2008

The Hedonic Experience of Enjoyment and Its Relationship to Informal Learning: A Study of Museum Websites

Aleck C. H. Lin
Australian National University, aleck.lin@mail.ndhu.edu.tw

Shirley Gregor
Australian National University, shirley.gregor@anu.edu.au

Jessica C.C. Huang
National Palace Museum, jessica@npm.gov.tw

THE HEDONIC EXPERIENCE OF ENJOYMENT AND ITS RELATIONSHIP TO INFORMAL LEARNING: A STUDY OF MUSEUM WEBSITES

Les relations entre l'expérience hédoniste et l'apprentissage informel: une étude des sites web de musées

Completed Research Paper

Aleck C. H. Lin
Australian National University
Canberra, ACT, 0200, Australia
Aleck.Lin@anu.edu.au

Shirley Gregor
Australian National University
Canberra, ACT, 0200, Australia
Shirley.Gregor@anu.edu.au

Jessica C. C. Huang
National Palace Museum
Shih-Lin, Taipei, 111, Taiwan
Jessica@npm.gov.tw

Abstract

Online hedonic experiences are increasingly of interest in both research and practice. In particular, it has been proposed that 'traditional usability approaches are too limited and must be extended to encompass enjoyment' (Blythe and Wright 2003, p.xvi). The aim of this study was to investigate the relationships among: (i) website design features; (ii) user's experience of enjoyment; and (iii) informal learning such as that occurring with a museum website. A cross-over experimental design was employed with web pages from the National Palace Museum, Taiwan. Results indicated that, as expected, a multimedia game-based 'lesson' led to both more enjoyment and more learning than a text-based 'lesson'. With text-based pages more enjoyment also meant more learning. The situation was complicated, however, with the game-based pages, as results were not in the expected direction. The study points to the need for more research in this complex area.

Keywords: Enjoyment, Engagement, Positive Affect, Fulfilment, Online Learning, Website Design

Résumé

L'objectif de cet article est d'étudier les relations entre : 1) les caractéristiques liées au design des sites Web, 2) l'expérience hédoniste des utilisateurs et 3) l'apprentissage informel en ligne. Pour ce faire, un plan expérimental mixte est mis en œuvre en utilisant des pages Web du musée national du palais de Taïwan.

摘要

本研究探討非正式線上學習網站設計與使用者愉悅經驗的關聯性。相關文獻顯示傳統的可用性網頁設計概念已太狹隘，新式的網頁設計理念必須考量如何增進使用者的愉悅經驗。本研究之目的希冀透過深入解析，協助博物館設計可提供愉悅學習經驗的網站。並藉由對台灣國立故宮博物院網頁進行的交叉式實驗設計分析，實證所提出的理論。

Introduction

Several recent studies have drawn attention to the importance of hedonic outcomes of website usage (see Treiblmaier and Pinterits 2007). The effects of hedonic experiences with websites have been linked to important goals of website design: for example the flow experience and the associated 'stickiness' that encourages return visits (Chen 2007, Nevo and Wade 2007). However, a number of hedonic concepts are not well defined in the extant literature and there is confusion among related concepts: for example, amongst flow, playfulness, and enjoyment (Mathwick and Rigdon 2004).

The aim of this study was to examine one hedonic experience, namely *enjoyment*, and its link to a non-utilitarian outcome, namely *informal online learning*, in the context of museum websites. The study has practical significance with the increasing use of websites by museums (MDMA 2008). A museum is a permanent institution serving society with the mission of providing *study*, *education*, and *enjoyment* for the general public (ICOM 2008). The educational mission of museums is in part achieved by enabling informal learning, where there is not necessarily any extrinsic motivator for learning and, rather, the visitors to a museum's website are motivated by intrinsic personal desires, including enjoyment.

The paper has theoretical significance as the work treating enjoyment as a hedonic web experience is sparse. Although some relevant work appears in the literature on flow, pleasure, happiness, and playfulness (Pace 2004, Telfer 1980, Webster and Martocchio 1992), these concepts differ from enjoyment in subtle ways. Further, there is almost a complete dearth of research relating enjoyment to online informal learning. Prior studies that have investigated enjoyment with websites have suffered from using instruments that have not been based on a careful delineation of the concept of enjoyment and its discrimination from other closely-related concepts. The current study benefits from the use of a validated instrument developed specifically to assess enjoyment (Lin et al. 2008).

The paper proceeds as follows. First, the concept of enjoyment is explored in some depth. The justification for relating enjoyment to online learning is then provided and the hypotheses for the study are advanced. The experiment performed and the results observed are then discussed.

Conceptual Background

The current study concentrates on two focal concepts, namely *enjoyment* and *informal learning,* in the context of the museum web environment, and the linkage between these concepts, which is referred to as '*learning-for-enjoyment*' (online learning that is not part of a formal instructional undertaking).

Enjoyment

The notion of enjoyment might seem commonplace, yet it is not easy to arrive at a precise and generally agreed upon meaning. Philosophers, psychologists, and physiologists have created a large body of literature relating to 'enjoyment', but definitions vary. Studies in human-computer interaction (HCI) have treated enjoyment as the extent to which the using of computer is perceived to be enjoyable in its own right (Davis et al. 1992). It has also been argued that an enjoyable user-technology interaction arises from the interaction between challenge and the development of skills (Brandtzeg et al. 2003). There has, however, been little effort devoted to delineating the enjoyment construct precisely. A number of studies in information systems (IS) have employed 'Perceived Enjoyment' scales to assess computer users' hedonic experiences. Some of these studies, however, treat "enjoyment" as a synonym for fun, pleasure or excitement (Van der Heijden 2004, Venkatesh 2000).

Here, we argue that the enjoyment experience contains several distinct characteristics that other hedonic experiences do not. Enjoyment is defined as a certain harmony between three elements: the activity or experience itself; the concepts you believe apply to the activity or experience; and a certain desire in which the same concepts figure (Warner, 1980). The concept of enjoyment necessarily involves three sub-dimensions: *Engagement*, *Positive Affect*, and *Fulfilment*. For a person to enjoy an activity, she/he has to: (i) **engage** in the activity and focus on it with high levels of attention; (ii) have a **positive affect** that could be designated by feelings of satisfaction, contentment, or similar emotions; and (iii) have **fulfilment** of needs or desires through the activity, although these needs may not be previously realised consciously. Table 1 shows how these three different sub-dimensions of enjoyment can be distinguished in definitions that occur in the literature.

