

Website usability evaluation with quickly applicable guidelines: An assessment of a government website

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Abstract

In this paper, an initial set of guidelines, rated as highly important by experts, is assessed in order to deduce a subset of quickly applicable ones. The widely accepted guidelines published by the U.S. Department of Health and Human Services is considered as an initial superset. Then an evaluation of a governmental website is done with the established subset and findings of the application process are discussed. In order to quickly improve the usability of websites in terms of design and aesthetics, quickly applicable guidelines may be helpful.

Keywords: Usability, usability guidelines, quickly applicable usability guidelines.

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1. Introduction

Good usability provides benefits to users and providers. On the users' side, they will enjoy interacting, achieve their goals effectively and efficiently, and cultivate confidence and trust in the product. On the providers' side, the benefits are reducing the development time and costs, reducing support costs, reducing user errors, reducing training time and costs and ultimately better return on investment.

The possibility of confronting usability issues in any web interface is unfortunately very high. This is because of unawareness of some website owners about the usability subject or their underestimation of the impact of usability issues. However, some innovative and global companies are aware of the impact of usability issues regarding their products and they care about the usability of their products. These companies carry out serious work on this subject and invest on remarkable budgets for usability studies.

Government websites are commonly pushed into the background due to their aesthetic appearance and usability manner. This approach can be observed almost all over the world. We consider the aesthetic appearance to be closely associated with usability [1, 2], and that usability is not only for commercial undertakers or the private sector but should also be considered and applied by the public sector [3].

Users put websites in an appropriate place in their cognitive map, based on the degree of quality in their perception. If the website makes the users feel bad, then in the worst case the website loses the user; in the best case, users will not use it unless they have to. In the private sector, users have the option to choose an alternative company or service. But in the public sector, there is no competition and the user has to use the service that is made available by the government.

Usability studies should be addressed in the early phases of the development process. Thus, it will not require a great budget for usability issues. Research shows that around 90% of academic studies apply evaluations during the implementation phase of development, which is one of the most costly phases to perform changes [4].

There are other studies about the usability of different kinds of websites, including various government websites [3, 5, 6]. The guidelines that are used for evaluation are selected from the Usability Guidelines Book prepared by the U.S. Department of Health and Human Services (HHS) [7]. All the selected guidelines have the highest ratings (five bullets) on the 'Relative Importance' scale. The ISO 9241-151 standard is another reliable resource that can be used as a reference to derive a guideline set. However, HHS studies of the Usability Guideline Book are based on earlier dates, compared to the ISO standard. Also, the HHS book has a relative importance scale for each guideline, which is quite handy for this study. In this paper, the website of the Scientific and Technological Research Council of Turkey is evaluated as a test subject, considering the selected usability guidelines.

2. Literature Review

Regarding the evaluation criteria, an important survey study was conducted by Insfran *et al.* [4] to compare web applications. A total of 206 research papers from an initial set of 2703 papers were selected for their mapping study. It was discovered that 39% of the reviewed papers were related to evaluation methods of web applications. The results also show that the most widely used type of method is user testing. One of the other important results of this mapping study is that 90% of the studies applied evaluations during the implementation phase of the development. Performing changes in this phase are costlier than the early phases.

There are some researches related to the Human-Computer Interaction (HCI) website usability and age impact [8, 9]. The value and meaning of HCI in terms of usability are addressed by Isaias and Issa [10]. They address both the design phase of a website and the websites that have already been built. They attempt to provide an overall approach to HCI and its usability. Young and older participants' interactions are observed by Hassanein *et al.* [8] in a laboratory environment with an experimental

website. The results revealed that age has an obvious impact on the user interaction performance. Arnott *et al.* [9] conducted usability studies with older populations. The focus of their paper is on the younger age density in usability studies and the ignorance of older people, which is not considered worth investigating.

