

University Website Design: a Case Study of Princess Noura University in Saudi Arabia

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تصميم الموقع الإلكتروني للجامعات : دراسة حالة جامعة الأميرة نورة في المملكة العربية السعودية

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Abstract

The usability and satisfaction, of which users can achieve their expectations and needs from the website, are important in establishing a healthy communication between the university and its stakeholders. It is the designers' role to facilitate the user's task and ensure that the user is able to use the product as intended and with a minimum effort to learn how to use it. User involvement in the design process could enhance the designer's understanding of the usability issues. This study presents a case study of Princess Noura University website. It aims to understand the current design practices implemented in the design of Princess Noura University website www.pnu.edu.sa and test its usability from the perspective of the users in order to provide recommendations for developing university websites. Data were collected using a combination of qualitative and quantitative approaches including:

- 1) WAMMI (Website Analysis and Measurement Inventory) , which was used as a tool to measure the usability of the website considering the five factors: attractiveness, controllability, helpfulness, efficiency and learn ability;
- 2) Usability tests of the website were conducted with students and faculty members considering the following factors: efficiency, readability, clarity and ease of use;
- 3) Semi structured interviews with the university web designers. The

مُلخَص

قضايا قابلية الاستخدام والتي يمكن للمستخدم أن يلبي من خلالها احتياجاته وتوقعاته من الموقع الإلكتروني تعد عناصر هامة لتحقيق الاتصال الصحي والفعال بين الموقع الإلكتروني للجامعة ومستخدميه. ويتمثل الدور الأساسي للمصمم في تسهيل مهمة المستخدم والتأكد من أن المستخدم قادر على استخدام المنتج على النحو المنشود و بالحد الأدنى من الجهد لتعلم كيفية استخدامه. و عليه فإن إشراك المستخدم في عملية التصميم يعزز من فهم المصمم لقضايا قابلية الاستخدام للمنتج. تهدف الدراسة الحالية إلى فهم مدى مساهمة مستخدمي موقع جامعة الأميرة نورة www.pnu.edu.sa في العملية التصميمية للموقع الإلكتروني. كما وتختبر الدراسة قضايا قابلية الاستخدام للموقع الإلكتروني لجامعة الأميرة نورة من وجهة نظر المستخدمين وذلك تمهيداً لإعداد سلسلة توصيات لتطوير المواقع الإلكترونية للجامعات.

تم جمع البيانات باستخدام مجموعة من الطرق الكمية والنوعية بما في ذلك تطبيق اختبارات قابلية الاستخدام للموقع الإلكتروني لدى الطالبات و أعضاء هيئة التدريس حيث تم استخدام (1) اختبار WAMMI كأداة لقياس مدى قابلية موقع جامعة الأميرة نورة للاستخدام في ظل العوامل التالية: جاذبية الشكل الخارجي والتحكم والمساعدة والكفاءة والتعلم.

(2) اختبار قابلية الاستخدام والذي يركز على العوامل التالية: الكفاءة و قابلية القراءة و الوضوح و سهولة الاستخدام.

(3) المقابلات الشخصية مع مصممي الموقع الإلكتروني للجامعة. وقد تم تحليل البيانات النوعية الناتجة من المقابلات باستخدام برنامج NVIVO.

أظهرت النتائج أن موقع جامعة الأميرة نورة من وجهة نظر مستخدميها من الطالبات وأعضاء الهيئة التعليمية يفتقر إلى قابلية الاستخدام في الجوانب التالية : جاذبية الشكل الخارجي والتصنيف وتقديم المساعدة للمستخدم.

quantitative data of the interviews were analysed using NVIVO computed aided data analysis software.

The results revealed that three out of five factors negatively and non-significantly affect the website usability perception of Princes Noura University website users. They are as follows: attractiveness, helpfulness, and controllability. The results also indicated that user's involvement in the design process of the Princess Noura University website is very poor and the website design is technology and business driven. Furthermore, the study discusses the possibility of enhancing the usability of the university website in terms of satisfying the users' needs and expectations through the implementation of the user centred design approach.

