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Framework for Evaluation of Academic Website

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Abstract:

The increased trend to use websites for various purposes has also increase in different domains such as education, health, government and business. Organizations seeking to obtain benefits from their websites need to create and maintain websites that are successful in supporting the interaction and communication of the organization with their users. The main goal of this paper is to design the website evaluation framework for academic websites. For this purpose the study of academic websites, website quality models and their quality factors. A new quality evaluation framework consisting of five high level quality factors namely: Usability, Content, Presentation, Functionality and Reliability.

Keywords — **Academic Websites, ISO 9126, MILE, Software Quality Factors and Website Quality Factors.**

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I. INTRODUCTION

Evaluation research is necessary to monitor and further improve the quality of the web sites and use expert focused methods to evaluate the web site [1]. A great number of new websites has been launched everyday. Poor web design will make user away and give poor reputation to organization [2][3]. The quality of a website makes a website profitable, user friendly and accessible, and it also offers useful and reliable information, providing good design and visual appearance to meet the user's needs and expectations [4]. This can be done by defining the measurable website criteria [5][6]. The evaluation process reflects the values and ideals of a group, society, field, or individual program and the criteria for evaluation derive from these core values. The process of evaluation often becomes a process of values classification and helps participants to refine their educational ideals [7].

The regular users of academic websites are students, professors, employees, journalists and parents. Each of this user group has their own requirements and expectations from the website.

Hence constructing a framework for evaluating the quality of academic websites needs to take into account the needs of these different user groups.

II. ACADEMIC WEBSITE

Website development has been done at a fast pace in recent years for wide ranges of purposes in different domains such as education, government, museum, business, entertainment and health [8]. One of the domains where websites are most widely used nowadays is the academic domain. Academic Institutions use websites for wide variety of purposes, which includes the distribution of information to the public, delivering online learning facilities to students, promotion of their educational and research programs.

Users of academic websites expect specific type of information in the website a short period of time to access the information. Generally, the users of academic websites are Students, Professors, Researchers, Journalists, Parents, Webmasters and Developers. Users of academic websites are concerned with two basic questions [9]:

- "Can I find the information I am looking for in the website?"

- "Can I find the information in a timely manner?"

These indicates that users of academic websites are more concerned about whether they can find the information they are looking in the website and how long to take the specific information.

Thus, there is a need to design a framework for evaluating quality of academic websites. There are several website quality models currently available, most of them only provide broad website quality factors and only few are designed for the purpose of evaluating websites in particular domains like museum [10], tourism [11], hotels [12], government [13] and commerce or business [14-16]. However, the number of website quality models for evaluating the quality of academic websites is limited. Hence, general quality models are used to evaluate the quality of academic websites. Moreover, the general quality evaluation models do not reflect on the expectations and requirements of specific users of the website concerned (under evaluation), besides citing the broad quality factors and sub factors.

III. QUALITY FACTORS

To evaluate the quality of websites using different quality assessment techniques starting in the earlier stages of the website design, during the intermediate design stages and the deployment stages [17]. Similar to software products, web applications consist of source and executable codes, list of requirements, design and testing specifications. Thus, quality factors in the software quality models can be equally applicable for evaluating quality of websites as well. Apart from the software quality models, there are also website quality evaluation models introduced over the past few year [18]. These include website quality evaluation models like Web-QEM, 2QCV3Q(7Loci), Minerva and MiLE.

A. Web-QEM (Web Quality Evaluation Model):

This model was a result of quality assessment first made on museum websites. Afterwards, it was applied to academic websites and other domains. The quality characteristics in this model are based on the ISO 9126-I model and therefore its characteristics include usability, reliability, efficiency and functionality [17][19].

B. 2QCV3Q-Models (7 Loci):

This is a conceptual model consisting of 7 dimensions to evaluate quality of Website: who-what-why-when-where-how and feasibility (with what means and devices). The model takes its name from the rhetorical principles of Cicerone loci and its dimensions are shown in Figure 1 [20].

