THE STUDY OF VISUAL INTERFACE AESTHETICS IN EDUCATIONAL WEBSITE USING KANSEI ENGINEERING APPROACH

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DECLARATION

I hereby declare that the material in this thesis is my own except for quotations, excerpts, equations, summaries, bibliographies and references, which have been duly acknowledged. And as additional credits to the research thesis, the research study was presented at Proceedings of The Faculty of Computing and Informatics Postgraduate Seminar, Labuan in February 2014 and the paper was also accepted for a conference by International Conference on Information Science & Application (ICISA2014) in Korea. The paper was published in proceeding and index by IEEE (http://icisasociety.org). The proceeding paper, '*Aesthetics in E-Learning Websites Interface Design using Kansei Engineering Method*', was also available for reading a review at deepdyve.com.

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ABSTRACT

E-Learning or educational website can be described as a ubiquitous platform for broad dissemination of knowledge. The educational website must be convenient and entertaining for students to utilize and experience the said website concerning their studies. Nevertheless, what educational website could offer for students might deter due to the lackadaisical of design on the web interface. There are times when the design interface and the mixture of multimedia elements applied on the particular websites may affect the students' tendency to use them. In accordance with that context, the objectives of this research are to: i. Investigate the student's emotional awareness on visual interface aesthetics based on the gender preferential reaction; ii. Evaluate the degree of preferable interface design concepts applied on the educational website; iii. Ascertain the appropriate extent of multimedia elements used for an educational website; and iv. Measure the correlation between motivation and utilization on the educational website concerning visual interface aesthetics. Kansei Engineering (KE) Approach was used for measuring the feelings response toward interface design to obtain the results. The proceedings in finding the design criteria began with the selection of web interface design. In furtherance to counterbalance the research hypothesis, the design scope had to be narrowed down into three designs; Colour-based Design, Grid-based Design (Layout) and Text-based Design. As a result, the response varies from one person to another according to gender differences. The result indicated that female students have the tendency of showing their emotional reaction rather than male students albeit that both genders indeed had mutual subjective agreement on Colour-based Design for an educational website. Other than that, male students prefer graphics on the website whilst female students prefer text. Despite having diversity response towards the said interface, the correlation between motivation and utilization are moderate enough to influence their interest and decision whether to utilize the educational website or otherwise.

ABSTRAK

KAJIAN ESTETIKA ANTARA MUKA VISUAL DALAM LAMAN SESAWANG PENDIDIKAN MENGGUNAKAN PENDEKATAN KEJURUTERAAN KANSEI

E-Pembelajaran atau laman sesawang berteraskan pendidikan boleh digambarkan sebagai satu platform yang sentiasa ada bagi tujuan penyebaran maklumat secara meluas. Laman sesawang berunsurkan pendidikan mestilah memberi kesenangan dan hiburan kepada para pelajar ketika menggunakan laman sesawang tersebut untuk tujuan pembelajaran mereka. Walau bagaimanapun, apa yang laman web pendidikan dapat berikan kepada pelajar mungkin akan dihalang atas sebab kekurangan yang ada pada reka bentuk antara muka sesawang itu sendiri. Kadang kala, rekaan bentuk antara muka dan gabungan elemen multimedia yang ada pada laman sesawang tersebut boleh menyumbang kepada kecenderungan pelajar menggunakan laman sesawang tersebut. Berlandaskan kepada konteks itu, kajian ini dibuat adalah bertujuan untuk menilai kesedaran emosi pelajar ke atas estetika antara muka visual berdasarkan reaksi maklum balas mengikut jantina; untuk mengukur tahap kesesuaian sesuatu konsep reka bentuk antara muka yang digunakan di laman sesawang pendidikan; untuk memastikan secara keseluruhan penggunaan elemen multimedia yang boleh dikira berpatutan dalam laman sesawang pendidikan; serta untuk mengaitkan hubungan antara motivasi dan penggunaan di laman web pendidikan mengenai estetika antara muka visual. Kaedah yang digunakan untuk mencari keputusan adalah menerusi Pendekatan Kejuruteraan Kansei (KE). Bagi meneruskan pencarian kriteria reka bentuk, pemilihan untuk reka bentuk antara muka sesawang terpaksa dikecilkan kepada tiga bentuk rekaan; Reka bentuk berasaskan warna, reka bentuk berasaskan grid (reka letak) dan reka bentuk berasaskan teks. Hasilnya, maklum balas yang diperolehi adalah pelbagai berdasarkan kepada pengaruh perbezaan jantina. Hasil kajian menunjukkan bahawa pelajar perempuan mempunyai kecenderungan menunjukkan reaksi emosi mereka berbanding dengan pelajar lelaki walaupun kedua-dua jantina mempunyai persetujuan subjektif terhadap reka bentuk berasaskan warna untuk laman sesawang pendidikan. Selain daripada itu, pelajar lelaki dilihat lebih gemar kepada penggunaan elemen grafik pada laman sesawang manakala pelajar perempuan pula lebih gemar kepada penggunaan elemen teks. Meskipun pelbagai maklum balas diterima ke atas bentuk rekaan antara muka, namun keputusan korelasi antara motivasi dan penggunaan adalah cukup sederhana untuk mempengaruhi minat dan keputusan pelajar sama ada mereka berniat untuk menggunakan laman sesawang pendidikan atau sebaliknya.