Keywords: Usability, website design, user centred design, design methods, University Website.

1. Introduction

According to Anctil (2008), colleges and universities have an ability to rapidly communicate a significant amount of information to a potentially enormous audience. A university website is a gateway to its information and services. Like many other universities, a significant proportion of Princess Noura University teaching, recruitment, administrative and research functions are occurring online. As a result, the ongoing relationship of Princess Noura university with many of its target audience groups is largely mediated through the University's online presence. Princess Noura University recognised that it is essential that interactions with the website consistently deliver high-value experiences. Though it should ideally be a reflection of the needs of the users it serves, university website designs are mostly driven by technology or business objectives, rather than by the user's needs. However, in recent years website owners and developers have gradually begun to acknowledge and address the issue of usability (Pierce, 2005). Aldwyn (2011) argued that usability is a requirement to survive in internet environment. Usability has assumed a great deal of importance in terms of satisfying website users' needs and expectations (Patterson and Ellis, 2004). Thus, this study tests the usability of Princess Noura university website by its primary stakeholders, students and faculty member,

إضافة لذلك أكدت النتائج أن إشراك المستخدمين في تصميم موقع جامعة الأميرة نورة محدود جداً حيث أن تصميم الموقع الإلكتروني للجامعة متمركز حول الجانب التقني والتجاري.

كما وتناقش الدراسة الحالية إمكانية تعزيز قابلية الموقع الإلكتروني للاستخدام من حيث تلبية احتياجات مستخدمي الموقع وتوقعاتهم وذلك باستخدام طريقة التصميم المتمركز حول المستخدم.

implementing the user-centred design approach, where users are involved in the development process, and in essence they are co-designers. As indicated by Preece, et. al, (2002), user involvement leads to a sense of ownership of the final product that often results in higher customer satisfaction and smoother integration of the product into the environment. Therefore, the present study investigated the extent to which users were involved in the design process of Princess Noura University website in order to understand the way user involvement in the design process could affect the usability testing results.

This study is composed of seven sections. 1) Introduction; 2) Aims and Objectives; 3) Literature Review; 4) Methodology; 5) Hypothesis; 6) Results; 7) Discussion and Conclusion.

2. Aims and objectives

This study aims to understand the current design practices implemented in designing Princess Noura University website www.pnu.edu.sa and tests its usability. This study is significant because of the lack of studies on the design of university websites in Saudi Arabia, and the results of this study are expected to provide guidance for developing better and more usable websites not only for Princess Noura University but for other institutions of higher education as well. The objectives of the study are to:

- a) Understand the extent to which users are involved in the process of designing Princess Noura university website;
- b) Assess the usability of Princes Noura University (PNU) website; and
- c) Propose a set of recommendations for designing University websites.

3. Literature review

3.1 Usability Testing

Usability is defined in ISO 9241 as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use". According to Nielsen (2003) usability is defined as "a quality attribute that assesses how easy user interfaces are to use. The word usability also refers to methods for improving ease-of-use during the design process." In addition, as stated by Sindhuja and Surajith (2009), usability refers to terms such as ease of use and ease of learning that imply providing users with systems requiring minimum cognitive and physical effort to accomplish their needs and expectations. Also, Nielsen (2000) argued that

usability is an extremely important aspect of website design. In other words, as mentioned by Yusof et. al (2010), the website usability is a test of the successfulness of the website's user in doing some task or finding information in the website.

Literature on the usability of university websites in Saudi Arabia is very limited. However, the usability of websites of European universities has been studied by several researchers, such as Caglar and Menten (2012) who conducted a study on the European University of Lefke, which is located in Northern Cyprus. The study reveals dissatisfaction and other usability problems. Also Eksioglu et. al, (2011) conducted a study which aims to assess the website usability of Industrial Engineering Department of Bogazici University and reveals some design issues regarding the department's website. Moreover, Sengel and Oncu (2010) assess the usability of Uludag University website and conclude that there are differences between the responses of males and females to usability. In addition, Bautista et. al (2010) studied the challenges encountered by users at four different universities during their attempt to complete the tasks in three areas, namely, content presentation, information structure, and navigation.

