

UXD for a Prototype Campus Information Kiosk

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Abstract: In this paper, user experience design (UXD) of a prototype campus information kiosk for Boğaziçi University (BUKIOSK) was presented in its initial phase. The kiosk has the following modules: a campus map, shuttle bus schedule, BUCard operations, a guide for Eat & Drink and Event information. The procedure consisted of a user survey, persona, scenario and task generation, design heuristics, system architecture, user testing and prototyping. The survey conducted with 71 participants revealed the following key points: Majority (75%) of the participants have difficulties in finding places in the campus; 56% of them looked for a map of the campus when they first arrived in the campus; and 82% of them favour the idea of a kiosk to support campus life and it is believed that kiosks would be helpful for orientation through the campus and following the events. The users in general thought that: the proposed kiosk is really necessary, and it would be pleasant and easy to use. With the planned further improvements, the design framework presented in this paper may provide a reference for the UXD of campus kiosks.

1 INTRODUCTION

Campus life plays a very important role both in university selection and university experience. According to Astin (1993) a satisfactory educational experience leads students to a better academic development. It was also concluded that the strong support for student services is a distinctive quality for a faculty and it is associated with positive educational outcomes. Siming et al. (2015) stated that campus services and facilities are radically related to student satisfaction. Therefore, services provided for the students to support campus life are beneficial to contribute to student satisfaction, hence to academic success. Conventionally, at university campuses help desks are provided for information services but this requires allocation of a certain amount of university resources such as university staff, rooms, land, etc. For example, at the Texas Tech University Libraries, the public service desk staff received 19,318 questions in six months (Litsey et al., 2015). It is possible to reduce this workforce dedicated to helping students by replacing the service desk with enhanced technological tools, i.e. public kiosks.

In recent years, Public Kiosks, which are defined as terminals that can deliver services at the point of need (Maguire, 1999), have been in use for various

purposes including airline check-in services (Lee et al., 2012), railway ticket vending machines (Sandnes et al., 2010), tourist information services (Slack and Rowley, 2002), public internet access (Er and Çağiltay, 2011), transportation services (Ekşioğlu, 2016), self-service banking (Paradi and Rock, 1997), collecting responses to questionnaires (Blignaut, 2004) and so on.

Nielsen (1994, 1994a) introduced 10 usability heuristics which have been the most well-known universal guiding principles in user interface design. These principles apply to a wide range of interaction applications, including public information kiosks. Maguire (1999) provided a summary of the guidelines asserted specifically for the development of public information kiosks, as well as a guideline for the user-based evaluation of public kiosks.

In one such study, Sandnes et al. (2010) evaluated the user experience of high speed rail ticket vending machine in Taiwan by developing sixteen heuristics. They detected design mistakes and proposed improvements by using a heuristic evaluation procedure. Similarly, Kamga et al. (2013) examined user experience of a touch-screen travel station kiosk system installed in subway stations in New York. Er and Çağiltay (2011) also performed a usability test for the kiosk that was already established in Middle East

Technical University (METU) due to the fact that usage rate was lower than expected. Johnston and Bangalore (2004) and Litsey et al. (2015) proposed interactive information kiosks as city guide and library kiosk, respectively.

In a more recent study, Ekşioğlu (2016) focused on an effective, efficient and satisfying user experience design (UXD) of an interactive public kiosk from scratch, for İstanbul Public Transportation System (İPTS) to solve the existing problems and satisfy the needs of the users. This was achieved mainly by considering a number of UXD heuristics and maximizing the user input in the design process.

In the present study, a design procedure similar to the one used in the study by Ekşioğlu (2016) was adapted with slight differences but for a different user group (mainly students) and application area (problems encountered in a university campus).

2 PROBLEM STATEMENT AND OBJECTIVES

A survey involving students and visitors of campuses of Boğaziçi University (Istanbul, Turkey) indicated a number of issues faced by especially new students and visitors. The identified problems mainly are related to the following areas: finding places (buildings, classrooms, facilities, etc.); accessing to shuttle bus schedules; finding food and drink options in the campus; following club activities and events held in the campus; and use of BUCard (a student ID card with bank card features). It is likely that similar problems are faced by students and visitors of college campuses around the world.

As stated by a number authors (e.g., Astin, 1993 and Simirg et al., 2015), the strong support for student services is a distinctive quality for a faculty and it is associated with positive educational outcomes. In addition, Litsey et al. (2015) suggested the possibility of reducing the workforce dedicated to helping students by replacing the service desk with enhanced technological tools, i.e. public kiosks.