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LIST OF ABBREVIATIONS

HCI	-	Human Computer Interaction
ICT	-	Information and Communications Technology
KE	-	Kansei Engineering
KMO	-	Kaiser-Meyer-Olkin
PCA	-	Principal Components Analysis
OT & M	-	Quality Technology and Management Group
SME	-	Subject Matter Expert
SPSS	-	Statistical Package for the Social Sciences
UI	-	User Interface

LIST OF SYMBOLS

Y	-	Kansei Dimension
X	-	Aesthetic Design Dimensions
F	-	Factor
Ɲ	-	Mean Value
n-value	-	Number of Respondents
p-value	-	Probability of something would occur frequently
sig. (2 - tailed)	-	Equivalent to *p-value*
r-value	-	The relationship between the two variables
H0x	-	Null Hypothesis
H1x	-	Alternative Hypothesis

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CHAPTER 1

INTRODUCTION

1.1 Background Study

E-learning is an advanced digital education used as a method to deliver education and tutorials through a global network. But the e-learning terms has no definite justification to best describe the e-learning characteristic. Arkorful and Abaidoo (2014), describe that the definition of e-learning tends to vary from authors and researchers thus it is still vague and difficult to find a common definition form to the said terms.

E-learning is essential for higher education institutions in Malaysia and is comprehensively used in the information, communication and technology (ICT) constitution, which influences the Malaysian economic growth (Muhammad Sukri Saud, Mohd Anuar Abdul Rahman, and Shiung, 2007:1123). As a result, e-learning applications are increasing over time in accordance with the growing technology advancement.

Chang and Smith-Jackson (2007), summarized that web-based courses and programs have been increasingly developed by many academic institutions, organizations, and companies worldwide due to their benefits for both learners and educators. However, she also pointed that it becomes a failure for web developers if the design on the web interface does not meet the user's expectation and preferences, wherein gaining their interest and attention to keep on browsing should be considered thoroughly.

Vaughan (2008:420) also mentioned that the multimedia design contents which are not organized wisely may lead to searching difficulty, boredom, feeling lost, and the viewer might just stop using and close the program. Therefore in retrospect to Vaughan statements, the aesthetical appealing on web interface

should be given full consideration in order to avoid users to stop or discontinue from using the educational websites.