Table 1. Definitions of Enjoyment Illustrating its Dimensions			
Dimensions	**Description**	**Study**	**Discipline**
Engagement	'……*enjoyment is confined to what we ourselves are engaged in*' (p.326).	White (1964)	Philosophy
	'…*toward some actual object for what it is in itself, which object is a present doing, undergoing, or experiencing on the part of the subject or is something which is intimately connected with a present doing, undergoing, or experience on his part*' (p.214).	Perry (1967)	Philosophy
	'*enjoyment refers to the extent to which the activity of using the computer……*' (p.1113).	Davis et al. (1992)	HCI
	'……*an enjoyable user-technology interaction depends on the interaction effect of challenge and the development of skills,……*' (p.62).	Brandtzeg et al. (2003)	HCI
Positive Affect	'*To enjoy or to derive enjoyment from a thing in a dispositional sense is to have a tendency to have this attitude toward it*' (p.214).	Perry (1967)	Philosophy
	'*positive affective response to the sport experience that reflects generalised feelings such as pleasure, liking, and fun*' (pp.202-203).	Scanlan and Lewthwaite (1986)	Physiology
	'*enjoyment refers to the extent to which the activity of using the computer is perceived to be enjoyable in it's own right……*' (p.1113).	Davis et al. (1992)	HCI
Fulfilment	'*enjoyment is completely different from a joyful feeling effected by the satisfaction of natural impulses or needs*' (p.56).	Beck (1945)	Psychology
	'…*enjoyment is not in the mere satisfaction of a choice formed voluntarily, but in the yielding to involuntary inclination*' (p.435).	Swinburne (1985)	Philosophy
	'*Enjoyable events occur when a person has not only met some prior expectation or satisfied a need or a desire but also gone beyond what he or she has been programmed to do and achieved something unexpected, perhaps something even unimagined before*' (p.46).	Csikszentmihalyi (1990)	Psychology
	'*The concept of demands is understood as the degree of variation and challenge experienced by users of technology, and is also an important aspect of enjoyment*' (p.56).	Brandtzeg et al. (2003)	HCI

Flow, Pleasure, Happiness, and Playfulness

Before proceeding to the investigation of online learning-for-enjoyment, it is wise to consider what enjoyment is not. *Flow*, *Pleasure*, *Happiness* and *Playfulness* are related constructs, but they are different from enjoyment. *Flow* is defined as a state 'in which people are so involved in an activity that nothing else seems to matter; the experiences itself is so enjoyable that people will do it even at great cost, for sheer sake of doing it' (Csikszentmihalyi 1990, p.4). Flow is a more constrained concept than enjoyment. Pace (2004) employed a grounded theory method to explore the flow experiences of web users engaged in information-seeking activities. He showed that curiosity and interest are two vital elements affecting online flow experiences. Flow could be regarded as a very extreme form of enjoyment, where absorption is so deep that a person can lose a sense of time and external surroundings (Pace 2004). Enjoyment, on the other hand, is broader because we can engage in things without being in flow (e.g. watching a movie). Although there has been a good deal of work on flow, it has not been previously clearly distinguished from the concept of enjoyment.

While the constructs of *pleasure* and *happiness* are also related to enjoyment, there are further subtle differences. Enjoyment can be distinguished from pleasure by the scope of the object: one can be pleased by external occurrences, yet one's enjoyment is generally focused on activities that one engages in (Telfer 1980). In contrast to the concept of pleasure, happiness is a broader concept and is 'an attitude to one's life as a whole, so any one thing which can be described as done *for the sake of happiness* must be sufficiently wide-ranging to affect one's life as a whole' (Telfer 1980, p.31). Happiness can be described as some level of success, good fortune, good luck, or prosperity (Perry, 1967). Happiness also refers to life-as-a-whole, which is 'the degree to which an individual judges the overall quality of his life-as-a-whole favourably' (Veenhoven, 1984, p.22). Further, *playfulness* refers to extrinsic experiences more than intrinsic cognition (Webster and Martocchio 1992). Play is regarded as neither the reasonable result of a plan, nor out of the person's control (Millar 1976). Compared with enjoyment, individuals might find well-being and positive affect in a playful activity, but not mental fulfilment. We can enjoy many things that are not 'play'. Hence, the current study proposes that the notion of enjoyment needs to be constrained in a way in which the concepts of flow, pleasure, and happiness are not. Enjoyment can only be said to arise while one engages in an activity; where something is done to one; or where one experiences something in the sense of watching, listening to, or feeling it or in the sense of having it.

The museum context and informal learning

The '.museum (dot-museum)' is a new communication channel through which museums can extend access to their most valued cultural and scientific treasures via the Internet (MDMA 2008). Some museums have transformed their domain name to dot-museum, such as the British Museum in United Kingdom (the.british.museum), the National

Palace Museum in Taiwan (npm.museum), and the Getty Museum in Los Angeles (getty.museum). However, '(museum) research into computer-based informal learning is rare, particularly for studies focusing on web-based informal learning' (Schaller et al. 2005). Compared with universities and schools, museums are not formal education institutions. There is no formal lecture and examination. Learning on a museum website does not lead to any degrees or certification. It is also different from organisational training for employees, which targets increasing organisational benefits. Museum online learners are not necessarily responsible for what they have learned. In terms of these exceptional conditions, museum websites offer an opportunity to study a particular type of online learning, referred to as *learning-for-enjoyment*.

A handful of museum studies have investigated the phenomenon of enjoyable online learning. Di Blas and Poggi (2006) observed the effects of two 3D game-based online learning programs, *Learning@Europe* and *Stori@Lombardia*, which were designed for cultural heritage and education. They found that students felt fulfilled in going through these programs, and, moreover, participants in *Learning@Europe* were motivated to learn by the goals of the game (Di Blas and Poggi 2006). It was held that traditional learning methods, using text and images, would not always create an enjoyable learning experience, as they lacked interactivity and visual attraction.

