Designing, developing, and testing a mobile health reservation system in the Egyptian context

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Abstract: The main subject of the research study is the implementation of m-health reservation system at the Arab Academy for Science, Technology and Maritime Transport (AASTMT), Egypt. The AASTMT was selected as a case university that offers health services to both staff members and students. The proposed system is based on the current electronic medical records of the academy’s staff at the clinic. The study tries to answer the research question: ‘What are the main usability problems that affect user experience with regards to m-health reservation system?’

In order to answer the research question, usability test was developed and tested on two phases, where respondents were asked to actually reserve an appointment at the academy’s clinic and to perform typical tasks using an iPhone 3G.

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The experimental evaluation was carried out at a controlled laboratory environment. The experiment was recorded, analysed, and conclusions were derived.

**Keywords:** mobile health; electronic health; usability; smart phones; user interface; reservation system.


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### 1 Introduction

The internet provides instant connectivity and global information services at a very low cost. It has changed and automated the way services are delivered to customers (Abd El Aziz, 2009). Mobile devices are becoming popular in accessing the web, making all sorts of information available at anytime and from anywhere. The upgrade of mobile devices, the expanded coverage of mobile telecommunications infrastructure, cheap and durable mobile devices has enabled flexible web browsing (Shrestha, 2007). However, regardless of increasing features of displays, their small size limits their ability to deliver the information effectively in comparison to desktop computers. Although the number of internet-enabled mobile devices are growing rapidly, not all websites cater to mobile visitors. They still seem to optimise their content exclusively for desktop clients. Thus, as
W3C director and web creator, Tim Berners-Lee said, that mobile web access has been a second class experience for far too long (Jacobs, 2005).

Mobile phones are used to extend people’s reach and delegate many functions that were previously time consuming. This simply means that m-commerce has a great potential to make a fundamental change in some industries like e-government, e-banking, e-learning and e-health, by shifting from ‘e’ to ‘m’. Albers and Kim (2000) have stated that people who use the web to take part in open-ended, exploratory behaviours, mobile devices seem to support task-specific use. With mobile web access, users usually find a personalised portal at front, which allows finding specific information. But, as Virpi Roto emphasised, many people only have experience with PC web sites only, and almost no experience with mobile websites. Their favourite sites may not have a mobile version, and sometimes, they do not know the mobile site address. They need to have access to the real full web, even if large pages are not highly usable on small screens. Now, it is indeed possible to use web browsers and search systems via mobile devices as well, which adapts the standard content to make it presentable for handheld access. However, the user experience may be very different from the way it originally intended by the designer; especially when the original design may be inconsistent in mobile web (Jones and Marsden, 2006). Not to mention that exploring, or searching using small screens can be a tedious and frustrating task.

In 2007, there were already over 3.3 billion mobile users (ITU ICT Eye, 2007). In 2009, the number of mobile payment users worldwide has increased 70.4%, where the number of users grew from 43.1 million users in 2008 to 73.4 million users in only one year (UMTS-Forum, 2005). According to a new research report by Berg Insight, the worldwide number of users of mobile services is forecasted to grow from 55 million users in 2009 at a compound annual growth rate of 59.2 % to reach 894 million users in 2015. In 2005, McKinsey and Company estimated that mobile commerce would soon be the second-largest industry in the world (Dai and Palvi, 2009). Egypt’s national telecommunications regulator stated that by the end of December 2009, the total number of mobile subscribers in Egypt has reached 55.848 million in January 2011 from 55.352 million in December 2010 (http://news.egypt.com/en/201003099671/news/-science-nature/egypt-mobile-subscribers-up-496000-in-january.html), which reveals a growth of 34.1%. At the end of December 2008, mobile subscribers were 41.27 million, according to data published on the Ministry of Telecommunication and Information Technology website. Mobile subscribers jumped 4.4% compared to the 53 million by the end of September 2009 (http://www.itnewsafrica.com/?p=9214).

The introduction of e-health represented the promise of information and communication technologies to improve healthcare systems. It has become an essential term (Alvarez, 2002), where it is regarded as the application of information and communications technologies (ICT) across the whole range of functions that affect health. It is the means to deliver responsive healthcare tailored to the needs of citizens (Silber, 2003). M-health though a relatively new concept, is still a subset of e-health. M-health is a combination of mobile computing, medical sensors and communication technologies in order to offer healthcare services. It uses mobile telecommunication and the multimedia technologies, which creates wireless healthcare delivery systems (Istepanian et al., 2004b).

