

# Evaluation of a university website's usability for visually impaired students

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Published online: 5 October 2015  
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**Abstract** Today websites are the tools most commonly used to access information. People with disabilities face difficulties accessing or using information, and the importance of website usability in their lives needs to be recognized. Visually impaired students need to be able to use university websites that inform them about the opportunities and events taking place on campus. This study aims to evaluate the usability of a university website by visually impaired students. In this research, six visually impaired students were interviewed. The assistive technologies they use, as well as the various web pages they wished to use unaided were identified. Following data collection, usability tests were conducted and satisfaction surveys were completed. The usability test was done with five visually impaired students. They were asked to think aloud while performing 11 tasks involving their university's web pages, including the main page and the pages of student affairs, library and departments and then to accomplish these tasks. In this test, five tasks were not

successfully completed by all students. According to the test results, finding final exam dates on the academic calendar posed major difficulties, and accessing the course schedule web page was the task that required the most time. The test results indicated the need for a search engine on each page, a text version for all pages, rearrangement of the web link sequences with tabs and more information about visuals. Suggestions related to the visually impaired students' needs were offered.

**Keywords** University websites · Usability · Accessibility · Visually impaired students · Human–computer interaction

## 1 Introduction

Household and work place products need to be usable for people to use, including all product features. According to the International Organization for Standardization (ISO), usability refers to the efficient, effective and satisfactory use of the product in a particular context [9]. Usable products and contexts make people happy. They also allow us to avoid spending effort, time and resources; hence, they bring economic benefits [6]. The effectivity of a method for increasing usability in human–computer interaction derives from user-centered design [7, 38]. User-centered design entails deep knowledge about the target population's characteristics and limitations. Users can consist of a variety of groups such as the elderly, youths, students, or people with mental or physical disabilities [37]. A product to be designed for all people needs to conform with the principle of “universal design” and to take into account differences and varieties based on gender, age, nationality, disabilities and proficiency in the use of computers.

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Distinguished from accessibility, the principle of universal design has increased importance in recent designs. Also conceptualized as “barrier-free design” and “design for all,” universal design is a design approach including the principles of equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort, and size and space for approach and use [26]. Related to web accessibility, the World Wide Web Consortium (W3C) defined three levels of priority. Websites meeting these levels are in principle accessible for a larger user population. However, in a study that included twelve university websites, it was found that most of them were non-compliant with the W3C guidelines and only one particular university satisfied these guidelines at all of the three levels [27]. In another study that included 102 public universities, most websites were rated between 4 (accessible) and 0 (inaccessible), while the scores of 4 and 0 were rare. It was indicated that many of these websites could easily improve their rating to 4 simply by adding alternative text to images, adding a null alt attribute to decorative or spacer images, and adding a “skip navigation” link to the top of the web pages [33]. To highlight the difficulties people with disabilities face in accessing and using information, designers’ emphasis on universal usability is crucial. The user-centered design process combines usability and accessibility to develop a positive user experience [24], and this can be achieved by including users throughout the design and evaluation stages. Therefore, participation of people with disabilities who are more vulnerable to usability problems in the evaluation phase of product design enables professionals to detect usability problems more easily.

The Turkish Statistical Institute (TUIK) conducted a study with individuals with disabilities in 2010 and found that, of the people with disabilities in Turkey, 17.1 % use computers, and only 10.4 % of them have access to the Internet [22]. Internet brings many conveniences in daily life that would benefit people with disabilities, such as bill payment, video chat and reading the news. To ensure an equal opportunity to use the Internet for visually impaired people, web pages need to have an intelligible design that allows for effective web search and interaction [23].

