

# Evaluating the Quality of Academic Websites using Proposed Framework – A Survey Study

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**Abstract** - As organization have become aware of the strategic importance of websites, the trend to use websites for various purposes has increased in different domains such as health, government, education and business. The main goal of this paper is to improve the website quality evaluation framework for academic websites from students' perspective. For this purpose, the proposed quality evaluation framework consisting of five high-level quality factors (Functionality, Usability, Reliability, Presentation and Content) and sub quality factors are designed. The proposed framework applied on five academic websites (GNDU, HPU, JPU, KU and PU) to assess its websites. The effectiveness of the proposed framework can be evaluated by compared the responses of the students' overall quality of websites with the results of WEBUSE analysis method. The results showed excellent quality of Content, good quality of Functionality, Reliability and Presentation while Moderate quality in Usability.

**Keywords** - Framework, Questionnaire, WEBUSE method, Websites.

## I. INTRODUCTION

This With the increasing number of websites and investment in them, website quality evaluation has become an important activity [1]. Organizations invest a lot of time and money to develop and maintain the quality of their websites. These websites provides effective or useful information to their clients. The quality of a website makes the websites profitable, user friendly and accessible [2]. Efforts for increasing the quality of websites made by the organization should be clearly shown on the websites because it establishes an important connection with clients [3]. As in all information systems, website evaluation is an important development and operational factor that may lead to the improvement of their user's satisfaction [4].

The aim of this paper is to evaluate the effectiveness of the proposed framework. The purpose of proposed framework was to evaluate the quality of academic websites from students' perspective. It consists of five high-level quality factors (Functionality, Usability, Reliability, Presentation and Content) and 19 sub quality factors. Based on the main quality factors of the chosen base model (ISO 9126 – 1), the quality factors were rearranged to group factor with an equivalent semantic meaning

into one category by eliminating existing repetitions and different factor names. Except Content and Presentation high-level quality factors, the rest are part of 9126-1 quality model. This research paper is based on User-based methods using Questionnaire for students' perception. This paper is organized into various segments: in segment 2, some previous studies and investigated framework are described. In segment 3, the methodology used for the evaluation of academic websites is explained. In segment 3 and 4, analysis and results of proposed framework is explained; lastly, giving conclusions and future work.

## II. FRAMEWORK

From an extensive study of the literature on existing quality evaluation models, essential website success factors are made to identify necessary quality factors and sub factors of new framework. This new and improved quality evaluation framework consists of five high-level quality factors (Functionality, Usability, Reliability, Presentation and Content) and 19 sub quality factors [5].

TABLE I  
Academic Website Quality Evaluation Framework

High-level Factors	Sub Factors
Functionality	Suitability
	Navigation
	Search
Usability	Understandability
	Learnability
	Interactivity
	Operability
	Multi-lingual
Reliability	Fault Tolerance
	Recoverability
	Availability
Presentation	Aesthetics
	Formatting
	Multimedia
Content	Relevance of Information
	Accuracy of Information
	Up-to-date Information
	Authority
	Identity

### III. METHODOLOGY

The comprehensive analyses of website quality evaluation and usability literature have been made to understand website quality characteristics and quality models. This has helped in the design of the academic website’s evaluation framework. The following methods were proposed to evaluate the new evaluation framework:

- To gather student’s perception over the quality of the university websites and compare their responses with the outcome of the WEBUSE analysis

#### A. Preparation of Questionnaire

A survey study consists of questionnaire and interviews as the major tools of gathering data from respondents. According to Oppenheim [14], the purpose of a questionnaire is “measurement” and the main types of questions can be classified into three: factual, attitudinal and classification. Factual questions request response concerning known facts. Attitudinal questions request response concerning opinion, feeling or belief. Classification questions are special types of factual questions concerning personal characteristics that allow dividing data into categories. The Likert scale method is used for gathering data through survey. A 5-point scale of agreement like below is usually used in the Likert scale [15]:

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

The questionnaire has two parts. The first part contained basic information of the respondent (Course enrolled, Sex and frequency of using websites). The second part consisted 17 questions, out of which 16 Likert-type questions in a 5-point scale (1 indicating Strongly Agree and 5 indicating Strongly Disagree) and 17<sup>th</sup> question gives the overall quality to the websites. Each question was based on the characteristics of the proposed framework.