Therefore, the presented study aims to evaluate the current e-health reservation system, to propose, design, implement and test the usability of a mobile health
reservation system at the Arab Academy for Science and Technology, in order to facilitate the academy’s clinic services.

2 E-health

Digital health is a broad topic. Within medicine and health informatics, e-health is usually understood as professional-to-professional interaction and patient to professional interaction to support ‘care’, where care is also determined via professional prescription (Schraefel et al., 2009).

The term e-health refers to services and applications that are related to healthcare through the use of information and communication technologies. E-health facilitates the exchange of medical data, physiological signals and medical imagery between computers. Gradually, with the availability of vast online information resources, other explanations of e-health evolve as people proactively seek out information for what may be considered self-determined, proactive and preventative care. Examples include seeking fitness, or information on treating minor illnesses. Some physicians fear the potential wrong actions taken due to misinterpretation of online sources and the increased number of questions some patients present to their doctors because they have done considerable homework prior to a visit (Pagliari et al., 2005).

3 M-health

M-health can be defined as the application of emerging mobile communications and network technologies for healthcare systems (Istepanian et al., 2006). It involves the use of mobile computing, medical sensors, and communications technologies for healthcare. Successful implementation of m-health makes the right information available at the right place, at the right time, and in the correct form (Whittaker, 2010).

The m-health field is remarkably dynamic, and the range of applications being designed is constantly expanding. In developing countries, the m-Health applications are mainly education and awareness, remote data collection, remote monitoring, communication and training for healthcare workers, Disease and epidemic outbreak tracking and diagnostic and treatment support. Currently, healthcare information technology (HIT) has advanced and been deployed in a variety of systems. HIT is useful to improve healthcare quality, improve efficiency, and reduce cost (Whittaker, 2010).

In 2004, Laxminarayn stated that the current health-care systems equation is ‘current organisation + new technology = expensive current organisation’ (Istepanian et al., 2004b). In order to include cost benefits in this equation, the whole system of care processes, roles, and responsibilities of team members, organisations, and structures, including technology, should be examined. Some of the developments in m-health show how emerging technologies can meet the growing demand for future m-health services. First, the evolution of current 3G wireless communications and mobile network technologies acts as the major driving force for future developments in m-health systems. Second, an appropriate integration of medical sensors into m-health systems allows physicians to diagnose, monitor, and treat patients remotely without compromising results. Third, m-health systems are an interaction of emerging mobile medical computing, medical sensor technologies, and communication technologies.
3.1 M-health uses and benefits

There are number of value-added attributes associated with m-health, some of which are ubiquity, convenience, instant connectivity, personalisation, and localisation of products and services (Turban et al., 2007). M-health is beneficial for patient monitoring and clinical care, reporting or health related to m-learning for the public, health services monitoring and emergency response systems such as road accidents (Malaria, AIDS, TB and diabetes). M-health adapts current health-care infrastructures and medical technologies to support future m-health services that are more reliable, flexible, and cost effective. This in turn, provides personalised healthcare in order to improve the understanding of the disease formation and correlating issues, such as genomics and the changing environments. It also highlights the effect of emerging health-care technologies on human life.

Usage of mobile technology has been growing rapidly in the developing countries. The trend within patient monitoring is to allow the patient more mobility (Raskovic et al., 2004). There has been considerable research and development in this area. There are many m-health applications that are already available such as personal health-care monitoring (Istepanian et al., 2004a); monitoring of soldiers in the battlefield (Park and Jayaraman, 2003); emergency of medical care and mass casualty event (Malan et al., 2004); home monitoring (Stanford, 2002; Warren, 2003); computer-assisted rehabilitation and therapy (Winters et al., 2003); and social networking of relatives of chronically ill patients.

SMS applications have been also used as an application for m-health to remind patients to take drugs and attend appointments. Blue tooth and web-based interfaces are also used in high-income countries to track the patient’s data. Studies from high-income countries focus on chronic or non-communicable disease treatment compliance, while studies from low-medium income countries focus more on infectious disease drug adherence. These applications generate benefits; as they increase access to healthcare and related information, increased efficiency and lower cost of service delivery, improved ability to diagnose, treat, and track diseases, timely, more actionable public health information, expanded access to ongoing medical education and training for health workers (Mechael, 2007).

