Measuring User Experience of Usability Tool, Designed for Higher Educational Websites

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Abstract: The user feedback is always important in order to enhance the quality of the software. Usability and user experience are the factors to be considered to improve the quality of the software. There are different methods to evaluate the usability of the software but here in this paper we are aiming to measure the user experience of software, designed for the usability evaluation of the higher educational websitesin order to enhance the usability. This will provide usinformation of the overall impact of software onend users or developers which will help us to analyze the usability level of our software.

Key words: Usability · User experience · Higher educational websites

INTRODUCTION

User Experience (UX): According to ISO CD 9241-210, the user experience can be defined as "all aspects of the user's experience when interacting with the product, service, environment or facility"[1].

There is no such agreed definition of UX [2] but most of the researchers agree that it's all about usefulness and usability of software [3,4,5]. Moreover, it can be affected by the users' present state, emotions and perceptions for that software [3,4]. According to [6] "Every aspect of the user's interaction with a product, service, or company that makes up the user's perceptions of the whole".

Why to Measure UX: According to Nigel Bevan [7], the major reason to measure the usability of any software is to obtain complete understanding of user's need and to improve the software in order to provide the better UX.

Measuring UX: There are different UX testing methods as discussed in [8, 9, 10] used to assess the real thoughts of the end users what they feel about the software. To know the value of your application whether it's better than others or the development efforts spent on it increases the user experience really paid off?.Therefore, if we want to know the answers of such questions we need to adopt a quantitative approach to measure the user experience

[11]. The best method used for the quantitative approach is questionnaire which efficient and inexpensive method to do such measurement.

The questionnaire is a quick approach for the assessment of user experience of any application. We are using a wide range of scale for the questionnaire to cover a comprehensive impression of user experience. The format of the user experience supports to express user's feeling, attitude and impression immediately.

Automated Usability Tool: Following we have defined the functionality of our tool.

Broken Link Checker: We have designed a tool having the functionality to check the broken links of the websites, means those links, which cannot be redirected on the specified path. We have provided a search facility that a web developer will enter the web address and search the broken links. We have also given options to check the nested links of websites and also an option to remove duplicate links found wheearching the broken links. Finally, the tool will search the all possible links present on the website and broken links. The result will be given in numbers such as 10 broken links found etc. The Fig 1, shows the screen shot of this feature.

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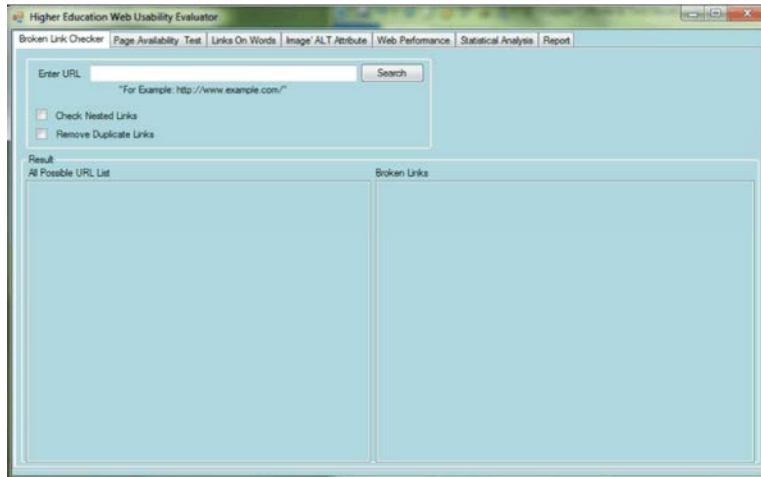
Fig. 1: Screen shot of broken link checker feature of tool

Fig. 2: Screen shot of "Availability of pages" feature of tool

Fig 3: Screen shot of tool checking links on word "Click here" and "more" feature of tool

Page Availability Test: The page availability feature of tool will search the following pages in the website.

- Sitemap page, Contact page, Home page, About us page, News page, Results page, Publication page, Research page, Search page, Scholarships page

In this feature of tool we have given the options to check the nested links and to remove duplicate links for better results. To save the evaluation time consumed in checking the nested links, we have coded in such a way that once you have checked the nested links in the broken links module then you don't need to waste the time again and again for other modules. The web developer just

needs to check the nested links option and it will check the links found in previous modules. We have also given the options to search any other page. The Fig 2, shows the screen shot of this feature.

Checking Links on Words: This module will check the links present on following words, which decreases the usability of the website.

