A STUDY ON THE USABILITY OF A UNIVERSITY REGISTRAR'S OFFICE WEBSITE THROUGH THE METHODS OF AUTHENTIC TASKS AND EYE-TRACKING

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ABSTRACT

Universities are one of the most important institutions that offer online services. It is observed that one of the most used web pages by university students is the registrar's office website, since students can access a great deal of information they need through this page. In this study, the usability of the registrar's office website, which can be regarded as the most-used and most-needed website by students, will be examined. The aim of this study is to demonstrate the usability of Hacettepe University Registrar's Office (HURO) website for students. To this end, researchers defined authentic tasks by considering situations that students use the most. The data were collected both using the data collection instrument developed by the researchers and the eye-tracker in a human-computer interaction laboratory. The usability of the website was tested through tasks performed in authentic or suitable environments with authentic users, problems related to usability were put forth, and solutions offered were presented. The results indicated that while none of the users reported problems in terms of content and up-to-dateness, the site could be improved in terms of its visual design and navigation.

INTRODUCTION

With the advancement of the internet, user-based system design has become important in the web environment. The increased volume and speed of information sharing via websites paves the way for questions about how the users can access information and use websites more effectively (Şengel & Öncü, 2010). Design of websites by paying attention to their usability has become an important issue today. In this respect; numerous variables such as the characteristics, interests and purposes of use of people are regarded as important variables that need to be given priority while defining the properties that websites should have (Lee & Koubek, 2010). After the characteristics of users; other factors that render a website successful and preferable are ease-of-use, performance, aesthetics, cost, the value of information that is provided via that website, and the extent to which it satisfies users' demands (Rosson & Carroll, 2002). Among these factors, usability has always been regarded as one of the most important factors that influence users' preferences.

Usability, in its simple sense, is defined as for a person who uses a product to rapidly and easily accomplish her task (Dumas & Redish, 1993). IEEE (The Institute of Electrical and Electronics Engineers), on the other hand, defines usability as facilities where users learn about the processes, prepare inputs accordingly and interpret the system's outputs (Andrzejczak & Liu, 2010). Usability is also referred to as the easy and effective use, under suitable environmental conditions, of works, which are defined in an application, after giving the required training and technical support to those users who have been specified as the target audience (Acartürk & Çağıltay, 2006). Nielsen (2003) suggests that usability is of great importance for web applications, and that people will not use a website if it is difficult to use it, if it does not clearly demonstrate its objectives and what can be done on it, if people get lost on it, if texts it includes are not easily legible, and if the website does not answer important questions.

Then, what makes a product or a system usable? What features embedded in it make it easily usable and friendly? These questions are not the ones understood by everybody in the same way and answered easily. What is easy for a user might not be easy for another one (Nielsen, 1994). Norman (1988), while defining user-friendly design, suggested that those designs that are based on users' needs and interests, and that focus on rendering products usable and comprehensible can be user-friendly. According to Norman, products become usable and comprehensible when the end users understand what they want to do and states what they can do. Then, it could be argued that what makes a system or a product user-friendly is its user-oriented design.

Characteristics that are attributed to usability in several definitions in the literature were grouped under different categories and then analyzed. ISO (International Standard Organization) defined the three essential aspects that should be considered while determining an interface's usability level as effectiveness, efficiency and satisfaction (Norman & Panizzi, 2006; Smith, 1997). In ISO's definition; effectiveness is measured with respect to the levels

of users to accomplish their objectives and tasks accurately and fully; efficiency is measured with respect to the resources, time and efforts spent while accomplishing these objectives and tasks; and satisfaction is measured with respect to the positive attitudes of users towards the use of the system. These three elements specified in the above definition are frequently used in the evaluation of websites' usability along with the usability of many other products (Uçak & Çakmak, 2009). Thomas (1998) divided usability features into three main categories: output, process and tasks. Elements of effectiveness, efficiency and satisfaction involve the outputs of the system; ease-of-use, interface, learnability and memorability involve the elements that influence the process of the system; whereas functionality and compatibility involve the tasks related to the system (Gürses, 2006).

Usability testing involves systematic measurement techniques based on testing interfaces through authentic users and authentic tasks (Dumas & Redish, 1993; Rubin, 1994). There exist a high number of methods and techniques used in usability evaluation: participatory design, focus group researches, paper and pencil evaluation, expert review, usability tests, field researches, monitoring studies, and usability calculations (Rubin, 1994). The usability evaluation methods defined in the literature are divided into three: inquiry, inspection and usability testing (Battleson, Booth, & Weintrop, 2001). In the inquiry method, users' opinions about the product are collected by means of various check lists or questionnaires. In the inspection method, the product is inspected by experts. Finally, in the usability testing method performed by authentic users, users are observed while they are fulfilling the authentic tasks related to the product. In a sense, usability testing is making pre-determined users fulfill pre-defined tasks in the product (system, interface, and website) that is intended to be evaluated and asking these users in this process to evaluate the product with respect to effectiveness, efficiency, and satisfaction. The aim of this method is to examine the interaction between the product and the user and to detect the usability problems that hinder the use of the product (Kılıç and Güngör, 2006).

There exist three different opinions about the evaluation of usability:
•   Product-oriented: It can be evaluated through the product's ergonomic features.
•   User-oriented: It can be evaluated through the user's mental effort and attitudes.
•   User performance: It can be evaluated through the way the user interacts with the product. For example, ease of use is related to the extent using a product is easy or difficult, whereas acceptability pertains to the use of that product in the real life (Bevan, Kirakowski, & Maissel, 1991).