Thus, as indicated by Yan and Guo (2010), website design should satisfy the user's specific needs and ensure that users are pleased to successfully complete tasks with website.

According to Dumas & Redish (1993), Usability testing aims to achieve the following goals: 1) To improve the product's usability; 2) To involve real users in the testing; 3) To give the users real tasks to accomplish; 4) To enable testers to observe and record the actions of the participants; and 5) To enable testers to analyze the data obtained and make changes accordingly;

3.2 Usability Testing Factors

According to Powell (2000) one should consider the following usability guidelines for determining the usability of a website: 1) Learnability--How easy it is to learn to use it? 2) Rememberability--How easy it is to remember how to use it? 3) Efficiency of use--How much work does it require the user to do? 4) Reliability in use--Does it work correctly and does it help users to perform tasks correctly? 5) User Satisfaction--Is the user generally satisfied as a result of using the site?

There are numerous studies that identify learnability as a key attribute of the usability (Nielson, 1993). Based on Nielson's usability model (1993), learnability refers to how easy it is for users to learn a system. In the websites with high

learnability users feel they are able to start using the site with the minimum of introductions, and everything is easy to understand from the start. In the websites with low learnability users feel that the website may be using concepts or terminologies which are unfamiliar and need more explanations.

According to the International Organization for Standardization (ISO) efficiency refers to the resources used in completing a task (ISO, 1998). Lee and Kozar (2012) define website efficiency as a representation of resources expended in relation to achieving goals while visiting a website. Users believe that the website is of high efficiency if they can quickly locate and do what is of interest to them effectively and the website responds at a reasonable speed.

Moreover, McLaughlin and Skinner (2000) have listed six related but distinct components for determining the usability of a website. They are: 1) Checkability: The system has or allows checks that ensure the correct information is going in and going out of it; 2) Confidence: Users have confidence both in their capability to use the system and in the system itself; 3) Control: Users have control over the operation of the system, particularly of the information fed into and out of the system; Controllability is also defined by Seffah et.al. (2006) in terms of whether users feel that they are in control of the software product. The website is considered to be well on controllability if users most probably believe they can navigate around the website with ease and achieve what they want to do. Poor controllability of a website usually means a poorly organized site that disrupts the way users normally expect to do things; 4) Ease of Use: The system is easy to use; 5) Speed: The system can be used quickly; 6) Understanding: The system and its outputs are understandable.

Additionally, Zhang et. al (2000) pointed out that considering the attractiveness in designing a website could improve the degree of users' satisfaction. Attractiveness is the capability of the software product to be attractive to the user (e.g., through use of color or graphic design; ISO/IEC 9126-1, 2001). Tan and Wei (2006) suggested that the graphical representations such as icons, colors, images and animations, give the website higher attractiveness.

Considering the assessment tools which could be used for testing the usability of websites, Claridge and Kirakowski (2011) mentioned the following tools: 1) QUIS (Questionnaire for User Interface Satisfaction); 2) SUMI (Software Usability Measurement Inventory); 3) NIST Web Metrics (The National Institute of Standards and Technology Web Metrics); 4) WAMMI (Website Analysis and Measurement Inventory). WAMMI was produced by the Human Factors Research

Group in Cork, Ireland in 1999, and as it was adopted to evaluate the usefulness of the websites. It consists of five factors: attractiveness, controllability, efficiency, helpfulness, learnability.

WAMMI was selected as a tool to be used in the present study because it was proved to be a convenient and cost-effective method of assessing the value and usefulness of websites. WAMMI results correlate well with both user-based usability assessment and expert-based heuristic evaluation data (Moore et al., 2001).