• "more", "click here", "links"

The module will search those links created on the above-mentioned words. We have designed four sections for this module, which will search each word separately in its own section. To make this module more efficient we have given the option to search ant other word having links on it. Here also we can check the nested links for better results. Finally, the result will be in total number of links found in each section. The Fig 3, shows the screen shot of this feature.

Checking Images Missing "ALT" Attribute: This module will check those images, which are missing "ALT" attribute in its source code. We have also given the option to show the list of all possible images found. Here also we can check the nested links for better results. The result will also be shown in numbers. The Fig 4, shows the screen shot of this feature.

Checking Website Performance: This module will show the loading time of a website. Following there is the screen shot of this module.In this model, we have set parameters to measure the web performance. The performance measurement depends on the time required to load a website. The Fig 5, shows the screen shot of this feature.

Excellent Performance: The website will have excellent performance if it takes less a seconds in loading.

• Good Performance: The website will have good performance if it takes greater than one (1) and less than two (2) seconds in loading.
• Average performance: The website will have Average performance if it takes greater than two (2) and less than three (3) seconds in loading.
• Poor Performance: The website will have poor performance if it takes greater than three (3) seconds in loading.

Statistical Analysis: There is need to check the usability level against these features, therefore we have designed a module "Statistical Analysis". In this module, the total usability score will be calculated which would be out of 16. It was very difficult task to calculate the usability level. There were few usability factors, which were necessary for the website such as home, contact, about us, sitemap pages while there were a few factors which need not to be the part of the website and their presence decreases the usability of the websites such as broken links, images missing ALT tag and links on some words. Therefore, we calculated the usability level as mentioned below.

• If the website contains broken links it should be given 0 number else 1.
• If the website contains a Home page option it should get 1 else 0, same for all pages.
• If the website contains links on word "click here" it should get 0 else 1, same for all words.
• If the website contains images which are lacking alt attribute it should get 0 else 1.
• For website performance, it is not included in this module and it is measured separately.
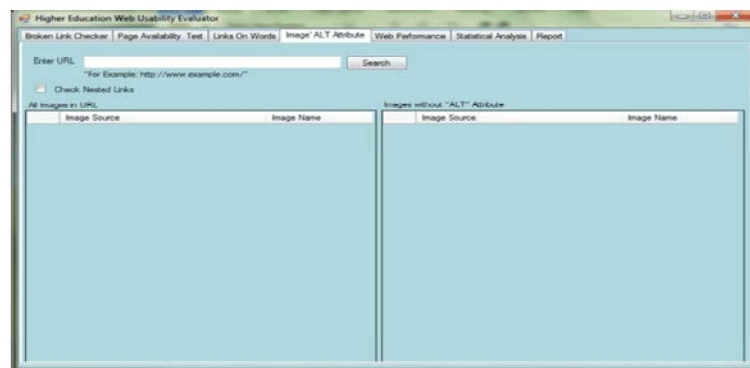