Learning-for-enjoyment

The question remains: *Is enjoyment associated with learning*? Answering this question indicates that the relationship between learning and enjoyment is circular and bi-directional. Learning can be a factor leading to enjoyment and further an enjoyable learning experience can mean more learning.

To show that learning can lead to enjoyment, it is essential to consider the second and third sub-dimensions of enjoyment, which include the idea that an enjoyable activity meets a person's needs or fulfils some desire. The idea of meeting needs leads to the theories of human motivation. There are various theories of human motivation; one of the best-known being Maslow's hierarchy of human needs (Maslow 1987). The current study makes use of a later work by Ford (1992), which integrates a number of other theories. Ford (1992) categorised human goals as: (i) affective goals; (ii) cognitive goals; (iii) subjective organization goals; (iv) self-assertive social relationship goals; (v) integrative social relationship goals; and (vi) task goals. Two fundamental characteristics of these human goals are that they represent consequences to be achieved and they direct the attention of the person to achieving those consequences. The first three categories represent within-person goals and the last three categories represent goals associated with people and their environments (Ford 1992).
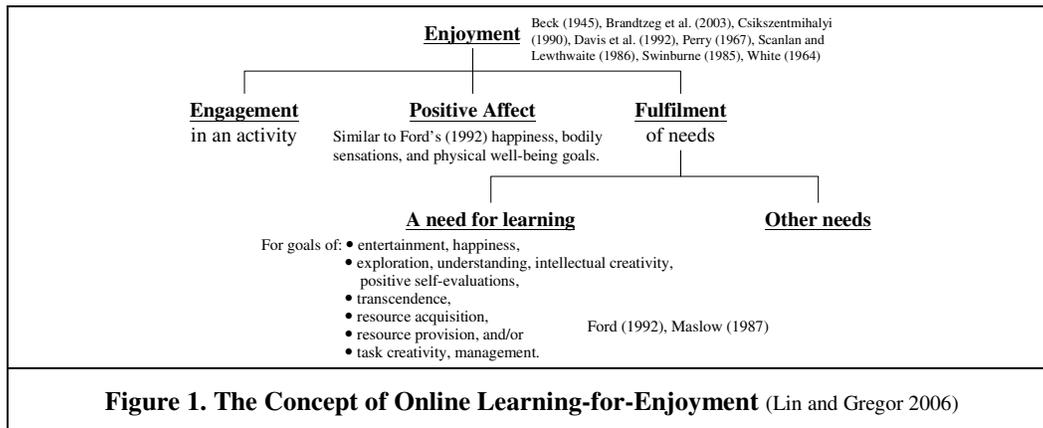
Figure 1. The Concept of Online Learning-for-Enjoyment (Lin and Gregor 2006)

Figure 1 shows relationships between enjoyment and human goals, including learning. The third dimension of enjoyment, *fulfilment,* occurs when some needs are satisfied, one of which could be learning. When a person has a need for learning, whether by formal or informal means, the learning activity itself leads to feelings of fulfilment. The second dimension of the enjoyment experience is *positive affect*. It includes the notions of contentment, gladness, and good feelings which can break through the limits of homeostasis. This dimension corresponds to the affective goals of happiness, bodily sensations, and physical well-being in Ford's taxonomy of human needs. In summary, enjoyment can be associated with learning, but it needs to be accompanied by positive affect.

Extending this argument further, it can be argued that the experience of enjoyment when learning will in turn lead to higher levels of learning. The enjoyment outcome will be self-reinforcing, leading to further engagement, more goal

fulfilment through more learning and so on. This argument finds support in the educational literature, where positive re-enforcement (a pleasurable outcome) is held to more effective than negative re-enforcement (non-enjoyable outcomes) (Noell et al. 2000).

Other types of learning are not 'learning-for-enjoyment'. These types of learning are extrinsically motivated, for instance, when learning is forced or undertaken for material gain. However, visitors to museum websites are likely to have intrinsic rather than extrinsic motives for learning. In this context, making the learning experience enjoyable is exceedingly important. Surprisingly, even though website design has been studied for decades, the goal of explicitly designing an online learning website for enjoyment, especially in the museum sphere, has been relatively unexplored.

Research Model and Hypotheses

Figure 2 presents the research model for the current study. The model shows that the design rationale of a 'learning' website will influence both learning outcomes and the level of enjoyment for visitors to the site. The design rationales contrasted are for a game-based 'lesson' versus a text-based 'lesson'. Further, the level of enjoyment of an individual exposed to the 'lessons' will be reflected in how much informal learning they acquire. Further support for the individual hypotheses follows. As the research model represents, the current study focuses on the '**online learning outcome**'. The influence in the reverse direction of the learning activities on enjoyment experiences was not explored in this study.

Figure 2. The Research Model for Online Learning-for-Enjoyment
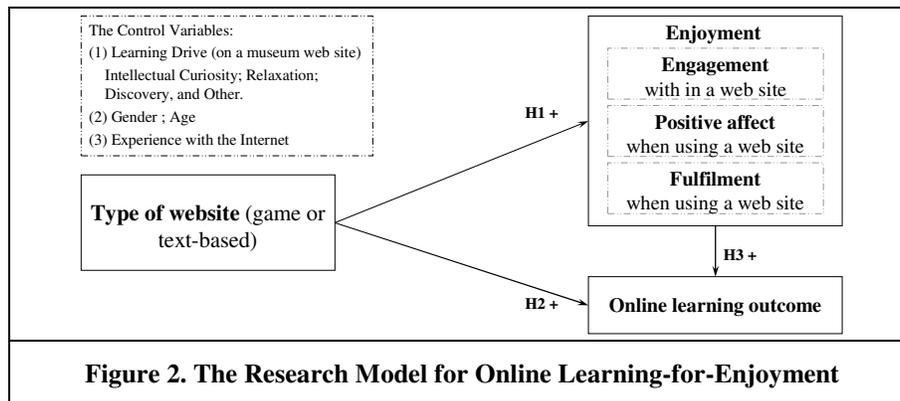
Does a game-based website result in higher levels of enjoyment?