A comprehensive search, including online databases like the ACM digital library and Google Scholar and also some proceedings and journals, indicates that no other studies exist in the literature targeting the mentioned or similar problems.

As a solution to the stated problems, this study aims to develop a touch screen information kiosk for Boğaziçi University (Istanbul, Turkey) campuses through a pre-defined UXD procedure which may set as an example for other university campuses. A

simple, accessible, user friendly kiosk is proposed through which students, employees and guests alike can access to useful information about the campus and events. The kiosk will offer the following features:

- A Campus Map, which shows the campus layout and allows search for buildings by names and acronyms used to signify them; presenting the photograph and historical information about the searched building;
- A module for Shuttle Bus Schedule, where users can check shuttle hours and display the routes and stops;
- BUCard money adding function via credit card;
- an Eat&Drink guide where the users can see the dining halls, restaurants and cafeterias nearby on a map and can display menu of the dining hall;
- An Event Guide that lists the current and upcoming events with time and location information, as well as an introduction of the event.

The concept of the campus information kiosk, named as BUKIOSK, was proposed in line with the results obtained in the survey, brainstorming and based on principles derived from the review of literature on UXD for public kiosks.

3 METHODS

Following the literature review of UXD of kiosks, group discussions in the form of brainstorming sessions and a survey with the prospective users are conducted in order to determine the issues of campus life at Boğaziçi University. As a result, a list of main difficulties affecting the campus life is created. The list includes the issues related to the orientation through the campus, eating and drinking facilities, transportation within the campus, following the events in the campus and usage of BUCard.

To further understand the user requirements, a persona representing the prospective users and scenarios are developed. The scenarios are pictured in storyboards. In the next step, the possible tasks are analysed to develop a system map and design screens based on relevant heuristics such that all functions are included. The screen designs are used to build a flipbook with which a user evaluation is conducted. The trial results and feedbacks of the participants are used for further improvement of the interface. A prototype is developed based on these results and feedbacks.

3.1 Heuristics of the Kiosk UXD

The design heuristics used for the proposed UXD of kiosk included the following:

- *Avoid unnecessary visual elements* (Sandnes et al., 2010).
- *Make text and elements visible* (Norman, 1998).
- *Communicate on multiple channels* (Smith et al., 1995).
- *Reveal all the needed steps from the start* (Gwizdka and Spence, 2007)
- *Provide clear affordances* (Sandnes et al., 2010):
- *Use “confirm and next buttons” sparingly – provide back buttons (undo)* (Norman, 1998):
- *Consider extraordinary users and physical constraints* (Newell and Cairns, 1993).
- *Consider aesthetic of the design* (Norman, 1998).
- *Provide language option.*
- *Consider the location and placement of the kiosk.*

4 RESULTS AND DISCUSSION

4.1 Survey

To verify the issues noted during brainstorming among four group members with some experience of UXD (2 PhD, 1 MS and 1 senior undergraduate students) in the guidance of their advisor and feedback from the students in the classroom, a survey was conducted among prospective users (i.e., Boğaziçi University students and visitors). The survey questionnaire consisted of 24 questions under six groups. The first group of questions was designed to inquire whether the students actually have difficulties in finding their ways through the campus and to learn what methods they adapt to overcome this kind of problems. The second group of questions was dedicated to understand where students usually eat in the campus and whether they need any application that could facilitate the eating and drinking activities. The third group of questions focused on transportation within the campus, questioning whether there is a need to support the existing transportation methods. The fourth part of the survey aimed to find out whether the students are effectively informed about the events taking place in the campus. The fifth group of questions was related to the effective usage of BUCard. In the last set of questions, the students were asked to verify whether there is a need for an information kiosk and their expectations from such kiosk. The last question was an open-ended question that provided the participants

opportunity to make further suggestions. The survey was designed as an online survey and distributed via Google Docs.

The main results of the survey based on the 71 respondents revealed that 75% of the participants have difficulties in finding places in the campus, 56% looked for a map of the campus when they first arrived in the campus. Another fact is that only a few students use car sharing and there is no request for a platform to carry out this activity. In addition, 82% of students favoured the idea of a kiosk to support campus life and believed that kiosks would be helpful for orientation through the campus and following the events in the campus. The survey results verified the existence of the problems that was speculated in the beginning. The need for an information kiosk was validated and the idea was supported by the prospective users.

