Decision Support Systems xxx (2012) xxx–xxx

Contents lists available at SciVerse ScienceDirect

Decision Support Systems

journal homepage: www.elsevier.com/locate/dss

Understanding web enjoyment experiences and informal learning: A study in a museum context

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ARTICLE INFO

Available online xxxx

Keywords:
Web enjoyment experience
Engagement
Positive affect
Fulfillment
Informal online learning
Website design

ABSTRACT

There is a significant and growing trend to provide informational learning material online by organizations including businesses, government and cultural institutions. Yet, the concept of enjoyable online learning experiences – specifically when learning is not part of a formal instructional undertaking – has not been well studied, and thus it is not well understood. To redress the gap in the literature, this article reports on a major exploratory study that analyzed the learning and enjoyment experiences of a large number of informal learners in a museum context. The paper shows how designing for an enjoyment experience has unique characteristics that distinguish it from traditional website design and calls for more research with focus on human emotions and reactions. The article also identifies a set of characteristics which would encourage enjoyable online learning experiences for the general public and suggests a number of conceptual guidelines for developing an online learning website for enjoyment.

1. Introduction

Researchers and designers have studied the effects of online system design features on important outcomes such as performance, effectiveness, or achievement [37,83]. The systems studied have a range of purposes; for example, online shopping [46], online marketing [20,91], and online learning [78,89]. However, few studies have considered the effect of different design features on users' emotional experiences.

Yet online emotional experiences not only are attracting global attention but are also the target of considerable amounts of research funding. Recently, the European Union launched a 6 million Euros (over 8 million U.S. Dollar) project – HUMAINE – to investigate the influences of emotional computing [42]. One emotional experience that has received attention is that of "enjoyment", which can have powerful effects in online interactions. A sensation of enjoyment can influence online shopping [28], computer and internet usage [90,92,93], e-Service continuance [22], and mobile commerce [21].

Enjoyment is also an important factor in informal learning [35], which is learning that is semi-structured and is not formally organized in an institutional setting [57]. The psychology literature has noted that whether and how memories are stored in the human brain may be affected by emotional states [77] and that emotions can influence both the recall of such memories and the operation of cognitive processing [25,89]. Informal learning occurs in the workplace, in government-to-citizen information provision, in everyday human interaction and in individual self-directed activity in following hobbies and special interests. Upwards of 70% of learning in the workplace is estimated to be informal, although industry spends billions of dollars on formal training each year [47].

This study is interested in the relationship between enjoyment and informal learning in an online setting, where individuals gain knowledge during interaction with a website. This topic is important because of the growing trend to provide informational material online by organizations including businesses, government and cultural institutions [17,35]. Further, this study is specifically focused on guidelines for the design of websites that are aimed at promoting both enjoyment and education, where these two outcomes are seen as linked. The extant literature in this area is sparse. Very few studies consider how an enjoyable online learning experience can be facilitated in formal educational systems (e.g., [13,24]), while only one study reports on web design features on informal online learning from the perspective of designers [52]. Thus, this paper explores the opinions and perspectives of online end users in order to answer the following research questions:

RQ1. What characteristics of a website encourage enjoyable online learning?
RQ2. What design guidelines lead to websites that support enjoyable online learning experiences?

The context selected for studying the relationships between web design features, enjoyment and informal learning is that of museums. Museums serve society through the provision of education and enjoyment to visitors motivated by intrinsic personal desires rather than extrinsic

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doi:10.1016/j.dss.2012.05.020

motivators for learning [43]. The nature of the visitors' motivation is important as it differentiates an informal online learning focus from other kinds of online learning. Learning on a museum website does not involve formal lectures and does not lead to any degrees or certification, as in formal online education [86]. It is also different from organizational training for employees [95], which targets increasing organizational benefits and a measurable increase in workforce skills or knowledge.

In this context, this study argues that website designers and managers wishing to increase the effectiveness of informal online learning websites not only should consider functions such as usefulness and ease of use, but also should consider the capacity of the website to generate enjoyable online learning experiences among its users.

This article proceeds as follows. First, the concepts of an enjoyment experience and informal learning are explored in some depth. Second, the method adopted for data gathering and analysis is described in detail. Third, findings from the study are presented in terms of specific characteristics that encourage enjoyable informal learning, and design guidelines are provided. Fourth, the paper concludes by integrating the study with the extant literature and suggesting implications for theory and practice.

2. Conceptual background

A range of literature has argued for the importance of studying emotional experiences, which can explain and predict how higher levels of utilitarian and non-utilitarian online outcomes arise from human interaction with computers (see [67]). The area of online learning is one in which emotional experiences are particularly important. The human brain can be influenced by emotional states [77], and emotions can influence both the recall of memories and the operation of cognitive processing [25,89]. This study works on the premise that online informal learning is also influenced by emotions and in particular by experiences of enjoyment.

In the remainder of this section, looking first at the concept of online enjoyment experiences is examined in some detail, then the nature of informal learning, then the relationship between enjoyment and learning, and finally the limited work in the extant literature that links website design, enjoyment and learning.

2.1. Enjoyment experiences

In human–computer studies, the experience of "enjoyment" refers to the sensation and perception of using the computer as enjoyable, apart from any probable and predictable performance consequences [23]. It has been argued that "an enjoyable user–technology interaction" would depend on "the interaction effect of challenge and the development of skills, as well as variation and the enabling of the decision-making authority of the user" [9, p.62]. However, the online realm still lacks a precise and generally agreed meaning of enjoyment, as experienced by web users. To thoroughly understand the experience of enjoyment, it is necessary to review concepts proposed in other research disciplines.

Philosophers and psychologists have created a large body of literature relating to the emotional experience of "enjoyment", but definitions of enjoyment vary (e.g., [19,73,81,96]). Psychologists consider that "enjoyment" is an entirely different emotional experience from a joyful feeling, which is "effected by the satisfaction of natural impulses or needs" [2, p.56], for example, the joy of satisfying physical or psychic needs. When people ponder what makes their lives rewarding, they tend to move beyond pleasant memories and remember events and experiences that overlap with pleasurable ones, but fall into a category that deserves a separate name: enjoyment [19]. Enjoyable events occur when a person has not only met some prior expectation or satisfied a need or a desire, but also has gone beyond what they have been programmed to do and achieved something unexpected, perhaps something previously unimagined.