The literature suggests that online and video games both engage and retain users' concentration on tasks (Steinkuehler 2004). Multimedia-interactive applications allow users to interact with the system and enjoy attractive content (Bailey et al. 2001). 'Animation, video, and other design features can really develop a whole sense of engagement with the website' (Benyon et al. 2005, p.72). It is vital to consider the sensations felt by participants, especially the participants' goals, because a designed experience should consider intention, involvement, and individual participation (Heeter 2000). However, it is also acknowledged that too much multimedia and interactivity is not a good thing, because a poor interactive interface might cause extra unnecessary interactions and navigation (Heeter 2000). The first hypothesis links game-based learning design features with online enjoyment experiences:

> **H1:** *A GAME-BASED website will result in users experiencing higher levels of enjoyment than with a TEXT-BASED website.*

Does a game-based website improve learning outcomes?

A small number of studies have considered that online game-based programs offered by museums might help users to learn complex information (Di Blas and Poggi 2006). Studies focused on online game-based learning have shown that game-based learning can be rewarding in many aspects, such as student learning and understanding, and teaching effectiveness (Dickey 2006, Gestwicki 2007). A well designed multimedia-interactive learning system, which contains the features of usefulness and ease-of-use, can impact the self-efficacy of online learning (Cheung et al. 2003). However, research subjects in these previous studies were school students. It is still unclear whether game-based online learning is suitable for museums and the general public. Nor do we know how the features of

engagement, positive affect, and fulfilment are embedded in a game-based learning system. The second hypothesis links a game-based design with learning outcomes on a museum online learning website:

> **H2:** *A GAME-BASED website will result in users experiencing improved learning outcomes than with a TEXT-BASED website.*

Is a higher level of enjoyment linked to more learning?

Very few studies provide practical principles for museums to design multimedia and interactive websites with the goal of providing an enjoyable learning experience. An exception is Iverson (2004), who recommends five features for successful online learning: (i) be enjoyable and engaging, (ii) be positive and supportive, (iii) be active, (iv) be collaborative, and (v) provide context. Traditional mono-mechanism website features, such as verbal descriptions, plain image displays, or one-way audio broadcast, are too restrictive and are less likely to lead to enjoyment. The future online learning environment needs to incorporate new types of website features, such as multimedia and game-based functions. The literature indicates that students' enjoyment of a course can influence their learning (Blunsdon et al. 2003). This line of thought leads to the third hypothesis.

> **H3:** *A higher level of enjoyment is linked to more learning.*

In sum, enjoyment can be related to informal learning. More enjoyment can lead to more learning and more learning can mean more enjoyment. The complex and bi-directional nature between enjoyment and learning is acknowledged. In this study, however, the direction of the relationship studied is from enjoyment to learning.

Method

This section describes the two target websites and participants in the study, the cross-over design experiment, the development of online learning questions, and the enjoyment instrument.

Target websites and participants

To establish comparable materials, the experimental vehicle (web pages) was selected from the same theme site named 'The Beauty of Chun Ware' with related content. It is developed by The National Palace Museum, Taiwan (NPM). This theme site has been awarded a 'golden' educational prize in Taiwan. Two experimental conditions were provided by the selected theme site: a game-based lesson and a text-based lesson.

The game-based lesson, the 'Virtual Kiln', included multimedia and interactive components. This lesson had two sub-sections: the *Hoof-Shaped Kiln* and the *Twin Fire Room*. Participants visit the Hoof-Shaped Kiln first, which uses animated cartoon-style graphics to teach participants about the basic procedures for making Chun Ware. After successfully completing the manufacturing steps, participants are guided to the Twin Fire Room. Participants can learn how to control temperature to produce Chun Ware. The activities and interactive procedures are more complex than those in Hoof-Shaped Kiln. If participants do not read the operational instructions carefully, they cannot easily obtain successful results in this section.

The text-based lesson, 'Introduction to Chun Ware', includes four sub-sections: (i) *Introduction to Chun Ware,* describing Chun Ware and the origin of the Chun kilns; (ii) *The Birthplace of Chun Ware,* summarizing the discovery of the Chun kilns and excavated objects; (iii) *The Magic of Chun Glaze,* describing the mysterious colours of Chun Ware, its unique worm tracks, and its appearance under a microscope; and (iv) *The Mysterious Numbers,* discussing Chun Ware numbers. The NPM ceramic research team has spent over a decade discovering, collecting, and interpreting information on Chun Ware. The text-based web pages summarise their research results with one or two paragraphs for each sub-section. The pages help users understand and learn the material in a short period.

Participation in this study was voluntary and anonymous. The sample population was drawn from undergraduate and postgraduate students in Commerce and Information Systems programs. After response-bias elimination and data screening, 57 valid paired-sample data sets were obtained. Analysis showed that the participants excluded by the data screening did not differ markedly in terms of demographics from those included in the final sample. Students were regarded as suitable surrogates for museum website users in general, as they should not differ in any important attribute from the population of museum website visitors.

Task-driven cross-over design experiment

The participants of this study were divided into two groups, following a cross-over experimental design approach (Ratkowsky et al. 1993). It is acknowledged that when two or more treatments are applied in a research experiment, residual effects might occur because some influences carry over from one treatment to the next (Pigeon and Raghavarao 1987). The literature suggests applying a '*Latin square cross-over design*' to balance residual effects and the variance from residual effects because 'the incidence matrices for treatment versus carryover' (Ratkowsky et al. 1993, p.172). With a Latin square design, each treatment can be processed equally. Cross-over design experiments have been used in many science research domains, such as biometrics (Oman and Seiden 1988) and mathematics (Williams and John 2007). However, they are less common in the social science and information systems spheres.

Table 2 details the 2 x 2 Latin square cross-over design in this research. Participants in Group 1 were instructed to visit the text-based lesson first. When finishing the reading, participants completed the first enjoyment instrument and the five learning questions for the text-based lesson. The group then moved on to the game-based web pages. After visiting the game-based lesson, they completed the second enjoyment instrument and the five learning questions for the game-based lesson. Group 2 followed the same process, but visited the game-based lesson first, then the text-based lesson.