3.3 User Centred Design

Preece (1995) indicated that a user-centered design is a participant design in which users are invited to participate in the entire design process. ISO 13407 explains how to achieve quality in use by incorporating user centred design activities throughout the life cycle of interactive computer-based systems. User-centred design is a multi-disciplinary activity, which incorporates human factors and ergonomics knowledge and techniques with the objective of enhancing effectiveness and productivity, improving human working conditions, and counteracting the possible adverse effects of use on human health, safety and performance. There are four user centred design activities that need to take place at all stages during a project. These are to:

1) Understand and specify the context of use; 2) Specify the user and organisational requirements; 3) Produce design solutions; and 4) Evaluate designs against requirements. Preece (1995) formulated four design principles to engage users: (1) focus on users and their needs; (2) focus on the functions to satisfy the needs after completing the analyses of user tasks and task environment; (3) execute a formative evaluation in order to ensure that the system's functions meet the users' needs; and (4) use an iterative redesign cycle.

The user-centered design approach leads to the development of products that are more effective, efficient, and safe. The involvement of users in the design process ensures that the product will be suitable for its intended purpose in the environment in which it will be used. Kravetz (2005) emphasized the importance of understanding users in order to build better products. Also Pearrow (2007) confirmed that a user-centered design is the central issue of web usability, which is based upon the user information. In addition, Lazar (2006) emphasized that in order to maximize the value of the user experience of a website the user needs should be the central issue of the website's design, from its conception to its implementation and management.

4. Methodology

Data were collected using a mixed methods research design. The overall purpose and central premise of mixed methods is that the use of quantitative and qualitative approaches in combination may provide a better understanding of research problems and complex phenomena than either approach alone (Creswell and Plano Clark, 2007). Data were collected by conducting 1) WAMMI (Website Analysis and Measurement Inventory) with students and faculty members; 2) conducting Usability Testing of Princess Noura University Website with students and faculty members; 3) and making Semi structured interviews with Princess Noura University website designers.

4.1 WAMMI (Website Analysis and Measurement Inventory)

Primary users of Princess Noura University website, who are students and faculty members, were asked to assess its usability using WAMMI questionnaire considering the following five factors: attractiveness, controllability, efficiency, helpfulness, and learnability. The sample size is 300 participants comprising 150 students and 150 faculty members. Participants were randomly selected. The report of the questionnaire was generated to each 30 separately and then results were combined and studied together. This was done due to the limitation of the tool as it is restricted to 30 participants.

4.2 Usability Testing of Princess Noura University Website

Usability test has been conducted with 30 faculty member and 30 students in Princess Noura University. The usability test consists of four testing scenarios. Each scenario contains a set of tasks all relating to the general theme and situation of the scenario.

Scenario 1: Finding out the effectiveness of the Home Page for clarity, readability, and efficiency

Scenario 2: Finding out the effectiveness of the Student Services pages for clarity, readability, and efficiency

Scenario 3: Finding out the effectiveness of the Academic Programs pages for clarity, readability, and efficiency

Scenario 4: Finding out the ease of searching using the website

The scenarios were designed to evaluate the intricacies of participant behaviour and thought and were designed to answer specific usability questions

pertaining to the objectives of this study. Each scenario was written with the intention of placing the participant in a role-play situation where an individual could easily imagine oneself in that situation and realistically look for the requested information. For each scenario five minutes were given to the participants to complete their tasks. On completion of the task, the participants were asked to respond to the usability testing questionnaire.

4.3 Semi structured interviews with Princess Noura University Web Designers

Qualitative interviews were carried out with all the design team working on designing Princess Noura University website (the team consist of six web designers). The semi structured interviews with the designers aim to understand the current website design practices applied in Princess Noura University. The questions address the following main topics: 1) User involvement: measuring the extent of user involvement in the design process and determining whether user assessment or any usability testing has been conducted during the design process clarifying when and how; 2) Design team: designers' background and the roles of the design team; 3) Design elements.