The enjoyment experience contributes to intrinsic motivation by "sustaining the willingness to continue and persist in the activity" [75, p.83]. When people enjoy some activity, it means that they have performed well and "they tend to persist in (e.g. show intrinsically motivated behavior toward) those activities for their own sake" [75, p.101]. Conversely, the initial appeal of an activity declines when it does not provide appropriate feedback or loses its distinctive features; when this occurs, individuals look for other activities that might arouse curiosity and be worth exploring [75]. Therefore, a positive affect circumstance can stimulate individuals' intrinsically motivated behaviors and thus enhance their enjoyment experiences and their desire to spend more time on enjoyable tasks [45].

The concept of enjoyment can be seen from different perspectives. This diversity is present in several empirical studies that have defined enjoyment and its usage as a construct. These studies can be organized into three categories: enjoyment as a prior stimulant [15,23,40,48,55,102], enjoyment as a transactional element [14,21,22,28,41,51,90,92,94,97,100] and enjoyment as a consequence [41].

While the listed studies are certainly useful, the extant literature is lacking in qualitative studies that explore more comprehensively users' perceptions of web experiences and their needs for enjoyment. Further, many prior studies are limited in that they ignore the complexity of the concept of enjoyment, regarding enjoyment as a unidimensional concept with varying definitions. In contrast, the current study argues that the enjoyment experience has a number of distinct dimensions and must be treated as a complex phenomenon.

The notion of enjoyment has several facets. Enjoyment can be related to "having one's desires satisfied" and "what we ourselves are engaged in" [99, p.326]. Perry [73] argues that enjoyment can only arise when a person performs an act or engages in an activity, or when a person experiences something, either by perceiving it (e.g. viewing, staring at, or listening to) or having it. One of the most comprehensive definitions of enjoyment is provided by Warner [96] in the philosophical domain. According to Warner [96], enjoyment consists of a certain harmony between three elements: (i) the activity or experience itself, (ii) the concepts you believe apply to the activity or experience, and (iii) a certain desire in which the same concepts figure.

This study builds on Warner's [96] seminal study of enjoyment, where psychological and philosophical arguments are synthesized, to present enjoyment in terms of three sub-constructs: Engagement, Positive Affect, and Fulfillment. For people to enjoy an activity, they have to (i) engage in the activity; (ii) be positively affected in terms of satisfaction, excitement, contentment, or similar feelings; and (iii) achieve fulfillment of needs or desires through the activity (although these needs may not be consciously realized *a priori*). This definition has been used as the base for an instrument to measure online enjoyment. Lin et al. [53] present twelve characteristics of the web enjoyment experience, against the three dimensions of engagement, positive affect, and fulfillment. The key characteristics are "engrossed, absorbed, attention focused, and concentrated" for the Engagement dimension; "happy, pleased, satisfied, and contented" for the Positive Affect dimension; and "meaning a lot, rewarding, useful, and worthwhile" for the Fulfillment dimension [53].

2.2. Informal online learning

Informal learning has been defined in diverse ways. One seminal work defines informal learning as "any activity involving the pursuit of understanding, knowledge or skill which occurs outside the curricula of educational institutions, or the courses or workshops offered by educational or social agencies" [54, p.2]. Conventionally, learning takes place in formal educational institutions and leads to credits or degrees. Informal learning, in contrast, is the outcome of everyday living experiences and this type of learning can be "noncredit, leisure oriented and short term" [62, p.21]. Facilitation of understanding, knowledge and skill outside formal learning surroundings is growing in importance in relation to businesses, government and cultural institutions [8]—thus the need for research in this emerging field.

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Prior studies have used the following descriptors for informal learning: voluntary, unstructured, unsequenced, non-assessed, non-certificated, open-ended, learner-centered, self-paced, social interaction centered and not legislated for Refs. [56,60,61,98]. A learner has "the freedom to make decisions (incorrect as well as correct ones) and observe their results" [10, p.5].

Museums are one context in which researchers have studied learning experiences [56,60,61]. Museums serve society through the provision of enjoyment and education to visitors motivated by intrinsic personal desires rather than extrinsic motivators for learning [43]. Learning in museums does not involve formal lectures and does not lead to any degrees or certification [86]. Further, learning in museums is different from organizational training for employees [95], which targets increasing organizational benefits and a measurable increase in workforce skills or knowledge. Thus, museums offer a good opportunity for further study of informal learning experiences.

Museums are making increasing use of the global Internet in supporting informal learning. Museums are aware that many people in virtual learning environments are seeking to learn at their own pace and about their own preferred topics [44]. The internet provides for this type of learning as it offers not only infinite potential, but also enormous resources for informal online learning [76].

A limited number of studies relate to informal online learning or informal learning with new technology, and the majority of these studies are in the educational literature (see [17,35,76,84]). These studies indicate that people who undertake technology-based informal learning at home have distinctive demographics (e.g., retirees, tradespeople). These people are often members of an informal online learning community seeking a dynamic knowledge environment in which they can interact and share knowledge [35,76]. Some studies have focused on children and young people, and found that the characteristics of "play" and "interactivity" and the "design" of new technology are important factors in attracting interest and motivation [17,84]. These articles demonstrate the potential of informal online learning in the digital era and the element of positive affect that is often associated with the learning experience.

2.3. The enjoyment experience and informal learning

Prior work has shown that enjoyment experiences are positively associated with informal online learning and that it is essential to consider particularly the second and third dimensions of enjoyment defined by Warner [96], Positive Affect and Fulfillment, in the design of online learning systems [52]. Consideration of the fulfillment of needs (e.g. acquiring knowledge) leads to theories of human motivation. Following Ford [30], this study considers that a person has affective, cognitive, self-assertive social relationship and task needs for learning. The second dimension of the enjoyment experience, positive affect, includes the notions of contentment, gladness, excitement and good feelings. In Ford's [30] taxonomy of human needs, this dimension corresponds to the affective goals of happiness, bodily sensations, and physical well-being. Enjoyment is linked to learning, because learning satisfies some human needs [30]. Conversely, enjoyment can act as a positive conducive re-enforcement to positive learning [6]. Thus, it can be argued that experiencing enjoyment while learning leads to higher levels of learning and to a desire to repeat the enjoyable learning experience. This argument is supported in the educational literature, where positive re-enforcement is held to be more effective than negative re-enforcement [66] and where a direct link between enjoyment and learning has been established [36,72].

To be sure, some types of online learning experiences are not necessarily enjoyable, yet people still engage in them. These are usually cases in which learning is extrinsically motivated, for example, when learning is forced or undertaken for purely material gain. This study argues that visitors to museum websites are likely to have intrinsic rather than extrinsic motives for learning. It follows that making the learning experience enjoyable is particularly important.