Table 2. The Cross-Over Design Experiment												
Procedures / Groups	**FIRST** Visiting ➜	**Fill out the FIRST part of the questionnaire** ➜	**SECOND** Visiting ➜	**Fill out the SECOND part of the questionnaire**	**Valid Paired-Sample Data Sets**	**Gender**			**Age**				
						F	M	Missing	<20	21~30	31~40	41~50	51~60
Group 1	Text-Based Web Pages	Fill out the enjoyment instrument and five learning questions for the text-based lesson	Game-Based Web Pages	Fill out the enjoyment instrument and five learning questions for the game-based lesson	34	15	18	1	4	27	2	0	0
Group 2	Game-Based Web Pages	Fill out the enjoyment instrument and five learning questions for the game-based lesson	Text-Based Web Pages	Fill out the enjoyment instrument and five learning questions for the text-based lesson	23	11	12	0	6	15	2	0	0
				Total	57	26	30	1	10	42	4	0	1

Independent variable – the instrument for measuring online enjoyment experiences

The instrument to assess enjoyment was developed and validated in a comprehensive and rigorous process following the approaches outlined by Churchill (1979) and Smith et al. (1996). Further details are given in (Lin et al. 2008). Table 3 outlines the 12 items in the instrument, against the three sub-dimensions *engagement*, *positive affect*, and *fulfilment*. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were employed to develop this instrument, based on the approaches of Lewis et al. (2005). Six measurement properties (content validity, factorial validity, reliability, convergent validity, discriminant validity, and nomological validity) were assessed and indicated the instrument had both construct reliability and validity.

Ghani and Deshpande (1994) used four features to explore levels of user engagement and focused attention when using a personal computer: (i) deeply engrossed in activity; (ii) absorbed intensely in activity; (iii) attention focused on activity; and (iv) concentrates fully on activity. Many studies have used them to measure concentration on the task at hand (Novak et al. 2000, Shin 2006). The current study also used these four features for evaluating user engagement and focused attention experiences on a web site. Havlena and Holbrook (1986) extracted four of the six characteristics to evaluate consumers' emotional behaviour: happy, pleased/annoyed, satisfied, and contented/melancholic. Novak et al. (2000) used these four characteristics to measure the positive affect of online customer experiences. Discussions on need fulfilment date back to the physical, psychological, and social themes of Maslow (1987), Ford (1992), and others. However, there are very few studies illustrating how to measure the fulfilment construct of enjoyment experience. This study employs four aspects for measuring the fulfilment sensation in enjoyment experiences: (i) meaning a lot; (ii)

rewarding; (iii) useful; and (iv) worthwhile. These were based on the enjoyment definitions found in the literature (Back, 1945; Brandtzeg et al., 2003; Csikszentmihalyi, 1990; Swinburne, 1985) and on the advice of an expert review panel comprised of ten academic colleagues.

Table 3. The Website Enjoyment Instrument (Lin et al. 2008)		
Dimensions	**Variables**	**Enjoyment Items**
Engagement	Enga1 Enga2 Enga3 Enga4	While visiting the web pages,	I was deeply engaged. I was absorbed intently. my attention was focused. I concentrated fully.
Positive Affect	Aff1 Aff2 Aff3 Aff4	While visiting the web pages, I felt:	Happy. Pleased. Satisfied. Contented.
Fulfilment	Nee1 Nee2 Nee3 Nee4	Visiting the web pages was:	Fulfilling. Rewarding. Useful. Worthwhile.
Scales: Seven-point Likert scales, scale values from strongly agree to strongly disagree		

Dependent variable – the online learning questions

The learning questions to assess a participant's online learning experiences were based on Bloom's (1963) Educational Objectives. The current study used two levels of educational objectives: *knowledge* and *comprehension* (Bloom 1963). These two educational objectives were used to develop five questions for each lesson. An expert panel of four academics and five PhD candidates pre-tested the 10 questions. Each of the five learning questions covered the whole lesson, from beginning to end. This means that participants had to take the whole lesson to be able to answer all the questions. Table 4 shows the questions.

Table 4. The Online Learning Questions		
Question / Lesson	**Questions**	**Bloom's Objectives**
Learning Questions for **GAME-BASED** Lesson	**G-Q1:** In the Hoof-shaped Kiln section, how many general processes should a kiln master know?	[K] [C]
	G-Q2: In the Hoof-shaped Kiln, what is the first process to make a Chun Ware?	[K]
	G-Q3: In the Hoof-shaped Kiln, what is the last process to make a Chun Ware?	[K]
	G-Q4: In the Twin Fire Room section, during the biscuit firing process, the temperature should be maintained between which degrees in phrase 2?	[K]
	G-Q5: In the Twin Fire Room section, during the glaze application process, the temperature should be maintained between which degrees in phrase 2?	[K]
Learning Questions for **TEXT-BASED** Lesson	**T-Q1:** Chun Ware was produced between which centuries A.D.?	[K]
	T-Q2: Which two categories can the Chun samples be roughly divided into?	[K]
	T-Q3: Which colour is not the major colour of Chun glaze?	[K] [C]
	T-Q4: Which symbol refers to a pattern found on some Chun Ware which resembles the tracks left by that creature?	[K]
	T-Q5: Which number is not found on the underside of the Chun Ware?	[K] [C]

[K]: *Knowledge* describes learner recall of previous learning information;
[C]: *Comprehension* describes learner understanding of the information presented (Bloom, 1963).

Parallel questionnaires must have the same measure to produce the same or similar results (Cooper and Schindler 2005). This leads the study to two issues in developing these learning questions. First, the five questions for each lesson should achieve the two levels of Bloom's learning objectives. Bloom's (1963) learning objective taxonomy represents a cumulative hierarchy, 'mastery of each simple category was prerequisite to mastery of the next more complex one' (Krathwohl 2002, p.212). That is, the first level of the learning objective has to be satisfied before the next one can occur. Second, the question design must consider the different complexity and functions of each selected lesson. The game-based lesson is more complex than the text-based lesson because it contains many interactive processes. Participants in the game-based lesson have to consider the learning scenarios and make decisions to move forward. Four teaching experts were invited to independently re-examine and identify which level of Bloom's learning objectives each question assessed. Their judgments were taken into account in developing the learning questions (see Table 4). This demonstrates that, at a micro level, the level of the learning-question set is slightly higher for the text-based lesson than the game-based learning-question set. However the game-based lesson is more complex. In sum, there is expected to be no intrinsic difference in difficulty between the two sets of learning questions.