Usability tests have five common features (Dumas & Redish, 1993):
1.   The primary goal is to improve the usability of the product. There should be more detailed targets and interests while planning for each test.
2.   Test participants should represent authentic users.
3.   The participants should do real tasks.
4.   What participants do and say should be observed and recorded.
5.   The obtained data should be analyzed, potential problems should be diagnosed and changes should be recommended to fix these problems.

In usability tests, more than one technique and method can be used together. The primary methods are observation and interview techniques. In usability tests in which the participants are selected from potential users, the tasks that will be performed by the participants should be defined by researchers beforehand. During the test, various techniques are also employed in order to collect data such as video recording, capturing, transaction file analysis, and think aloud protocol (Gürses, 2006). Additionally, the eye-tracking method is also employed in usability studies. Eye-tracking practices are used in fields such as neuroscience, psychology, industrial engineering, human factors, marketing, advertising, and computer sciences (Duchowski, 2002). The method of tracking eye movements has been known for a long time; however, the usability of the method has increased only with technological advancements (Özdoğan, 2008). Besides, thanks to new technologies, users' eye movements can be tracked more easily and accurately during human-computer interaction (Özçelik, Kurşun, & Çağıltay, 2006). Eye-tracking is a method that provides objective and quantitative data about attention processes and it is argued that it adds a diagnostic dimension to the evaluation phase of these methods (Duchowski, 2002). This method provides data about at what points and for how long an individual looks and thus produces a significant amount of data about the processed information or the point in consideration (Nakatani & Pollatsek, 2004). Practitioners can obtain more information by using eye-tracking data about the fields the user focused more on a website, the fields that were overlooked and the fields that distracted her (Russell, 2005). In addition, eye movements reflect knowledge acquisition (Lohse & Johnson 1996; Rayner 1998). Using eye movement data obtained through eye-tracking, information can be gathered about how the users have learned how to use the designed website.

With the advancement of distance education and web technologies, institutions' websites should be original and

usable pages that offer fast access to information and provide good experiences. Today, university websites are the media where students, university administrators, and other people share information, which makes these websites very important in the lives of these people.

University websites include webpages of Registrar's Office, which carries out students' all university-related procedures throughout their affiliation with the university and performs the task of inspection in this respect by working in cooperation with relevant units. Through these pages, follow-up of numerous activities are carried out such as students' enrollment procedures, announcements about courses, scholarships, graduation procedures, arrangement of documents about students, and so forth. Since these webpages are used by university students very frequently, they should be ensured to be easy-to-use, effective, efficient, and satisfactory. Website developers should understand this condition, know well why individuals visit these pages, what their expectations are and what they want to do on these pages (Zaphiris & Kurniawan, 2007).

Kıyıcı (2011) studied the perceptions and descriptions related to human-computer interaction and its basic concepts of teacher candidates studying at a Computer Education and Instructional Technology department. The results indicated that the teacher candidates properly described the Human-Computer Interaction and related basic concepts. However, when teacher candidates were asked to describe the concept of usability, %54 of the responses focused on satisfaction, while only %27 of the responses included effectiveness and %19 of the responses included efficiency. Kıyıcı (2011) indicates that these individuals will be responsible from instructional programs and software development including the web sites. Therefore, it is essential to provide exemplar methods of usability testing in our field. Kıyıcı's study is the only one related to Human-Computer Interaction that came out in the Turkish Online Journal of Educational Technology. This study is important in that it aims to contribute to this line of research while at the same time providing an exemplar methodology, namely the utilization of usability testing methods along with eye-tracking technology.

THE STUDY

AIM OF THE RESEARCH
In this study, it is aimed to test the usability of Hacettepe University Registrar's Office (HURO) website, where students carry out all university-related procedures throughout their studies online. The unit of analysis was chosen as the registrar's office web site for the reason that it is the most commonly used service by students at a university. In addition, the researchers were contacted by the Registrar's Office and conveyed the difficulties they encountered related to the usability of the website. Additionally, reported student complaints about the site paved the way to the reason for this site to be the main unit of analysis. So it is aimed to determine the problems that students encounter while using the website and to demonstrate what needs to be done in order to improve the effectiveness of the website. Finally, it is aimed to obtain students' opinions about the design of the medium. The main page of HURO website is shown in Figure 1.

RESEARCH METHOD
In this research, the case study method, which is one of the qualitative research methods, was used. Case study is a research method, where the phenomenon that is investigated is examined in its own living framework, the boundaries that separate the phenomenon and the environment it is found in are not strictly clear, and more than one proofs or data sources are used together (Yin, 1984). According to Creswell (2007), case study is a qualitative research approach in which the researcher examines one or more conditions limited to a certain time period through data collection tools that involve multiple sources, and defines conditions and themes related to these conditions (Yıldırım & Şimşek, 2006). In this study, the website was examined by the researchers thoroughly and authentic tasks were defined for students. Students were observed and the process was recorded while they were using the website.

PARTICIPANTS
The study group consists of 10 students attending different departments at Hacettepe University. The maximum variability sampling, which is one of purposeful sampling methods, was used in determining the study group. The purpose of maximum variability sampling is to construct a relatively small sample and include a wide range of extremes in this sample (Yıldırım & Şimşek, 2006). Students were selected from different faculties, different departments, and different grades. Most of the students were chosen from faculty of education based on the information that more number of students from this faculty experienced problems related to usability; however, 20% of the participants were also included from other faculties. Further, the distribution of participants to different departments was pursued. In addition, gender of participants was equally represented: the group includes five female and five male students. Table 1 shows demographic data about the participants.