2.4. Website features, informal learning, and web enjoyment experiences

The manner in which a website is implemented could help users to experience a sense of engagement, positive affect, and fulfillment. To achieve this aim, the design of websites should consider users' intention, involvement, and participation [38], and should also endeavor to offer interactive experiences that facilitate the enjoyment of its content [4]. Therefore, several factors have been identified as relevant to successful website design for enjoyment. These factors are primarily related to the website itself, such as content, organization, and technology [101] and to how users experience the website in terms of entertainment, information, and organization [12]. Designers of high performance websites should follow certain technical rules (i.e., [87]) and also consider how different media could influence users' perception of enjoyment [68,92]. In addition, website development must consider the difference between designer needs and user needs, how to balance form and function while providing good quality of execution, and the interplay between convention and innovation [65,74].

The features of a website can enhance users' learning experience and facilitate teaching outcomes. In formal online learning, a well-designed multimedia system that is useful as well as offering ease-of-use, can impact on the self-efficacy of learning [13] and game-based learning can benefit learning and understanding and enhance teaching effectiveness [32]. However, since only a few studies focus on website design and informal online learning, it is not well known whether design concepts for formal learning can be applied to informal online learning.

Addressing this gap in the literature, Lin and Gregor [52] examined design features and informal learning from the viewpoint of web designers and educational experts. The study revealed six features that encourage online learning and argues that designing online learning systems for enjoyment involves the following: adopting multimedia and interactive technologies, considering the characteristics of self-directed learning, having qualified staff and adequate financial support, recognizing the target audience, and making information more sharable [52]. Yet, the study was delimited to designers and expert builders; thus the users' perspective was missing. By analyzing users' needs and wants, this paper aims at providing a more rounded appreciation of design features that encourage engagement, positive affect, and enjoyment. To that end, Section 5 of this article contrasts the finding of this study with Lin and Gregor's [52] features and guidelines.

3. Method

The preceding discussion shows that the goal of explicitly designing learning websites for enjoyment, especially in terms of the three subdimensions of Engagement, Positive Affect, and Fulfillment, has been relatively unexplored. There is little research on design features that leads to web enjoyment experiences and very little work that employs qualitative methods to gain insights into end users' views. This study endeavors to address this gap in the literature, and this section explains the adopted data collection and analysis method.

3.1. Data collection

The challenge here was to design a study that could provide rich data on which an empirical exploration of users' experiences could be conducted. The research processes included determining relevant web sections in a non-simulated museum as an experimental vehicle, selecting participants for the study, designing the research tools and using an appropriate data analysis method.

With the support of the National Palace Museum, Taiwan (NPM), three relevant web sections were selected. These sections offered diverse design features to stimulate the participants into various modes of thinking. The sections were part of an award-winning site—"Age of the Great Khan". This currently operational site has received two international awards, indicating that it has a recognized quality. The three

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Table 1
Research design.

	Group 1	Group 2	
FIRST Visit	 "Balance" section	 "Portraiture" section	
SECOND Visit	 "Khubilai Khan Hunting" section	 "Khubilai Khan Hunting" section	
Data gathering	Opinions and perspectives for designing enjoyable experiences in informal online learning.	Opinions and perspectives for designing enjoyable experiences in informal online learning.	Total
Providing opinions for design features	278	337	615
Providing perspectives for design guidelines	198	232	430

sections chosen were related to concepts for developing paintings in the Mongolian Dynasty during 1279–1368 A.D. While offering thematic unity, each section was different. The "Balance" section contained interactive multimedia demonstrating how to develop a balanced painting, with the materials presented in six steps on one screen. The "Portraiture" section also contained interactive multimedia illustrating new painting techniques in that period, with the materials presented in 27 steps with animated graphs and pop-up windows. Finally, the "Khubilai Khan Hunting" section was a reading-based section presenting the Emperor and his Empresses in a hunting scene. This section was read via hyperlinks as in turning pages of a book, with clicking on a painting to view an enlarged image.

Data were collected by an online questionnaire (see Appendix A) from voluntary and anonymous participants. The online survey system, developed by the NPM website team, randomly and automatically assigned each participant to a group (see Table 1). Participants in Group 1 visited the "Balance" section first, then moved on to the "Khubilai Khan Hunting" section and then completed the survey questions. Group 2 followed the same process, but visited the "Portraiture" section first. The research design occurred because quantitative data were collected as part of a larger project, for purposes beyond the scope of this paper (reference withheld during review). The important feature of the research design for this study is that each participant visited more than one web section.

A total of 615 participants provided their opinions on "the characteristics of a website that encourage web enjoyment experiences and informal online learning", and 430 participants gave their perspectives on "the guidelines for developing a website that supports web enjoyment experiences and informal online learning". The high volume of responses provided a rich source of data for analysis.

3.2. Data analysis

Qualitative data analysis can employ rigorous and systematic processes [29,79]. This study employed qualitative content analysis to explore the web enjoyment experience and its connections to informal online learning. Content analysis provides a rigorous mechanism for analysis of narrative data. It can be used to identify the purposes or tendencies of an individual, groups, or organizations; resolve the psychological or

Table 2
Methodological considerations.

Activity	Description	Actions taken
Getting started	The first phase of the study involves the selection of a suitable case to study, the crafting of instruments and protocols, and entering the field [26,29]. This phase is concerned with the demands of the study and obtaining access to suitable research sites and individual participants [29,71].	• The NPM was selected as a case because it provided a suitable unifying environment in which to conduct the research in terms of access, infrastructure, quality of data and potential to obtain a rich data set. In addition, the NPN was a "known sponsor" that facilitated issues of access, response and credibility [71]. • Human ethical protocols were developed to obtain permission to conduct the research. Transcription protocols were also developed at this stage. • Arrangements for data collection were made with the NPM to procure an effective study causing minimal disruption to the NPM.
Data collection	Crafting and administration of data collection instrument based on the research questions guiding the study [29].	• Development of an online questionnaire (see Appendix A) covering the areas to be explored. The questions needed to be concrete, well-delimited and very clear [29] • Testing of the questionnaire via cognitive walkthroughs. The aim of this activity was to reduce the ambiguity of questions by asking volunteers to explain the meaning of each question (rather than responding to the question). • An electronic online standardized interview [1] provided uniform stimulus to respondents, thus increasing the comparability of responses. • Administration of the online questionnaire was random; the NPM survey system automatically assigned each participant to a group.
Data analysis	Data analysis involves the processes of classifying (coding), sorting and interpreting the collected data [29,33,34,63]	• All data were entered in a computer assisted qualitative data analysis system (CAQDAS). The software was used only to help with the data administration and analysis process [33]; all data were coded and analyzed manually by the researchers. • An iterative protocol for analysis was established. One researcher (the coder) coded the responses, and a second researcher provided quality assurance by assessing the coding outcomes. Divergent views were then discussed to reach consensus on interpretation of the data. • The coding followed a process of conceptual densification [34]. Open coding techniques borrowed from grounded theory were used to name and categorize the collected data or incidents. Coded incidents were then compared, sorted and related. (see Fig. 1) • Connected the valuable data and information to the study's two research questions and generate the second level concept map (see Fig. 2) • Interpreted the findings by comparing and contrasting the viewpoints of the participants (see the left-hand sides of Figs. 3 and 4)
Closure	Closure is reached when researchers have exhausted all analysis and the emerging conceptualization explains the investigated phenomena [26,34]. In reaching closure a broad range of literature is consulted to increase the confidence in the findings [26]	• Consulted the extant literature from diverse disciplines to identify supporting theory (see the right-hand side of Figs. 3 and 4) and also potential conflicts which could challenge the internal validity of the study, as advised by Eisenhardt [26]. • Generated the research reports and devised a publication plan to communicate the findings.