#### B. Selection of Websites

To assess the effectiveness of the proposed framework, a survey was conducted to evaluate the quality of case study academic websites. The five academic websites of different universities are chosen, as shown in TABLE II.

TABLE II  
The Universities Included in the Research

Name of Universities	Website Address	Abbreviation
Guru Nanak Dev University	www.gndu.ac.in	GNDU
Himachal Pradesh University	www.hpuniv.nic.in	HPU
Jaypee University	www.juit.ac.in	JPU
Kurukshetra University	www.kuk.ac.in	KU
Punjab University	www.puchd.ac.in	PU

### IV. ANALYSIS

Using the quality factors in the proposed framework, a survey was conducted on the case study websites (GNDU, HPU, JPU, KU and PU) to test the designed evaluation framework comprising of 130 respondents and at the same time to evaluate the overall quality of the websites from current students’ perspective

#### A. WEBUSE Usability Analysis Method

A usability analysis method called WEBUSE was used to make a more valuable analysis of the case study evaluation. The method basically was applied practically for evaluating the usability of websites by using questionnaire [16] in the form of Likert scale items. In this rating method, first questions are grouped into categories based on the quality factors they address; a category indicates one high-level quality factor. Then, a merit value for each response of the questions is assigned according to the responses gathered as shown in TABLE III.

TABLE III  
Response Options for Questions and Corresponding Merit Values

Response Options	Merit Points
Agree	0.75
Disagree	0.25
Neutral	0.50
Strongly Agree	1.00
Strongly Disagree	0

Then the Merit points for the high-level quality factors will be accumulated as follows:

$$X = \frac{\text{Merit point of each question of a high-level Quality Factor}}{\text{Total number of questions for the quality factor}}$$

Finally, to calculate the overall quality of the website, the mean average of the high-level quality factors will be computed as:

$$Q = \sum_{i=1}^n X_i / n$$

Where,

- $X$ , is the average merit point of a high-level quality factor
- $Q$ , is the mean average of the overall quality of the website
- $n$ , is the total number of items in the questionnaire

The values of the merit points of the quality factors range between 0 and 1, which are divided into five categories to indicate five different levels of quality (Bad, Poor, Moderate, Good and Excellent). The quality merit points determine the quality levels of the websites. The quality level depends upon the ranges of the average merit point as shown in TABLE IV.

TABLE IV  
Merit points and Quality levels

Average Merit Point	Quality Level
$0 \leq x < 0.2$	Bad
$0.2 \leq x < 0.4$	Poor
$0.4 \leq x < 0.6$	Moderate
$0.6 \leq x < 0.8$	Good
$0.8 \leq x < 1.0$	Excellent

## V. RESULTS

### A. Response Rates

The questionnaire was manually distributed from 15<sup>th</sup> July-20<sup>th</sup> August, 2016. The questionnaire was given to 150 Bachelors, Masters and PhD. students. Out of which 130 valid responses were gathered. 57 students who participated in the questionnaire were Bachelor students, comprising 43.8% of the response. 52 students were Masters, comprising 40% of the response, rest 16.2% being PhD. scholars. The number of female students who participated in the questionnaire was 61, while that of male students were 69.

The frequency of the student's visits to the websites varies in the response gathered. The options given to the students to choose from were, everyday, weekly, monthly, occasionally, never and other. Therefore, according to the responses gathered, the highest frequency of use is in a occasionally period with scoring 41.5% and weekly scoring 30.8%. The options everyday and monthly scored 14.6% and 13.1% respectively.

### B. Using WEBUSE Analysis Method

To give more valuable analysis of the responses, a usability rating method is used. To be able to use this method, questions for each of the five high level quality factors grouped under one category for the purpose of analysis. Thus it was possible to find out the quality level of five academic websites in terms of five high-level quality factors as shown in TABLE V.