It is important for information to be visually displayed in a way with a great effort of recognition and preference by the user. Visual preference can be classified based on gender aspects. Referring to the research journal entitled, *Gender Differences in Website Design: Implications for Education*, finding the gendered differences when producing websites and preference aesthetics especially for educational purpose is important since the impacts will be on teaching and assessment (Moss and Gunn, 2007). In order to achieve that, the user's visual preference when using the web page needs to be investigated. Each user may have unique preferences which can be organized into demographic groups with associated visual tendency. For instance, the literature's evidence shows that there was a difference on layout preference between males and females (Djamasbi, Tullis, Hsu, Mazuera, Osberg and Bosch, 2007). Also, combining the elements of multimedia in a meaningful way by taking advantage of each medium's unique characteristics is required in order to make an effective multimedia for learning. However, the media added needs to be mindful and considered (Shank, 2005:1). However, Al Qeisi (2015:272) reviewed that although the discussion among researchers reveals gender differences, but the details on how the online banking users perceived the overall design of the website are still lacking. Al Qeisi statement on that matter gives conscious to the possibility of having the same revelation on how students perceive the overall design of an educational website.

Foremost, gender issues can effect on how users interact with the design interface and visual screen elements (Hupfer and Detlor, 2009:219-220). Thus, this might decrease the user's interest to browse the website if the interface is not appealing, has no attraction and does not reach to their design preference aesthetics. There are three problems that might subsequently lead for users feeling deflated when browsing the site: First, the user preference and interactivity based on gender; second, aesthetical value for visual appearance; and third, multimedia combine for e-learning interface. Web-based learning for college level needs to be attractive to students in order for them to keep on browsing and using the sites as

their secondary method of study. Therefore, the ideology of different gender tendency on web design and the consideration of media elements arrangement on web-based learning has led this research in finding the exact sensibility of design interface that can attract college students' interest to keep them browsing on web-based learning.

Obviously, the younger generation is attracted to technology advancement and applications. (Al Qeisi, 2015:270) The idea of finding the exact sensibility of design interface which can attract college students' interest to use the e-learning websites could be done by using the KE Approach. Referring to the conference paper entitled *Kansei Engineering Concept in Instructional Design: A Novel Perspective in Guiding the Design of Instructional Materials,* Kansei is a Japanese term that refers to human's psychology feelings that derived from stimulus responses in which will evoke a reaction and thus will influence either positive or negative judgment of a person. KE is a methodology that absorbs and assimilates human emotions and psychological feeling into design elements to create products and designs in order to obtain satisfactions from the users or consumers (Chuah, Chen, and Teh, 2008:1).

Fauziah Redzuan, Anitawati Mohd. Lokman, Zulaiha Ali Othman and Salha Abdullah (2011:64) mentioned that Kansei Engineering domain is general and proven were able to extract design elements in many areas that made them decided to adopt KE technique into their research studies. According to Nagamachi (1995:3-4), KE refers to technology that expresses human psychological feeling into design criteria. Technically, KE can determine sensory attributes that can evoke particular responses which are influenced by personal feelings from people, then using the attributes in designing the products, in which can elicit the desired response from people (Bouchard, Lim, and Aoussat, 2003:4-5).

Therefore, the Kansei methodology is used in order to discover the correlation between human feelings and web interface. The design interface is divided into three division; Text-Based Design, Grid-Based Design (Layout) and

Colour-Based Design. Consumers' feeling could be different according to their gender distinctive characteristic and that is the major substance for this research.

1.2 Problem Statement

Web-based learning for college is developed for academic services that emphasize on interaction with computers such as online tutorial, forum, downloading notes, news feeds and etc. Therefore, e-learning should be considered as a fundamental and prudential medium for college students. However, the user interface might have the influence on students' acceptance toward the educational website. Furthermore, gender differences might also provide the possibilities of students' preferences and acceptance on a web interface. Consequently, the design interface requires aesthetic value as part of appropriate construction on the educational website as to avoid students from losing interest.

1.2.1 Aesthetic Design Interface

Designing e-learning website interface is one part of the challenges for web developers when developing websites for college students. According to David and Glore (2010:1), how users perceive information, judge credibility, and usability, learn, and ultimately assign a value to a product depends on the design and aesthetics of the web, since the design and aesthetics have a profound impact on users when using the web. The possibility of students having their own requirements and preferences aesthetic design interface on this particular educational website may occur. When the requirements and preferences do not occur, it becomes a failure for web designers/developers when the design interface designed by them does not achieve the expectation preferred by users. Generally, gaining the users interest and getting their attention to keeping on browsing is the main priority on this matter (Nam and Smith-Jackson, 2007).