4 Mobile devices usability

The smart phones market is one of the most dynamic and competitive markets in the consumer electronics industry; as the market has expanded by 75% in 2006 compared to 2005. Smart phones have a lot of features like traditional voice communication and messaging functionality. In addition to these features, it provides web access, personal information management, multimedia and business applications. With all these features, its costs have fallen significantly and this makes it more affordable.

Consumers seem interested in smart phones and all its features. However, they still face usability problems. Usability is defined as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use (Keijzers et al., 2008).

The variation in mobile devices screen size, its features and other related issues, brings in design challenge issues (Shrestha, 2007). Mobile device input is
often hard when compared with use of desktop device. Text input is particularly slow even on devices with dedicated mini-keyboards and forms are hard to fill in (Shrestha, 2007; Rabin, 2006). Small-screens is a another main problem; as it requires users to concentrate more in browsing or scrolling, and the larger the page size the longer it takes to load (Geven et al., 2006). Small screens also provide fewer visible options, which require users to rely on their short-term memory (Kaikkonen and Roto, 2003). Jones et al. has also reported that users of the small screen were 50% less effective in completing tasks than the large screen (Nielsen, 2009).

As the user interface is the environment in which online users conduct communication, information search, and transactions (Jones and Marsden, 2006), an important prerequisite for the success of m-commerce sites is ensuring that customers’ experience, satisfies both their sensory and functional needs (Venkatesh et al., 2003). An empirical research by (Ziefle and Bay, 2004) shows that being aware of the hierarchical structure of menus is of central importance to using a cell phone. The study reveals that the better the mental map of the menu, the better the usage performance of the device. Thus, usability is important for mobile devices, especially because many mobile applications remain difficult to use.

We expect that these design issues might be less problematic with smart phones because of the integrated features they have. Mobile internet is a main mobile application, which challenges user interface (UI) design. Mobile internet browsers often break the underlying interaction style consistency (Kiljander, 2004). Features, performance, security and add-on applications in smart phones depend on the operating system (OS) (Malykhina, 2007). Currently, the smart phone market is dominated by seven OSs: Symbian OS, Android, Mac OS (iPhone), Windows Mobile, RIM BlackBerry, Palm, Linux and since the launch of the iPhone: Mac OS X. Symbian is the market leader, installed on 100 million smart phones worldwide. In the USA, Blackberry and Windows Mobiles are market leaders.

5 Medical Services Department at AASTMT

The Arab Academy, running its medical administration by a set of skilled visiting professors in certain specialisations, and also stands in partnership with the best hospitals and medical laboratories as well as reliable radiation centres, which are known for their efficiency at the level of the republic.

This clinic is divided into sub clinics depending on the specialisation for example (dental, ophthalmology, and internal medicine clinic). This clinic serves the academy’s both staff and students. Patients can access the clinic either by actually going to its main location, visit the website of the clinic and make their reservation.

Each patient frequenting the clinic has a medical file on the computer to review his/her medical history, past medical history, which is skimmed by each clinic doctor in various specialties. In addition, the use of computers and internet were integrated in various tasks associated with the therapeutic service.

The e-health system website offered various services as follows:
A reservation process has been developed through the internet by accessing the website of the academy before reaching the clinic and it enables the identification of the patient’s turn to the target doctor, as well as the expected time period until the start of medical examination.

Awareness information tips are updated on a regular basis to educate and increase medical awareness of students and staff. These contain some information of the various prevalent diseases.

The partnership link let users know doctors, laboratories, hospitals and pharmacies that the academy is dealing with.

However, numerous problems are identified when using this e-health system. One of the main problems is that the reservation system is restricted to IP addresses located inside the academy, which means that the system will not work outside the border of the campus. This simply means that no one can use this system from anywhere at anytime. In addition, the ‘full’ website is not usable when accessed using a mobile web browser; as there is no customised version that was designed specifically for mobile devices. Furthermore, there is no search feature especially when searching for a hospital near a specific location.

Accordingly, an m-health reservation system was proposed to work in parallel with the existing e-health system. This system was designed, implemented and tested in order to overcome the previously mentioned problems.