Figure 1: Mainpage of HURO Website

Table 1: Distribution of Users by Faculty, Department, Grade, and Gender

Users	Faculty	Department	Grade	Gender
User 1	Faculty of Education	CEIT	4	Female
User 2	Faculty of Education	CEIT	3	Male
User 3	Faculty of Education	Classroom Teaching	1	Female
User 4	Faculty of Education	English Teaching	2	Female
User 5	Faculty of Education	English Teaching	2	Female
User 6	Faculty of Education	CEIT	2	Male
User 7	Faculty of Education	CEIT	3	Male
User 8	Faculty of Engineering	Electrical-Electronics	1	Male
User 9	Faculty of Education	CEIT	2	Male
User 10	Health Faculty	Nursing	4	Female

Table 1 shows that students are distributed between Faculty of Education, Faculty of Engineering and Health

Faculty. Of eight students selected from Faculty of Education, five study Computer Education and Instructional Technologies (CEIT), two study English Teaching and one studies Classroom Teaching. One student selected from Faculty of Engineering attends the Department of Electrical and Electronics Engineering, whereas the student selected from Health Faculty studies Nursing.

As is seen in Table 1, four students were selected from the second-grade and two students were selected from each of other grade levels in order to ensure the participation of all grade levels in the study. In this respect, the study is able to demonstrate the opinions of experienced and inexperienced students. The motive behind including more first and second-graders is to put more emphasis on those who recently started to use the website.

Students were also asked questions regarding their computer and internet using experiences and number of hours they spend per day using computer and the internet. It was found that most of them have a computer and internet using experience of 4-6 years, whereas CEIT and Electrical-Electronics Engineering students have an experience of more than 7 years. In addition, while CEIT students reported that they spend 4-6 hours every day using computer and the internet, students from other departments reported 2-4 hours. In conclusion, the students who formed the study group of the research are experienced in using computer and the internet and use them every day.

RESEARCH PROCEDURES

Firstly, the researchers reviewed the HURO website and defined authentic tasks to be carried out by the students. While defining tasks, it was ensured that all sub-menus on the website would be used and tasks would be defined about all activities on the website. The researchers initially defined 20 tasks; then discarded eight of them since they were in parallel with the remaining twelve. While two of them were asked in order to make observations about returning to the homepage, the other ten are the main tasks all users are asked to complete.

DATA COLLECTION INSTRUMENTS

In the data collection, qualitative and quantitative approaches were used together. To this end, the researchers developed various forms and questionnaires explained below.

• Usability Test Information Form: This form informed the users about the aim, content and operation of the study.

• Computer and Internet Use Questionnaire: In this questionnaire, questions were asked aiming at determining the users' demographic characteristics, purposes and frequencies of using the website, and computer and internet use levels.

• Usability Satisfaction Interview Form: A semi-structured interview form was formulated in order to obtain the users' opinions and suggestions about the usability of the website.

• Website Evaluation Questionnaire: This form was prepared in order to gather the users' opinions through their grading the website with respect to its design, navigation, up-to-dateness, and content.

• Observation Form: This form was prepared in order to record data during the usability implementation.

• Form of Authentic Tasks to be Performed: It involves the tasks to be carried out by the users. Table 2 demonstrates the list of tasks to be completed by the students.

Table 2: List of Tasks

Tasks	Explanation
Task1	Find the information for contacting the Registrar's Office.
Task2	Find the date the classes begin in the Spring 2010 Semester.
Task3	Download the sample application form for taking the foreign language proficiency exam to be conducted by the School of Foreign Languages at the end of the Fall Semester of the 2009-2010 Academic Year.
Task4	A student received 67 as a grade in a course. Find the letter grade and coefficient equivalence from the regulations.
Task5	Find where to apply for a new password to be used for online actions on the HURO website in case you lose it.
Task6	Find the total number of credits you take this semester.
Task7	Find the date of the oldest announcement in the announcements archive.
Task8	Find what need to be done in case you lose your ID Card and need to get a new one.
Task9	Open the university's Beytepe Campus map.
Task10	Open the course evaluation survey page.

- Eye-tracking records: These are all the image, voice, screen and data records obtained from the implementation performed with three students in the human-computer interaction laboratory.
- Voice records: These are the voice records obtained from the implementations performed with seven students in authentic environments.

DATA COLLECTION PROCESS
The data collection process was carried out in two dimensions. While the first was in authentic environments with seven students, the second was carried out in a human-computer interaction laboratory with three students.

In the dimension carried out in authentic environments, researchers worked with students in, when available, environments such as department laboratories where they used the website. When not available, somewhere else suitable for users was selected by the researchers. The process commenced with the reading of the usability test information form. The users were informed about the aim, content and the execution of the study, and they were asked permission to use the data and voice records collected for possible analysis. In order to be able to record the users' voices and videos, the video capturing and recording software was installed in the computers. Then, the users filled the Computer and Internet Use Questionnaire that was distributed to them. After that, the users were given the Authentic Task Form. In addition, each task was read out to each user by the researchers. The users were asked to notify whenever they have difficulty in completing the task written on the task list or they want to proceed to the next task. In this process, they were asked to think aloud, to utter each action they work on and to explain step-by-step what they do. Those users who forgot to think aloud during the implementation were reminded of it. Along with voice and screen records, the users' behaviours and comments were recorded by the researchers on the observation form.