4.2 Persona and Task Scenarios

In UXD, it is very important to understand what is going on in users' mind. Developing empathy would help to create this understanding of user expectation, goals, needs, experiences and behaviour. Creating personas is a technique to establish this empathy. Miaskiewicz and Kozar (2011) provide a ranked list of benefits of using personas in user-centred design process including problem scope definition, decision guide and improved usability,

In this step, according to survey results and the issues covered in problem statement, a Persona which represented a typical user of the initial interface was created. Although a wide range of users were targeted for the final design, in this initial design, a freshman, who will likely using the kiosk most frequently and would address the widest range of features, is created as persona. The character was employed in typical scenarios in which various tasks were simulated that cover main features of the kiosk. The persona played a role to show what tasks the interface could perform and how. When the relationship between the character and the scenario were analysed, required tasks, such as finding the classroom, looking for information about eating options and places, and events in the campus, were determined to meet the demands of the users. After tasks were specified, task analyses were performed to identify the necessary steps of each task.

The sufficiency of the system and the interface was evaluated through the tasks played by the persona. As a result, possible needs, improvements and required tasks were specified to fulfil the needs of potential users.

4.3 System Map and Screens

Considering the tasks and functions required to perform these tasks a preliminary system map was created and screens were designed (Figure 1 to Figure 4) with respect to the available heuristics which are described in Section 3.1.

In the system map, main screen, image zoom window and pop-up screen are represented with different shapes. Besides, for the screens which have 'return to home screen' and 'backward' options indicators (a pentagon and an arrow sign) were used to point out that these screens have these features.

The ease of use is one of the main principles for UXD. Therefore, simplicity was aimed in the design of BUKIOSK. It is also visible in the system map that the design of the interface is simplistic as the flat hierarchy can be viewed.

4.4 The Initial UXD of the Interactive Prototype Kiosk

The kiosk system was planned as an online platform which gets updated information simultaneously. Here, screen designs, features of BUKIOSK screens, main functions and basic interactions between the kiosk and users are explained. Besides, some examples from different screens about main modules of the kiosk are shown (Figure 1 to Figure 4). Screens are in English in this article but both Turkish and English versions are available. The layouts of the screens were first designed in Microsoft Office PowerPoint; and then the interactive prototype was modelled with the help of a software solution, Axure RP.

Main Screen (Home Screen/Welcome Screen): This page primarily includes five touch screen buttons which have links to each main functional screens (Figure 1). The buttons to the main functions "CAMPUS MAP", "SHUTTLE", "BUCard", "EAT&DRINK" and "EVENTS" are accessible on the main page to allow users to reach required information quickly. The buttons of Turkish and English flags which symbolize language options are available at the right corner of the screen. Also, there are three shortcuts at the bottom of the screen that link to extra functions, i.e., help, emergency and contact information.

Campus Map Function: This function is mainly an interactive map which shows current location of the user and important facilities, buildings and places such as mosques, libraries, banks, university buildings, sports centres, infirmaries etc. For those who want to search any building or facility, there is a

search bar on the top of the screen (Figure 2a). The standard search result screen for buildings is shown in Figure 2b. Back and Home buttons linked to previous screen and main screen, respectively, are provided.

Shuttle Function: In Shuttle Main Screen, there are two options of two shuttle routes. Each option is linked to Shuttle Screens which includes "Hours" and "Routes" options.

Eat&Drink Function: The Eat&Drink Main Screen includes three options: "Dining Halls", "Restaurants", and "Cafeterias". By tapping on "Restaurants" or "Cafeterias" the user can display image zoom windows that show closest restaurants or cafeterias on an interactive map.

BUCard Function: The BUCard function offers three options: "Balance Inquiry", "Add Money from Bank Card" and "ATM Locations" (Figure 3a) and related operations are shown in Figure 3b-c.

Events Function: This function is designed to inform people about events in the campus. On the Events Main Screen, users can check the list of upcoming events (Figure 4a). Each event in the list has a link to a screen dedicated to that particular event. The Event Screen has two options: "Event Information" (event name, ticket price and time) and "Find Location" (Figure 4b).

4.5 Flipbook Design and Focus Group Evaluation

The initial design of the interface was tested by a focus group with the help of a flipbook. Flipbook is a loose-leaf notebook that simulates functional interaction of the interface by displaying the screen designs and allowing the user to pretend to 'operate' the interface by flipping between 'screens' according to a given set of tasks. Figure 5 shows the flipbook design and represents the movement from screen to screen.