Quis? (Who)	» Identity
Quid? (What)	» Content
Cur? (Why)	» Services
Ubi? (Where)	» Lacation
Quando? (When)	» Management
Quomodo? (How)	» Usability
Quibus Auxiliis?	» Feasibility

(With what means and devices)

Figure 1: Ciceronian Loci and Dimensions of the 2QCV3Q Model

C. MiLE (Milano Lugano):

MiLE model is a usability focused evaluation method based on the combination of inspection from expert evaluators and user's empirical testing. It bases its evaluation on two heuristics: abstract and concrete evaluation heuristics [20]. It categories different levels of analysis: content, services, navigation, cognitive features of the interface, aesthetics/graphic level and technology level [21].

D. MINERVA (MInisterial Network for Valorising Activities in Digitization):

In this model, quality is defined in terms of accessibility and usability. The purpose of the quality criteria in this model is two-fold. The first one is they are used to represent the quality characteristics for evaluating quality of websites and the second one is that they support the design and evolution of websites [20]. The model support the use of 10 quality principles: transparent, effective, maintained, accessible, user-centered, responsive, multi-lingual, interoperable, managed and preserved [22]. A summary of the high level characteristics of the above website models are presented in Table 1.

Website Quality Models And Their High Level Characteristics				
Website Quality Models	**Web-QEM**	**2QCV3Q (7 Loci)**	**MiLE**	**MINERVA**
High Level Characteristics	-Usability -Efficiency -Reliability -Functionality -Content -Navigation	-Usability -Feasibility -Maintenance -Services -Content -Identity -Location	-Services -Content -Navigation -Aesthetics/ Graphics -Cognitive feature of interface -Technology	-Transparent -Accessible -Responsive -Multi-Lingual -Interoperable -Managed -Preserved -Effective -Maintained -User-centered

Table 1: High Level Quality Characteristics of Existing Website Quality Models

E. Problems with Website Quality Models:

- The models present general characteristics lacking justification that describe which factors to determine for evaluating a website in a specific domain.

- Lack of underlying principle for deciding which specific quality characteristic relate to which high level quality criteria.

IV. FRAMEWORK

In order to design the new evaluation framework, careful study on the key quality factors for websites is made to identify necessary high-level quality characteristics, sub characteristics and criteria. Based on the main quality factors of the chosen base model (ISO 9126-1), the quality factors are rearranged to group factors with an equivalent semantic meaning in one category by eliminating existing repetitions and different factor names.

The high-level quality factors in the proposed framework are Usability, Reliability, Functionality, Content and Presentation. Except the Content and Presentation high-level quality factors, remaining are the part of the ISO 9126-1 quality model. The proposed framework constructed is shown below in Figure 2.
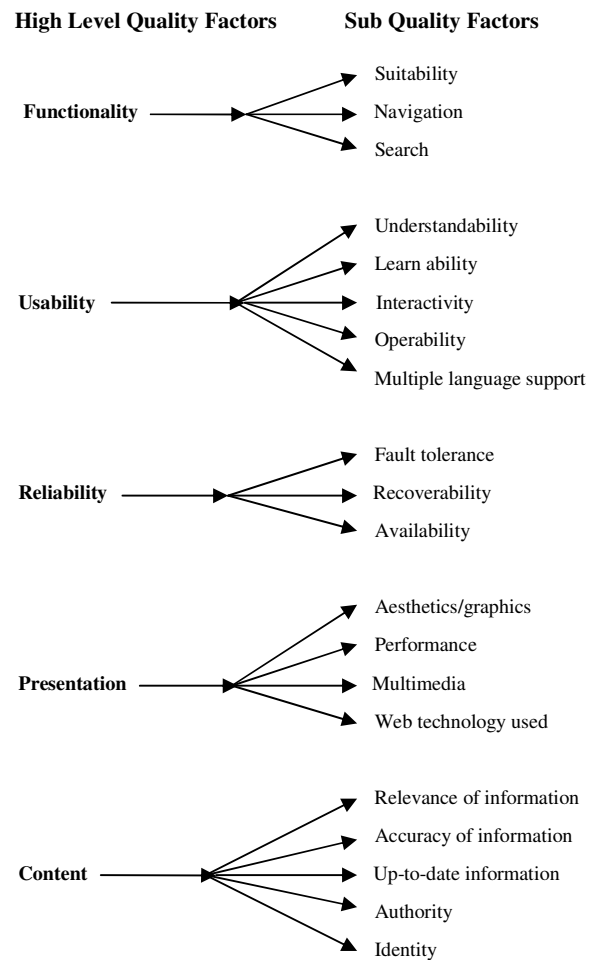