#### 1) Functionality

The result for the navigation showed excellent quality for all the websites. The result for the suitability showed excellent quality in case of JPU and KU websites, but moderate quality in case of HPU website. Moreover, the result for the search characteristic showed poor quality level for JPU website, which indicate that there is a lack of search option in JPU website.

#### 2) Usability

The understandability of the websites showed good and excellent quality level. This indicates that the terminologies of all the websites are understandable by students. The learnability showed excellent in case of JPU website, good quality level in case of GNDU and PU website while moderate quality level for HPU and KU websites. It indicates the students are not satisfied with learnability of HPU and KU websites. The interactivity showed good quality level only in case of KU website, moderate quality of GNDU and HPU websites while poor quality level of JPU and PU websites. This means that frequently asked questions are not organized in JPU and PU websites and also not better organized in case of GNDU and HPU websites. The operability showed excellent quality of HPU, KU and PU websites while moderate quality of GNDU and JPU websites. The multi-lingual characteristic showed bad quality level for each website. It means that all five websites (GNDU, HPU, JPU, KU and PU) does not support multi-lingual characteristic.

TABLE V  
Results of WEBUSE Analysis Method

High-Level Quality Factors	Sub Quality Factors	GNDU		HPU		JPU		KU		PU	
		Merit Value	Quality Level	Merit Value	Quality Level	Merit Value	Quality Level	Merit Value	Quality Level	Merit Value	Quality Level
Functionality	Suitability	0.75	Good	0.49	Moderate	<b>0.83</b>	<b>Excellent</b>	<b>0.83</b>	<b>Excellent</b>	0.77	Good
	Navigation	<b>0.82</b>	<b>Excellent</b>	<b>0.82</b>	<b>Excellent</b>	<b>0.88</b>	<b>Excellent</b>	<b>0.87</b>	<b>Excellent</b>	<b>0.88</b>	<b>Excellent</b>
	Search	0.70	Good	0.50	Moderate	0.27	Poor	<b>0.80</b>	<b>Excellent</b>	0.41	Moderate
Usability	Understand Ability	0.69	Good	0.66	Good	<b>0.80</b>	<b>Excellent</b>	0.74	Good	0.63	Good
	Learnability	0.63	Good	0.59	Moderate	<b>0.91</b>	<b>Excellent</b>	0.57	Moderate	0.63	Good
	Interactivity	0.52	Moderate	0.54	Moderate	0.28	Poor	0.62	Good	0.35	Poor
	Operability	0.46	Moderate	<b>0.83</b>	<b>Excellent</b>	0.59	Moderate	<b>0.86</b>	<b>Excellent</b>	<b>0.87</b>	<b>Excellent</b>
	Multi-lingual	0.08	Bad	0.09	Bad	0.1	Bad	0.1	Bad	0.10	Bad
Reliability	Fault Tolerance	<b>0.80</b>	<b>Excellent</b>	0.64	Moderate	<b>0.88</b>	<b>Excellent</b>	<b>0.80</b>	<b>Excellent</b>	0.77	Good
	Recoverability	<b>0.82</b>	<b>Excellent</b>	0.68	Moderate	0.64	Moderate	0.59	Moderate	0.67	Good
	Availability	0.53	Moderate	0.54	Moderate	<b>0.88</b>	<b>Excellent</b>	0.65	Good	0.59	Moderate
Presentation	Aesthetics	0.59	Moderate	0.60	Good	0.72	Good	<b>0.87</b>	<b>Excellent</b>	<b>0.84</b>	<b>Excellent</b>
	Formatting and Multimedia	0.76	Good	0.63	Good	<b>0.86</b>	<b>Excellent</b>	0.63	Good	0.35	Poor
Content	Relevance and Accuracy	<b>0.88</b>	<b>Excellent</b>	<b>0.84</b>	<b>Excellent</b>	<b>0.84</b>	<b>Excellent</b>	<b>0.87</b>	<b>Excellent</b>	<b>0.89</b>	<b>Excellent</b>
	Up-to-date Information	0.73	Good	0.63	Good	<b>0.82</b>	<b>Excellent</b>	0.75	Good	0.79	Good
	Authority and Identity	0.83	<b>Excellent</b>	0.57	Moderate	<b>0.89</b>	<b>Excellent</b>	<b>0.89</b>	<b>Excellent</b>	0.65	Good

### 3) Reliability

The fault tolerance showed excellent quality of GNDU, JPU and KU, good quality in case of PU website, but moderate quality of HPU website. It means that students not get the valid page clicking on links of HPU website. The recoverability showed moderate quality of HPU, JPU and KU whereas excellent and good quality of GNDU and PU websites respectively. The availability showed excellent in case of JPU and good quality of KU website. But, showed moderate quality level in case of HPU, GNDU and PU websites.

