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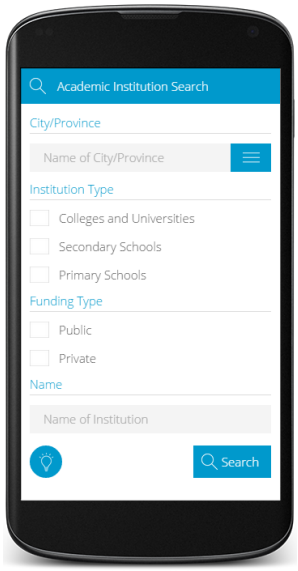
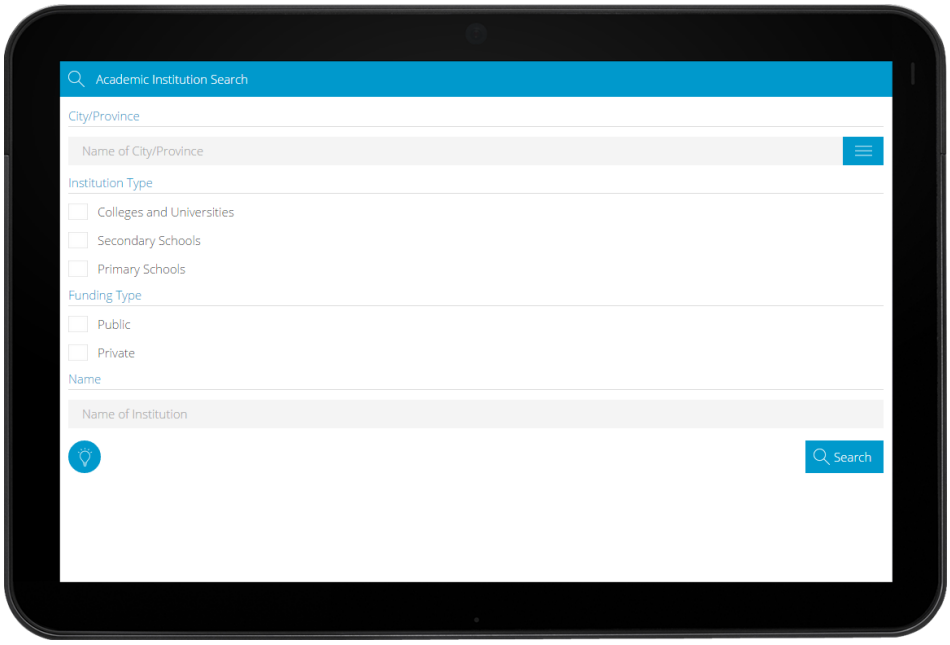
CHAPTER I - INTRODUCTION

1 - REQUIREMENTS

The coursework is to design a high fidelity multimedia prototype, which is a mobile website, based on the given scenario. This website should enable people to search for academic institutions in Vietnam and then look up local amenities, for example medical centers, places of worship, shopping malls, place to eat and stay. It should also provide an approximate cost of these, where applicable. More importantly, the prototype should take into consideration the current key issues for interaction designers including cognitive psychology, established design principles, methodologies and evaluation techniques.

2 - A FIRST LOOK





CHAPTER II - MOBILE DESIGN INVESTIGATION

1 - THE IMPORTANCE OF MOBILE WEBSITE

According to statistics from a report by *KISSmetrics (2011)*:

- Mobile browsing represented 0.7% of worldwide browsing activity in 2009 but by August 2011, this number had jumped to 7.1% (approximately 1000% increase).
- Researchers estimate that in 2011, 25% of mobile users expect to access the web from their device at least once a day.
- Website without mobile optimization has 3.5 average visits per user. In contrast, a mobile site can increase consumer engagement by as much as 85%.

From these figures, it can be seen that most of people tend to use their mobile device to visit websites. It is because the convenience of mobile device and people are even happier when they offer a good mobile experience. Therefore, it is significant to develop a mobile website.

2 - MOBILE DESIGN ISSUES

Base on the two characteristics which are user's working memory and screen size that limit the capacity of the communication channel *(Nielson Norman Group, 2014)*, this report addresses the main current issues in mobile design as well as suggests some possible ways that will be applied to the final design to solve them.