Figure 2: Academic Website Quality Evaluation Framework

A. Sub Quality Factors of Proposed Framework

The high level quality factors of the proposed framework are further decomposed into number of sub quality factors.

1) Functionality

The ISO 9126-1 model defines functionality as "A set of attributes that relate to the existence of a set of functions and their specified properties". The functions indicate specific tasks that help to accomplish stated or implied needs

[23]. Accuracy is already grouped under the content and therefore it is excluded in functionality. Functionality is decomposed into following sub factors:

- **Suitability**

In the ISO model, suitability is defined as "the appropriateness of the functionalities the website provides to users" [24].

- **Navigation**

A good navigation structure helps users to browse through the website in finding the information they look for without getting lost or being frustrated [25].

- **Search**

The search functionality in the website help users looks for different kinds of information through various search option [25].

2) *Usability*

Usability in general is defined as a quality characteristic that assesses how easy user interfaces is to use [26]. Website usability are defined as a combination of several design goals like easy to learn, easy to remember, easy to understand, easy to find etc. It consists of following sub factors:

- **Understandability**

This sub quality factor includes the arrangement of the labels, links and terms used in the website should match to user's terms so as not to confuse the user [27].

- **Learn Ability**

Learn ability indicates how easy it is for the users to accomplish basic task the first time they come across the design [24].

- **Interactivity**

A website must provide facilities for users to interact with the webmaster, an author of the content in the site [28].

- **Operability**

Operability indicates the capability of website to be easily operated by the users [24].

- **Multiple Language Support**

A website should provide the facility for users to choose the language they would prefer to access information on the website [10].

3) *Reliability*

Reliability concerned with the performance of the website. The performance of the website starts with the availability of the website and capability of the website to recover quickly at times of any kind of problems [22].The sub factors for reliability high level quality factor are:

- **Fault Tolerance**

The capability of the website to keep a certain level of performance even when there are major faults [20].

- **Recoverability**

The capability of the website to recover the website to previous state after the occurrence of faults or errors [24].

- **Availability**

Availability measures the readiness of websites. The website should be ready and available for users to access at any time [36].

4) *Presentation*

The presentation is the capability of the website that how to present it in front of users. The new technology should be applied on the website. It should be attractive. The sub factors of the presentation are:

- **Aesthetics/Graphics**

The user interface of the website should be attractive, enjoyable and pleasant enough for users to create an emotional appeal to use the site [29].

- **Performance**

A website performance measures the speed of services requests completion. It can be measured in terms of throughput, response time, latency and execution time [34].

- **Multimedia**

In the past five years, the bandwidth to the customers has expanded. Web multimedia has been receiving near exponentially increasing attention. The explosion of YouTube and the emergence of Internet TV are creating enormous interest in the use of online communication such as video and advertising medium [30]. Multimedia creates an outlet for this demand. This is why it is so important to incorporate an effective multimedia design scheme.

- **Web Technology Used**

Technology level indicates the compatibility of the website to perform well in different types of browsers. It indicates the models and standards used in the website [33].