### 4) Presentation

The aesthetic characteristic showed excellent quality in case of KU and PU websites and good quality in case of HPU and JPU websites. But it showed moderate quality level for GNDU website. Formatting and multimedia showed excellent quality in case of JPU website and good quality in case of GNDU, HPU and KU websites. But it showed poor quality in case of PU website. This indicates that PU website does not make the effective use of images, video presentation, graphics and text.

### 5) Content

The quality to the relevance and accuracy of information in each five websites (GNDU, HPU, JPU, KU and PU) showed excellent quality level and up-to-date information also showed excellent and good quality level for all websites. Authority and identity characteristics showed excellent and good quality level for GNDU, JPU, KU and PU while moderate quality for HPU website.

The WEBUSE analysis results indicated that all five websites (GNDU, HPU, JPU, KU and PU) has an excellent Content quality and good Functionality, Reliability and Presentation quality factors. But the websites has moderate quality level of Usability. In general, the mean average of the quality merit value of each five quality factors showed that all websites (GNDU, HPU, JPU, KU and PU) has good quality.

TABLE VI  
Final Quality Merit and Quality Level of Five Websites

High level quality factor	GNDU		HPU		JPU		KU		PU		Quality Level of Quality Factors
	Final Quality Merit	Quality Level	Final Quality Merit	Quality Level	Final Quality Merit	Quality Level	Final Quality Merit	Quality Level	Final Quality Merit	Quality Level	
Functionality	0.76	Good	0.60	Good	0.66	Good	0.83	Excellent	0.62	Good	0.69 Good
Usability	0.48	Moderate	0.54	Moderate	0.54	Moderate	0.58	Moderate	0.52	Moderate	0.53 Moderate
Reliability	0.72	Good	0.62	Good	0.71	Good	0.68	Good	0.62	Good	0.67 Good
Presentation	0.66	Good	0.62	Good	0.79	Good	0.75	Good	0.60	Good	0.68 Good
Content	0.81	Excellent	0.68	Good	0.85	Excellent	0.84	Excellent	0.78	Good	0.80 Excellent
SUM	3.43		3.06		3.55		3.68		3.14		
AVERAGE	0.67	Good	0.61	Good	0.71	Good	0.74	Good	0.62	Good	