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emotional status of individuals or groups; describe behavioral and/or attitudinal responses; and provide steps for conceptual analysis [5]. This study combined the formal procedures of Rossman and Rallis [79] with suitable guidelines for analyzing data of Eisenhardt [26], and Glaser and Strauss [34]. Following Sarker and Sarker's [80] approach, Table 2 summarizes the main activities of the study and the corresponding key methodological considerations of this research.

Qualitative research demands a multi-layered approach to data analysis and interpretation that goes beyond the impressionistic reading of text [33]. The validity of content analysis depends on the validity that emerges from considering the analysis itself and how it is conducted within a sense-making process that includes several measures to enhance the internal validity of the findings [34,85]. To increase the reliability of the qualitative analysis, an independent multi-person and multi-level coding strategy was adopted. The first author, who has both theoretical sensitivity and professional knowledge on web enjoyment experiences and website design, performed the coding, following techniques of open-coding and sorting [34]. The data was manually coded with ATLAS.ti, a qualitative data analysis software; no automated feature was used, but rather the entire evidence was analyzed on-screen by the coder, assigning labels to particular instances in the text. On completion of each coding iteration, the second author, who has expertise on qualitative analysis and grounded theory method, acted as a quality assurer (QA). The role of the QA was to check the coded data for consistency and integrity and to discuss any emerging issue with the coder. This activity was designed as a mechanism to reach consensus and to decide on further data analysis steps. The same quality assurance procedure applied to more advanced stages of analysis. For example, during the sorting stage the coder produced conceptual maps to guide the discussions with the QA, as shown in the next section. The constant interplay of data analysis and discussion sessions enhanced the quality of the coding and reduced the influence of personal bias on the data analyzed (as assertions in coding and sorting needed to be supported by evidence and agreed between the coder and the QA). The following sections provide a more detailed account.

3.2.1. Phase 1: first and second level content analysis

Initially the text was coded and organized into manageable categories that presented relevant and meaningful information. This phase contains the key steps mentioned in the previous paragraph. Fig. 1 presents the initial conceptual map of the relationships among the research ideas, categories, and key words that resulted from the analyses of all 1045 narrative responses (615 for design features and 430 for design guidelines). The key words were selected by considering the two research questions (RQ1 and RQ2). Words related to the key words were also chosen, for example, synonyms, and nouns, verbs, adjectives, adverbs, singulars and plurals with similar meanings. Based on these key words, seven categories were generated by analyzing the relationships among key words and the original interview data. A category is a word or phrase that describes an explicit segment of the data [79]. The major categories relating to the central idea of an enjoyable learning experience are the following: emotional descriptions, functions, designing concepts, techniques, learning subjects, learning concepts, and learning materials.

Further analysis was then performed by reviewing, comparing, and contrasting the viewpoints of the participants, as expressed in the first level map in Fig. 1, against the substance of the two research questions. This process led to a second level conceptual map (see Fig. 2).

3.2.2. Phase 2: focused analysis of enjoyable learning characteristics

The aim of Phase 2 was to integrate key concepts emerging from Phase 1 with the relevant literature—this work was necessary to provide a solid theoretical foundation to the inducted concepts, and to enable further theorizing. The focus of the analysis was on categories pertaining to RQ1 (represented on the left-hand side of Fig. 2). Accordingly, the extant literature was explored in relation to the following: (i) new functions and innovative learning materials, (ii) coherence of design concepts and learning resources, (iii) unenforced learning state, and (iv) helpful information and extension. As a result of this focused analysis and integration, the initial categories of RQ1 were transformed to the following: (i) novelty, (ii) harmonization, (iii) no time

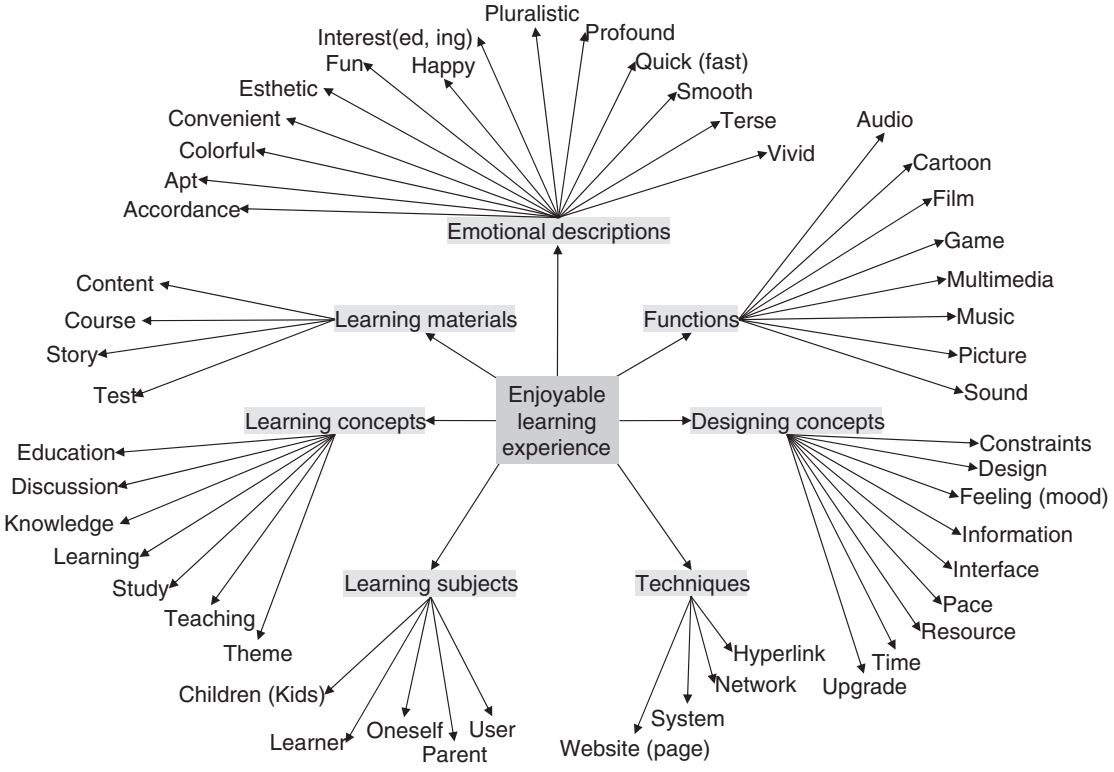

Fig. 1. First level concept map.

