Kansei Engineering Assessing System to enhance the usability in E-learning web Interfaces: Colour basis

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Abstract: Good visual design provides high quality and also it is appropriate and relevant for the audience and the message it is supporting. Many computer-based Educational programmes are designed with more consideration on their functionality, where as very little consideration is given to the aesthetic needs of the users. Quality of a product cannot be determined solely by its functional aspects, it is also crucially depend on user's opinion and evaluation. In this paper we attempt to propose a method using Kansei Engineering to recognise people's colour-feeling associations in regards to interactive learning web interfaces, to find a pattern of colour preferences to propose a way, how we could manipulate them to deliver a better message. In other words how colour can be used effectively as an attention getting device in web interface which enhance the learning ability and usability

Keywords:, Kansei Engineering, Interactive learning Interfaces, usability, colour

Introduction

Colour has an ability to immediately change our moods and alter our opinions. They can make a person happy, comfortable, make us sad, or get us excited. Since our childhood we go through immense experiences but still we quickly forget about events that are routine and mundane. When all websites look the same, we easily forget them. Hence, if there is any opportunity for websites to be distinct, it should not be wasted. If your site stands out more, there is a chance that the web users might give it more time or thought when they visit the site also most like to remember it and revisit. Human tend to save their memories for unique experiences or events with which they had an emotional attachment. Therefore understanding how people feel about colours and then using a proper combination of colours by skilful web designers, can create a more memorable website. These colours in the websites can be used to provide guidance to users by focusing on interactions, let the user earnestly engaged by making page layouts comfortable and more inviting and finally inspire the users by providing a pleasing environment to interact with from complex e-commerce web applications to informative web sites.

Colours play a major roll in recognising objects and also they associate memories about day to day activities in our daily life. A child learns in his socialisation. What human learned about colours as children is with them in their entire lives. We may not be aware or even remember our childhood colour associations with a specific incident but our brains do and we continue to respond in either a positive or a negative way. With all the experience we have with colour we know that colour has an ability to motivate, excite, draws attention to a

particular matter and provides emphasis. This paper draws the attention on an ongoing research which is designed using Kansei Engineering as a test tool to find out the ability, the colour has, to enhance the usability of a computer interface with special attention to e-learning web interfaces.

1. The Effect of Colour in a Learning Environment

The prime aim of a learning environment is to provide Education. In accordance to the nature of learning environments, the options that it provides slightly changes. For an example, if it is an Educational gaming environment, while providing Education, that particular environment also provides, fun, excitement filled engaging experience. In that context, colour should be used in such a manner that it supports the functionality whilst deliver the intended message without making the environment cluttered and confusing. Colours can be used in a certain way when designing learning materials which can lead to certain behavioural outcomes. In general, vivid colours such as bright reds and yellows can promote idea generation and activity, whereas darker colours may evoke feelings of anger [9]. And also if a learning environment is to be appealing especially to girls, it is important to consider visual imagery [6]. Though designers question the effectiveness of colours, in improving the usability of a display, according to studies [3] and [7] it has shown that colour has improved performance of the display and also studies by [2], and [1] have shown that colour has an ability to improve the visual search.

Educational websites have a potential to enhance its usability by designing and developing learning environment where students can construct knowledge and acquire it. In designing a website, generally priority is given to its functionality, rather than to its appearance. However user's aesthetic need is also equally important as its functionalities. Interactive Learning Environment is a virtual classroom. It is a place a user spends considerable amount of time as a student in his learning process. If the learning environment is not pleasing and comfortable, there is a high possibility of students to getaway from that place. Therefore when designing an interactive learning environment, it is important to look at not only its functional but also its aesthetic point of view. Following section attempt to propose a method, which designers can adopt to explore what learners or users think and feel about existing learning web interfaces.

2. Method

The research method based on Kansei Engineering approach which uses the sensibility measurements such as Semantic Differential Analysis [4]. The Figure 2 elaborates Kansei Engineering Assessing system, which has been employed in this research. After designing the strategy, test subjects were selected from engineering students who do not have special training in colour designing. The participants consisted of 63 both Japanese and Asian International university students in Nagaoka university of Technology in Japan. Students were both female and male age ranging from 20 to 35 and tested no impairment of visual field or colour vision. Research is conducted in normal day light conditions.

2.1 Kansei Engineering

In a very special way, Kansei Engineering is able to capture the information, which is humans sense from five sensory organs as an input and use filters such as culture, emotion, gender, sense, etc to create the final output. The engineering process is a network which is interconnected and it recognizes the right functions to generate interrelationships and

produce the out put with sense. Kansei Engineering process doesn't end at that. It is a continuous process of testing and redesigning, which has ultimate target of user satisfaction. Figure 1 elaborates Kansei Engineering Processing System.

