

Examining user engagement attributes in visual information search

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Abstract

This study performs an exploratory factor analysis (EFA) to examine user engagement scale (UES) in the setting of daily life visual information search (i.e. searching images and/or videos using Web-based information systems). Principal Components Factor Analysis was employed to examine the six sub-scales of user engagement while searching images and/or videos on Web-based systems. Results indicated that the most stable sub-scale is Aesthetics (AE), while Endurability (EN) retained four of five items, Focused Attention (FA) retained four of seven items, Perceived Usability (PUs) retained three of eight items and Novelty (NO) retained one of three items. The remaining items from EN, FA, Pus, NO and two of three Felt Involvement (FI) items shifted onto different factors, and one NO item and one FI item merged with one FA item to form one new Factor. A number of 519 college student users responded to an online administered questionnaire in two months duration. The findings showed that more than 65% of the users used Google and 31.8% of them chose YouTube to search visual information. Social media and special sites were also used for their daily life visual information search.

Keywords: Visual information search, User Engagement Scale, User experience

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1 Introduction

The assessment of interactive information systems has extended from a simply system-centered approach to explore aspects of user interactivity (Cavaye, 1995; Ehn and Kyng, 1989, Hirschheim and Klein, 1994; Järvelin, 2011; O'Brien & Toms, 2013). However, in many studies of past decades, the elements of user interactivity in visual context are measured mainly limited in described statistics. Although in these studies user interactive performance plays the central role of the research, the objective of the studies still focuses on the functionality or utility of the systems, rarely concerning the feeling and cognition of different users who are experiencing or engaging in the information systems.

In the studies of interactive visual information search, the notion of experience was used but only referred to the overall opinions or perceptions of users about the functionality or utility of information systems, or the judgments of limited professional users about the system features, functionality, and organization (Matusiak, 2006; Wilkins et al., 2009; McDonald & Tait, 2003; Westman, Lustila & Oittinen, 2008; Wildemuth, Oh & Marchionini, 2010). Few studies assess the user experience in a holistic perspective involving feeling, motivation, and cognition in addition to performance during a searching session.

As Neo-humanism researchers in information retrieval argued, people and the potential users of information resources or systems are the most important rather than the development of the system (Hirschheim & Klein, 1994; Ehn & Kyng, 1989). In this world view user experience or engagement is seen as a means of improving understanding between users and system builders and developers. It is believed that this understanding can help system builders make efforts to create a superior environment in which the users are able to experience with increased understanding and an enriched working and leisure life.

In some notable information seeking and information search models, user experience is thought as an important factor influencing users' search behavior (Wilson, 1997) or an interplay of thoughts, feeling, and action (Kuhlthau, Heinström & Todd, 2008). Moreover, user experience is thought not only a process of information search or retrieval but also a process of sense or meaning construction, in which users make sense their current situation with knowledge, ideas, opinions, or effective interactions (Dervin, 1998). Therefore, it is necessary to explore the concept user experience or user engagement for the better understanding of users' information search process and sense making. This is also essential for the better understanding between information users and information system designers and developers.

It is believed that user experience is a multi-dimensional concept rather than one-dimensional one. This is because user experience is rich and multi-dimensional, especially in the experiential interactive products or exploratory information search systems (Hassenzahl & Tractinsky, 2006; O'Brien & Toms, 2013). Prior research has revealed that information search is a dynamic and interactive process (Bates, 2005), and researchers are increasingly looking into user experience frameworks or models as means of understanding the interaction between user and information systems (O'Brien, 2011b, Banhawi & Ali, 2011; O'Brien & Toms, 2013).

The concept of user experience (UX) is extensively discussed in Web design (Garrett, 2002), e-commerce and customer relationship (Donoghue, 2002), and its relevant concepts like participation, involvement (Barki & Hartwick, 1989; Kappleman and McLean, 1991), and usability (Norman, 2002, 2004) were developed in the field of information systems (IS) and human computer interaction (HCI). It is suggested that although there are similarities between UX and usability, UX incorporates not only usability or other pragmatic qualities like reliability and functionality, but also novel and hedonic qualities like stimulation, fun, attractiveness, and etc. (Jetter, H. & Gerken, J., 2007; Bevan, 2009). In information system field (IS), UE is suggested to be a general concept referring to both participation and involvement (Hwang & Thorn, 1999), which has been found having different influences on user satisfaction (Kappleman & McLean, 1991; King & Lee, 1991).

This study will perform an exploratory factor analysis (EFA) to examine attributes of the user engagement in daily life visual information search. The user engagement scale (UES) from previous work that have been created and examined in settings of online shopping and social networking application are adapted for the measurements of this study. UES includes six sub-scales: Aesthetics (AE), Endurability (EN), Felt Involvement (FI), Focused Attention (FA), Novelty (NO), and Perceived Usability (PUs).

2 Conclusion

The results of Principal Components Factor Analysis with Varimax Rotation indicated that the six factors accounted for 65.93% of total variance. Four EN items, four PUs items, one NO item, and one FI item formed Factor 1, accounting for 18.95% of the total variance. All six AE items, the remaining one EN item, and one of four remaining PUs items made up Factor 2, which contributed 16.35% to the total variance. Six FA items and one of two remaining FI items loaded together on Factor 3, accounting for 12.54% of the total variance. One remaining FA item, one remaining FI, and one of two remaining NO items formed Factor 4, accounting for 8.39% of total variance. The remaining three PUs made up Factor 5, accounting for 6.22% of the total variance. One remaining NO item made up Factor 6, which contributed 3.49% to the total variance.