Fig. 4: Screen shot of tool checking images "alt" attribute feature of tool
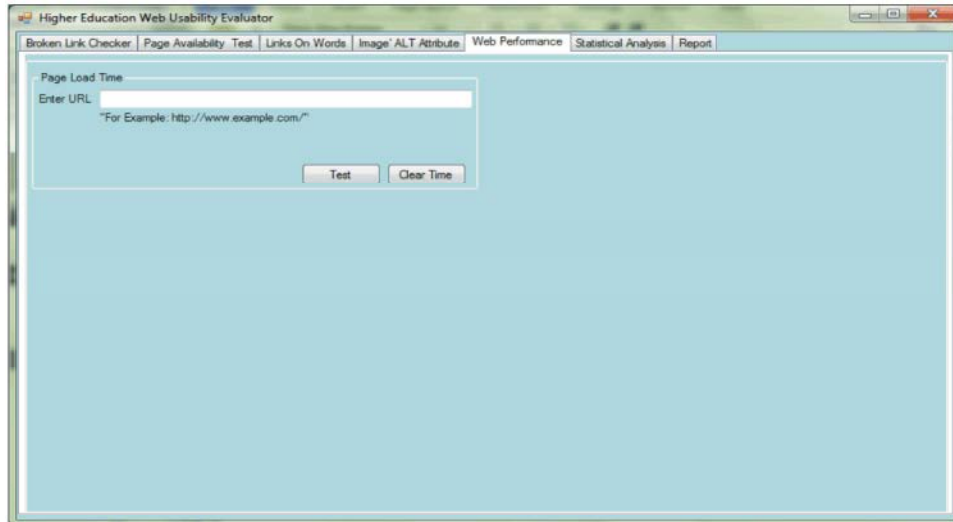
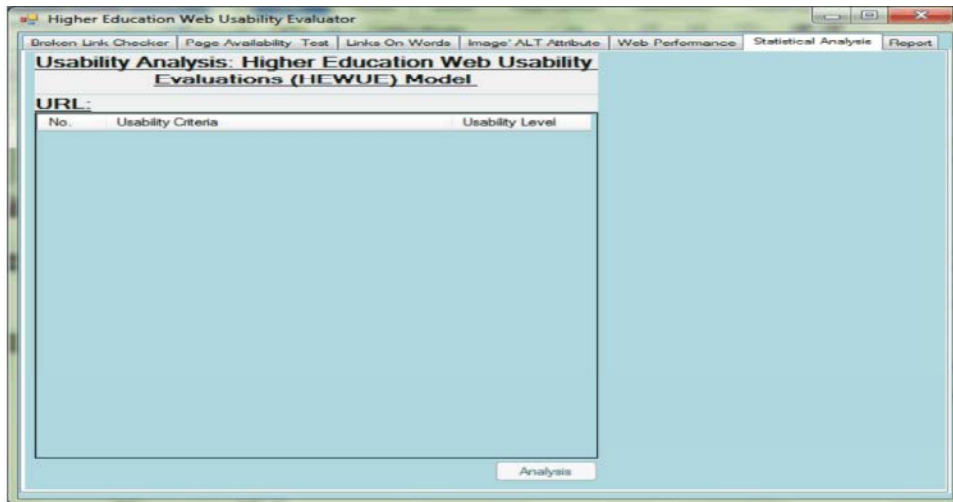Fig. 5: Screen shot of checking "Website Performance" feature of the tool

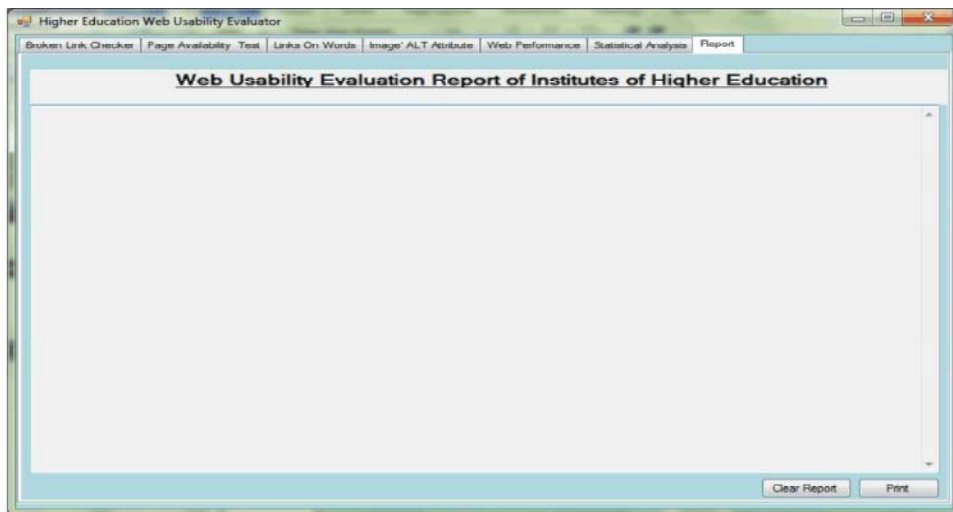Fig 6: Screen shot of "Statistical Analysis" feature of tool

Fig. 7: "Report" feature of tool

The Fig 6, shows the screen shot of this feature.

Report: The last feature of our tool is designed to provide the detailed outcome of each usability factor. In this feature, you can see the number of occurrences of each usability factor and their results such that the total number of broken links, availability of pages, web performance etc. The Fig 7, shows the screen shot of this feature.

Related Work: Mark and Tim [12] worked on the user experience with referenced to usability. The have used the e-commerce websites website design to measure the user experience. They proposed a model for user experience consisting of few usability factors.They concluded their research on development in theory and practices in user experience.

Angeli [13] worked on the usability evaluation of the two informative websites. The usability scale was consisting of usability factors and user experience factors. Usability measures and expressive aesthetics were significant predictors of overall preference in their research.

Lindgaard [14] in his research involves the end users to inspect the given websites of B2C. He also used the usability and aesthetic factors to evaluate the usability of the websites.he involved the given factors for inspection; Perceived usability, Aesthetics, Emotion, Likeability, Expectation and WAMMI standards to measure the users' satisfaction.