There are studies that deal with the relation between aesthetics and usability [1, 2]. Tractinsky [1] investigates the relation between aesthetics and apparent usability, and conducts three experiments to support and validate the work performed by different researchers. Tuch *et al.* [2] also analyse the relation between usability and aesthetics. Their results show that the aesthetics does not have an effect on perceived usability, but the usability has an effect on the perceived aesthetics.

Hsieh [11] proposes the need for creating a usability context, considering the cultural differences. She discusses the problems of previous methodologies of cross-cultural usability, constructs a usability evaluation and finally recommends ways for improving the cultural usability methodology. Shi *et al.* [12] report a field study of think-aloud testing in seven companies from Denmark, China and India. They also attempt to answer questions related to cultural diversity, user interfaces and current usability test practices. Gould [13] discusses a project that investigates the effect of culture on usability surveys. He reveals different answers for the same questions that are affected by culture.

Vitouch and Huber [14] investigate the correlation of web usability and web accessibility in their paper. They test with 131 users over a test portal with different levels of accessibility. The results show that accessibility has an impact on usability with a significant difference.

Bernard [15] investigated the individual expectations of novice (less than 1 year of web experience) and experienced (more than 3 years of web experience) users for specific web-related objects to be located on a typical web page. The results showed that users do have definable expectations related to the location of these web objects, and these expectations are created in the user's early experience (less than 1 year) with the web.

3. High-Rated Usability Guidelines for Evaluation of Websites

The guidelines listed in the following quickly evaluate the usability of websites. The guidelines are selected from the Usability Guidelines Book considering the highest ratings (five bullets) on the 'Relative Importance' scale. While all the guidelines may not be applicable to all audiences and contexts, these highest rated guidelines are also filtered according to the applicability on the test subject. The above-mentioned usability guidelines book is also available as HTML content from HHS [7].

Table 1. Usability guidelines with highest ratings of relative importance (5)

Chapter no.	Guidelines
1:1	Provide useful content
2:1	Do not display unsolicited windows or graphics
3:2	Design forms for users using assistive technology
3:3	Do not use colour alone to convey information
5:1	Enable access to the homepage
5:2	Show all major options on the homepage
5:3	Create a positive first impression of your site
6:1	Avoid cluttered displays
6:2	Place important items consistently
6:3	Place important items at top centre
8:1	Eliminate horizontal scrolling
9:1	Use clear category labels
10:1	Use meaningful link labels
13:1	Distinguish required and optional data entry fields
13:2	Label pushbuttons clearly
15:1	Make action sequences clear

16:1	Organise information clearly
16:2	Facilitate scanning
16:3	Ensure that necessary information is displayed
17:1	Ensure usable search results
17:2	Design search engines to search the entire site

Ranking the usability issues is a problem among usability professionals and designers. Even highly experienced usability professionals can seriously disagree when ranking the usability issues [16]. The list in Table 1 consists of the highest rated items from the usability guidelines book created by HHS and referenced in this paper [7]. These guidelines are research based and intended to provide the best practices over a broad range of web design and digital communication issues.

The usability guidelines book has more than 500 references, some of which are academic, while some are articles of popular and highly experienced usability professionals such as Jacob Nielsen [17].

4. Quick Applicability of the Guidelines

All the guidelines with the highest rating (5) are evaluated in regard to their quick applicability. While determining the quick applicability of the guidelines, the following aspects are taken into consideration:

- Does the guideline require extra analysis before evaluating the website (e.g. useful content)?
- How many pages should be analysed to satisfy the guideline (homepage, search page or all pages)?
- How much time is needed for the evaluation of the guideline?

For quick applicability rating of the guidelines, three different values are assigned:

- YES
- NO
- PARTIALLY.