After authentic tasks were completed, we moved on to the interview questions on the Usability Satisfaction Interview Form. The semi-structured interview form included questions about the evaluation of the website with respect to its visual design, navigation and up-to-dateness as well as its overall evaluation. These semi-structured interviews were made in order to obtain the participants' opinions and suggestions about the usability of the website. In this way, most of the qualitative data were obtained through the interviews. After the interview, the users were given the Website Evaluation Questionnaire and asked to grade the website out of five.

In the second dimension of the study, on the other hand, the implementation was performed with three students in a Human-Computer Interaction (HCI) Laboratory. Different from the first dimension, the users' eye movements were recorded while they were completing the pre-defined tasks. Thus, data about at what points of the screen, for how long and when the users looked at while completing their tasks were collected. This way, the qualitative data obtained earlier were supported quantitatively by the eye-movement data collected at this environment.

ANALYSIS OF THE DATA
Minimum, maximum, range, average, and total values were calculated for task completion durations, percentages were calculated for the task success, and average fixation counts and average fixation lengths were calculated for the areas of interest when analyzing the quantitative data, whereas content analysis method was used to analyze the qualitative data.

FINDINGS

FINDINGS RELATED TO THE USERS' TASK COMPLETION TIMES AND SUCCESS RATES
The total, minimum, maximum and average times that the users spent while completing the tasks for the usability study of HURO website are shown in Table 3.

The implementation with the users 1, 2 and 3 was conducted in a human-computer interaction laboratory, whereas researchers worked with the other seven users in authentic environments. As Table 3 shows, the average duration that the users spent for tasks is 618 seconds. While the User 9 was the fastest (428 seconds) in completing tasks, the User 3 was the slowest one (1097 seconds). The task on which the users spent the longest time is the eight one (104 seconds), followed by the fourth (69,3) and the first tasks (62,9). On the other hand, the task on which the students spent the shortest time is the fifth task (39,5), which was followed by the third one (52,6). The notable point in Table 3 is high ranges of all tasks, that is, there are big differences between the completion times of the fastest and slowest users. The reason of this might be that students completed the tasks through the method of trial-and-error, and thus while those who had previously used the website spent less time to complete the tasks, others who had not used it before spent more time since they were not familiar with it.

Table 3: Users' Task Completion Durations (sec)

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8	Task 9	Task 10	Total Duration
User1	139	19	48	57	49	58	41	92	26	49	578
User2	13	17	16	45	38	51	34	163	120	21	518
User3	82	36	56	76	130	215	136	178	48	140	1097
User4	47	45	69	95	34	58	62	47	34	34	525
User5	96	78	118	135	45	123	98	118	82	55	948
User6	91	26	57	30	17	50	17	78	79	97	542
User7	48	71	27	57	21	35	27	114	46	23	469
User8	47	94	70	73	19	28	18	63	67	36	515
User9	46	57	53	27	17	35	18	71	26	78	428
User10	20	55	12	98	25	62	76	116	55	38	557
Minimum	13	17	12	27	17	28	17	47	26	21	428
Maximum	139	94	118	135	130	215	136	178	120	140	1097
Range	126	77	106	108	113	187	119	131	94	119	669
Average	62,9	49,8	52,6	69,3	39,5	71,5	52,7	104	58,3	57,1	618

Table 4 shows users' success levels and rates in completing the tasks. It suggests that all users successfully completed the third, fourth, ninth, and tenth tasks, whereas nine of the users successfully completed the fifth and seventh tasks. On the other hand, the task on which the students were least successful was the first one; only one student successfully completed it. The first task is also the one on which the highest number of students (7) were partially successful. The first task was followed by the eighth task with a 40% of success rate.

Table 4: Task Success

Tasks	Results			
	Successful	Unsuccessful	Partially Successful	Success Rate (%)
T1	1	2	7	10
T2	6	-	4	60
T3	10	-	-	100
T4	10	-	-	100
T5	9	1	-	90
T6	7	3	-	70
T7	9	-	1	90
T8	4	6	-	40
T9	10	-	-	100
T10	10	-	-	100

FINDINGS RELATED TO EYE-TRACKING OF THE USERS

It is possible to obtain ample amounts of data through the eye-tracking method. Based on the eye-tracking records of three users, analyses were conducted with the variables of Fixation Count, Fixation Length, Heatmap and Gaze Plot. Due to the structure of the website, only the data on its main page were analyzed in this study. It was aimed to demonstrate the areas the users focused on the most. For the analyses, the main page of the website was divided into nine areas of interest (AOI): Main Page Link, E-Mail, Banner, Scrolling Announcements, Top Menu, Recent Announcements, Shortcuts, Bottom Menu and Correspondence. These areas of interest are presented in Figure 2.

Figure 2: AOIs defined on the main page

Figure 3 and Figure 4 demonstrates the users' fixation counts and fixation lengths, respectively. In addition, the heatmap about the areas on which the users focused the most is given in Figure 5.