6 Research focus

The aim of the research at hand is to evaluate the current e-health reservation system and implement a comprehensive m-health insurance reservation version at AASTMT. The proposed system is based on the electronic medical records of the staff at the academy’s clinic. The system aims to facilitate the communication in general and reservation in particular, with just one click on their mobile phones.

After implementing the proposed m-health reservation system, a usability test was conducted on smart phones, namely iPhone. User-centred design has improved the UI by reducing the number of keystrokes to perform a given task while at the same time providing better menu designs. The main subject of the research here is fixing the current system in order to increase health awareness and insurance.

The research focuses on staff only and will offer the staff the ability to reserve physician visits at the clinic through their mobile phones from anywhere and at anytime.

7 The proposed system

This system already has databases for the academy’s staff members, physicians and the available hospitals and pharmacies that have contracts with the academy. The system will keep patient records accessible by health-care professionals from any location by
connecting them to the institution’s information system. Physicians’ access to patient history, laboratory results, pharmaceutical data, insurance information, and medical resources would be enhanced by mobile technology and thus improves the quality of patient care.

As a result, this system helps the staff (patients) to minimise time and effort as they can see all the available physicians with their available time at the clinic so they can reserve which physicians they need through mobile phones. This m-health reservation system will consist of some links and processes that help any patient to make the reservation. The domain name was selected and registered as www.medicalserv.mobi; especially as it is a mobile domain. First, each patient already has a username and password for the clinic so he will login using his own username and password. Then, he will click on the ‘clinic reservation link’ to select the clinic he wants. After that, he can choose day and time to go to the selected doctor. After making the reservation, a confirmation message with a unique code will appear to validate his reservation. If the patient forgets his appointment date or he wants to cancel his reservation, there is another link called ‘my appointment’, where with just one click; he can review and update his reservations.

Moreover, as mentioned before, the system has links to the available hospitals, external doctors and pharmacies that the academy has contracts with. The patient can choose the hospital, doctors or the pharmacy and its location area. Furthermore, a link called ‘awareness’ allows the patient to access monthly medical reports that are issued on a regular basis to educate and increase the medical awareness of both students and staff. This link contains information about the various widespread diseases such as HIN1. Finally, a link called ‘contacts’ contains a list of the AASTMT clinics’ phone numbers.

**Figure 1** Print screens of some page of the m-health clinic reservation system (see online version for colours)

8 **Research question**

What are the main usability problems that affect user experience with regards to m-health reservation system?
9 Experimental design

In order to answer the research question articulated above, an experiment has been designed where participants are required to test the user interface system’s usability by actually reserving an appointment at the clinic using iPhone 3G.

The m-health clinic reservation website user interface was evaluated first by nine moderately experienced users performed typical tasks. Then the test was extended to include six more respondents working at different departments at the academy, making the sample a total of 15 respondents. The experimental evaluation was carried out at a controlled laboratory environment to allow participants’ perform tasks using mobile device browser in an attempt to minimise the possible distractions. The experiment has been recorded to facilitate subsequent analysis.

The equipment used was selected based on the given need for an internet-enabled mobile application, a rich graphical interface, 480-by-320-pixel resolution at 163 ppi, 3.5-inch (diagonal) widescreen multi-touch display, full QWERTY keyboards, touch gestures and ease of use of the mobile device itself. Accordingly, iPhone 3G has been chosen as the mobile smart phones on which the application should run (Apple website, http://www.apple.com/iphone/specs.html).

9.1 Interface design

The design of the interface has taken into account latest trends of mobile web design usability. The last requirement is particularly important when designing interfaces for mobile devices, given the space constraint on the screen of the mobile device.

The users performed seven different tasks during the test. Tasks were assigned to users one at a time on separate paper sheets during the test. These tasks are listed below:

1. login using username: Rehab and password: reh1234
2. reserve a date for the cardiologist clinic, date and time are ‘Thursday 30/12/2010, 11:00 – 11:20’
3. make sure that this reservation is registered in your appointment
4. search for telephone number of Dr. Nada pharmacy located at ‘Roushdy’
5. search for a doctor of Radiology located at ‘Cleopatra’
6. open the awareness tip for HIV and search for hospital at ‘Gamal Abdel Nasser Street, Miami’
7. search for the contact telephone of Miami clinic.