All the guidelines with the highest rating (5) are evaluated in regard to their quick applicability. While determining the quick applicability of the guidelines, the following aspects are taken into consideration:

Table 2. Quick applicability of the guidelines

Guideline	Quick applicability	Clarification/rationale
Provide useful content	NO	It requires in-depth analysis and much time. Determining the usefulness of the content is another major job, which needs a long time. Making this analysis for all content also increases the required time greatly
Do not display unsolicited windows or graphics	PARTIALLY	Indeed, the job is easy but analysing the entire website requires much time. An evaluation considering the homepage and important pages can quickly be carried out
Design forms for users using assistive technology	YES	It can be quickly evaluated
Do not use colour alone to convey information	NO	Interpreting the colour theme of the website requires in-depth analysis and much time
Enable access to the homepage	PARTIALLY	A quick decision can be obtained by analysing the important and commonly used pages. However, it requires much time to analyse the entire website
Show all major options on the homepage	YES	If the purpose and the main functions of the website are known, it can be evaluated quickly. It only requires evaluation of the homepage
Create a positive first impression of your site	NO	It requires in-depth analysis and much time. 'Positive First Impression' is an abstract expression and requires a usability

Avoid cluttered displays	PARTIALLY	test with a certain number of users Analysing the entire website requires much time, but analysing only the homepage and important pages can be carried out quickly
Place important items consistently	PARTIALLY	Analysing the entire website requires much time, but review of the homepage and important pages can be carried out quickly
Place important items at top center	PARTIALLY	Analysing the entire website requires much time, but review of the homepage and important pages can be carried out quickly
Eliminate horizontal scrolling	PARTIALLY	Analysing the entire website requires much time, but review of the homepage and important pages can be carried out quickly
Use clear category labels	PARTIALLY	Analysing the entire website requires much time, but review of the homepage and important pages can be carried out quickly
Use meaningful link labels	NO	It requires deep analysis of all the pages and costs much time
Distinguish required and optional data entry fields	YES	The pages containing forms can be quickly evaluated
Label pushbuttons clearly	PARTIALLY	Analysing the entire website requires much time, but review of the homepage and important pages can be carried out quickly
Make action sequences clear	NO	Determining action sequences and the clarity analysis of these sequences requires in-depth analysis and much time
Organize information clearly	NO	Determining the clarity of the information presented in a website requires in-depth analysis and much time
Facilitate scanning	PARTIALLY	Analysing the entire website requires much time, but review of the homepage and important pages can be carried out quickly
Ensure that necessary information is displayed	NO	Determining the necessary information for a page requires in-depth analysis and much time. Doing this analysis for every page requires much more time
Ensure usable search results	YES	It can be quickly evaluated by observing the search results page
Design search engines to search the entire site	YES	It can be quickly evaluated by observing the search page

5. Evaluation of a Website with the Quickly Applicable Guidelines

A website of the Scientific and Technological Research Council is evaluated in consideration of the usability guidelines, which are derived from Table 2. The list consists of the guidelines with the values 'YES' and 'PARTIALLY' from Quick Applicability column.

Table 3. Website evaluation by usability guidelines

Guidelines	Description	Website evaluation (TÜBİTAK)
Do not display unsolicited windows or graphics	Unsolicited windows or graphics distract and annoy users while they are focusing on completing their original activity	This website does not display any popups that distort its users in the observed pages. Displaying popup windows is not encountered generally in government websites
Design forms for users using assistive technology	Online forms are critically important, while much of the information is collected using these forms. So, all users should be able to access forms and interact with elements in these forms	Knowledge acquisition page in this website has a couple of forms that is not designed for users using assistive technology. These forms also have problems with general design principles
Enable access to the homepage	While many users expect that the logo of the website should be clickable,	Although the logo is clickable on this website, there is no link to the