As Figure 3 and Figure 4 shows, the sections that the users focused on and looked at the most are Recent Announcements, Bottom Menu and Top Menu, respectively. Figure 5 also suggests a similar pattern. Since the main page is long and exceeding the length of a screen, scroll bars or mouse wheel should be used in order to see the lower parts of the page. Therefore, the users tended to use the lower parts of the page since it includes more information and is more attention-grabbing. Moreover, using scroll bars became inevitable due to the banner takes one-third of a screen. Figure 3 and Figure 4 show that participants' fixation counts and fixation lengths differed for different AOIs; this reminds us how important it is to include test participants with differing characteristics in a usability study.
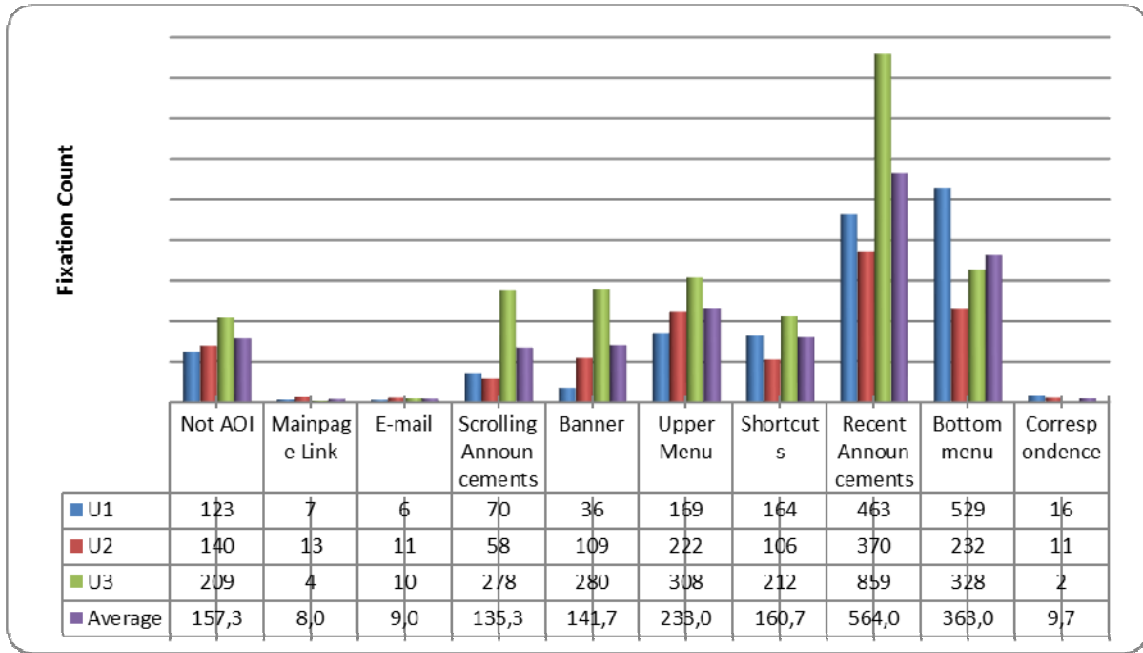
	Not AOI	Mainpage Link	E-mail	Scrolling Announcements	Banner	Upper Menu	Shortcuts	Recent Announcements	Bottom menu	Correspondence
U1	123	7	6	70	36	169	164	463	529	16
U2	140	13	11	58	109	222	106	370	232	11
U3	209	4	10	278	280	308	212	859	328	2
Average	157,3	8,0	9,0	135,3	141,7	233,0	160,7	564,0	363,0	9,7

Figure 3: Fixation Counts and Graph with respect to Areas of Interest

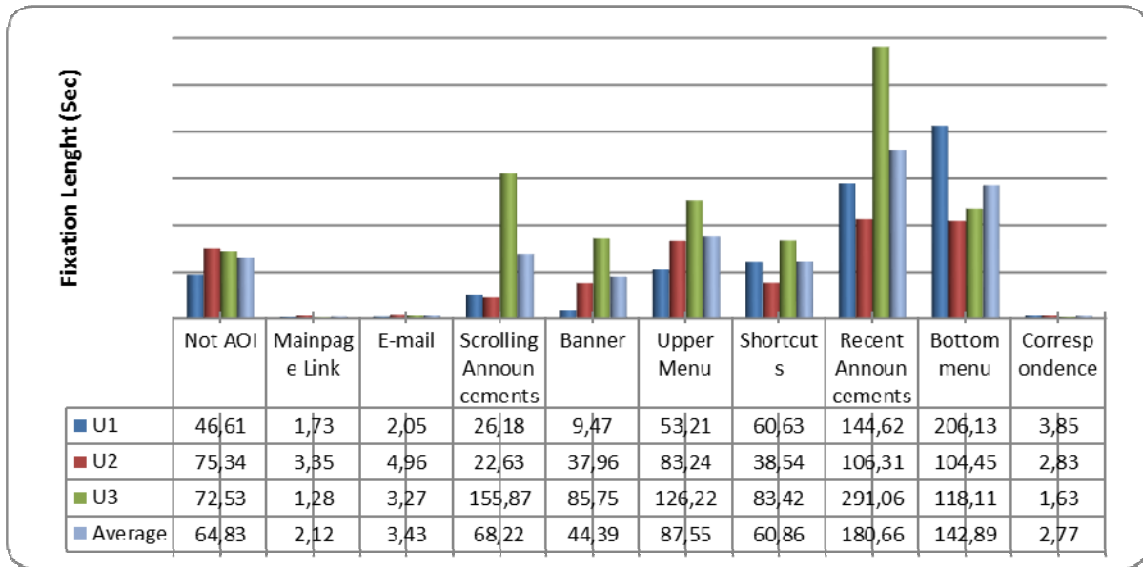|	Not AOI	Mainpage Link	E-mail	Scrolling Announcements	Banner	Upper Menu	Shortcuts	Recent Announcements	Bottom menu	Correspondence
U1	46,61	1,73	2,05	26,18	9,47	53,21	60,63	144,62	206,13	3,85
U2	75,34	3,85	4,96	22,63	37,96	83,24	38,54	106,31	104,45	2,83
U3	72,53	1,28	3,27	155,87	85,75	126,22	83,42	291,06	118,11	1,63
Average	64,83	2,12	3,43	68,22	44,39	87,55	60,86	180,66	142,89	2,77

Figure 4: Fixation Length and Graph with respect to Areas of Interest

Yet another noteworthy issue in Figures 3 and 4 is that the users focus highly on outside the areas of interest. The reason of this might be that the main page is too long and it includes too much unnecessary blank spaces. In addition, the users looked at the areas of interest of main page link, e-mail and correspondence at very low rates. These areas of interest did not attract the users' attention even while they were completing tasks. Furthermore, while dealing with the task "Go to the main page", neither the area of interest of main page link nor the main page link in the top menu was used. Instead, the users frequently used the "back" button of the browser.

