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An Interactive Case Scenario For Teaching User Interface Design

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Introduction

The technological explosion of the 1970s has resulted in the development of very complex systems. The user interface also known as the Man-Machine Interface (MMI) became a general concern to both systems designers and researchers. The term user interface has been defined "as those aspects of the system that the user come in contact with" (Moran, 1981, p.4). The term "user friendly" was later coined to refer to a system that a user can easily interact with through its interfaces. In the mid-1980s the developing field of user interface design began to include aspects such as organizational issues, work practices, design, implementation and evaluation amongst others. A broader term "human-computer interaction" (HCI) was then adopted to describe this new field. Today, HCI is taught as a course (or as part of a course) in the computer science and information systems curricula of most universities. The knowledge in the field of human-computer interface development is intertwined, with no clear beginning or end. Designers of user interfaces must draw from as many sources of information as can be obtained at reasonable cost. User interface designers try to satisfy the human requirements of a system by applying knowledge from many areas: cognitive psychology, input and output devices, guidelines and standards, dialogue types, and (because design knowledge is inadequate) prototyping methods. It is multidisciplinary (Preece et al., 1994).

The explosive growth of the Internet in the late 1980s and 1990s has resulted in a paradigm shift that has affected all aspects of our lives. The ease of use and accessibility to the Internet - any time and any place has helped propagate its growth. This paper describes an effort to harness the strengths of hypertext and utilize it to develop an interactive virtual menu system based on a case scenario for user interface design using the constructionist approach (Papert, 1980a). The constructionist approach uses constructive tasks to impart knowledge. The objective is to motivate learning through activity. In this way, learning is made more effective. The approach taken to teach students user interface design is to allow them to have a hands-on experience through the interactive virtual menu system.

The interactive scenario allows the novice designers (students) to navigate the virtual menu system and to have complete control of the outcome. In this project, the frills and thrills have been reduced to a minimum while the basics of user interface and menu system design are emphasized. The interactive menu system is developed on the web and is used in conjunction with a version of the QUIS, Questionnaire for User Interaction Satisfaction (Slaughter, Harper & Norman, 1994). QUIS is used in this project primarily as a teaching tool to illustrate to the students what basic design features to look for in a good interface design and also to provide usability evaluation experience.

Approach

In learning user interface design, students often are unable to grasp the full implications of the techniques found in textbooks. There is a need for students to experience 'real' interfaces and learn through 'doing and experiencing', that is, constructionism (Papert, 1980a; Papert, 1980b). This project requires that the students interact and navigate through a virtual menu system on the web depending on what outcome is wanted and also provide a written quantitative evaluation of the interactive menu system based on a version of QUIS.

There are two motivations for this project. The first motivation pertains to the interactive virtual menu system on the web: To allow the student to interactively experience what a good (and/or bad) basic user interface for a menu system is like. The second motivation pertains to the use of a version of the user interaction satisfaction questionnaire based on QUIS: To clearly define to the students what basic criteria or features are required for a good user interface design or user interaction satisfaction and to provide usability evaluation experience.

This project is intended to get the student involved in an interactive exercise yet come away with a knowledge of what a good user interface design requires. There are a few criteria that are necessary for the successful implementation of any new tool, in this case, for teaching the basics of good user interface design. One major criterion is that the students should be able to interact with a complete menu system, so as to experience the importance of navigation and structure in a menu system without having to develop a complete menu system by themselves. The menu system should be complete so that it mimics a real-life system that has options for inputs, for specific processes that perform different operations on the data and for generating specific outputs according to the user's choice. Another