In current study, the User Engagement Scale (UES) was administered to users who searched for visual information, images and/or videos, using Web-based systems for the needs of both personal interests and assignments in daily life. The users employed comprehensive systems to search visual information. More than 65% of the users used Google and 31.8% of them chose YouTube to search visual information. Social media like Pinterest and Facebook, and other special sites like IMDB and Fox and etc. were also used for their searches.

Contrasted with previous administrations of the Scale in online-shopping (O'Brien & Toms, 2010a), social networking application (Banhawi & Ali, 2011), and an interactive search system (O'Brien & Toms, 2013), the results of this study indicated the differences in the number of items retained in the context of daily life visual information search. In this context, the sub-scale Aesthetic Appeal is the most stable one with all the items loading on one Factor. The Focused Attention sub-scale has three of seven items shifting onto two different Factors and the other four items made up a single factor (Factor 3) with one FI item. Endurability sub-scale has one of five items shifting onto a different Factor and the other four items made up a single factor (Factor 1) with four PUs items, one NO item, and one FI item.

The PUs sub-scale, which has demonstrated stability across previous studies, manifested variability with its total eight items loading on three different Factors, one of which retained a single item. In addition, the results for EN, FI, and NO sub-scales were consistent with previous studies, which have demonstrated that the configuration of their items are less straightforward (O'Brien & Toms, 2013). In this study, total five items from EN sub-scale loaded on two different factors, and total three items from FI sub-scale and total three items from NO sub-scale have separately loaded on three different Factors.

In this study, the UES was examined to the context of daily life visual information search using Web-based information systems. The results showed that there is a need to identify a new factor merged by items from such sub-scales as FA, FI, and NO. Also the result that ten items from EN, PUs, NO, and FI loaded on one Factor (Factor 1) implies that the definitions of some subscales like Pus, FI, and NO may need to be refined in the context of visual information search.

It is impossible to find measures that do not vary across context (Serenko & Turel, 2007), and hence there is a need to establish an appropriate factor model in the visual context, delineating the connection and difference in UES between different settings. For this purpose, the future work will also examine the engagement attributes in an experimental environment with the control of such factors as task and system to validate the findings in the item and dimension, and establish a multi-factor model to understand users' experiences with information systems for visual information search.

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Table of Figures

Principal Components Factor Analysis With Varimax Rotation

Items	UES Sub-scale	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
My searching experience was: Unfruitful vs. Rewarding	EN	0.78					
My searching experience was: Not working out the way I had planned vs. working out the way I had planned	EN	0.773					
While I was searching, I felt: Annoyed vs. Pleased	Pus	0.742					
While I was searching, I felt search on this website was: Unworthy vs. Worthwhile	EN	0.729					
While I was searching, I felt: Discouraged vs. Encouraged	PU _s	0.712					
My searching experience was: Unsuccessful vs. Successful	EN	0.705					
While I was searching, I felt: Frustrated vs. Inspired	PU _s	0.671					
The content of the searching website: Discouraged my curiosity vs. Incited my curiosity	NO	0.626					
My searching experience was: Boring vs. Fun	FI	0.616					
While I was searching, I felt: Uncontrollable vs. Controllable	PU _s	0.554					
To my visual senses, the screen layout of this searching website was: Unpleasant vs. Pleasing	AE		0.818				

To my visual senses, this system or website was: Repulsive vs. Appealing	AE	0.79
To my visual senses, this system or website was: Dull (I don't like the graphics and images used on it) vs. captivating (I liked the graphics and images used on it)	AE	0.774
This searching website was aesthetically appealing	AE	0.752
The information system or Website was: Repelling vs. Appealing *	AE*	0.721
The information system or Website was: Unattractive vs. Attractive	AE	0.716
I would recommend searching on this website to my friends and family.	EN	0.635
The information system or Website was: Confusing vs. clearly structured	PUs	0.561
When I was searching, in this searching experience: I didn't lost track of the world around vs. I lost track of the world around	FA	0.827
When I was searching, in this searching experience: I didn't lose track of time vs. I lost track of time	FA	0.777
When I was searching, in this searching experience: I didn't let myself go vs. I let myself go	FA	0.759
When I was searching, in this searching experience: I didn't block out the things around me vs. I blocked out the things around me	FA	0.754
When I was searching, in this searching experience: I was not drawn into search vs. I was drawn into search	FI	0.709

When I was searching, in this searching experience: Time went slowly vs. Time slipped away	FA	0.671
When I was searching, in this searching experience: I didn't lose myself vs. I lost myself	FA	0.628
While I was searching, I felt: Unoccupied vs. Absorbed	FA	0.765
While I was searching, I felt: Uninvolved vs. Involved	FI	0.759
While I was searching, I felt: Uninterested vs. Interested	NO	0.63
The information system or Website was: Mentally easy vs. Mentally taxing**	Pus**	0.828
My searching experience was: Easy (flexible) vs. Demanding**	Pus**	0.754
I could not do some of the things I needed to do on this searching website.-strongly disagree: strongly agree**	Pus**	0.623
When I was searching, in this searching experience: I continued searching out of curiosity vs. I discontinued searching out of disinterest**	NO**	0.907

The scale was administered using a seven-point scale. The item identified with an asterisk (*) indicates the item that was not included in previous work, and the items identified with two asterisks (**) indicate items that were reverse-coded.