There exist significant differences between the users with respect to fixation counts and lengths. For example, in Figure 3, while the User 3 focused very much on the AOI of banner, User 1 barely did it. This is also the case almost in all other areas of interest. Since the User 3, who has little experience in using the website, mostly used the trial-and-error method while completing the tasks, she focused and spent time on almost all areas of interest more than others did.
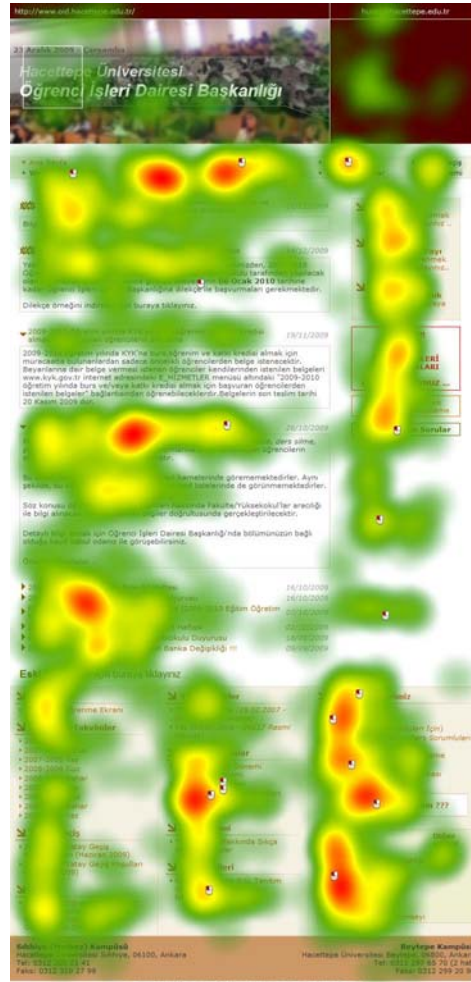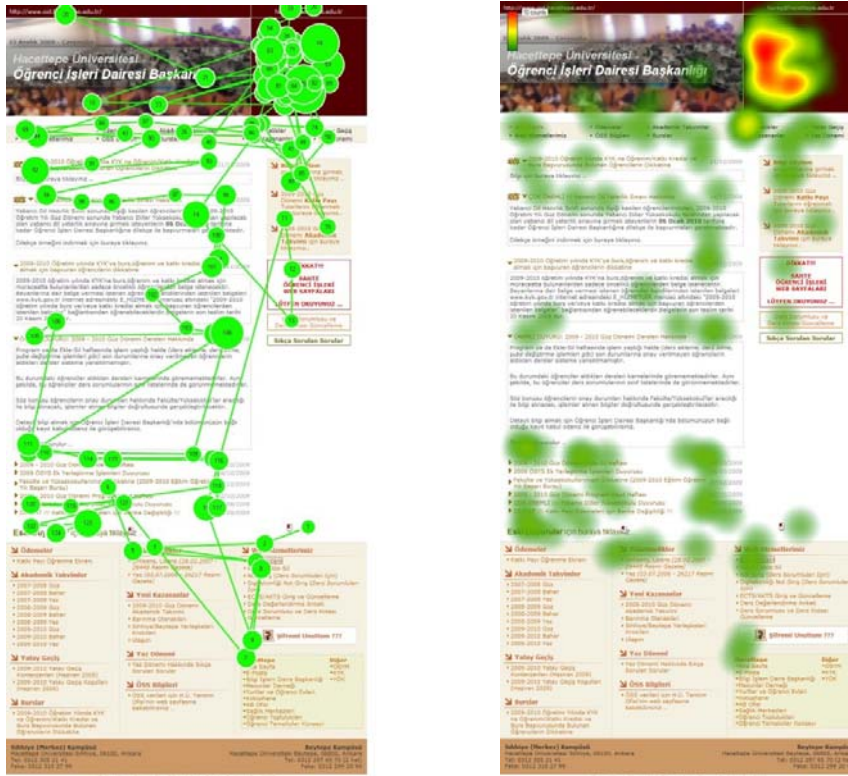
Figure 5: Heatmap of the main page

Figure 5 shows the eye movements and heatmap related to the areas on the main page on which User 1 focused until she clicked on the "announcements archive" link while completing the task "Find the date of the oldest announcement in the announcements archive". User 1 was on the bottom menu when the task was read out to her. Firstly, she quickly reviewed some part of the bottom menu and scrolled up. After looking over the shortcuts on the right side of the page, she focused on the top menu. Then, she focused on the scrolling announcements, which became the area of interest on which she focused and spent the most time. After that, she looked over the current announcements below the top menu and then clicked to the "older announcements" link towards the bottom of the main page. This suggests that User 1, while accomplishing this task, scanned the entire page and found the correct link by scanning the whole page.

It is important for a design to have an approach that makes the user's actions easier and does not constrain her. Figure 6 shows that the design of the webpage makes it more difficult for the user to do what she wants to do. The user achieved her objective through trial-and-error by scanning the entire page. Although the point she first focused was right, it failed to catch her eye.