The duration of the interviews was 30 minutes for each participant, and interviews were conducted at their work places. The interview transcripts were analysed using NVIVO computer aided data analysis software which help users to organize and analyze non-numerical or unstructured data.

5. Study Hypothesis

The study assumed that all five of the assumed usability factors are positively associated with the usability of Princess Noura University website.

H1: Usability of Princess Noura University website is positively associated with its attractiveness;

H2: Usability of Princess Noura University website is positively associated with its controllability (navigation);

H3: Usability of Princess Noura University website is positively associated with its efficiency and consistency (Search);

H4: Usability of Princess Noura University website is positively associated with its helpfulness (Help);

H5: Usability of Princess Noura University website is positively associated with its learnability (Context and text).

6. Results

6.1 Hypothesis testing

The five hypotheses were tested using the regression analysis. The five factors of WAMMI test were aggregated before feeding in regression equations. The arithmetic average of each factor and its logarithms were calculated. The results of WAMMI test are presented in Table 1 below.

Independent Variables	Dependent Variable
	LN(Usability) (Linear Regression)
LN (Attractiveness)	0,011ns
LN(Controllability/Navigation)	0,014ns
LN(Search - Efficiency and consistency) (Helpfulness)	0,129** (0,078)
LN (Helpfulness)	0,043ns
LN(Learnability- context)	0,411*

Table 1: WAMMI Test Results

*Standard Errors are Given in Parenthesis, * $p < 0,01$, ** $p < 0,05$, ns=non-significant*

As indicated in Table 1: WAMMI test results shown above, attractiveness, controllability and helpfulness have turned out to be non-significant. However, learnability, efficiency and consistency have turned out to be significant with high significance degrees ($p < 0,001$ and $p < 0,05$). Three of the factors are negatively related with usability perceptions and not as it is hypothesized in underlying theory. Hypothesis 1, Hypothesis 2, and Hypothesis 4 are rejected. However, Hypothesis 3 and Hypothesis 5 are accepted.

6.2 Usability Testing Study

6.2.1 Purpose of the Website

25 out of the 30 students were able to decipher the purpose of the site right away. Only 5 students took 10 seconds to understand the site's purpose. All the

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30 faculty members were able to ascertain the purpose of the site even before they checked the site.

6.2.2 Usability of Home Page

Students' ratings of usability of Home Page varied from very poor to average. Among student participants 15 students considered user satisfaction to be very poor. 10 students rated usability as average. 5 students rated it as poor. Faculty members' ratings of usability of Home Page varied from average to good.

6.2.3 Usability of Student Services Page

Among students, 20 participants rated usability of student services page to be average while 10 participants rated it as poor. All faculty members were quite content with the usability of these pages.

6.2.4 Usability of Academic Programs Page

Among students, 15 participants rated usability of academic programs page to be average while 15 participants rated it above average. All faculty members were quite content with the usability of these pages.

6.2.5 Usability of the Contact Page

Faculty members were pleased with the contacts page. While 10 students rated it as very poor.

6.2.6 Navigation within the Website

Participating students felt that the website was easy to use with the exception of 10 students who responded "No". However, faculty members were quite happy with navigating within the pages.

6.2.7 Overall Usability of Website

26 students were not happy with the overall usability of Princess Noura University website while 20 faculty members rated it as average.

6.3 Designers Semi-Structured Interviews

Below are some of the answers gathered from participants in response to the interview questions:

“The theme and template is consistent”.

“Symbols are recognizable by Princess Noura University users”.

“Images used are provided by the public relations with the content required to be published and the users never get involved in that selection”.