9.2 The experiment

Test cases were recorded using a microphone and two digital cameras, one of which was used in recording the expressions of the test subject and the other; a mini-camera, shooting the screen of the test phone. The two pictures were mixed together into one screen. The videotape created was used to confirm the observations made during the test. Two observers were available in all test sessions in order to monitor the test and take down notes of the events.
Participants were given an overview of the planned evaluation. Pre-test questionnaire (Church et al., 2006) was distributed and collected in order to record the participants’ demographic data.

The test aims at investigating the usability of the m-heath reservation system website considering its efficiency, effectiveness and user satisfaction. The test metrics have used the chosen definition for the usability from ISO 92401-11 (Jones et al., 1999). During the task execution, users were asked to think aloud whenever possible. After the test sessions, users were asked to fill in a questionnaire, which evaluates the application on a 5-point Likert scale. The questionnaires related to every application were handed to users after testing that application. The test subject provided lots of qualitative data, too. Some of the measures were used as criteria to assess the proposed system:

- Effectiveness was measured by calculating the number of completed tasks.
- Efficiency was measured through task execution times and the number of clicks needed for each task. The users will not be asked to perform tasks as quickly as possible, instead they will be asked to do the tasks at their normal speed, as the speed in task execution was not the main target in the study.
- User satisfaction was measured using survey questionnaires at the end of the test session. ISO standard defines satisfaction as: “The comfort and acceptability of the work system to its users” (Nielsen, 2009).

10 Results

In this section, effectiveness, efficiency and satisfaction measures for each task are analysed separately. In addition, the users’ actions and problems for each task are discussed in details to show the influence of smart phone platforms on usability.

10.1 Participants

Nine employees from BIS Department, College of Management and Technology, AASTMT took part in the test, after which, six more respondents working at different departments of the College of Management and Technology at the academy. The age of participants varied between the age of 21 and 45 years. Six subjects were males and ten were females. They all had modest to high mobile website experience and normally use the internet on a daily basis. All the participants had a smart mobile phone, some of which were iPhone, Blackberry, HTC and Nokia.

Out of 16 participants, ten had a good iPhone mobile using experience, four had average experience, and two had below average mobile phone experience. Five of these participants had no experience of web browsing on mobile phones as well. The other eleven participants browse the web using their mobile phone at least once a week. All participants use their mobile phones mostly for making calls, Blackberry messages and text messaging in general. They also occasionally use it for pictures, music and alarms and were very multitalented in their mobile phone skills. Those who use mobiles for browsing the web, mainly use it to access Facebook, and check emails.
Even though most participants never used this particular mobile phone together with mobile web browser such as Safari, they initially showed a positive attitude towards its use and were interested in to take the test.

10.2 User performance

Before beginning the first task on the mobile, all participants expressed that it would have helped if they had some previous experience of using this particular mobile phone and the same mobile browser.

- **Task 1:** Concerning the performance of Task 1, all participants completed this task successfully although the password was a combination of letters and numbers.

- **Task 2:** While performing Task 2, all participants had little difficulty recognising the appropriate button that they should click on. Only six user failed to do this task, four among them chose ‘doctors’ button and the rest chose ‘appointment’ instead of the ‘clinic reservation’ button although ‘clinic reservation’ button was in the top of the page and was bigger in size. However, they discovered the error and succeeded to select the appropriate button from the second attempt. As a result, it took little extra time to complete the task.

- **Task 3:** At Task 3, six out of 15 accomplished this task easily by clicking on the ‘appointment’ button to check the reservation that they have done, while the rest thought in order to perform this task, they saw the confirmation page only. They were accordingly considered to have failed to do it because they did not go to the ‘appointment’ button to see the reserved appointment.

- **Task 4 and Task 5:** Tasks 4 and 5 are almost similar except for the searched data that is different. In Task 4, 13 participants completed the task easily, seven participants succeeded from the second attempt and the rest failed to do this task. Two of them searched the internet for the required data instead of using our reservation website to search for ‘Dr. Nada’s pharmacy that is located in Roushdy’, and thus they got wrong data. Although Task 5 is similar to Task 4, amazingly all participants succeeded to perform this task from the first attempt.