5) Content

Web applications are a combination of information, services or functionalities. Users come to a website, primarily looking for a specific kind of information; they give less attention to the navigation, visual design and interactivity of the site [31]. The sub factors of content are:

- **Relevance of Information**

Information provided in the website should be relevant and engaging to users. In academic website, the information should be student oriented, useful, comprehensive, appropriate and within the expected level of details [29].

- **Accuracy of Information**

Grammar and spelling errors that could alter the meaning of the information should be avoided [32].

- **UP-to-date Information**

The website must deliver current information related to current situation in the university or institution [35].

- **Authority**

The information about authors who edit the contents of pages in the website should be available for any kind of reference users would like to make [8].

- **Identity**

The logo of the organization which owns the website must be available and clearly visible in every page [35].

V. CONCLUSIONS AND FUTURE WORK

This paper presents a quality evaluation framework for academic websites. To achieve this, definition of academic websites and website quality models are reviewed. Taking the "satisfaction of users" as the definition of product quality, five high-level quality factors and 20 sub quality factors for academic websites are identified. In future, the proposed framework used to evaluate the quality of any academic website or may be used for the comparisons of various academic websites.

REFERENCES

[1] S. Eiling, L. Lentz and M. De Jong, "Website Evaluation Questionnaire: Development of a Research-Based Tool," *Evaluation*, pp. 293-304, 2007.
[2] J.W. Palmer, "Website Usability, Design and Performance Matrices," 2002.
[3] F. B. Tan and L. L. Tung, "Exploring Website Evaluation Criteria using the Repertory Grid Technique: A Web Designers Perspective," *Technology*, pp. 65-69, 2003.
[4] J. Hartmann, A. D. Angeli and A. Sutcliffe, "Framing the User Experience: Information Biases on Website Quality Judgement", *Proceeding of the Twenty-sixth Annual SIGCHI Conference on Human Factors in Computing Systems,* Florence, pp. 855- 864, Italy, April, 2008.
[5] G. Gledec, "Quality Model for the World Wide Web", in *8th International Conference on Telecommunications - ConTEL2005* Zagreb, pp. 281-287, Croatia, June 2005.
[6] Z. Zhou, H. Zhou, and H. Yang, "Evaluating Websites using A Practical Quality Model", in *4th International Conference on Automation &Computing Society* West London, England, September 2008.
[7] Kellaghan, T. Stuffebeam, D. L., and Wingate, A. (Eds.), "International Handbook of Educational Evaluation", The Netherland: Kluwer, 2003.
[8] J. Alexander and M. Tale, "*Web Wisdom: How to Evaluate and Create Information Quality in the Web*: Lawrence Erlbaum Associate Inc.", 1999.
[9] S. Mustafa and L. Al-Zoua'bi, "Usability of the Academic Websites of Jordan's Universities an Evaluation Study," Yarmouk University, Faculty of Information Technology, 2008.
[10] Minerva Group, *Quality principles for Cultural Websites*, 2005.

[11] L. Mich, M. Franch, and U. Martini, "A Modular Approach to Quality Evaluation of Tourist Destination Web Sites: The Quality Model Factory," in *Information and Communication Technologies in Tourism*, Innsbruck, Austria, 2005, pp. 555-565.

[12] C. Zafiropoulos and V. Vrana, "A Framework for The Evaluation of Hotel Websites: The Case of Greece", *Information Technology & Tourism,* vol. 8, pp. 239-254, 2006.

[13] M. Ataloglou and A. Economides, "Evaluating European Ministries' Websites", *International Journal of Public Information Systems,* vol. 3, pp. 147-177, 2009.

[14] B. Behkamal, M. Kahani, and M. K. Akbari, "Customizing ISO 9126 Quality Model for Evaluation of B2B applications", *Information and Software Technology,* vol. 51, pp. 599 -609, 2009.