“For the first year of launching the website, it was only available in Arabic after that the English version has been developed and lately the French version is working”

“The real estate page has been used wisely”

“The information is organised in multiple ways but depends on the user’s ability to use the website”

“Princess Noura University website users are not considered in the design process as we are using the template and not updating it according to users demand or feedback”

“A template provided by the design company and the users did not have any involvement in the design made”

“The website is designer-centred”

“We had nothing to do with the layout – once the template has been approved and the design” company launched it we only developed it by adding multiple languages”

“We are focusing on the functionality more than the aesthetics aspects”

“The website allows high speed download but it depends on the internet speed of the user”

“Most of the instructions are short and require less than 30 seconds to read”

“The navigation memory of the site is good”

“The search capability of the website is satisfactory”

“The items are grouped together and groups differentiated by colour, size, or location”

“The content is understandable and clear, users are mostly able to get the desired information when they visit the site”

“The design of the website is technology-driven”

Thus, the results indicated that all the interviewed team had an information technology or computer science background and experience. And their role is mainly focusing on the technical issues emerging after launching the website. Considering the user involvement, 5 out of 6 of the designers indicated that overall the users involvement in Princess Noura University website design are considered to be very poor. Only one pointed out that it is average. Also all the interviewed team pointed out that the website is technology, business-driven, and users' feedback is not considered in the website development. In addition, they mentioned that users did not participate in any assessment to provide formative or summative feedback during the design process. Considering the design aspects, 4 out of the six team members interviewed indicated that the attractiveness of the pages is not as important as their functionality. And feedback from users after launching is only considered if pointing to functionality issues and not attractiveness.

7. Discussion and Conclusion

A university's website is becoming key components for its survival in the globalized world. It is considered to be a cost-efficient and timely method to communicate with its stakeholders.

Studies mentioned earlier underline the vitality of the usability issue for the websites. Usability has assumed a great deal of importance in terms of satisfying website users' needs and expectations. According to Gutierrez- Garcia (2008), usability of the website plays a central role in establishing a healthy communication between the university and its stakeholders. The healthy communication between the university management and the stakeholders can undoubtedly contribute to well governance of the university in many ways.

Mixed method qualitative and quantitative approaches were used to collect data in this study. The usability of Princess Noura University website was measured using WAMMI tool considering five factors of usability: attractiveness; controllability, helpfulness, efficiency and learnability. In addition to the usability test conducted which takes into account the following factors: clarity, readability, navigation, and ease of use. Results showed that the user acceptance of Princess Noura University is poor. Three of the five usability factors of WAMMI test are negatively related with usability perception conflicting with what was hypothesized in the underlying theory. Research hypotheses that claim usability of Princess Noura University website is positively associated with its efficiency (Hypothesis 3), and learnability (Hypothesis 5) However, the hypotheses that

claim usability of Princess Noura University website are positively associated with its attractiveness (Hypothesis 1), controllability and navigation (Hypothesis 2) and helpfulness (Hypothesis 4) are rejected.

Students and faculty members participating in the study clearly stated their wish for a more usable website that considers their needs as a main priority in its design.

On the other hand, the study investigated the current design practices of Princess Noura University website through semi-structured interviews with the designing team of the website. Results revealed that the design approach implemented in Princess Noura University website emphasizes technology with the development as the focal point. Also, specialists may work in isolation, with their efforts being brought together towards the end of the website launching.

Since usefulness is the principal reason for accessing and eventually accepting the website, involving users in the design process one way or another has been shown to lead to developing more usable satisfying designs.

Studies indicated that the user-centred design approach is user-driven rather than technology-driven (Pearrow 2000: 31-4). User Centred Design is concerned with the user's perspective of the system and involving the user in the design process from the early stages ensures the best possible user experience and the development is aimed at helping users accomplish their tasks. The ways in which users participate can vary. At one end of the spectrum involvement may be relatively light; they may be consulted about their needs and may observe and participate in usability testing.

Thus, it is crucial that a user centred design approach be adopted when developing a university website's content and interaction capabilities.

Therefore, it is recommended to redesign the Website of Princess Nora University considering the involvement of users intensively at early stages in the design process having them participate throughout the design process as partners in the design. Also university website designers should ensure a consistent, positive user experience of the University website by improving the user interface, navigation and information architecture of the top levels of the site, based on an analysis of business and user needs.

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