Kansei Engineering uses Kansei words which are usually adjectives or sentences of feelings as parameters. In Kansei engineering, designers collect Kansei words or adjective related to the product domain (in this case colors in web interfaces), and categorize adjectives represent feelings that represent the user needs in the particular web interface, and test them against the 5 or 7 point Semantic Differential scale [4]. After analyzing questioners, most frequently used adjectives can be selected to design SD scales. After gathering SD data and analyzing statistically to find a meaningful pattern.

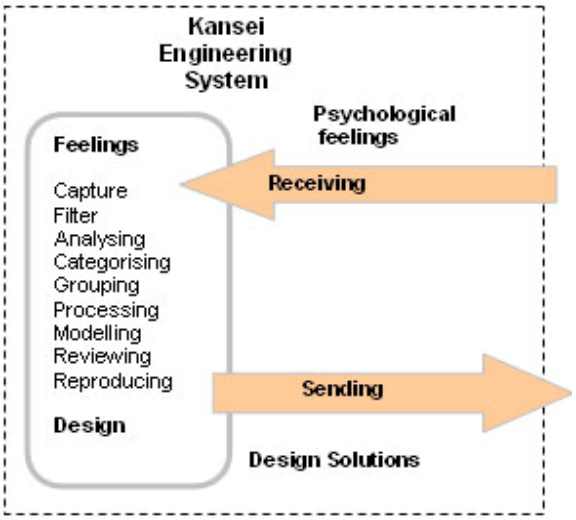

Fig. 1. Kansei Processing System

3. Kansei Assessing Process

The assessing process which is adopted in this research (see figure 2) is discussed in detail in the following sections.

3.1 Introduction to colours

Introduction to colour is a general presentation about colours, it includes an informal question and answer session. In this session selected colours were presented on the white screen, and randomly selected observer from the audience has to select a colour and provide reasons for selecting that particular colour. This exercise is important for both the users and the designers since it provides an opportunity to user to think about color in different perspective concurrently beneficial for the designers. Experienced designer can manipulate this testing session to stimulate user's mind to generate feelings for colours. This interactive excise is used as a warm-up session for forthcoming colour experiments. This interactive brain storming sessions can be used to study how users think and feel about colours. As such, sample questions in the Interactive session are; which colour circle do you like the most from the circles displayed on the screen? , Why do you like that particular colour?

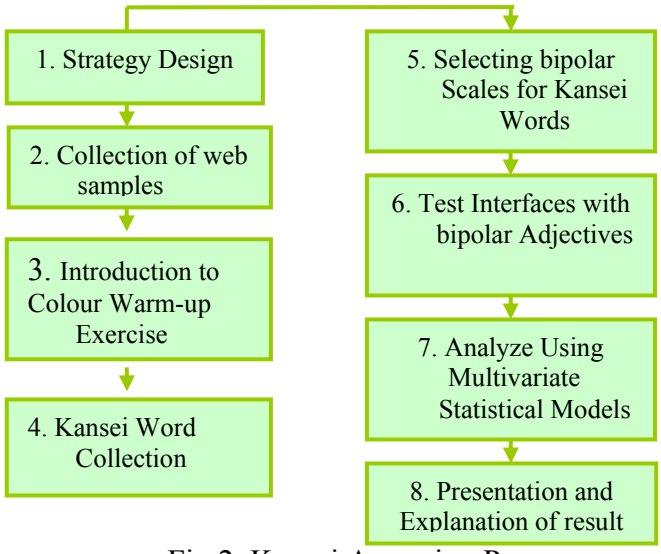

Fig.2. Kansei Assessing Process

3.2 Kansei Word Collections

After brainstorming sessions, Kansei word collection was carried out in two phases. In the 1st phase, subjects were given collectively 500 positive and negative feelings related adjectives both in Japanese and English media. (See figure. 3 for sample adjective list) Participants were asked to select the most frequently used feelings related adjectives, which can be used to describe feelings towards colours. This phase was used for primary Kansei word collection.

In the second phase of Kansei word collection, already collected various interactive learning web interfaces were tested using previously selected Kanesi words or adjectives. Interactive interfaces consisting colours, black and white, which also use different backgrounds, text colour combinations etc. In this phase, test subjects had to participate for an open questionnaire where they had to examine web interfaces and comment on them.