Figure 6: Eye movements and heatmap related to the process User 1 followed in order to open older announcements

INTERVIEW FINDINGS

After the task-related implementations, the participants were interviewed in line with the questions in the interview form.

Firstly, the users were asked the question, "How did you find the visual design of the website?" The responses given to this question can be divided into two categories namely positive and negative responses. In general, the users stated that the visual design of the website is simple and adequate, type font is legible and comprehensible although it might become even better if the font size is increased, and the color harmony is very good. The issue on which the users experienced difficulty and expressed negative opinions most is that texts on the website are too intertwined. They suggested that the website would be more attractive in terms of visual design if topic titles were bigger and clearer. Moreover, the announcements scrolling on the upper right-hand corner disturbed the users. Although the users found the design of the website usable and suitable in general, they complained about the intertwined distribution of texts, unclarity of menus and scarcity of detailed titles.

The users' responses to the question, "Could you find what you were searching for easily? Where did you have difficulty the most?" can be divided into two as "I could find them easily" and "I struggled a little". Whereas five of the users stated that they did not have any difficulty in completing the tasks, two of them reported that they struggled a little. Those users who reported that they had difficulty on the website associated this with their failure to accomplish the tasks they were given. The tasks on which the users had most difficulty are; finding what need to be done in case the ID card is lost, finding the campus map and finding the contact information. This finding overlaps with the data on the task success chart. Moreover, the users reported that they did not experience any difficulty in accessing the data they visited frequently, while they did in accessing unfamiliar information.

All users, as responses to the question "What do you think about the up-to-dateness of the information on the website?", stated that the website is up-to-date, that the announcements are very recent and that the website has no problems with respect to up-to-dateness. In addition, the users reported that they are satisfied with the website and it meets their demands in accessing up-to-date information.

Finally, the users were asked the question "What could be changed to make the website better?" It is seen that

the common problem among the users is about the visual design, navigation, and content of the website. The problems expressed by the users are; the website is too disorganized, the announcements cover the entire page, the banner is too thick, one needs to scroll up and down constantly as the page is too long, and menus are distributed all around the webpage.

DISCUSSION AND CONCLUSION

When the users' task completion times and the interviews are considered, it is possible to conclude that the users experienced problems with respect to the design of the website. It was observed that they struggled to find what they were searching for, they got lost between menus, and they could find the bottom menus after long efforts due to design errors on this page that is designed for them. According to Özçelik, Kurşun and Çağıltay (2006), the way information is presented on a webpage and the tasks given influence the participants' behaviours. Therefore, it is beneficial for designers to take into consideration the general design principles to enable users to find what they look for on a website in a faster and more accurate manner. As a guideline for the designers of the registrar's Office web sites, the pages should not be longer than a screen size could handle, and the height of the banner of the web site should be minimal. This way most of the problems experienced by the participants in this study (such as being lost between the menus, and losing the menus at the bottom) can be addressed.

Students' navigation on the page is affected by the fact that, unfitting to general website design standards, menus are located on the top and bottom sides of the page. The users, who firstly looked over the menus for long time, headed towards the bottom of the page since they could not find what they looked for and performed their actions there. This stems from the design errors and deficiencies of the HURO website. This finding is in parallel with the eye-tracking data. To solve this problem, the menus and titles on the upper side of the page can be re-arranged. As a guideline for the designers of the registrar's Office web sites, menus can be designed in the form of drop-down menu so that users can access the open form of the menus they prefer after clicking on them. Thus, the complicated nature of menus will be eliminated and students will spend less time. Besides, it will not be necessary to put open forms of menus at the bottom of the page.

Allocation of relevant links on different parts of the page created problems in terms of finding the desired link. To solve these problems, all relevant links could be put together on the visible parts of the page by the designers of the registrar's Office web sites. Along with giving link names clearly, data that are relevant to each other could be grouped under same titles since the eye moves by looking at close focal points (Özçelik, Kurşun & Çağıltay, 2006).

A general overview of the users' opinions and comments suggests that although the navigation on the system is easy, the users experienced difficulties in completing tasks since the page was too long, menus were distributed around the page and data were disorganized. In this respect, the layout of the website should be reviewed and menus should be re-arranged. While making these arrangements, high-load of data on the website could be eliminated, as the interviews conducted with the users suggest that they were unhappy with the intertwined layout of texts. Item sizes and spaces on the website should be proportional (Bayram & Yeni, 2011). Therefore, as a guideline for the designers of the registrar's Office web sites, it is important to adjust line and paragraph spacing. Additionally, there could be options to change the font size on the website. Students also reported that menus on the website are not clear and remarkable enough. Bayram and Yeni (2011) suggest that sizes of items and texts should neither be too small to go unnoticed nor be too big to distract attention. For this, it is thought that these problems can be eliminated if titles are designed in sizes and colours in a more distinguishable way and if announcement are put together under a specific link rather than on the main page.

The usability of the website, about which none of the users reported problems in terms of content and up-to-dateness, could be improved if its visual design and navigation are reviewed and if regulations are made specifically addressing the above-specified problems.

Although the qualitative and quantitative approaches, and observation, interview, and eye-tracking methods complemented the findings, this study has inherent limitations. Nielsen (2000) indicated that one can find 85% of the usability problems in a design with only 5 participants. While this study has included 10 participants in the usability tests, the usability tests utilizing the eye-tracking method only involved 3 participants. Further, although the usability problems were identified in this study, they were not addressed in the actual design. According to the systems view, changes in a system will result in further changes. Therefore, the suggested changes might result in additional usability problems. Future studies could take into account these limitations and could address them as part of their methodology.