1.2.2 Design Interface Conceptual on Emotion and Gender

The preferences and requirements on aesthetic design interface can be differentiated by the aspects of feeling and emotion that are derived from both discrete gender characteristics. The possibility of the changes made with consideration to both gender preferences on aesthetical design interface, wherein

the case was considerably noticed by the designer, might subsequently motivate the students and encourage them to keep on using the websites. Referring to the journal entitled *Sex, Gender and Self-Concept: Predicting Web Shopping Site Design Preferences*, gender issue can effect on how a user interacts with the design interface and visual screen elements (Hupfer and Detlor, 2009).

Therefore, in order to find the pattern of feelings and emotions from both genders distinct behavior, a test was conducted by selecting three educational websites developed by individuals as a sample to examine and analyze the reaction. A total of fifty college students as respondents, consisting of twenty-five male and female each was involved in the research. The research aimed at assisting web designers getting the results of the actual feelings derived from college students from both genders in response to the design interface on e-learning sites. Thus, hoping that the web-based learning could be seen in different values and widens the opportunity for academicians on utilizing the idea of ubiquitous learning and edutainment.

1.3 Research Objectives

The objectives of this research are:

i. To investigate the student's emotional awareness on visual interface aesthetics based on the gender preferential reaction.
ii. To evaluate the degree of preferable interface design concepts applied on an educational website.
iii. To ascertain the appropriate extent of multimedia elements used for the educational website.
iv. To measure the correlation between motivation and utilization on the educational website concerning visual interface aesthetics.

1.4 Methodology

The main focus of this research is to study student's emotional awareness towards the educational website and user interface design aesthetics which later contributes to particular design elements that occurred on human desire and insights. KE Approach was used in order to evaluate student's emotional awareness, determine

whether the ideal interface on an educational website have the impact on students, and also investigate whether the design preference tendency had any relative inclination to gender basis.

However, all the necessary materials for research had to be gathered, compiled and analyzed accordingly. Using Mixed Qualitative and Quantitative Methods by Clark, Creswell, Green and Shope as stated in a book entitled *Handbook of Emergent Methods* edited by Hesse-Biber and Leavy (2010) in order to achieve the research objectives, this research requires Preliminary Data Collection and Study, Test and Evaluation. The diagram below indicates the process:

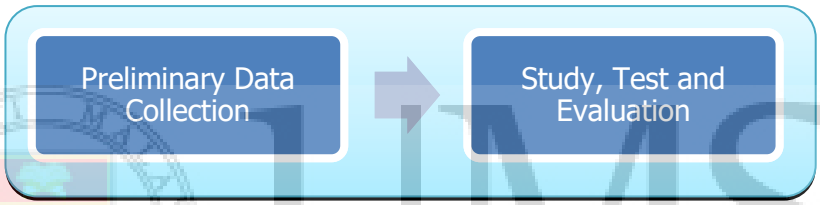
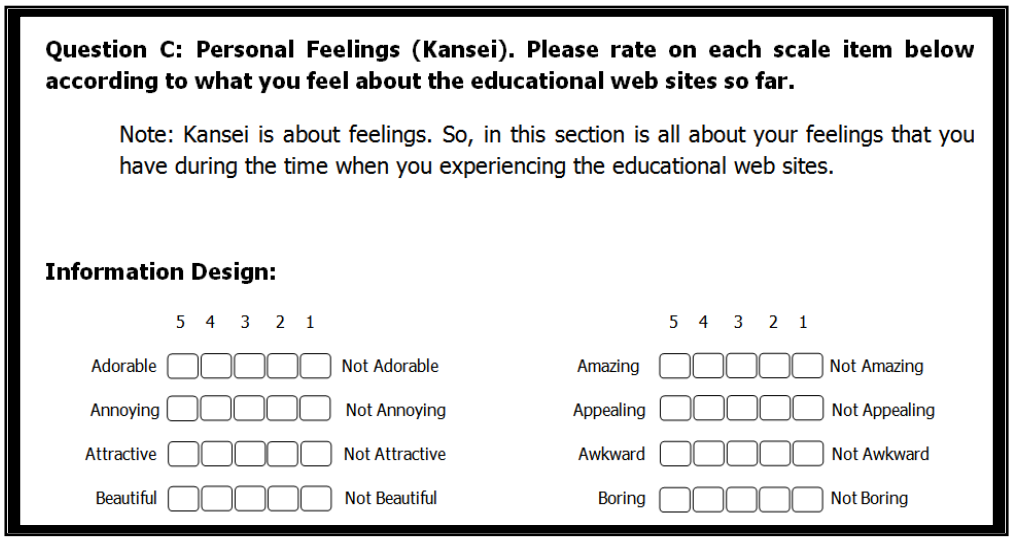