Once the data was gathered, it was analyzed to identify more Kansei words or identify the adjectives which represent the feelings that represent how the user feel and how user likes to feel in respect to particular web interfaces. After gathering the questionnaires and analyzing the data, 40 words were selected as the frequent colour emotion associations in the web. Some examples of most frequently used words considering the web interfaces are; Attractive, cool, elegant, aggressive etc.

3.3 Selecting Bipolar Scales

Once the Kansei word collection is done the next step is to design bipolar adjective scales (SD scales) such as good-bad, heavy-light etc. After selecting the most frequently used adjectives and colours, five point SD scales were defined. These scales were tested against the selected learning interactive web interfaces. Each interface had to be tested with five different bipolar adjective scales. This technique usually provides a total of seven or five points and the points in between the extremes are not labelled. The subject is therefore forced to provide his own rating on a 'one to five or seven' scale by only knowing the description of the two extremes. Each individual colour was tested ten times using different bipolar adjective scales.

3.4 Statistical Analysis and Presentation of Results

After gathering SD data, It is analysed statistically using various statistical models; regression analysis, correlation analysis, etc. to find a meaningful patterns. Once data is analysed, the output result can be used to design better interactive learning environment.

Japanese	English	Japanese	English
negative feelings		positive feelings	
恐ろしい	Afraid	活発な	Active
攻撃的な	Aggressive	情熱的	Ardent
怒った	Argy	魅力的な	Attractive
苦い	Bitter	美しい	Beautiful
失望した	Disappointed	平穏な	Calm
変色した	Discoloured	カジュアルな	Casual
怒りっぽい	Edgy	愉快な	Cheerful
暗い	Gloomy	快適な	Comfortable
困難な	Hard	冷静な	Cool
威嚇するような	Intimidating	上品な	Elegant
古い	old	楽しい	Joyful
悲しい	Sad	さわやかにする	Refreshing
		甘い	Sweet
		暖かい	Warm

Fig. 3. Sample adjective list in Japanese and English

4. Discussion

Colour is able to generate feelings [8][9]. These feelings play a major role in human behaviour, which in other words, colour influences on human decision making process. This is a relation that colours directly have with feelings, and makes colour a better test case for Kansei Engineering. In this research Kansei Engineering techniques were used to acquire information from participants to find out, to what extend colour has been useful to increase the usability of the learning environment. According to the results priority was given to colour interfaces than black and white for effective processing time of information and for memory performance. Selections for favourite theme colours were blue, green, pink and orange. Dark colour fonts were preferred in light colour backgrounds.

By arranging elements and colours to emphasize the importance of the main ideas in the web interface, designer has an ability to create a better hierarchy in a learning environment which is also helpful for user to understand the structure of the design. For example, by selecting bright colours, designer can draws the attention of the user to the most important elements or emphasis an important message in the screen. Consistency of the design also paves the way for the user to understand the structure of the design; for example consistency assist with understanding of the navigation method; how each of the web pages related to the main or parent website. Different pages may represent different categories but it is important to represent it in a balanced manner to explain that each and individual screen is part of the whole to make it a unified design. For an example even though each page represent different colours there should be some sort of pattern or clues to indicate that they are part of the whole or they belong to the same environment.

It is an eminent fact that colour influences the way we see and process information. Most importantly colour makes us remember both words and images. But not just any colour enhances memory. It has to be the right colour at the right place and time. One way of selecting the right colour for a design is associating it with natural or environmental colour associations as such; green trees, blue sky etc. because colour in nature has a universal and timeliness value.

This research explores the use of colour in web pages and how it affects user's feelings. As an extension in future this study plan is to explore how a designer can utilize the colour feeling relationship to design better human computer interfaces in terms of aesthetics and usability. Since Kansei colour palette is selected according to specialized scenario based, and considering more about user's feelings, it has an ability to select a colour scheme very much appropriate for the audience where colour communicates so effectively and as an attention getting device [6] to Increase the accessibility and usability of the website. Finally Errors in understanding and using the interface can actually be reduced by using colour to clarify the system meanings and concepts.

5. Conclusion

Initial phases of this study were to evaluate the existing learning web interface and finding out user's preferences in regards to colour. Furthermore secondary stages analyze and present the aesthetic needs of the user to increase the learning ability and usability. Evaluation is done using Kansei engineering techniques to capture user's feelings towards the e-learning web interfaces. Once the data is gathered and analyzed, research would be able to find a pattern of most frequently liked and disliked colours. In this research we use Kansei Engineering as a test tool to acquire user's opinions and evaluation In other words what user expect from a e-learning environment in respect to aesthetic aspect specifically colour and to what extend it has an ability to improve or support the content of the learning environment. Finally this research explore the capability of introducing Kansei colour palette to designing interactive e-learning Interfaces

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