stages to eventually have a user interface that achieves what we set out to develop from our first submission presentation.