Since websites use visuals extensively, visually impaired people face more difficulty accessing and using websites than other people with disabilities. People with poor vision or complete lack of vision are considered visually impaired [5]. There are assistive technologies that visually impaired people use to access to web pages. People with a complete lack of vision use screen readers, and those with poor vision use screen magnifiers [2]. Screen readers read the written material on the screen from the upper left to the bottom right and execute functions. The keyboard shortcuts of screen reader programs such as

JAWS or Windows-Eyes enable visually impaired people to efficiently surf the Internet. Yet, assistive technologies are not sufficient to solve visually impaired people’s difficulties while using the Internet [17]. The content and design problems of web pages cause problems in surfing, and links may not be easily accessed with the keyboard. Such issues waste visually impaired Internet users’ time [19]. The relevant literature points out various problems concerning this issue. Baguma and Lubega [4] indicated that pop-up windows on websites misguided visually impaired people, and the lack of a download indicator disappointed them. There are also other problems, including conflicts between screen reader and applications, unlabeled forms, images without alternative texts, inaccurate links, inaccessible PDF files and the screen reader’s page structure which makes feedback harder [13]. Pribeanu et al. [16] showed that too many links on a web page makes surfing harder for visually impaired people. They also showed that certain links with similar labels were connected to different links, and such links misguided visually impaired people. Abu-Doush et al. [28] documented similar problems. They found that websites are difficult to navigate using only a keyboard or screen reader program, and web forms are incompatible with screen reader programs. They also stated that hyperlink names not reflecting their content, absence of keyboard alternatives, and excessive amount of tabs required to start tasks make usability and accessibility difficult for visually impaired individuals.

Theofanos and Redish [21] emphasized the cognitive load for users that results from too much focus on the web browser, websites and the screen reader. Kurt [11] conducted a study of website accessibility for visually impaired people at ten universities in Turkey. He noted that most of the websites were not efficient in keyboard accessibility and surfing with tab keys and that page components needed to be arranged coherently in HTML code. Kubuş and Çağıltay [36] found that Turkish government websites were generally inaccessible to visually impaired citizens. Other studies of users’ experiences indicated that sighted people were three times more successful in web usage than visually impaired people, and six times more successful in usability tests [15]. Loporini and Paternò [14] suggested that web interfaces designed in accordance with the page’s structure, order and content offer users high speed access to websites and make it easier for them to surf the website. Therefore, website designers should concern themselves with universal design principles and consider visually impaired people’s needs when attempting to improve websites accessibility.

Given the fact that university websites represent campus life in the cyber world, access for students and university staff to these websites is highly important if they are to

benefit from university services [1, 35]. This study evaluates the usability of certain web pages at a university (the home page, and the pages for departments, library and student affairs) for visually impaired people who use assistive technologies to access the university website. In interviews, visually impaired students mentioned their problems with the university website and using university web services (the registration system, PDF copies of library books, etc.), and informed they had to ask for help from volunteers or university staff for their daily tasks. This study evaluates how effectively university websites reduce visually impaired people's dependency on others and evaluates students' satisfaction. Accordingly, the research sample consisted of visually impaired students. Data collection focused on their ability to use computers, the Internet and the accessibility of their university's web pages. Their assistive technologies were also identified. The university website was tested for its usability and recommendations were made to improve its usability for visually impaired students.

## 2 Method

### 2.1 The research group

A usability test was used to evaluate the university website. The research sample consisted of five visually impaired students from different departments at a state university in Ankara, Turkey. In order to recruit the participants, the researchers initially contacted a student with visual disability living in one of the university dormitories. Then, information about other visually impaired students was acquired from that student and the researchers followed them up.

Consequently, six visually impaired students were interviewed in accordance with the voluntariness principle. One of the students decided not to participate in the study, since a relationship of trust was not established between the researchers and the participant. A usability test was thus conducted with five student volunteers.

Nielsen and Landauer [32] found that 85 % of the usability problems are detected with five users and including further users are waste of resources. Therefore, the number of users in this study was found satisfactory to reveal usability problems when the researchers recruited the fifth user.

A personal information form was used to collect data about the participants in the usability test. Table 1 shows participants' demographic information.