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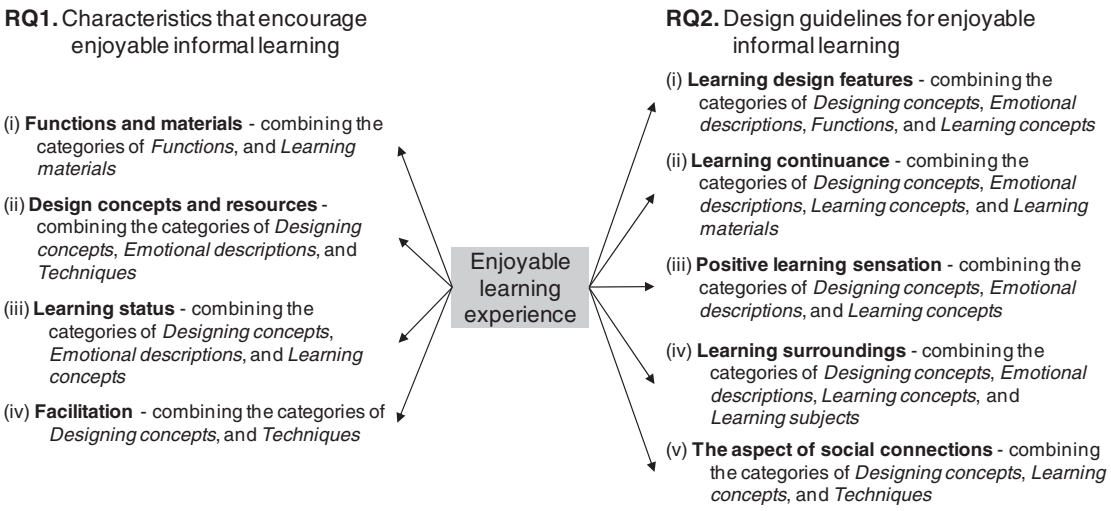

Fig. 2. Second level concept map.

constraint, and (iv) appropriate facilitations and associations. Fig. 3 shows the relevant literature as it relates to emerging categories.

3.2.3. Phase 3: focused analysis of design guidelines

This phase was similar in aim to the previous phase. However, the focus was on concepts pertaining to RQ2 (see right-hand side of Fig. 2). Hence, the analyzed five categories emerging from Phase 1 were (i) visual, auditory and kinesthetic design features; (ii) increasing involvement and possession; (iii) designing for positive feeling; (iv) providing emotion-driven learning surroundings; and (v) developing connections and interaction between learners. After integrating each category with the extant literature, five categories of design guidelines for online learning for enjoyment were identified: (i) design multisensory learning experiences, (ii) create a storyline, (iii) assist mood building, (iv) introduce fun into learning, and (v) establish social interaction (see the right-hand side of Fig. 4). The results for the content analysis represented in Figs. 3 and 4 are expanded upon in the following section.

4. Findings

This section discusses the main findings in relation to the two research questions. The first sub-section focuses on the characteristics that provide for enjoyable online learning and the second sub-section reflects on design guidelines for developing websites which support enjoyable informal learning.

4.1. Characteristics that encourage enjoyable informal learning

The described three levels of content analysis revealed four characteristics of websites that encourage enjoyable online learning experiences: novelty, harmonization, no time constraint, and appropriate facilitations and associations. These characteristics are explained next.

(1) Novelty: Creating enjoyable learning experiences requires an effort in the provision of novel elements that can be a memorable and motivational factor with potential for long-term impact. The majority of the participants expressed a desire for enjoyable online

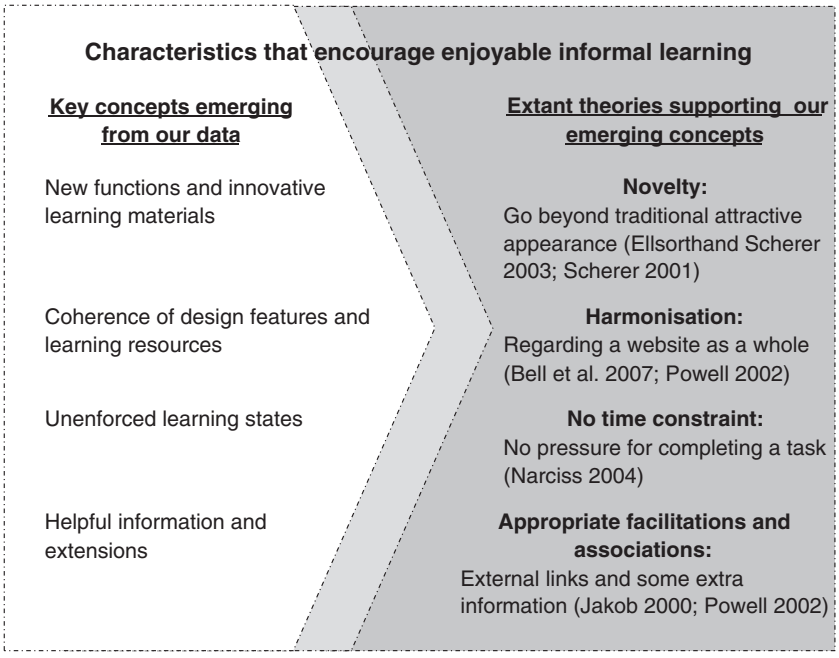

Fig. 3. The advanced content analysis process for RQ1.