The study also included several control variables: gender, age, intellectual curiosity, relaxation, discovery, and experience with the Internet. None of the control variables were included in the final analysis as preliminary analysis indicated they were unrelated to the dependent variables.

Data Analysis

Preliminary analyses were conducted to screen data sets and test for response bias. Paired-sample t tests were employed to investigate the within-subject effects of online enjoyment experiences and learning outcomes. Subsequently, two linear regression models were constructed using Structure Equation Modeling (SEM) to explore the within-subject relationship between online enjoyment and learning experiences. Further details follow.

Preliminary analysis

This study originally obtained 61 raw paired-sample data sets. Three stages of data screening were performed to screen these 61 data sets: removing incomplete and missing data, indicating the outliers, and exposing and excluding the extreme data sets. Fifty-seven [57] valid paired-sample data sets finally took part in the study. The *Kolmogorov-Smirnov Test* was used to evaluate the sample distributions and the results indicated normal distributions (Norusis 2003). A one-way ANOVA was used to investigate whether there were any distinct order effects in the cross-over design experiment. As all of the p-values (Sig., .05 level, 2-tailed) of the tested variables are higher than .05, no significant order effect was indicated.

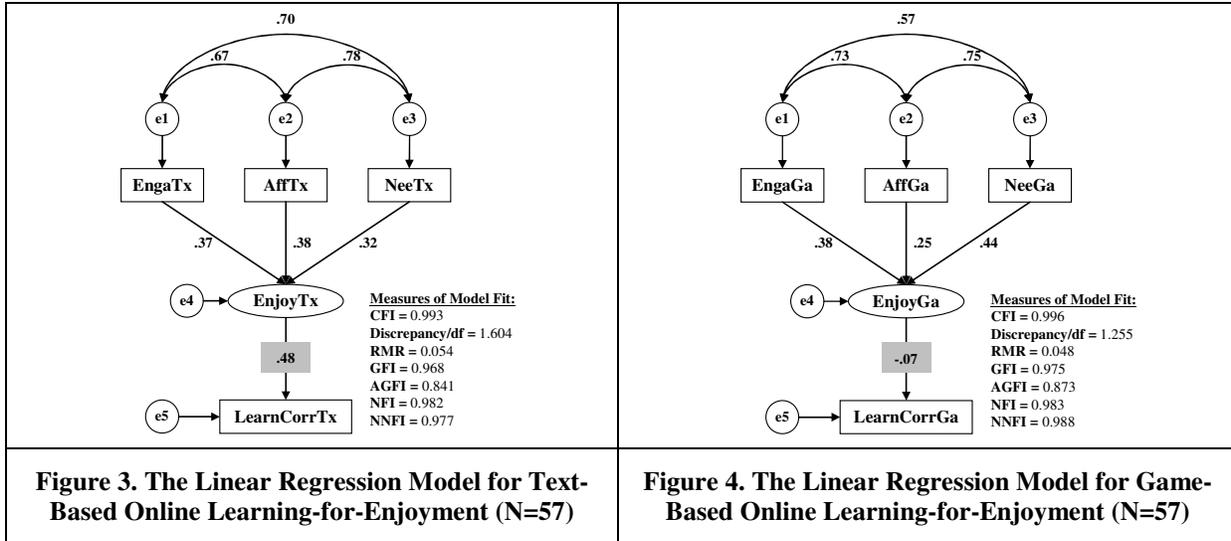### *Paired-samples t test for H1 and H2*

The paired-samples t test was used because it can discover any differences between the responses of enjoyment and learning experiences from the two different website visits. Table 5 compares the participants' scores from visiting the game-based web pages and the text-based web pages. It is conspicuous that all of the p-values (Sig., .05 level, 2-tailed) are significant at the .000 level, indicating that after visiting the game-based web pages, participants' enjoyment experiences and online learning outcomes were higher than after visiting the text-based web pages. In sum, the hypotheses H1 and H2 are supported.

Table 5. The Comparison of Enjoyment Experience and Learning Scores						
Variables	**The Game-Based Web Pages** (N=57)		**The Text-Based Web Pages** (N=57)		**Paired-Sample T-Statistic**	**Sig. (.05 level, 2-tailed)**
	Mean	Std Dev	Mean	Std Dev		
Engagement (7 points Likert scale)	5.68	0.786	4.26	1.397	7.317	**.000**
Positive Affect (7 points Likert scale)	5.56	0.997	4.48	1.254	5.582	**.000**
Fulfilment (7 points Likert scale)	5.28	1.085	4.59	1.156	4.130	**.000**
Enjoyment (average of Engagement, Positive Affect, and Fulfilment)	5.50	0.852	4.44	1.142	6.646	**.000**
Learning Score (5 questions)	3.46	1.255	2.18	1.537	4.695	**.000**

SEM linear regression models for H3

Two SEM linear regression models were constructed to investigate whether there was a linear relationship between the enjoyment experience and online learning outcomes. SPSS AMOS 16 was employed for the analysis. The current study realises that a form of path analysis (Hair et al., 1998) could be performed in place of the analysis that are reported in this paper (e.g. using LISREL or PLS). However, on balance, the "Conventional SEM Linear Regression" was performed because the research design was a traditional experimental design predicting a single observed variable as a linear combination of the other observed variable with three dimensions (Arbuckle 2005).

For the online text-based learning condition (Figure 3), the regression weight from the enjoyment experience (EnjoyTx) to the online learning outcome (LearnCorrTx) was 0.48, significant at the .000 level, showing that when the enjoyment experience was higher, the learning outcome was also increased. However, for the game-based learning condition (Figure 4), the regression weight from the enjoyment experience (EnjoyGa) to the online learning outcome (LearnCorrGa) was -0.07, meaning that when the enjoyment experience was higher, the learning outcome decreased. This is an interesting finding, which is reported in the subsequent section.

Figure 3. The Linear Regression Model for Text-Based Online Learning-for-Enjoyment (N=57)

Figure 4. The Linear Regression Model for Game-Based Online Learning-for-Enjoyment (N=57)

The measures of model fit, as Comparative Fit Index (CFI), Discrepancy/df, Root Mean Square Residuals (RMR), Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Normed Fit Index (NFI), and Non-Normed Fit Index (NNFI) (Byrne 2006, Lewis et al. 2005), all indicate that the two models are appropriate (See 'Model Fit' in Figure 3 and Figure 4).