According to the demographic information in Table 1, three students were female (60 %) and two students were male (40 %). There were two sophomores (40 %), two

freshmen (40 %) and one junior (20 %). Of the students, four owned a personal computer and one student used the computers available in the library and study rooms.

### 2.2 Data collection tools

Qualitative and quantitative methods were used to collect data. The qualitative method was used to compile observation notes from the interviews and the application of usability test. The quantitative method was used to collect satisfaction survey data and make up the percentages regarding the accomplishment of tasks in the usability test and their time duration.

#### 2.2.1 Interviews

Before preparing a usability test, visually impaired students from different departments were interviewed. An interview form (see "Appendix") was used to collect data on their usage of the university website, their access to Internet and study rooms available for use by students with disabilities. Data collection also included information about the hardware and software that visually impaired students use and the staff who provided their computer programs and solved their problems. Before the usability tests, six students were interviewed, and their data were evaluated by content analysis.

#### 2.2.2 The usability test

In the interviews, visually impaired students indicated they needed to accomplish their tasks unaided, including keeping up with university and department announcements, learning schedules, exam dates and grades and accessing course materials and secondary resources. According to the data collected from the interviews, 11 tasks were specified that visually impaired students needed to accomplish unaided while using the university website. Table 2 presents the task list regarding the use of the home page, department and library web pages.

As shown in Table 2, the tasks numbered 1 and 2 refer to the main page; 3, 4 and 5 to the department web page; 6, 7 and 8 to the student affairs web page; and 9, 10, 11 to the library web page.

The usability test was conducted in the study rooms available for use by visually impaired students, and complied with the principle of voluntariness. The participants were informed about the aims and procedure of the study, and the tasks to be performed. They were also informed that researchers were taking notes during the test, and were asked to think aloud when answering the questions. The researchers' notes were written on the observation form.

**Table 1** Demographic information of the participants

P	Gender	Department	Grade level	Personal computer owner	Frequency of internet access	Frequency of access to university website	Web browser used
1	M	Philosophy	1	No	1–3 h(s) daily	Once a month	Internet explorer
2	F	Psychology	2	Yes	1–3 h(s) daily	A few times a month	Internet explorer
3	F	Translation and Interpreting	3	Yes	4–6 h(s) daily	Once a month	Internet explorer
4	F	Turkish Language and Literature	2	Yes	1 h or less daily	Once a week	Internet explorer, Google chrome
5	M	Sport Sciences and Technology	1	Yes	1–3 h(s) daily	Never	Internet explorer

*P* participant

**Table 2** Tasks in usability test and their related web pages

#	Tasks	Related web page
1	Open university web page	Homepage
2	Tell announcements published in 24.12.2013 from the part of current announcements	Homepage
3	Open your department web page	Department
4	Find exam dates from “announcements” link	Department
5	Open your course schedule	Department
6	Open student affairs web page	Student affairs
7	Open your transcript by logging in the system with your username and password	Student affairs
8	Open academic calendar, and find final exam dates	Student affairs
9	Open library web page	Library
10	Login to “library without handicap” system with your username and password	Library
11	Download a document digitized for you	Library

### 2.2.3 The satisfaction survey

Following a literature review and data analysis, an 11-item satisfaction survey (see “[Appendix](#)”) was formed to evaluate the accessibility of the university website for visually impaired students and its adequacy in relation to universal design principles, feedback, consistency and learnability. The survey used a five-point Likert-type scale, with the items “Strongly Disagree,” “Disagree,” “Neither agree nor disagree,” “Agree” and “Strongly Agree.” Every item was read aloud to the participants, and their responses were recorded.