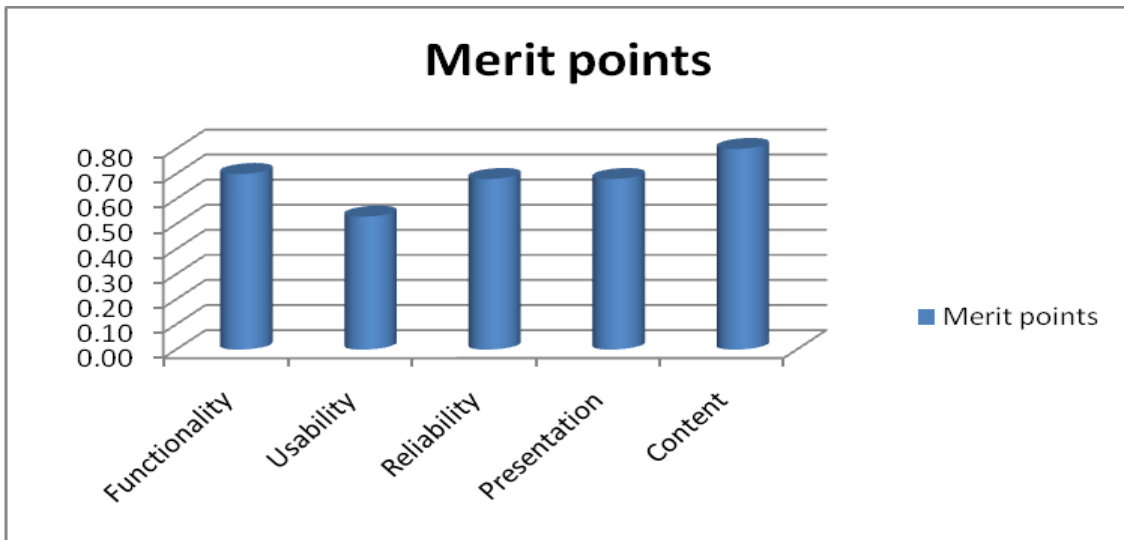


Fig. 1. Quality Merit Points for each High-level Quality Factor

**Comparison of Student’s Perception of the Overall Quality of each Websites and Results of WEBUSE analysis:**

In 17<sup>th</sup> question, students were asked to give the satisfaction of overall quality of each website just like other Likert type questions. The responses showed in TABLE VII.

TABLE VII  
The Result of 17<sup>th</sup> Question

Question	GNDU	HPU	JPU	KU	PU
17. Give the Overall Quality of the Websites	0.66	0.61	0.77	0.79	0.62
Quality Level	Good	Good	Good	Good	Good

By comparing the results of TABLE VI and TABLE VII, the quality level for each for each websites are same.

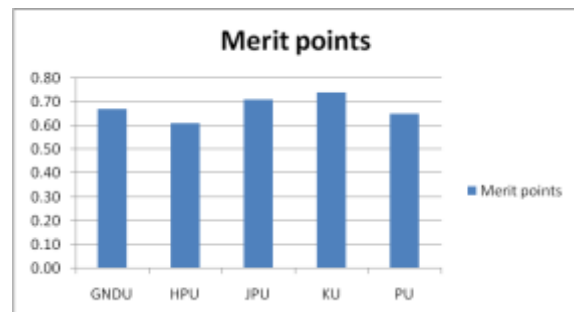


Fig 2. Quality Merit Points for each Website

**VI. CONCLUSIONS**

The main objective of this paper was to apply the proposed framework on a case study academic

websites to evaluate how the framework performs by comparing the five academic websites (GNDU, HPU, JPU, KU and PU). For this the proposed framework was used to evaluate the quality of five academic websites by means of a questionnaire. Likert scale type questions that address the quality factors and sub factors of the proposed quality evaluation framework were designed and distributed to students. The effectiveness of the proposed quality evaluation framework was done by two methods. The first method was to evaluate the sum of responses of each question of five academic websites. The second method was to make a comparison between the quality rating students' gave in 17<sup>th</sup> question using five academic websites and quality rating of the websites by adopting a website usability analysis method called WEBUSE.

From the results of the analysed responses of the questionnaire, it was observed that the KU website showed highest number of responses. JPU website was also slightly closer to the KU website. The responses gathered for all websites for most quality factors are consistent across the number of students who participated in the case study. But there were cases in which the responses of the sub-quality factors showed slight inconsistency from the total responses of the students. These sub-quality factors were Search in case of JPU website, Interactivity in case of JPU and PU websites and Multi-Lingual in all five websites, which are the part of Functionality and Usability high-level factors.

The result of the case study of five academic websites is same as the response of the 17<sup>th</sup> question (giving ranking to the websites) and the final analysis result of the WEBUSE method. All showed that all the five academic websites (GNDU, HPU, JPU, KU and PU) were good quality. However, website of KU is the best as per the framework and as per the responses given by the respondents for overall quality of the websites. Further, as per the framework HPU and PU websites are of lesser quality which is also supported by the overall response of the respondent. In general, these respondents believed that the parameters of website were suitable. Hence, the proposed framework was well validated.

## VII. FUTURE WORK

The proposed evaluation framework focuses on only one group of users. The evaluation results of a given academic websites using the proposed framework will only reflect the quality of website from students' point of view. Therefore, it is worthwhile to carry out a similar study on different group of users.

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