2.1 - Screen Size

Issue

In mobile web design for smartphones and other portable devices, one of the most common and difficult challenges to address is the screen size. When designing a mobile layout, the way we plan it to be displayed might not work correctly because the screen size is diverse while the content is consistent for all mobile devices. Small screens might interfere user with conducting tasks as well as perceiving information because of lack of space. Eventually, users have to waste their time scrolling up and down as well as left and right.

Proposal

The prototype should enable users to access on various mobile devices. The interface should be basic, with a simplified design, especially for small screens, enabling users to handle instructions easily and only display relevant information and content within the user's needs. The measurement should be relative in order to make the layout stretch flexibly across various screen resolutions (e.g. width = 100%).

As reported by *binvisions (List of Tablet and Smartphone Resolutions, 2012),* the resolutions for popular mobile phones and tablets (including Apple iPhone, Apple iPad, Samsung Galaxy S, Samsung Galaxy Tab, and Nokia Lumia), range from 480x320px to 2048x1536px, and the screen sizes range from 3.5" to 10.1"; therefore, the design is mainly focused on these screens compatibility and smoothness. However, making website compatible with smaller screen resolutions will be taken into consideration to bring in the best user experience. Particularly, the smallest mobile screen resolution is 240x320px with 3.1" screen size (Samsung Brightside); hence, this is the minimum requirement for the website to run correctly.

2.2 - Content

Issue

It is undeniable that content is the most important feature of every cultural website. But, too many contents on a web page, especially a mobile web page, would make user confused because they might not know where the information they need is; apparently, most of users are impatient, so they would leave in a blink of an eye instead of spending time for scanning. Moreover, too many contents on a web page will increase the loading time. Users expect mobile websites to load in under five seconds. However even five seconds is a long time. The user requirement often is "the faster the better". Therefore, the content should be optimized and it has to be relevant, worthwhile, and in particular suitable for mobile use.

Proposal

Loading time is considered to be the most significant factor for users to decide whether to leave or stay. Thus, the page content should be minimized as much as possible but it still brings users the most essential data they need. Moreover, the amount of scrolling required in the mobile website should be limited. This may involve splitting normal pages into multiple pages. Information should be also systematically organized to maximize user experience. In the context of this website, table layout is used to represent information.

2.3 - User Input

Issue

Another issue taken into account when designing website for handheld devices is user input. Typing on a touch keyboard is a slow and error-prone due to small screen size, this often makes users lose their patience and leave a website. Therefore, minimizing text input is crucial.

Proposal

In order to reduce user interaction cost, auto-complete functionality will be implemented. By this way, the appropriate results will be displayed if it matches the keywords entered by users, they do not have to type in the whole word. For instance, while typing "h" in the City field, a list of suggestion will be displayed for users to choose (e.g. "Ha Noi", "Ho Chi Minh", etc.).

3 - DESIGN IMPLEMENTATION

After analyzing some main issues in mobile design as well as proposing solutions, I decided to use my own CSS and JavaScript for the design implementation rather than using responsive framework such as Bootstrap or jQuery Mobile because the scope of this project is to design a website run on either a phone or tablet, no desktop experience required. Furthermore, even responsive framework helps developers to build website faster and make it accessible on all devices from smartphone to desktop, but it takes time to learn and in my opinion, it is quite difficult to implement as well as to customize.

jQuery library is implemented to the prototype to make it easier to write JavaScript. My JavaScript codes are mostly used for handling events, giving feedbacks to user and creating some fancies. In addition, Google Maps JavaScript API *(referenced in Assets/JS/myJS.js)* is also implemented to enhance the effectiveness of the design (this will be clarified later in more detail). However, the API is still customized to match with my final design.

4 - CONCLUSION

There are three main issues in mobile design are taken into account for the final design including screen size, content and user input. They are all minimized without using external responsive frameworks, only my CSS and JavaScript will do. Ultimately, while my CSS decides how the website looks, my JavaScript decides how the website talks.