### 2.3 Data analysis

Content analysis was used to evaluate data collected from the interviews. Frequency and percentage values for the emerging themes were determined. Content analysis was also used to evaluate the observation notes taken during the usability test and suggestions for improving the website’s usability were derived. The time needed for each participant to accomplish a task was recorded. The related data were analyzed and reported as the percentage for the

accomplishment of a task and its average time duration. Satisfaction survey data were classified under the headings of accessibility, universal design, navigation, feedback, consistency and learnability. Their means and standard deviations were then calculated.

## 3 Findings

### 3.1 Interview findings

During the interviews, data provided by six visually impaired students on their university website usage were collected. All the students who participated in the interviews used the Jaws for Windows screen reader program, and a headset. They stated that they did not need any other hardware or software for their Internet and computer usage.

#### 3.1.1 Visually impaired students’ use of library and study rooms

In the university library, there is a study room available for the use of visually impaired students, one computer with a

screen reader program and Internet connection, and a headset. Library staff accompanies a visually impaired student from entrance to the study room and helps them to start the computer. In the library, there are personnel in charge of ensuring visually impaired students' access to digital sources and digitizing the printed material they wish to read. Visually impaired people can open the link "Barrier-Free University" on the university website using their username and password and then download and read the digitalized material.

Students were asked which services they use on the university website. Their answers are presented, in terms of frequency and percentage, in Table 3.

Table 3 presents the web services that visually impaired students need to utilize unaided. Visually impaired students need to keep up with university and department announcements, find out schedules, exam dates and grades, and access course materials and secondary sources. Table 4 shows students' views of their problems with using the web pages.

Most of the students indicated that they had difficulty registering for courses, and given the risks of the add-drop procedure, they asked their friends to help them with course registration. Moreover, they indicated that access to information takes time due to the lack of a text version and reading order for data displayed on the web page. There were also other problems students described, including conflicts between the screen reader program and Internet browsers, unreadable links on the screen and the reading order for links. They also pointed out that the screen reader program is not compatible with different browsers and does not read all of the links. Some comments included:

Announcements at homepage are not listed from the newest to the oldest. Not only formal announcements, but also posters and visuals should be announced.

Screen reader program does not read all links. Course registration and add-drop have visuals and Jaws can't read the visuals.

Following the interviews, students were informed about the usability test and were asked whether they would

**Table 3** Services utilized in the university website

For which tasks do you use university website?	<i>f</i>	%
Following announcements	3	50
Access to library sources	2	33.3
Course registration, add-drop actions	2	33.3
Obtaining course schedule	1	16.6
Reading academic calendar, getting exam dates	1	16.6
Getting transcript	1	16.6

**Table 4** Difficulties encountered when using the website

Difficulties encountered when using the website	<i>f</i>	%
Complexity of course registration	4	66.6
Irregular reading order of the links at homepage	2	33.3
Irregular listing of the announcements	2	33.3
Failure to read visuals (posters, etc.)	2	33.3
Lack of direct access from web page to the target link	1	16.6

participate in it. For those who were willing to participate, appointments were arranged.

### 3.2 The findings of the usability test

A usability test was conducted with five visually impaired students. Tasks were read for participants, who were then asked to think aloud while completing their tasks. During the usability test, researchers took notes with an observation form. Tables 5 and 6 show the data collected regarding the accomplishment of tasks.

Participants were able to accomplish most of the tasks. Finding the final dates on the academic calendar posed the biggest difficulty for them. When students knew the shortcuts of the screen reader program and had experience fulfilling the task in question, this positively affected the accomplishment of the task and reduced the time required for it. Table 6 shows the time each participant spent to accomplish the tasks.

As indicted in Table 6, participants completed the usability test, on average, in 35 min. The fifth participant completed the test within the shortest time. Accessing the main page was accomplished most quickly, while accessing the course schedule, final exam dates on the academic calendar and the barrier-free library web page required the longest time.

### 3.3 The findings of the satisfaction survey

Following the completion of the usability test, a satisfaction survey was read aloud to the participants, and their responses were tallied. Table 7 shows the participants' responses to the satisfaction survey, categorized under six titles designating the items' contents.