Schenkman [15] used the sample of 13 websites of different domain to check its similarity, complexity, beauty, meaningfulness and overall impression scale. He concluded that the beauty was a primary predictor of overall impression and preferences of websites.

Lavie [16] also worked on usability and aesthetic factors of 10 websites of different domains. The evaluation parameters were playfulness and service of quality.

Ben-Bassat[17] worked on usability and aesthetic factor of computerized phonebook. The objectives were to evaluate the performance, preferences, economic measures, usability and aesthetic factors. He found that there is no effect on user preferences while the auction bis has no effect on usability but has aesthetic effect on the product.

Chawda [18] Worked on the Search tool and evaluated the visual and search tasks of the tool. They also used questionnaire to evaluate the product. He found that there is strong relation between pre-use aesthetic and pre-use usability.

MATERIALS AND METHODS

We are aiming to measure the user experience of our usability software. We have reviewed different methodologies used to evaluate user experience and selected a questionnaire based approach. The software was designed to evaluate the usability of websites of higher education institutes. For this reason we are using a likert scale questionnaire to know the user experience of software. The questionnaire is designed using the google docs and is available online for the users to evaluate. We have emailed the questionnaire to 30 different developers working on educational websites. Participants can rate software concerning its position on the dimension spanned by the two adjectives on a 7 point scale.Finally we validated the results after receiving the response from the users'.

Structure of the Questionnaire: The user experience questionnaire [19] contains 5 scales with 15 items total.

Attractiveness: General impression towards the product. Do users like or dislike the software? SelectedItems: annoying / enjoyable, good / bad, unlikable / pleasing, friendly / unfriendly

Efficiency: Is it possible to use the product fast and efficient? Does the user interface looks organized?

SelectedItems: Fast / slow, organized / cluttered

Perspicuity: Is it easy to understand how to use the product? Is it easy to get familiar with the product?

SelectedItems: not understandable / understandable, easy to learn / difficult to learn, complicated / easy, clear / confusing

Stimulation: Is it interesting and exciting to use the product? Does the user feel motivated to further use the product?

SelectedItems: valuable / inferior, boring / exiting, not interesting / interesting.

Novelty: Is the design of the product innovative and creative? Does the software grab users attention?

SelectedItems: Creative / dull, conservative / innovative.

RESULTS

We sent the questionnaire with the tool to measure the user experience but we received the results only from 21 developers. They filled the questionnaire and sent back to us. We evaluated and validated the results to measure the user experience. We have shown the graphical representation of the users' feedback which shows the overall user experience of our usability tool. To answer such questions, it is sufficient to validate the UX results, if the 20 to 30 users of the software fill out the form and send their feedback [20].We have shown the user experience measurement in Table 1 and graphical representation of overall user experience impact on end user in Fig 8.
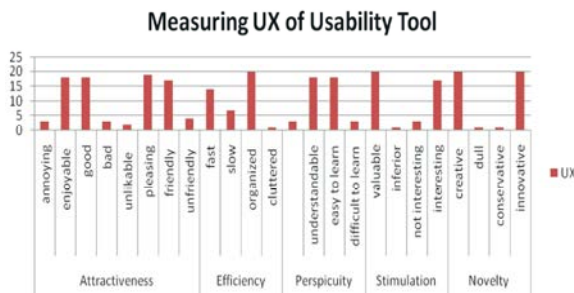

Fig 8: Graphical representation of measurement of UX

Table 1: Measurement of user experience

User Experience		
Category	Items	Measurement
Attractiveness	Annoying	3
	Enjoyable	18
	Good	18
	Bad	3
	Unlikable	2
	Pleasing	19
	Friendly	17
	Unfriendly	4
Efficiency	Fast	14
	Slow	7
	Organized	20
	Cluttered	1
Perspicuity	Not understandable	3
	Understandable	18
	Easy to learn	18
	Difficult to learn	3
Stimulation	Valuable	20
	Inferior	1
	Not interesting	3
	Interesting	17
Novelty	Creative	19
	Dull	2
	Conservative	1
	Innovative	20

CONCLUSION

The overall feedbacks received from the developers have shown that the usability tool used for evaluation of higher educational websites has good user experience and they feel happy to use this software. Moreover, the feedback also show that still the efficiency of the software needs improvements in order to increase its user experience in terms of usability. They found the software innovate and helpful to evaluate the websites which can evaluate the websites in an organized way. They also appreciated this idea which is innovative used to enhance the usability of the educational websites. Finally they found the tool valuable and innovative.

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