CHAPTER III - COGNITIVE PSYCHOLOGY

1 - COGNITIVE PSYCHOLOGY AND USERS

Cognitive psychology is the study of human's mental processes including thinking, perceiving, remembering and learning. The core focus of cognitive psychology is on how people interact with computers to acquire, process and store information.

There are two types of cognition; experiential and reflective (*Norman, 1993, cited in Sharp et al, 2011*). Experiential cognition represents skilled activities that can be conducted without pausing to think, but they can be done effectively and effortlessly. The previous experience with different user interfaces will determine how users interact with elements on a website due to user habit. Reflective cognition involves thinking, comparing and decision making. This is the key to determine the effectiveness of a design because it motivates creativity and new ideas. In fact, when using a website, users often explore and compare the current interface with the previous they interacted and decide which one is better, do they have to learn the new one and change the way they interact or not. There are six kind of cognitive processes and they are interdependent, which means that several processes may be involved for a given activity (*Sharp et al, 2011*).

2 - COGNITIVE PROCESSES

2.1 - Attention

Attention is the process of concentrating on important things, it involves human auditory or visual senses; in the context of this design, only visual attention is involved. The purpose of this website is to allow people to search for a school and local amenities. Specifically, it will provide users a general information of a school and the details of local amenities they want to find.

When a user visit a website, he has a specific goal in mind, and he will have to perform some tasks to find information then match it with what he needs. Thus, it is important to bring what users need in front of their eyes. In the context of this prototype, the form fill-in should be highlight to allow users to quickly find where to type in their search criteria; likewise, the information should be represented respectively and exactly depending on what user wants and it should also be ordered logically by using techniques that make things stand out like colour, spacing.

2.2 - Perception

The process of perception is quite similar to attention, it refers to how information is acquired. Vision is the most dominant sense for sighted individuals *(Sharp et al, 2011);* hence, it is crucial to represent information in a particular manner, so that users can perceive it readily. This can be achieved by taking into consideration of the final design the following ways: using white space and border when grouping items, icons should be easy to distinguish and readable, text should be legible and high contrast with the background, giving appropriate feedback to user's touch sensations.

2.3 - Memory

Memory involves first encoding and then retrieving knowledge. It basically enables us to recall or just recognize something and response appropriately. For instance, answering a question or telling an old story. *(Sharp et al, 2011)* indicates that the more attention we pay to something, the easier it becomes to be remembered; therefore, the way we interpret information determines how it is represented in user memory and how easy it is to be retrieved later.

Consequently, it is important to minimize number of steps to achieve their goal in viewing a school details or an amenity information. The use of icons, buttons and links should be familiar to users, to enable users to recognize, rather than memorize; by this way, it will simplify the procedures for carrying out tasks and reduce user's memory load.

2.4 - Learning

Learning can be considered in two terms: learning to use a computer-based application or using a computer-based application to learn a topic. It is indicated by *(Caroll, 1990 cited in Sharp et al, 2011)* that users prefer learning through doing to reading instructions; hence, the final design should encourage exploration, but still constrain and guide users to perform their actions accurately. In the context of this design, users will be available to search for appropriate local amenities on a map implemented.

2.5 - Reading, Speaking, Listening

"Reading, Speaking and Listening" are three main forms of language processing. This is the way for information to be actually conveyed between the application and users. In the situation of a mobile website, reading text on a small screen is a big challenge for users. To overcome this, the text should be dynamically rearranged to adapt to the user's screen to represent the details of schools, amenities effectively.

2.6 - Problem-solving, Planning, Reasoning, Decision-making

Problem-solving and Decision-making are processes involving reflective cognition which means that users should be able to make quick decisions without researching. Therefore, the user interface complexity should be minimized. This can be achieved by designing with some web standards such as using familiar icon for button, selecting prior to typing; under the circumstances, magnifier icon is used for "Search" button, a list of cities is displayed for users to choose, etc. This will bring in user-friendliness and comfort because users are enabled to plan effectively and make decision rapidly.