The flipbook was tested to understand the user experience characteristics of the interface. In order to evaluate the user experience of the interface with prospective users, five Boğaziçi University students were asked to perform the 14 tasks on the flipbook. During the trial, completion time of the whole set of tasks was recorded for each user, as well as task completion rates and number of errors. Moreover, the participants were asked for their objective evaluation regarding the experience they had with the interface, whether they liked it or not and whether they found it easy to use or not. They were asked to evaluate the likability ("How much did you like using this kiosk?").



Figure 1: Home screens in (a) English and (b) Turkish.



Figure 2: Campus map screens: (a) interactive campus map and search area; (b) standard search result screen for buildings.

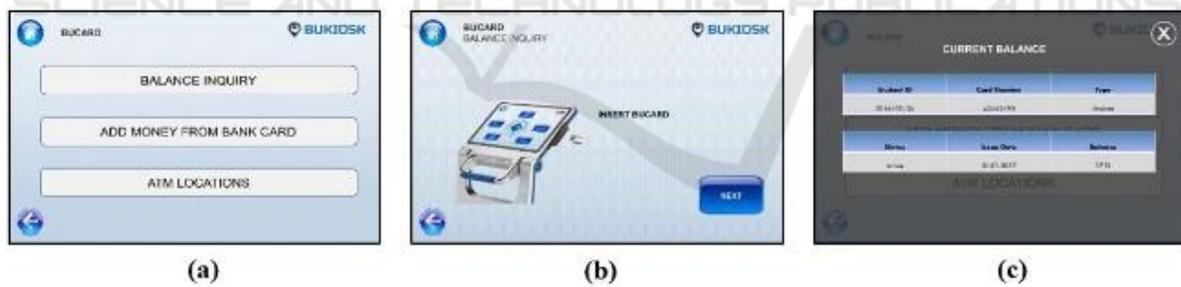


Figure 3: BUCard menu screens: (a) main BUCard screen; (b) animation screen about BUCard insert; (c) current balance.



Figure 4: Event function screens: (a) event lists and search; (b) event screen; (c) event information; (d) event building information.

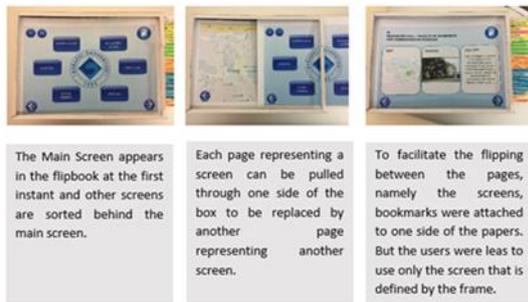


Figure 5: Sample photos of the flipbook physical model.

Please evaluate from 1 to 10. 1: I hated it 10: I loved it”) and ease of use (“How easy did you find using the kiosk? Please evaluate from 1 to 10. 1: It was extremely difficult 10: It was extremely easy”) in a 10-point Likert Scale. The results are tabulated in Table 1.

The task completion times were between 3 to 4 min. Maximum two mistakes were made by the users but the task flow could be quickly recuperated by using back and home screen buttons. The errors were noted to be considered in future revisions. All tasks were completed successfully in the end by all participants and no one failed to complete the task list. The interface was found to be highly easy to use by the participants and 4 out of 5 participants rated the interface as highly likable.

Table 1: Summary of the focus group study.

	Participants				
	1	2	3	4	5
Task completion time	3' 37"	4' 06"	3' 55"	3' 20"	3' 31"
Task completion success rate	100%	100%	100%	100%	100%
Number of errors	2	1	0	2	1
Likability	9	8	10	6	10
Ease of use	9	9	10	8	10

5 CONCLUSIONS

In this study, a UXD of a prototype public kiosk for Boğaziçi University, named as BUKIOSK, was developed. The design was completed by considering the UXD principles. Throughout the design process it was aimed at maximizing the user input in the design. In this respect; survey, persona and scenario generation, task analysis and user testing were conducted and feedbacks were obtained during class presentations. The problems arising from daily campus life were the motivators to develop BUKIOSK. The survey results confirmed that an information kiosk is a need for Boğaziçi University campuses. Hence, an interactive information kiosk design, which is intuitive to learn and use, is

proposed. A fairly simple design was developed by considering UXD principles so that users do not get confused due to the complexity of the interactions.

As a future work, using the results of the focus group study with the flipbook, the system map as well as the screen designs will be improved and a more comprehensive user testing will be conducted with the improved prototype and final design will be obtained.

The authors hope that the proposed framework of UXD of a campus kiosk may serve as a reference for other campus kiosks around the world.

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