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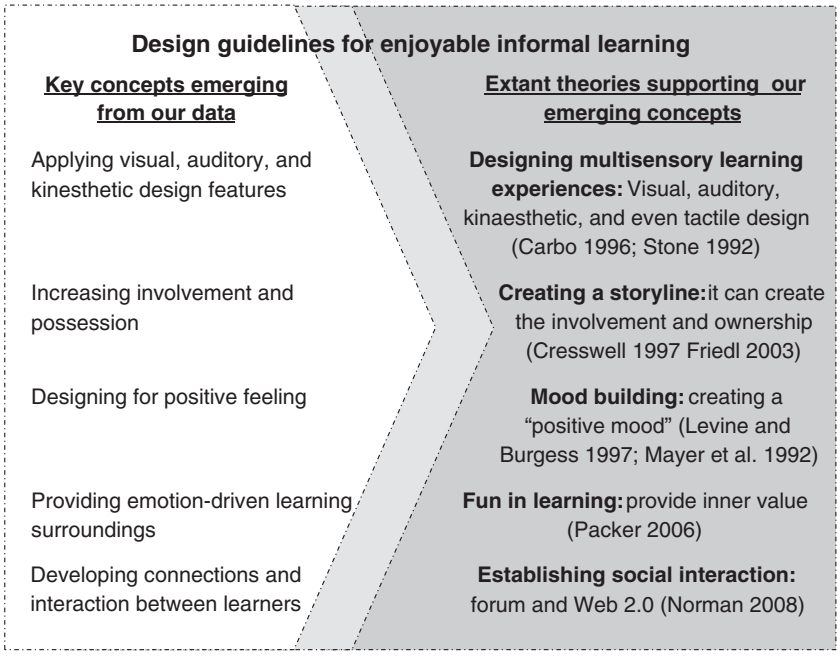

Fig. 4. The advanced content analysis process for RQ2.

learning websites that could draw their attention by providing new content, new functions and new interfaces frequently. Participants wanted the website "to provide novel learning materials" (Participant 304290370) and "to renew the website content frequently" (Participant 305050945). Some responses added an anticipatory element to the website renewal, saying that the "information provided should be timely and meet the potential needs" (Participant 305010679). These opinions go beyond traditional requests for attractive appearance, since an attractive appearance chiefly influences the first-time experience when engaging with a website. This finding is congruent with studies in psychology that indicate that a novel stimulus is able to engage and draw human attention and, moreover, able to elicit and affect human thinking and decision making (e.g., to decide whether further processing and possibly adaptive action are required or whether to continue or persist with the current learning activity) [27,82].

(2) Harmonization: Participants stated that the coherence of design functions can promote enjoyable online learning experiences. In their view, websites should "clearly dispose the page layouts and choose coherent colors. This can make the texts to be legible and key words to be conspicuous. It is also necessary to consider the aesthetic design at the same time" (Participant 305050991) and "pictures and texts should be concordant and well disposed. To enrich the page layouts by using colors properly" (Participant 105030782). They appreciated a website as a whole, requiring all of the functions and interfaces to be coherent and harmonized. The data also show that users wanted website functions to be easy to use and also in harmony with an appropriate learning content—as a respondent stated, "the interface should be easy to operate and the layout appearance should also be pleasing and conformable" (Participant 104300401). Failure to have harmonization between these two elements led them to perceive the website as having lower value. Thus, a "good website" needs to show coherence between valuable learning content, ease of use and a visual design that is appropriate to the learning objective. Failing to provide these elements could negatively affect the participants' willingness to continue using the website. The finding supports human–computer interaction work that identifies harmonization as a crucial design concept [3,74].

(3) No time constraint: Some traditional online lessons set up time constraints for learners. However, some participants expressed the view that learning materials provided by the informal online learning website should not have this function, that they should be able to "access and browse the website at anytime anywhere" (Participant 305050928) and also that "the learning processes could be terminated at any time" (Participant 105140898). This finding contrasted with the educational literature, which advocates forcing learners to spend a fixed amount of time to solve as many tasks as possible [64]. Furthermore, evidence from this study suggests that most visitors to an informal online learning website are primarily motivated by intrinsic desires rather than extrinsic pressures for learning. The online informal learners do not want to feel rushed or restricted when completing a task; on the contrary, they want to be in control of the time spent in the activity, preferring time-unconstrained online environments.

(4) Appropriate facilitations and associations: External links and some extra information could help online users to "connect with other professional websites," (Participant 104280092). The museums are expected "to offer links which provide similar learning topics" (Participant 104290352) and "to provide guidelines or directions for further learning resources" (Participant 105140897). Thus, the participants indicated their desire to learn well and to be in control of their learning experience by being able to extend their enquiries via external links and extra associations as a channel for obtaining more informative materials. Some thought that these extensions offer the ability to increase their breadth of knowledge because they can visit other relevant and useful websites. Similarly, the literature shows that each link might represent a door beyond online users' expectations and lead them to explore more [74]. More discoveries mean more rewards for their learning processes because they feel that the online learning website provides additional helpful associations. These associations must also be in harmony with the website.

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4.2. Design guidelines for online learning for enjoyment

The three levels of content analysis also led to a number of practical guidelines for designing enjoyable learning experiences:

(1) Multisensory learning experiences: Many participants recommended using combined characteristics of visual, auditory, kinesthetic, and even tactile design for delivering enjoyable online learning materials. For example, participants suggested several website features, such as "to provide asides to guide the online reading process—similar to using the self-served audio guidance devices while visiting a museum" (Participant 305010522), "to demonstrate the learning content by using some tactile/touchable devices" (Participant 305151419), and "to provide 3D animations and stereoscopic pictures" (Participant 104290289). Some participants suggested that the online learning materials could be organized to focus on enhancing the entertainment aspects in the virtual learning environment. The formal education literature also shows the advantages of multisensory learning experiences for encouraging learning outcomes [11,88]. This study extends these findings' perspective to informal online learning.

(2) Creating a storyline: A number of participants advocated the need "to develop learning content that uses a story-telling style" (Participant 305010601). The online users thought a storyline was ideal because it could create involvement and ownership. Storylines should also "set up check points to promote each step of learning" (Participant 305151419) and "provide the narrative-style content (do not express the learning content straightforwardly)" (Participant 105150909). Some participants believed that if the learning materials contained a good storyline, they would visit a learning website frequently. A storyline might be suited for establishing relationships between the online users and an organization because the more users visit the website, the more connections will be established. This idea is congruent with "Online Game Interactivity Theory" [31]. A storyline has also been indicated as a positive step to counteract some negative learning consequences [18], such as less involvement or discontinuance.

(3) Mood building: The participants' narratives revealed that creating a "positive mood" can promote enjoyable learning experiences and, at the same time, increase the online learning outcomes. The visitors stated that "the learning content should be cheerful and vivacious. It should not be too solemn or serious" (Participant 105010576); some participants even suggesting certain features to achieve this goal, for example "to provide some emotion-driven background music" (Participant 105010579) and "the learning content should be communicative and inspiring" (Participant 105020700). According to some participants being in a good mood has learning consequences because "to be in a positive mood, helps me to memorize more things" (Participant 105290053). This finding aligns with prior studies showing that mood can affect a person's judgment, inferences, and predictions [50,69]. Moreover, individuals in a positive mood tend both to store and to retrieve more information [8,98], which in the museum context could be perceived as a mood enhancing outcome; thus creating a positive reinforcing loop or virtuous circle.