According to the findings of the satisfaction survey, participants were moderately satisfied with the university website in terms of learnability, feedback, accessibility, consistency and navigation. However, they were not satisfied with the website insofar as it did not comply with the universal design principles such as adding information about diagrams and visuals and the web page having text version support. In addition to the

**Table 5** Findings about task completion

Task no	Task completion					Percentage of each successfully completed task
	P#1	P#2	P#3	P#4	P#5	
1	√*	√*	√*	√*	√	100
2	√	√	√	√	X	80
3	√	X	√*	X	√	60
4	√	√	√	√	√	100
5	√	√	√*	√	X	80
6	X	√*	√*	√*	√	80
7	X	X	√	√	X	40
8	X	X	√	X	X	20
9	√	√*	√*	√*	√	100
10	√	√	X	√	√	80
11	√	X	√	X	X	40
Number of successfully completed tasks	8	7	10	8	6	
Percentage of successfully completed tasks	73	64	91	73	55	

\* Participant used the search engine

√, task was completed; X, task was not completed; P, participant

**Table 6** Task completion duration of each task

Task no	Time spent in tasks					Average task completion time
	P#1	P#2	P#3	P#4	P#5	
1	2 min	1 min	1 min	3 min	1 min	1.6 min
2	6 min	2 min	2 min	3 min	1 min	2.8 min
3	1 min	6 min	1 min	4 min	2 min	2.8 min
4	6 min	5 min	1 min	3 min	2 min	3.4 min
5	8 min	7 min	3 min	2 min	4 min	4.8 min
6	5 min	2 min	1 min	5 min	1 min	2.8 min
7	2 min	2 min	2 min	4 min	2 min	2.4 min
8	1 min	5 min	5 min	8 min	3 min	4.4 min
9	3 min	2 min	1 min	2 min	2 min	2 min
10	2 min	7 min	5 min	3 min	5 min	4.4 min
11	4 min	4 min	4 min	5 min	1 min	3.6 min
Total time	40 min	43 min	26 min	42 min	24 min	35 min

P participant

satisfaction survey, participants also stated other comments and suggestions about university website. Some remarkable comments are listed below;

There are lots of pictures and visuals at course registration page and it is difficult for me to use this page. I have to get help from my friends.

After logging into course registration page with username and password, there should be a button for safely logging out.

Links should be shown in a list. Removing unnecessary links may be helpful.

I have problems with downloading materials.

#### 4 Discussion and conclusion

According to the research findings, students mostly used the university website to keep up with announcements and rarely used it to search for course schedules, the academic calendar and transcripts. In the usability test, participants needed the longest time to find the academic calendar page and the final exam dates. The reason may be that participants had to click on many irrelevant links before reaching the desired content.



**Table 7** Satisfaction level of the participants

Category	Question number	$\bar{X}$	SD
Accessibility	1, 2	3.1	0.82
Universal design	3, 5	1.6	0.84
Navigation	4, 6, 7, 10	2.85	1.39
Feedback	9	3.6	1.52
Consistency	8	3	1.41
Learnability	11	3.8	1.3

Additionally, participants searched for the academic calendar under the academic menu, which was located under the students menu on the student affairs web page. With regard to the problem of specifying menu names, Swierenga et al. [19] suggested adding descriptive labels to menus and making site maps for visually impaired people.

According to the study, course registration posed the biggest difficulty for visually impaired Internet users. Similarly, during the interviews students said they asked for help from their friends or student affairs staff for course registration since they found it risky to register for courses with no assistance. As Yücel and Acartürk [25] have emphasized, audio feedback could be used in login systems such as ATM operations, user registration and course registration to ensure easy and secure use for visually impaired people.

Another problem facing visually impaired students was their lack of access to information about visuals such as images and posters. The studies of Baguma and Lubega [4] and Kaygısız et al. [10] suggested that this problem derives from the lack of captions.

