AN INTEGRATIVE MODEL ON WEB USER EXPERIENCE

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ABSTRACT

In this paper, we present an integrative approach to describe the user experience of website usage. Starting from a basic user experience process model four dimensions of experience are integrated in the model: perceived usefulness, ease of use, hedonic quality and visual attractiveness. The model is tested empirically in two web domains: online bookshops and travel agencies. The intention to use a system as a predictor of system usage is studied as one consequence of the users' experience of interaction. The results suggest that all four aspects of experience are mostly independently perceived by the user and all contribute significantly to the intention to use a website while perceived usefulness had the major influence and the other experience dimensions had smaller effects. Consequences of the findings for developing interactive systems that take all of the users' needs into account and that users so intend to use are discussed.

KEYWORDS

Users' perceived website quality, user experience, e-commerce.

1. INTRODUCTION

User satisfaction is defined as one aim in developing usable interactive systems (ISO, 1998). The concept of satisfaction refers in contrast to other objectives to the subjective perspective of the user. Measures of satisfaction are defined to assess the user's perception of aspects such as efficiency, helpfulness or learnability, or attitudes to the use of the product. The design of the user experience, which has increasingly become a goal in developing interactive systems over the last years, considers a wider scope than the aspects paid attention to with the concept of user satisfaction. But while the term user experience is widely used, the theoretical foundations are not very well understood so far.

Some approaches have been made to describe the foundations of the user experience of online services, e.g. Novak and Hoffman (2000) used the flow concept (Csikszentmihalyi, 1990) as basic principle to explain which factors make using the web a compelling experience. But while Novak and Hoffman modelled and explained user experience of Internet usage overall, this approach helps less in describing and understanding the user experience of a particular system. In contrast, the aim of the integrative approach to user experience we present here is to describe the user experience of a single interactive system and thus being helpful to identify why a particular system may not yield to a suggested user experience, and to pursue appropriate corrective steps in design.

Also, Huang (2003) studied flow experiences in the Internet context and thereby differentiated utilitarian and hedonic aspects of web performance. The main result of the study was that a successful website must be able to satisfy both the information and entertainment needs of users. Hassenzahl (2005) describes two categories of interactive product qualities that target these needs: instrumental and non-instrumental qualities. Instrumental quality aspects focus on users' tasks, goals and their efficient achievement. One classical approach that considers these aspects is Davis' (1989) Technology Acceptance Model. Davis defines the usefulness and ease of use of an interactive system as important instrumental quality aspects.

The influence of non-instrumental quality aspects on user behaviour has been studied as well. Hassenzahl (2001) introduced the concept of hedonic quality as comprising quality dimensions with no obvious relation to the task the user wants to accomplish with the system, such as originality, innovativeness, etc. Although not task-related he showed hedonic quality to be an important quality aspect for the user (Hassenzahl, 2001)

In the website context studies focused primarily concepts like visual attractiveness or aesthetics. Schenkman and Jönsson studied aesthetics and preferences of websites and found that a very good predictor for the overall judgement of a website was the users' perceived beauty. V. D. Heijden (2003) studied the concept of visual attractiveness as an extension of the Technology Acceptance Model (Davis, 1989) to explain the individual acceptance and usage of websites and found a remarkable influence. Lavie and Tractinsky (2004) found that users' perceptions consist of two main dimensions regarding visual attractiveness, which they termed ''classical aesthetics'' and ''expressive aesthetics''.
Recapitulating, different non-instrumental quality aspects like hedonic quality and visual attractiveness have been studied for there one. However, to study the user experience of websites as a whole non-instrumental and instrumental quality aspects have to be integrated to fully understand users' experience of interaction.