	many others could not notice the clickable logo. Therefore, together with the clickable logo, a 'Home' labelled link should be included on top of the web page	homepage to help users. Also, institution websites that are positioned as subsites have no links in visible areas to the main homepage. There is only a whitened logo of the corporation at the bottom of the page, which some users might not realize as clickable
Show all major options on the homepage	Users should not have to click second- or third-level links for major options in a website. Access to the most demanded content should be easy and one-click away	The content for funding/scholarship programs and publications can be accessible from the homepage. The positions and emphasis of the elements can be designed better
Avoid cluttered displays	Cluttered pages can be observed when much information is tried to be given on a restricted-size screen. Cluttered pages lead to degradation of performance when trying to find certain information	The observed pages of this website have no clutter
Place important items consistently	Important items on a website should be positioned in the same locations on all pages and they should be closer to the top of the page where users can easily estimate their location. When the location of items remains consistent in different pages, users learn their location and use this knowledge to improve task performance	The website does not display important items consistently. If the user clicks on a sub-menu item from the top menu, the items on the top menu change
Place important items at top centre	When users first come to a website, they generally look at the top centre first, then look left, then right, and finally begin systematically moving down the total web page. Therefore, all critical information and navigation items should be placed on the top of the page	This website displays a menu in the top centre, which includes some critical navigation items, but not in an effective manner. The menu items are not clearly visible and are not arranged in order of the importance of the items
Eliminate horizontal scrolling	Appropriate page layouts should be used to eliminate horizontal scrolling, because it is a slow and tedious way of viewing the entire screen. All screens should be designed for common screen resolutions	The observed pages of this website have no horizontal scrolling
Use clear category labels	Category labels should clearly reflect the information and items contained within the category. Generalized and vague link labels create confusion for users, whereas clear and detailed link labels are easily rendered by users	The top menu items have clear category labels. However, some pages contain confusing labels
Distinguish required and optional data entry fields	Users should be able to easily distinguish the required and optional data entry fields. Many websites use an asterisk symbol in front of the	Two application forms for knowledge acquisition can be accessed from the knowledge acquisition page. Both the forms do not provide any

	required fields	distinguishable symbol or any notification message for the required and optional data entry fields
Label pushbuttons clearly	Pushbutton labels should clearly indicate the action that will be applied when the pushbutton is clicked	This website uses common labels like 'Submit' and 'Clear'
Facilitate scanning	To facilitate scanning, each content page should be structured as it will display clear and well-located headings, short phrases and sentences and small readable paragraphs. Typical users scan until they find something interesting and then they start to read. So, the most important headings and content should be placed high in the centre section of the pages. Also, older users should be considered as they will scan more slowly than younger users, and the pages should be structured for all kinds of users so that they can easily find the most important content	This website displays the important content with clear headings in some research program pages. However, some program pages do not have clear and standardised headings
Ensure usable search results	Search results should provide the precise information about what the user searches. The format of the search results should be easily understandable and match the user's expectations	The search results provided by this website are not much usable. Each search result has a low-level specific header due to which users cannot estimate the category of the content. In some cases, search results display the same specific headers with different content and the subject of the content is not distinguishable by the users
Design search engines to search the entire site	Users tend to believe that a search engine will search the entire website. Though designers know a large website has subsections that are handled as several different sites, users may not be aware of this and they may consider all subsections as a whole. Users should know what parts of the website they are searching	There is no option to select the scope of the search

6. Conclusion

First, it is observed that some of the guidelines that are marked as 'not quickly applicable' are highly important from an information content and communication perspective. However, all of these guidelines require in-depth analysis and/or all the pages have to be scanned and, therefore, require much time for evaluation. The derived list of guidelines is useful if a quick insight about the usability of a website is needed. An evaluation with the derived list could be done quickly, while it does not require an in-depth analysis.

The first list of the guidelines is picked out from the highest rated guidelines list with five bullets. So, the derived list also contains some of the most important guidelines and can be used to gain a quick insight that can be really useful in some cases.

Evaluating websites in compliance with the usability guidelines is a convenient method for a quick usability feedback. There are various guideline sets from different reliable sources. This paper mainly used the usability guidelines book provided by HHS. An applicable guidelines subset consisting of highly rated items is selected from a large amount of guidelines set in regard to this book. The obtained usability guidelines can be utilized for eliminating most critical usability issues in a website.

As a further research, we plan to develop an application framework that supports the set of guidelines from the ISO standard 9241-151 [18]. This application enables usability experts to evaluate websites in accordance with usability guidelines and provides a set of concrete guidelines for automation.

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