It was observed that the time spent accomplishing a task decreased as the class level of the participants and the frequency of their Internet usage increased. Moreover, using the shortcuts of the Jaws screen reader program helped them reduce the time spent accomplishing tasks on the web. Many of the users cannot use screen reader programs efficiently. Using all the features of a screen reader program enables the users to benefit from web pages effectively; hence, users should be trained for such software features [21]. Tanyeri and Tüfekçi [20] also emphasized the importance of visually impaired users' knowledge of the shortcuts of their screen reader programs. There were also other problems students noted, including conflicts between the screen reader program and Internet browsers, unreadable links on the screen and the reading order for links. Although some of the screen reader programs have language support in Turkish, this is not an adequate level of support for visually impaired people. Studies have indicated the need to develop a Turkish interface for screen reader programs to solve this problem [8, 25].

According to the results of the satisfaction survey, participants were moderately satisfied with the university

website in terms of learnability, feedback, accessibility, consistency and navigation. However, they were not satisfied with the website since it did not comply with the universal design principles that entail adding information about diagrams and visuals and the web page having text version support. According to the literature, the presentation of visual contents on a web page is one of the major problems facing visually impaired people [3, 4, 10, 19, 25]. This demonstrates the importance of inserting captions into website visuals.

It was found that, except for the library web page, text version support was not available on the university website. Moreover, announcements on the department web pages opened in a new frame and the screen reader program did not exit that frame, preventing visually impaired students from navigating the department page. Web pages need to be designed to allow a comfortable and hassle-free use for people with disabilities, instead of putting up barriers to their Internet usage [10]. Text version support for all pages on the university website may help solve the problems visually impaired students experience while using the university website. However, it should be noted that this option has largely been seen as non-equal access and not sufficient. Therefore, although preparing a text version of web pages is one of the solutions to address accessibility problems, Theofanos and Redish [21] suggested making only one version that is accessible to all instead of spending time and effort on creating different versions.

During the usability tests, most of the research participants used a search engine to open the main page, department and library web pages. Similarly, Aydın's [3] study found that visually impaired students did not have a great problem in using search engine. Thus, it would be useful to add an internal search engine to all web pages in a university website.

Users found it unnecessary and annoying that the screen reader program read all the links repetitively each time a page was opened. A study conducted by Tanyeri and Tüfekçi [20] also determined that users were bored by the repetitive link reading at the beginning of every task. In similar studies, it is suggested that including a "skip navigation" link as the first item presented in the web page for skipping to main content or using heading tags are useful for effective navigation [21, 29, 30]. This problem can be addressed by arranging the tab order of links with the tabindex available in HTML code. Ringlaben et al. [18] claimed that accessibility tools such as screen readers by themselves were not really adequate and that an arrangement of HTML codes in accordance with web content was needed. Adding explanatory texts to the link names may be useful for visually impaired users to distinguish among multiple links [16].

The research participants indicated they worried about the lack of a “log off” button in the student affairs web page. Given that visually impaired users have negative attitudes toward the login process, “log off” or “secure logout” buttons should be added to the pages that require authentication.

It was observed that users were not content with the download process of the digital resources due to a lack of information about the downloading process and file locations. This problem can be solved by giving audio feedback about the downloading process and file location. A study by Baguma and Lugeba [4] discussed the same problem.

Another problem was that opening the course schedule in PDF format made it harder to read the document. PDF files should be converted into a Word document so that visually impaired people can use it without inconvenience.

It was realized during the study that obstacles encountered in the usability tests conducted with visually impaired students could also be characterized as accessibility problems. Therefore, in usability studies conducted with visually impaired people, the term accessibility can interchangeably be used with the term usability.