Examination of the correlation matrixes shows that all the variables for the text-based web pages are correlated with each other (Table 6), indicating that enjoyment (EnjoyTx) and its three sub-dimensions have significant positive relationship with online learning outcomes (LearnCorrTx). However, in Table 7, participants' game-based enjoyment experiences, including all of its sub-dimensions, are not correlated with the online learning outcomes (LearnCorrGa), congruent with the SEM analysis.

Table 6. The Correlation Matrix for Text-Based Online Learning-for-Enjoyment (N=57)						**Table 7. The Correlation Matrix for Game-Based Online Learning-for-Enjoyment (N=57)**					
	EngaTx	AffTx	NeeTx	EnjoyTx	LearnCorrTx		EngaGa	AffGa	NeeGa	EnjoyGa	LearnCorrGa
EngaTx	1.000					EngaGa	1.000				
AffTx	.672**	1.000				AffGa	.729**	1.000			
NeeTx	.702**	.782**	1.000			NeeGa	.575**	.752**	1.000		
EnjoyTx	.855**	.885**	.883**	1.000		EnjoyGa	.814**	.856**	.845**	1.000	
LearnCorrTx	.432**	.363**	.484**	.439**	1.000	LearnCorrGa	.003	-.043	-.191	-.069	1.000
**. Correlation is significant at the 0.01 level (2-tailed).						**. Correlation is significant at the 0.01 level (2-tailed).					

In summary, the results indicate that a positive relationship between enjoyment and online learning experiences is indicated in some circumstances.

Discussion

This section discusses the research results in relation to the hypotheses and the research model in Figure 2, and addresses some limitations of this study. The results provide significant support for the hypotheses **H1** and **H2**. However, **H3** is not fully supported.

Reflecting on the hypotheses

(1) H1: Does a GAME-BASED website result in users experiencing higher levels of enjoyment?

The findings suggest that, in general, the online user enjoyment experience is better facilitated by game-based web pages than text-based web pages. According to the paired-samples t test (see Table 5), users had more enjoyment experiences with the game-based web pages than the text-based web pages, regardless of the sub-dimension of enjoyment considered.

In other words, game-based online learning features attract more attention, provide more positive experiences, fulfill more desires, and create more online enjoyment experiences than traditional text-based web pages.

(2) H2: Does a GAME-BASED website result in users experiencing improved learning outcomes?

The findings also indicate that, in general, the online user learning experience is more affected by game-based web pages than text-based web pages (see Table 5). On average, participants scored 3.46 correct answers to the five learning questions in the game-based lesson. In contrast, participants only scored an average of 2.18 correct answers for the text-based lesson. This finding is consistent with previous literature that suggests museum online game-based functions can help users to learn some complex information (Di Blas and Poggi 2006). The findings also suggest that museums could adopt appropriate multimedia and interactive features in their online learning websites in order to disseminate knowledge and achieve their educational mission.

(3) H3: Is a higher level of enjoyment linked to more learning?

It is acknowledged that different learning activities can lead to different degrees of enjoyment. However, this study concentrates on the enjoyment and learning outcomes of the online user on different types of websites. Literature from different disciplines suggests that learning arises from enjoyment because learning satisfies a number of human needs (Ford 1992, Maslow 1987) and enjoyment in turn leads to more engagement and more learning. In this study, the SEM regression model demonstrated that online learning was related to the enjoyment experience only for the text-based web pages. However, this study did not find a significant linear relationship between enjoyment and online learning for the game-based pages.

This unexpected result is interesting and indicates that the relationship between learning and enjoyment may be more complex than anticipated. There are several possible explanations for the finding. First, the game-based pages may have provided a degree of difficulty which was too high for some participants. 73.7% of participants successfully passed through the Hoof-Shaped Kiln section, which demonstrated the five basic steps for making Chun Ware. Participants simply had to drag each graph into the appropriate position. No specific computer game techniques were required and time was not restricted. In contrast, only 45.6% of participants successfully passed through the second phase, the Twin Fire Room section, which was a true game-based program. It required several computer game techniques and was difficult for a participant with no (or limited) computer game experience. Moreover, this sub-section had a time limit, which made it difficult to complete if one had poor motor coordination. Several studies had shown that game-based learning can be rewarding in student learning and teaching effectiveness (Dickey 2006, Gestwicki 2007). However, there is still some resistance to the idea of game-based learning (Zühal 2003). The procedures for interacting with the Twin Fire Room section were complex in terms of multimedia design (Powell 2002). The results suggest that a game-based program will not always be enjoyable.

The results of this study overall are interesting. The situation is that the game-based lesson led to higher levels of learning and enjoyment overall. On an individual basis, however, the participants who enjoyed it more were not necessarily those who learned more. Table 7 shows that only the Engagement sub-dimension of enjoyment was positively correlated (although not significantly) with learning for the games pages. It could be that some participants engaged in the game quite fully, and were people with retentive memories who were then able to answer learning questions well. However, they did not 'enjoy' the game because they were not very good at it nor just were not 'game-type' people. Table 5 and Table 7 give some support to this explanation. In Table 5, the game-based pages' 'engagement' (5.68) was higher than 'positive affect' (5.56) and 'fulfilment' (5.28). The opposite is in the text-based pages (engagement=4.26 is lower than positive affect=4.48 and fulfilment=4.59). In Table 7, only engagement (EngaGa) has a slightly positive relationship with the online learning outcomes (LearnCorrGa). The other two dimensions, positive affect (AffGa) and fulfilment (NeeGa), were negatively correlated to the game-based online learning outcomes (LearnCorrGa). Considering both Table 5 and Table 7, there is the suggestion that with the game-based site, a participant could be 'engaged', but not necessarily experiencing 'fulfilment' or 'positive affect', as supported by Zühal (2003). The game-based learning anomaly was unexpected and is worthy of future study in future research.