REFERENCES

Acartürk, C. ve Çağıltay K. (2006). *İnsan bilgisayar etkileşimi ve ODTÜ'de yürütülen çalışmalar.* Akademik Bilişim 2006'da sunulan bildiri, Denizli.

Andrzejczak, C., & Liu, D. (2010). The effect of testing location on usability testing performance, participant stress levels, and subjective testing experience. *Journal of Systems and Software, 83*(7), 1258-1266.

Battleson, B., Booth, A., & Weintrop, J. (2001). Usability testing of an academic library web site: A case study. *The Journal of Academic Librarianship, 27*(3), 188-198.

Bayram, S. ve Yeni, S. (2011). Web tabanlı eğitsel çoklu ortamların göz izleme tekniği ile kullanışlılık açısından değerlendirilmesi. *Ahi Evran Üniversitesi Eğitim Fakültesi Dergisi, 12*(2), 221-234.

Creswell, J.W. (2007). *Qualitative inquiry and research design: Choosing among five traditions (2nd edition).* London: Sage.

Duchowski, A.T. (2002). A breadth-first survey of eye tracking applications. *Behavior Research Methods, Instruments, and Computers, 34*(4), 455-470.

Dumas, J.S., & Redish, J.C. (1993). *A practical guide to usability testing.* Norwood, NJ: Ablex Publishing Corporation.

Gürses, E.A. (2006). *Kütüphane web sitelerinde kullanılabilirlik ve kullanılabilirlik ilkelerine dayalı tasarım (Usability in library web sites and design based on usability guidelines).* Yayımlanmamış doktora tezi, Hacettepe Üniversitesi, Sosyal Bilimleri Enstitüsü, Ankara.

Kılıç, E. ve Güngör, Z. (2006). *Web site tasarımlarında kullanılabilirlik değerlendirme yöntemlerinin önemi.* Akademik Bilişim 2006'da sunulan bildiri, Denizli.

Kıyıcı, M. (2011). Determination of perceptions of the teacher candidates studying in the computer and instructional technology department towards human-computer interaction and related basic concepts. *The Turkish Online Journal of Educational Technology, 10*(2), 54-62.

Lee, S., & Koubek, R.J. (2010). The effects of usability and web design attributes on user preference for e-commerce web sites. *Computers in Industry, 16*(4), 329-341.

Lohse, G. & Johnson E. (1996). A comparison of two process tracing methods for choice tasks. *Organizational Behavior and Human Decision Processes, 68*(1), 28-43.

Nakatani, C., & Pollatsek, A. (2004). An eye movement analysis of "mental rotation" of simple scenes. *Perception & Psychophysics, 66*(7), 1227-1245.

Nielsen, J. (1994). *Usability engineering.* Boston, MA: AP Professional.

Nielsen, J. (2000). *Why you only need to test with 5 users.* Jakob Nielsen's Alertbox web sitesinden 15 Kasım 2008 tarihinde http://www.useit.com/alertbox/981115.html adresinden erişilmiştir.

Nielsen, J. (2003). *Usability 101: Introduction to usability.* Jakob Nielsen's Alertbox web sitesinden 15 Kasım 2008 tarihinde http://www.useit.com/alertbox/20030825.html adresinden erişilmiştir.

Norman, D.A. (1988). *Design of everyday things.* New York, NY: Currency Doubleday.

Norman, K.L., & Panizzi, E. (2006). Levels of automation and user participation in usability testing. *Interacting with Computers, 18*, 246-264.

Özçelik, E., Kurşun E. ve Çağıltay, K. (2006). *Göz hareketlerini izleme yöntemiyle üniversite web sayfalarının incelenmesi.* Akademik Bilişim 2006'da sunulan bildiri, Denizli.

Özdoğan, F.B. (2008). Göz izleme ve pazarlamada kullanılması üzerine kavramsal bir çalışma. *Gazi Üniversitesi Ticaret ve Turizm Eğitim Fakültesi Dergisi, 2*, 134-147.

Rayner, K. (1998). Eye movement in reading and information processing: 20 Years of research. *Psychological Bulletin, 24*(3), 372-422.

Rosson, M.B., & Carroll, J.M. (2002). *Usability engineering: Scenario-based development of human-computer interaction.* San Francisco: Morgan-Kaufmann.

Rubin, J. (1994). *Handbook of usability testing: How to plan, design, and conduct effective tests.* New York, NY: John Wiley & Sons Inc.

Russell, M.C. (2005). Hotspots and hyperlinks: Using eye-tracking to supplement usability testing. *Usability News, 7*(2), 1-11.

Smith, A. (1997). *Human-computer factors: A study of users and information systems.* New York, NY: McGraw.

Uçak, N.Ö. ve Çakmak, T. (2009). Web sayfası kullanılabilirliğinin ölçülmesi: Hacettepe üniversitesi bilgi ve belge yönetimi bölümü web sayfası örneği. *Türk Kütüphaneciliği, 23*(2), 278-298.

Yıldırım, A. ve Şimşek, H. (2006). *Sosyal bilimlerde nitel araştırma yöntemleri.* Ankara: Seçkin Yayıncılık.

Yin, R.K. (1984). *Case study research: Design and methods.* Newbury Park, CA: Sage.

Zaphiris, P., & Kurniawan, S. (2007). *Human computer interaction research in web design and evaluation.* London: Idea Grub Publishing.