## 5 Implications and future work

The study presented in this paper evaluated the usability of a university website for visually impaired people, and was carried out with the participation of five visually impaired students from different departments. At the beginning of the research, while one of the participants was performing the seventh task, (opening a transcript by logging in the system with her username and password), she felt uncomfortable and decided to leave the study. This may be considered a limitation at first. The particular characteristics of the research participants and the sensitivity of working with visually impaired people affected the participant’s decision to leave the study. In similar studies carried out with the participation of visually impaired users, similar problems emerged with ensuring participation and recording data (written, video, audio, etc.) [16]. The above reveal the sensitivity of working with people with disabilities and emphasize developing a relationship of trust with participants. According to Ellis and Kurniawan [31], trust is crucial for participatory designs to make participants comfortable to contribute to the process. In future work, it is recommended that researchers build trust with participants before starting a usability test. These research findings can be used as a guide for similar studies and for website designers and researchers.

The results of this study offer insight into the obstacles encountered with computer and Internet use by visually impaired people. Trust and safety are the main problems

for visually impaired people, because they feel distrustful about login and registration procedures. Entering a username and password are difficult and venerable. Providing an identity authentication system that uses fingerprints may make visually impaired students more comfortable while performing tasks in the student affairs page and course registration procedures. Another problem is the disorientation when searching the website. It would be useful to add an internal search engine to a university website. Speech recognition systems in searching a website could also be helpful for individuals with disabilities to remove dependency on using keyboards.

In university libraries, personnel to help visually impaired students to access digital resources and digitize the printed material they wish to read might exist. Similarly, a supporting center could be built in the university, for helping visually impaired students to register for courses and to overcome other problems. Furthermore, university information technology services should provide some electronic materials and software for visually impaired people, such as screen reader programs. On the whole, technical and personnel support can remove barriers and enhance the quality of campus life for visually impaired students. National and international guidelines or standards that check websites with respect to usability and accessibility might provide complementary control mechanisms over institutional support. As an example, the “KAMIS” (public websites guide) project focuses at ensuring compliance with the standards of usability and accessibility of public websites in Turkey [34].

It was observed that using screen reader shortcuts helped visually impaired students reduce the time spent for accomplishing tasks on the web. In future research, it would be useful to examine the effects of using screen reader program shortcuts on task performance to verify this observation. In the context of the present study, usability tests were conducted while the participants were performing tasks on a desktop computer. Therefore, the study findings are limited to contexts where desktop computers are used. Since mobile devices are increasingly in widespread use in daily life [12], the focus of the usability and accessibility research for visually impaired people can be shifted to these platforms. Usability studies conducted on desktop platforms with visually impaired people suggest that there is a level of saturation related to the findings and perhaps it would be more innovative and beneficial to explore how to diffuse these findings.

**Acknowledgments** The authors would like to thank the users participated in this research, and the anonymous reviewers along with the editor for their constructive feedback.



## Appendices

See Tables 8 and 9.

**Table 8** Interview form

1	Do you use the university website? What tasks do you use it for?
2	Do you experience problems while using the university website? If you do, what are they?
3	Do you experience problems in accessing computers and the Internet?
4	To whom do you tell your needs related to software and hardware?
5	Which screen reader program is installed in your computer? Do you experience problems while using it?
6	Is there any special hardware or software you use (i.e., Braille keyboard, etc.)?

**Table 9** Satisfaction Survey

Items	Totally agree	Agree	Neutral	Disagree	Totally disagree
I can access the web pages in the university website					
I can access a web page in the university website I have never visited easily					
I can collect enough information about visuals in the university website					
Link names in the university website direct me correctly					
There is a text-only version of web pages of the university website for visually impaired students					
Web pages of the university website can easily be navigated with a keyboard					
While using the university website, I am feeling being lost					
General structure of web pages of the university website is similar to each other					
I can take enough and effective feedback after making mistakes while entering information to forms					
Content in the university website can easily be followed					
When I visit the university website again, I can access web pages more easily and rapidly					
Your suggestions for the university website:					

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