Figure 1.1: Context Diagram on Research Analysis.

a. Preliminary Data Collection: Gathering relevant data from the specified users and compiling them together in order to analyze and understand the selected student's aesthetics preferences on design elements, using quantitative approach. A questionnaire was developed in order to measure students' feelings. The feelings were listed down as a formative channel for students to express themselves. The reliability of this questionnaire is based upon on Anitawati Mohd Lokman (2009:91-92), Checklist for Exploratory Study, as a reference. Below is the sample of questionnaire used for research study:



Question C: Personal Feelings (Kansei). Please rate on each scale item below according to what you feel about the educational web sites so far.

Note: Kansei is about feelings. So, in this section is all about your feelings that you have during the time when you experiencing the educational web sites.

Information Design:

	5	4	3	2	1			5	4	3	2	1	
Adorable	☐	☐	☐	☐	☐	Not Adorable	Amazing	☐	☐	☐	☐	☐	Not Amazing
Annoying	☐	☐	☐	☐	☐	Not Annoying	Appealing	☐	☐	☐	☐	☐	Not Appealing
Attractive	☐	☐	☐	☐	☐	Not Attractive	Awkward	☐	☐	☐	☐	☐	Not Awkward
Beautiful	☐	☐	☐	☐	☐	Not Beautiful	Boring	☐	☐	☐	☐	☐	Not Boring

Figure 1.2: Sample of Questionnaire.

Both questionnaire development and selective feelings are an adaptation from Anitawati Mohd Lokman (2009:91-92) in her thesis entitled, Emotional User Experience in Web Design: The Kansei Engineering Approach. Assoc. Prof. Dr. Anitawati Mohd Lokman performed the selection of domain-specific emotional keywords in her experimental procedure for an exploratory study. Hence, the same procedure also can be practiced in this research. Table 1.1 shows the selective of 58 feelings highlighted for lab test session.

Table 1.1: List of Feelings Sample

List of Fifty-eight Feelings	
Adorable	Amazing
Annoying	Appealing
Attractive	Awkward
Beautiful	Boring
Calm	Charming
Chic	Childish
Classic	Convenient
Comfortable	Comprehended
Confusing	Cool
Creative	Crowded
Cute	Elegant
Feminine	Fun
Futuristic	Gorgeous
Impressive	Interesting
Irritating	Light
Lively	Lost
Lovely	Luxury
Masculine	Messy
Modern	Mystic
Natural	Neat
Necessary	Old-Fashioned
Plain	Pretty
Professional	Refreshing
Relaxing	Satisfied
Sexy	Simple
Sophisticated	Stylish
Surreal	Troublesome
Unique	Updated
User Friendly	Waste of Time

b. Study, Test and Evaluation: First, study the current design interface, select several samples of educational websites and analyze the design aesthetic elements on them. Second, execute an experiment on intended students, twenty-five males and another twenty-five females, using the selected educational websites to measure their psychological feelings against the selected samples; the measurement is based on rating level between 0 to 5, content and discontent, using a qualitative approach. Third, evaluate the