(4) Fun in learning: Most participants regarded the concept of fun in learning as a vital guideline for the design of enjoyable online learning. Participants expected websites "to make people feel happy when engaging the learning process" (Participant 305020745). They wanted websites to provide personal value for amusement as well as satisfying their specific learning needs, stating that websites need "to provide vivid and interesting learning content" (Participant 305010525), which may need "to add some gimmicks and use creativity for designing the learning content" (Participant 304300478). These participants provided examples of how to achieve this aim, e.g., provide a rich sensory experience that uses novelty, surprise, fascination and the freedom to explore. Evidence from this study is consistent with prior educational studies about learning for fun (see [70]) and it is also consistent with the characteristics that encourage enjoyable informal learning, as reported in Section 4.1.

(5) Establishing social interaction: The concepts of a forum and Web 2.0 social networks were also suggested as desirable from the participants' perspectives. Many participants wanted websites to enable "users to share and discuss their learning experiences with each other" (Participant 305010636), to "allow users to upload learning materials designed by themselves" (Participant 104290352), and to "establish diverse learning communities" (Participant 105030780). Some participants believed that the use of virtual forums or communities is beneficial for their online learning. Such facility allows them to learn from and share knowledge with other people having similar interests. Typical examples are blogs and virtual discussion rooms that assist knowledge sharing among participants. This finding is also supported by prior work: "Individuals are experiencing a greater sense of social presence while managing their identities, forming meaningful and romantic relationships online, extending spheres of influences, and generating a sense of belonging and meaningfulness" [67, p.301]. This is consistent with the enjoyment experience because online users can experience positive affect and can obtain fulfillment through social interaction.

5. Discussion

This study found a number of characteristics that are related to the enjoyable online learning experiences. In this section we compare this study's findings with prior work. First we compare with the expert viewpoints reported in Lin and Gregor [52]. Several aspects can be compared and contrasted to Lin and Gregor's [52] results. First, since learning can be considered as a long-term activity, the design features should elicit and affect decision making and human thinking for continuance [27,82]. Although a good visual design, such as esthetic appeal and attractive appearance, is considered important by the end users, an online learning website should also add new content, new functions, and new interfaces, especially for informal online learning and enjoyment purposes. Second, ease of use, usefulness, and interactivity have become the fundamental design concepts for enjoyable online learning. Yet end users can benefit only when the characteristics of good interaction [16], trouble-free navigation, flexible accessibility [39], and compelling learning structure all work coherently. Therefore, the findings of "novelty" and "harmonization" in this study have gone beyond traditional design concepts and have more focus on experiential features.

Third, both end users and experts think about "relaxation" as a vital characteristic for creating informal online learning with enjoyment experiences. Both studies found that the design should be user-centered

Table 3
Characteristics that encourage enjoyable informal learning.

Current study	Lin and Gregor [52]
(1) Novelty	Partially relevant to (i)
(2) Harmonization	Partially relevant to (i), (ii), (iii), and (iv)
(3) No time constraint	Partially relevant to (v)
(4) Proper facilitations and associations	Partially relevant to (iv) and (vi)

Note: The findings of Lin and Gregor [52]: (i) appearance; (ii) interactivity; (iii) ease of use; (iv) accessibility; (v) simplicity (relaxing and short tasks); (vi) partnerships.

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Table 4
Guidelines for designing learning with web enjoyment experiences.

Current study	Lin and Gregor [52]
(1) Designing multisensory learning experiences	Partially relevant to (i)
(2) Creating a storyline	Partially relevant to (ii)
(3) Mood building	Non-relevant
(4) Fun in learning	Non-relevant
(5) Establishing social interaction	Partially relevant to (v)

Note: The findings of Lin and Gregor [52]: (i) adopt multimedia and interactive technologies; (ii) consider the characteristics of self-directed learning; (iii) have qualified staff and adequate financial support; (iv) consider the targeted audience; (v) make the information more shareable.

and leisure-based. Although experts concentrated more on the characteristics of simplicity and short tasks [52], end users in this study focused more on the aspects of stress-free and frustration-free design. Lastly, the experts thought that collaboration with schools and industries would encourage potential users to access their learning materials. The end users, on the other hand, placed more value on useful hyperlinks and external resources, which are more content-driven. Table 3 lists both studies' major findings and indicates the partial relationships between the current study's findings and those of Lin and Gregor [52].

The five guidelines for designing online learning for enjoyment from the perspective of the end users can also be compared with the experts' viewpoints in Lin and Gregor [52]. In contrast with the experts, the end users did not provide many opinions to support the ideas of self-directed learning and considering audience's levels [52]. These development guidelines were based on the viewpoints of systems providers and resource suppliers, and are consistent with the expert educational literature [49,59]. From the perspective of end users, the development guidelines are more practical and comprehensive. The concepts of stickiness [31], creating a storyline [18] and establishing social interactions [67] are revealed as essential design goals for informal online learning with enjoyment experiences. Furthermore, the fulfillment of leisure needs, such as mood building and fun in learning, has been added to strengthen the design guidelines. Table 4 lists both studies' major findings and indicates the partial relationships between the current study's findings and those of Lin and Gregor [52].

We now relate findings from this study to prior conceptual work on enjoyment. Prior studies have proposed that the concept of enjoyment necessarily involves three sub-dimensions: Engagement, Positive Affect, and Fulfillment [53,96]. The web enjoyment experience contains several distinct characteristics and must be treated as a complex phenomenon [53]. While the findings of this study are congruent with these theories, it is necessary to compare and integrate the findings against the dimensions of enjoyment reported in Lin et al. [53]. Table 5 presents how the theoretical constructs from Lin et al. [53] are linked to the design characteristics and guidelines elicited in this study.

6. Conclusion

This section presents important conclusions from the research findings and addresses the implications of the research for theory and practice. Research limitations and future research directions are also noted.

The investigation reported in this paper shows the nature of web enjoyment experiences from the perspective of online end users. Based on these participants' views, the study provides insights into the key factors affecting website design. It identifies four new features for encouraging enjoyable online learning, and proposes five design guidelines for developing websites for enjoyable online learning in an informal environment.