- **Task 6:** Concerning Task 6, the user should click on the ‘Awareness’ button and select HIV tip which opens in a new window and then return to the website to search for a hospital located at Miami. The main problem in performing this task is to return to the clinic reservation window. All participants succeeded to perform the first part of the task as they opened the HIV tip but only nine of them could return safely after two trials and the rest failed to return back to the site and to complete this task.

- **Task 7:** Concerning the last task, six of the users failed to do this task as they could not return to the site from the previous task, four of the rest failed to perform the task from the first trial; as they clicked on a wrong button ‘doctors’ instead of ‘contacts’ but they discovered their error, and actually did the task from their second attempt.

10.3 Data analysis

Evaluation results were analysed to identify the user experience on clinic reservation mobile browser. The results below highlights the usability problems participants faced
during the evaluation. It also reflects on users’ satisfaction and subjective feelings in using the mobile phones for the clinic reservation system. One of the major incidents observed during the test was that participants were visibly seen lost very often in long web pages such as in the ‘awareness’ page, and so they needed a lot of careful scrolling to locate the right information on the small screen. Moreover, the number of succeeded tasks from second attempt was too high.

- **Effectiveness:** Concerning the ‘tasks completed; all participants completed Task 1 and Task 5 but only 13 participants managed to complete Task 4 easily using the mobile phone.

- **Efficiency:** Regarding the ‘task completion time, the average time participants spent on performing all tasks were 8:20 minutes. Task 1 was the fastest task done as it took 22 seconds on average. Task 6 was the longest task (2:25 minutes) as the users have to open a PDF file, which it took time to be downloaded, in addition, they took more time in order to discover how to return back to the website window.

Additionally, Table 1 shows a comparison between the minimum number of menus (keystrokes) needed to execute the task and the actual average number of menus (keystrokes) occurred during the experiment

<table>
<thead>
<tr>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
<th>Task 4</th>
<th>Task 5</th>
<th>Task 6</th>
<th>Task 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini keystrokes</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Average (no.)</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

- **Satisfaction:** According to Zhang et al. (1999), user satisfaction is the result of the interplay between the features in the web environment, user’s information seeking tasks, and information seeker characteristics, and it is usefulness to determine what makes a user satisfied. User satisfaction is an important usability measure to study the perceived success of any kind of interface. Tasks were purposely chosen to be simple and the main focus of the study was to evaluate the user’s experience of the system, which depends on the mobile web interface.

In this evaluation, participants were interested in mobile clinic reservation website and did not have problems in understanding the way web pages could be viewed on the mobile browser. Using the mobile clinic reservation system is easy to understand and participants could easily learn to work with it, they found it not very simple to interact with, which simply reflects their mobile web browsing experience.

A USE questionnaire with 5-point Likert scale was used to evaluate the user satisfaction:

1. Perceived usefulness questions that aimed to see whether the system is useful or not, it was 4.3.
2. For questions concerning the easy of use, the average was 4.2.
3. For questions related to the ease of learning, the result was 4.32.
For the question ‘How can you recover from mistakes quickly and easily?’ 5-point scale was used, and the average result was 3.65. This shows that participants find it easy to correct their mistakes.

For questions asking if the user was satisfied, it was average, with a result 4.1.

The average rating for overall of the system experience on mobile phone was 4.4.

11 Conclusions

There are limitations for accessing websites via mobile phones due to small screen sizes. The analysis of the system user experience shows that the site has a good potential and participants were almost satisfied. The evaluation was conducted in a lab environment, participants did not face problems of long downloads and broken connections. Some desirable features such as, ‘search’ function within the page, bookmark manager using folders, ability to use other functions of the phone without exiting from browser and saving web page for offline viewing could immensely enhance the functionality of the browser. In addition, some button labels should be changed such as ‘appointment’ and ‘clinic reservation’ as the users got confused, so when choosing label, user can scan it and easily identify and select the right button without confusion. Besides, it is important to give users a feeling of control over the site and they should never get lost within the page or not know how to return to the site. Also, users should not be restricted to think that the best way to look at a website is to look at a particular format, as different users may have different preferences. Browser support for multiple layout modes such as natural fit, fit to screen width and zoom and other possible ways of viewing the same content could give great flexibility. In the small screen, browser should also give indication of how long the page takes to load and where in the page are the users.

References


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