2. WEB USER EXPERIENCE: AN INTEGRATIVE APPROACH

Norman (1999) described user experience as encompassing all aspects of the users' interaction with a product: the experience of the system happens during the interaction with the system. We define this processing of information about the interaction as the central part within the basic user experience process. On the one hand, this information processing is influenced by the qualities of the interactive system: the user perceives these qualities within the interaction with the system. On the other hand, this information processing leads to various consequences of experience, such as the behaviour of the user, e.g. the usage of the system, judgments or emotional outcomes (Mahlke, 2002).
We assume that information about the interaction with the system is processed on different dimensions of experience. We integrated four concepts as experience dimensions: perceived usefulness and ease of use, perceived hedonic quality and perceived visual attractiveness. Perceived usefulness (U) and ease of use (EOU) are defined in Davis' Technology Acceptance Model (Davis, 1989) and represent instrumental quality aspects. Hassenzahl's (2001) concept of hedonic quality (HQ) and v. d. Heijden's (2003) construct of visual attractiveness (VA) are studied as non-instrumental quality aspects. The intention to use a system (INT) as an important predictor of website usage is one consequence of experience. These assumptions are summarized in our user experience model presented in figure 1.

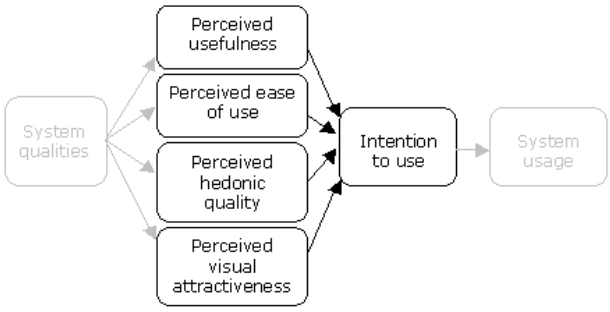

Figure 1. User experience model
(Concepts that were not studied here are displayed grey)

The integration of these aspects of experience as factors contributing to the intention to use (INT) a website leads to the following research questions:
Q1: Are perceived usefulness, ease of use, hedonic quality and visual attractiveness four independently perceived aspects of the experience of website usage?
Q2: Is the intention to use a website formed by combining and weighting the four aspects of experience?

3. AN EMPIRICAL STUDY OF THE EXPERIENCE OF WEBSITE USAGE

An experiment was conducted to study the user experience model empirically and answer the research questions.

3.1 METHOD

210 individuals participated in the study. The sample was balanced for gender and mean age was 28,8 years (Min 15, Max 64). Internet expertise varied from moderate to high. Websites were chosen from two domains of general interest: online bookshops and travel agencies. Ten websites from each domain were selected for inclusion in the study. The main criterion for selection was heterogeneity.
A questionnaire was developed to measure the four aspects of experience and the intention to use. The four aspects of experience and the intention to use were operationalised based on studies of Venkatesh & Davis (2000), Hassenzahl (2001) and v.d. Heijden (2003). The questionnaire consisted of 24 items and is described in Table 1.

Table 1. User experience questionnaire

Scale	Item
Perceived usefulness	Using the website makes it possible to complete the task.
	Using the website enhances my effectiveness completing the task.
	Using the website is helpful completing the task.
	I find the website to be useful completing the task.
Perceived ease of use	I find it easy to get the website to do what I want it to do.
	Interacting with the website requires a lot of mental effort.
	My interaction with the website is clear and understandable.
	I find the website to be easy to use.
Perceived hedonic quality	The website is standard.
	The website is innovative.
	The website is exciting.
	The website is impressive.
	The website is original.
	The website is boring.
Perceived visual attractiveness	The colours that are used on the website are attractive.
	Overall, I find that the site looks attractive.
	The design of the website is unattractive
	The layout of the site is attractive.
Intention to use	If possible I intend to use the website again.
	If possible I predict that I would use the website again.
	I would recommend to use the website to friends.
	In a similar situation I would use the website again.