This article has two key implications for theory. The study rests on an argument that the enjoyment experience has unique characteristics that distinguish it in important ways from the traditional website design features of usefulness, ease-of-use, and user acceptance [7]. Prior quantitative studies in the higher education realm and in the applied psychology sphere showed that enjoyment can be a positive intrinsic motivation [6,72]. Enjoyment experiences can be an enhancement of creative activities and might also carry further positive effects on extrinsic motivation: they could facilitate aiming beyond the current task to tackle the next new one [72]. However, prior studies do not provide clear guidance on how to embed the web enjoyment experience into website design. The results of this study provide concrete support of means of stimulating and eliciting this complex and multi-dimensional emotion, showing that characteristics such as novelty, harmonization, no time constraint, and proper facilitations and associations are required.

Second, the design guidelines for designing multisensory learning experiences, creating a storyline, mood building, fun in learning, and establishing social interaction, have extended knowledge from the formal learning realm to the informal online learning aspect.

This study is also significant because it redresses the previous failure of the website design literature to take into account alternative benefits from emotional experiences (i.e., [74]).

This study has shown the need to go beyond the traditional concerns for technology use and functionality. In doing so, this study recognizes that positive emotions have profitable value [7], and that positive emotional experiences may result in web usage eventually contributing to utilitarian outcomes [4]. Researchers in website design should further explore the role and impact of positive emotions, seeking to connect the functionality and usability to positive emotional experiences that can produce better advantages for providing a positive and stimulating online environment.

This study makes a significant contribution to practice by providing directions for organizations and web designers who aim to encourage

Table 5
Connections between research findings and the enjoyment experience.

		Dimensions of enjoyment (Lin et al. 2008)		
Research questions	The findings	Engagement (including engrossed, absorbed, focused, concentrated)	Positive affect (including happy, pleased, satisfied, contented)	Fulfillment (including meaning a lot, rewarding, useful, worthwhile)
RQ1. What characteristics of a website encourage enjoyable online learning?	(1) Novelty	✓	✓	
	(2) Harmonization	✓	✓	
	(3) No time constraint	✓	✓	
	(4) Appropriate facilitations and associations		✓	✓
RQ2. What design guidelines lead to websites that support enjoyable online learning experiences?	(1) Designing multisensory learning experiences	✓	✓	✓
	(2) Creating a storyline	✓	✓	
	(3) Mood building		✓	✓
	(4) Fun in learning	✓	✓	✓
	(5) Establishing social interaction		✓	✓

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and support informal online learning. The study has explicitly identified web characteristics and design guidelines that lead to positive emotions such as enjoyment during a web experience and that can thus add to learning outcomes for web users. The characteristics that designers should endeavor to embed in websites for informal learning are the following: novelty, in terms of continuous change to stimuli; harmonization that links both form and content of the design; unconstrained time for engagement; and links to other resources of value. Important design guidelines for practice are the following: build involvement through a storyline, promote a positive mood for users, make the learning opportunity fun, and provide mechanisms for social interaction. The directions that are provided by the study for practice are important because they arose from a study of what users think and across a large sample of users. As discussed, these directions differ to some extent from what the literature and theory says from the expert designers' point of view.

As with any study, a number of limitations should be acknowledged when interpreting the results. First, all three studied web sections dealt with Chinese fine art, painting, and calligraphy, a topic which may not have been interesting to some participants, although their participation was voluntary. Second, most of the participants were subscribers to the NPM e-newsletter and may not necessarily be representative of the general public. Third, this study took the website end users' views, focusing on the users' needs and their perceptions of web enjoyment experience. Fourth, from the research design aspect, studies undertaken to produce new knowledge need to reflect reality and to be certifiable and reliable [58]. Although this study was conducted within an operational museum website, there may be a gap between the current research results and the broader real-world phenomenon, due to national or cultural differences. Thus, further studies are needed to extend the generalizability of this study to different contexts and different countries.

This study has contributed to bridging a substantial research gap in emotional experiences, informal online learning, and website design knowledge. The study has used a large data set and rigorous qualitative analysis to show what real-world users think is needed for enjoyable online experiences, such as novelty, harmonization, no time constraints and proper facilitations and associations. Among the more novel insights are that users suggest strong storylines, mood building, fun in learning and social interactions are important design guidelines for informal learning environments.

Acknowledgements

Special thanks to the National Palace Museum, Taiwan, for providing the web sections.

Appendix A. The online questionnaire—user's perspective section

A STUDY OF WEBSITE USAGE

1. In your opinion, how important are the following website features for online learning:

(Please indicate the level of importance of the following statements by clicking the appropriate❍.)

	Extremely Unimportant	Not Important	Neutral	Important	Extremely Important
(1) Attractive appearance	❍	❍	❍	❍	❍
(2) Easy to use and find your way around	❍	❍	❍	❍	❍
(3) Opportunities to interact	❍	❍	❍	❍	❍
(4) Accessible to people anywhere at any time	❍	❍	❍	❍	❍
(5) Short, simple learning tasks	❍	❍	❍	❍	❍
(6) Free access	❍	❍	❍	❍	❍
(7) Provide appropriate feedback (e.g. correct answers for learning questions)	❍	❍	❍	❍	❍

Please suggest other website features that you feel are important for learning.

(8) _____

(9) _____

(10) _____

(11) _____

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2. Imagine that you are designing a website that has to be both educational and enjoyable. In your opinion, how important is it to follow the following guidelines:

(Please indicate the level of importance of the following statements by clicking the appropriate ❍.)

	Extremely Unimportant	Not Important	Neutral	Important	Extremely Important
(1) Use interactive media (e.g. graphics, audio, video, animation)	❍	❍	❍	❍	❍
(2) The learning materials can be run on many different types of computers	❍	❍	❍	❍	❍
(3) Let visitors explore what interests them	❍	❍	❍	❍	❍
(4) Cater for any limitations of the visitors (e.g. new web users, expert web users, disabl ed web users)	❍	❍	❍	❍	❍

Please suggest other guidelines that you feel are important for designing an enjoyable educational Website.

(5) _____

(6) _____

(7) _____

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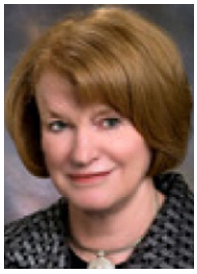
Please cite this article as: A.C.H. Lin, et al., Understanding web enjoyment experiences and informal learning: A study in a museum context, Decis. Support Syst. (2012), doi:10.1016/j.dss.2012.05.020



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Please cite this article as: A.C.H. Lin, et al., Understanding web enjoyment experiences and informal learning: A study in a museum context, Decis. Support Syst. (2012), doi:10.1016/j.dss.2012.05.020