3 - COGNITIVE FRAMEWORKS

Cognitive frameworks are conceptual frameworks and theories that explain and predict user behavior based on theories of cognition. There are six main frameworks in relation to interaction design including three internal frameworks and three external ones; however, the three discussed below will be taken into consideration for the design.

3.1 - Mental Models

Mental models involves in human's knowledge of how system works and they are used by people to fathom out how to react when something unexpected happens. It can be based on fact or previous experience. Let take an example cited in *Sharp et al (2011)*: what should be done; setting the thermostat as high as possible or turn it to the desired temperature. Many people choose the first option, despite this is incorrect. The mental model is not always correct, it depends on user experience.

Consequently, the design of this prototype will aim to create transparency, by making ways of interacting intuitive, providing clear instructions and where necessary, context-sensitive guidance for users.

3.2 - Gulfs of Execution and Evaluation

The "gulf of execution" and the "gulf of evaluation" describe the gaps that exists between the user and the interface *(Norman, 1986; Hutchins et al, 1986 cited in Sharp et al, 2011)*. The significant issue is how to reduce the cognitive effort of the user; which means, it should enable user to achieve their goals just by performing a certain tasks. In order to do this, the interfaces should be designed within the characteristics of the user.

Under the circumstances, the main purpose of users in using this mobile website is to search for a school and then relevant local amenities. The aim of this product is to represent users the respective information that they expect in an easy-to-understand way.

3.3 - External Cognition

External cognition is concerned with explaining how we interact with external representations (e.g. maps) and its main goal is to explicate the cognitive benefits. There are three activities and processes involved include "Externalizing", "Computational Offloading" and "Annotating and Cognitive Tracing".

Firstly, externalizing reduces the memory load for the user by reminding people of what to do, when to do as well as what they need to do. Secondly, computational offloading occurs when using an external tool or device to solve a problem; for instance, using supercomputer to analyze complex data. Finally, annotating involves modifying existing representations by making marks such as crossing off, ticking, and underlining; cognitive tracing is to manipulate external data into different orders or structures. Ultimately, external cognition provides external representations at the interface that reduces memory load and facilitate computational offloading.

Externalizing will be taken into consideration for the interface design; specifically, the interface will enable users to search for schools that matches their search criteria in case they forget the institution name or they want to find an appropriate institution. Moreover, google map service will be implemented in order to provide an intuitive way to find local amenities as well as facilitating computational offloading. Annotating by ticking in checkboxes to choose types of institution will also help users plan effectively what they are going to search

4 - CONCLUSION

My final interface design will focus on the following:

- User goal.
- Information representation.
- Element distinction.
- Feedback.
- Familiarity.
- Recognition.
- Exploratory interaction.
- Flexibility.
- Simplicity.
- Efficiency.
- Transparency.
- Reducing cognitive effort.
- Reducing memory load.
- Facilitating computational offloading.

These objectives substantially involves in design principles. Therefore, they will be clarified in more detail in Chapter 5.

CHAPTER IV - MULTIMEDIA USAGE

1 - CHOOSING TYPES OF MULTIMEDIA

Multimedia can be almost anything we hear or see, including, but not limited to, pictures, music, sound, videos, records, films and animations. In term of website, there are five multimedia types supported, they are sound, music, videos, movies and animations *(HTML Multimedia, w3schools).*

Only static images are chosen to be displayed across pages of this website; therefore, image is the essential multimedia type used. The formats of these images are .PNG and .JPG, they are all supported across many browsers on popular devices including iOS, Android, Windows Phone and Blackberry.

2 - USING TYPES OF MULTIMEDIA

It is undeniable that an image is worth 1000 words, it plays an important role in every cultural websites. Since the scope of this website is searching and retrieving information about a school along with local amenities, using images is considered to be the most suitable multimedia type under these circumstances. Particularly, an image of a logo will help user to recognize his institution in the list of tons of institutions within seconds because the logo distinguishes one institution from others. Likewise, an image of an institution will help user to partly imagine how it looks like; this makes user decide whether to perform next step, which is searching for local amenities, or go back to the list of institutions.

Funding the project further: Although this is a prototype, Google Maps JavaScript API is implemented in order to

If spend more time and cost, this could…. etc

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