[15] S. Barnes and R. Vidgen, "An Integrative Approach to the Assessment of E-Commerce Quality", *Journal of Electronic Commerce Research,* vol. 3, pp. 114-127, 2002.

[16] S. Chen and R. Macredie, "The Assessment of Usability Of Electronic Shopping: A Heuristic Evaluation", *International Journal of Information Management,* vol. 25, pp. 516-532, 2005.

[17] E. Mendes, *Web Engineering*. Berlin, Heidelberg: Springer-Verlag, 2006.

[18] I. Biscoglio, M. Fusani, G. Lami, and G. Trentanni, "Establishing A Quality-Model Based Evaluation Process for Websites", vol. 2009, 2008.

[19] L. Olsina, G. Lafuente, and G. Rossi, "Specifying Quality Characteristics and Attributes for Websites", in *Web Engineering,* pp. 266-278, 2000, 2001.

[20] O. Signore, "A Comprehensive Model for Web Sites Quality", in *Seventh IEEE International Symposium on Web Site Evaluation*, Budapest, Hungary, 2005.

[21] L. Triacca, "Web Usability Enhancing Effectiveness of Methodologies and Improving their Communication Features", in *Faculty of Communication Science*: University of Lugano, 2005.

[22] F. Micali and S. Cimino, "Web Q-Model: A New Approach to the Quality", in *The 26th Annual CHI Conference on Human Factors in Computing Systems* Florence, Italy, 2008.

[23] P. Berander, L.-O. Damm, J. Eriksson, T. Gorschek, K. Henningsson, P. Jonsson, S. Kagstrom, D. Milicic, F. Martensson, K. Ronkko, and P. Tomaszewski, "Software Quality Attributes and Trade-offs", L. Lundberg, M. Mattsson, and C. Wohlin, Eds.: Blekinge Institute of Technology, 2005.

[24] ISO, "Software Engineering-Product Quality- Part 1: Quality Model", 2001.

[25] L. Rosenfeld and P. Morville, *"Information Architecture for the World Wide Web"*, 2nd ed.: Sebastapol, CA: O'Reilly, 2002

[26] J. Nielsen, "Introduction to Usability", 2002. O'Reilly, 2002.

[27] L. Hasan and E. Abuelrub, "Assessing the Quality of Web Sites", *INFOCOMP Journal of Computer Science,* vol. 7, pp. 11-20, 2008.

[28] L. Olsina, D. Godoy, G. Lafuente, and G. Rossi, "Assessing the Quality of Academic Websites: A Case Study", *New Review of Hypermedia and Multimedia,* vol. 5, pp. 81-103, 1999.

[29] L. Hasan and E. Abuelrub, "Assessing the Quality of Web Sites", *INFOCOMP Journal of Computer Science,* vol. 7, pp. 11-20, 2008

[30] Y. Han, L. Kim and J. W. Cha, "Evaluation of User Reputation on YouTube", *Proceedings of the 3d International Conference on Online Communities and Social Computing: Held as Part of HCI International 2009 (OCSC '09),* San Diego, CA, pp 346 – 353 July 2009.

[31] J. Nielsen, "Is Navigation Useful?", in *Jakob Nielsen's Alert Box*, 2000.

[32] N. Shedroff, "Recipe for a Successful Website." vol. 2010, 1997.

[33] X. Wang and W. Huang, "Lund University Website Evaluation: Focus on Homepage and English Research Pages", in *Informatics*. vol. Masters Lund, Sweden: Lund University, 2009.

[34] R. Sumra and D. Arilazi, "Quality of Service of Web Services Demystification, Limitations and Best Practises", March 2003.

[35] N. Dragulanescu, "Website Quality Evaluations: Criteria and Tools", *Information and Software Technology,* vol. 34, pp. 247-254, 2002.

[36] Gunther N. J., "The Practical Performance Analyst", S McGraw Hill, 1998.