The study was carried out as an online experiment. After a short introductory page the participants were randomly assigned to one of the investigated websites. Dependent on the domain of the website a prototypical scenario was presented. It consisted of a short cover story asking the participants to execute a task on the web sites within 10 minutes. Subsequently the questionnaire was presented. Some questions concerning demographics, Internet expertise, and personal relevance of the domain were added at the end of the questionnaire.

3.2 Results

Q1: The scale characteristics of all measurement scales of the questionnaire showed high reliability with Cronbach alpha coefficients higher than 0.88. A factor analysis (Principal Component, Equamax rotation) of

the U, EOU, HQ and VA items of the questionnaire extracted four relevant factors. Together the four factors explain approx. 79% of the total variance.
Q2: The intention to use is conceptualized as being formed on the basis of the individual's perception of the four aspects of experience. To check this assumption a regression analysis was performed in order to predict the intention to use from the factor values of the four aspects of experience. Table 2 shows the results of the regression analysis. The four aspects of experience succeed all in predicting the intention to use. Together they explained approx. 72 % of the variance of the intention to use. The weight of contribution to the intention to use differs from U with the major influence to VA with the smallest effect.

Table 2. Regression Analysis of U, EOU, HQ and VA on INT

Criterion	Adjusted R^2	Predictors	Beta	Sig.
INT	.719	U	.653	<.001
		EOU	.377	<.001
		HQ	.311	<.001
		VA	.244	<.001

3.3 Discussion

The results of the factor analysis show that users can perceive the four assumed experience aspects consistently and mostly independently. The regression analysis to predict the intention to use indicates that the perceived usefulness expectedly has a main influence on the intention. Also, the other three experience factors contribute significantly to the intention to use. The results demonstrated that especially the consideration of non-instrumental quality aspects of websites offers a potential to improve the user experience.
However, one limitation of the study is that the question what design characteristics or features support the user experience on the different dimensions was not studied. We had no controlled variation of systems used in the experiment that should lead to a hypothesized user experience. The stimulus material used in the experiment was chosen in a way to elicit a wide variety of positive and negative reactions by the users.
Also, we focused just on one consequence of experience in the experiment: usage. As indicator for usage we asked the users about their intention to use the systems. Davis et al. (1989) demonstrated that the intention to use is a very good predictor for usage. Other consequences like emotional outcomes, judgments, etc. were not studied.

4. CONCLUSION

The presented approach appears promising for a better understanding of the concept of user experience as a complex phenomenon. Four aspects of experience have been proposed to describe important parts of the user experience and were validated empirically. Their influence on the intention to use an interactive system as a predictor for usage and an example for a consequence of user experience has been demonstrated. Still many research questions that build up our research agenda on user experience are unanswered.
We expect that next to the four experience dimensions we integrated so far further concepts may be of importance for the user experience. In the commercial website context possible concepts may be trustworthiness especially for e-commerce websites (Riegelsberger, Sasse and McCarthy, 2003) or the support of social aspects like communication or cooperation. Angeli, Lynch and Johnson (2001) introduced in this context the concept of social quality of interactive systems. The comparison of our model with the frameworks of Norman (2004) and Jordan (2000) shows which other possible facets of the user experience might be relevant. The interplay of the experience dimensions must be taken into account.
Further consequences of experience next to the intention to use as a predictor for usage of the interactive system were mentioned. Judgments and emotional outcomes are examples of further possible categories of consequences. Hassenzahl (2001) studied the concept of judgement of appeal as an evaluative concept that

can be considered as another consequence of experience. Next to questionnaire methods to operationalise emotional outcomes like fun of use or enjoyment other innovative methods for measuring emotions during interactive experiences may be established.

Another complex of questions that is still open is what design characteristics and feature support a positive experience on some of the experience dimensions. While design for usefulness and ease of use is reasonably understood (e. g. Shneiderman, 1997) the question about what leads to an interactive system being perceived hedonic is not answered. Other dimensions of user experience will bring up the same question for designing a positive experience.

In spite of the open issues we think the further development of the approach according theory and methods can help designing interactive experiences in the future.

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