criterion is that the menu interfaces themselves should illustrate what is required from a user's perspective. The students should also be able to easily access this menu system wherever they are through the use of a computer. The success of the whole project actually depended on the students being able to access this menu system. The Internet is the ideal vehicle to deliver such a menu system. All the students have access to the Internet through their individual user accounts at the university. By using the Internet, the linkage structures of hypertext and image maps can be utilized to create a virtual menu system that actually 'works' when the user performs a direct manipulation of the metaphors on the screen. It is a virtual menu system because even though the metaphors (such as pushbuttons) on the screens are activated when clicked, the environment is just a shell made up of a set of embedded image maps using the hypertext markup language.
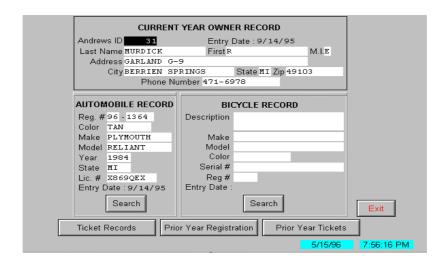
In this virtual environment, users will be able to interact with the menu system and navigate via a direct manipulation paradigm. Each student is provided with an adapted copy of QUIS to help them identify the basic design features to look for in an interface design and for evaluating the virtual menu system. Through the interactive menu system and the evaluation process (using QUIS) the student can gain an experiential knowledge of what basic features are required for a good user interface design and user interaction satisfaction.

Implementation

The setting for the virtual menu system is framed in a 'Campus Safety Department Database System.' The Windows-based system employs standard Windows user interfaces. The system allows the user to point at a "button" on the screen and click the mouse to execute commands. It also allows the user to move from one database to another without losing her place in any database.

As this tool is just a virtual environment, all the input features have been disabled. The overall depth structure of the menu system consists of three networked levels, with each level down providing a higher degree of detail. The first level basically serves as a main menu page and provides links for different options or tasks as well as more detailed information, found at the second level. The second level pages have links to other more detailed tasks in the third level that provides options to display different types of outputs or reports. This context-structured approach allows the user to navigate between the levels easily as well as within a given level (so that the experienced user need not return to the top level to see other areas of information). This particular method of representation seemed best to capture the "inherent organization" of the displayed items (Norman, 1991, pp. 263-265).

Navigation among the pages is facilitated by different pushbuttons, which appear either vertically and/or horizontally aligned at the bottom of each successive screen or page, depending on the type of interface. Each interface has a title that shows the current context as well as serving as a reference point as to where the user is and where the user can go. The pushbuttons and its captions provide the user information as to what option each pushbutton will provide. These pushbuttons allow the user to "reposition to cognitive landmarks" (Norman, 1991, p. 230), avoiding the necessity to always return to the top level. In this way, the user can efficiently move from one area of interest to another. By providing a menu system, cognitive overload is avoided which minimizes the need for memorization and reduces the possibility of errors, two principles of good interactive design. An example of an interface from the interactive virtual menu system is as shown on the next page.

Example of an Interface from the Virtual Menu System

Most of the features of the topography were chosen to promote a professional, simple image. The plain colored background was chosen for simplicity and clarity, as did the classic "white" background for the titles. Color was kept conservative, as per the "classic" professional look and also, so as not to overload the user (Shneiderman, 1992, pp.325-327). Pictures, Symbols, Signs, and Icons were kept to a minimum.

Discussion

The complexity of both humans and computing systems makes their interaction less predictable than we would like. Even the best intentions can result in unusable systems or, more often, in systems with problems. A version of QUIS was provided for each student to provide feedback on the usefulness of this tool for teaching user interface design. This questionnaire require the students to evaluate the interactive menu system based on four categories: overall user reactions, screen, terminology and system information, learning and system capabilities. Each of these categories contains questions that address specific issues within that category. The intent is for the students to evaluate the interactive menu system, and in the process, each category and its questions is expected to make plain to the students the basic requirements for a good interface design. There is also an additional question in the questionnaire to determine the usability of the menu system in assisting the students understand

user interface design. Thus, the aim of this questionnaire survey is not so much in collecting data for the user interface satisfaction but to determine if this project has

assisted the students to understand the basic features of a good user interface design. The feedback was collected from the student as a proof-of-concept. More than 90% of the students surveyed stated that the interactive menu system and the questionnaire has helped them gain a better understanding of what is required in a good user interface design and user interaction satisfaction. And 65% stated that it has been a great help. The results obtained from the feedback of the students indicated that this project was successful. The interactive virtual menu system based on scenario has fulfilled both its motivations.

As students' feedback, based on the prototype, have been positive, a more detailed study will be carried out in the future.

Selected References

References available upon request from first author.