Limitations of the research

Several limitations are acknowledged. First, it is acknowledged that online learning activity could also affect user enjoyment experiences in the reverse direction. This study did not test the bi-directional relationship between online learning and enjoyment experiences. It focused on whether enjoyment experiences affected online learning outcomes while accessing different types of websites. Second, a relatively small student sample was used. The

current study only analysed 57 observations; increasing this sample size could help make the analysis more effective by increasing power (Meyers et al. 2006). Third, from the aspect of experimental design, experiments undertaken to produce new knowledge need to satisfy two basic criteria: (i) reflect reality and (ii) be certifiable and reliable (Mason 1989, p.4). There may be a gap between the current research results and the real-world phenomenon investigated because participants only visited two sets of museum web pages.

Fourth, from the aspect of data collection procedures, (i) the learning questions across treatment groups may not be exactly comparable, even though Bloom's (1963) taxonomy was used and every care was taken to ensure they were equivalent; (ii) the two selected web pages were from Chinese fine art, a topic which may not have been interesting to some participants; and (iii) the game-based lesson chosen possibly were not suitable for all participants because some were not interested in computer games. Other types of websites might be more appropriate for testing the relationships between enjoyment and online learning experiences. Fifth, there may be yet undiscovered dimensions of the enjoyment experience. As Csikszentmihalyi's (1990) flow study suggests that the flow experience contains eight general dimensions. There might be some undistinguished factors in the enjoyment construct, especially when this philosophical and psychological concept encounters the new computer era.

A subsequent field study with other types of websites with the same enjoyment instrument has added further evidence in support of online learning-for-enjoyment, although full description of the study is beyond the scope of this paper. Details of the study can be found in (Lin, 2008). Appendix A gives an outline of results.

Conclusion

This section concludes the research findings and addresses the implications of the research for theory and practice. Future research directions are also addressed.

The current study was a laboratory study designed to investigate the relationships between enjoyment experiences and online learning. The aim was to provide insights that would help museums design websites for online learning-for-enjoyment. The research began with a novel theoretical model, based on the broad themes of enjoyment, human motivation theory, and multimedia and interactive website design theory. The findings of this study are: (i) online users obtain a higher enjoyment experience with a game-based website than a text-based website; (ii) online users also obtain higher learning outcomes with a game-based website than a text-based website; and (iii) a higher level of enjoyment experience is related to improved learning outcomes, but only under some conditions.

Implications of the research for theory

This research has three key implications for theory. First, web design features can influence online users' enjoyment experiences. Previous HCI studies have indicated that enjoyment is an important characteristic for designing websites and delivering information (Blythe et al. 2003). The current study shows how an enjoyment experience has unique characteristics that distinguish it from the traditional website design features of usefulness, ease-of-use, and user acceptance (Blythe and Wright 2003) in important ways. Moreover, there are three conceptual features vital to website design for enjoyment: *engagement*, *positive affect*, and *fulfilment*. The study indicated that multimedia and interactive functions can lead to a higher degree of enjoyment experience than traditional plain text features. This is a novel finding contributing to HCI web design theory.

Second, web design features can influence online user learning outcomes, especially for learning that is not part of a formal instructional undertaking. Some HCI studies have described the experience of developing multimedia game-based learning systems (Dickey 2006, Gestwicki 2007), but they are more concerned with formal online learning for schools or workplaces. Literature has also pointed out that many new media allow individuals to interact with instruments, learning materials, data, environments, simulations, visualisations, and media clips (Heeter 2000). The results of the current study are congruent with these theories, albeit in the context of learning-for-enjoyment. This study also found that poor interface usability could affect user online learning experiences. The multimedia and interactive features in the online game-based lesson appeared to have 'poor interface usability'; that is, they were too complex. This indicates that a complex learning interface might limit online user learning tasks, especially on museum websites.

According to Iverson (2004), successful e-learning has five characteristics, it is: (i) enjoyable and engaging, with interesting and attractive programs and materials that motivate online users; (ii) positive and supportive, with a positive, relaxed, and stimulating environment; (iii) active, allowing users to construct their own knowledge and

understanding; (iv) collaborative, with learning communities and users that support each other; and (v) contextual, linking online users to the real world. In terms of the current study, Iverson's (2004) positive and contextual characteristics arise from valuable and useful online learning museum content. Multimedia technologies can create enjoyable, engaging, and active characteristics. Interactive functions are supportive, collaborative, and active. Thus, multimedia and interactive online learning is an ideal strategy for museums.

Third, the current study establishes a link between enjoyment and online learning. The concepts of learning and enjoyment can be related analytically through the second and third dimensions of the enjoyment experience: positive *affect* and *fulfilment*. When a person establishes a goal to learn, whether by formal or informal means, the learning activity itself creates some kind of fulfilment. The current study maps online user learning goals to Ford's (1992) taxonomy of human needs (goals). Online learning-for-enjoyment corresponds to the affective goals of happiness, bodily sensations, and physical well-being. In sum, enjoyment can be derived from learning, as learning satisfies a number of human needs, but it needs to be learning that is accompanied by positive affect. In turn, more enjoyment leads to further engagement and more learning. Very few studies offer concepts or strategies for designing websites that have a primary goal of providing enjoyable learning experiences. The current study has helped to fill this gap.

Implications of the research for practice

The findings of the current study offer practical guidance to museums. First, well designed online game-based learning features attract more attention and provide more positive experiences than traditional online text-based features. Multimedia game-based features seem to increase online user enjoyment. It is important to consider the new concept of user enjoyment experience when developing an online learning website for the general public. Second, appropriate multimedia game-based features could assist museums to disseminate knowledge and achieve their educational mission.

The current study also has implications for organisations offering e-learning programs for their staff. Enjoyable websites could help staff learn more and faster. And, more knowledgeable staff contributes to an organisation's success. This study will help website designers re-consider user engagement, sensation, and reaction and generate new design ideas. It will also assist website managers to re-think information offering approaches and plan future website modifications.

Directions for further research

There may be yet undiscovered dimensions of the enjoyment experience. Csikszentmihalyi's (1990) flow study suggests that the flow experience contains eight general dimensions. There might be some undistinguished factors in the enjoyment construct, especially when this philosophical and psychological concept encounters the new computer eras. In addition, learning activities might lead to some degree of enjoyment. The current study mostly concentrates on investigating online user enjoyment experiences and learning achievements while accessing different types of websites. Future research could consider how to develop a sequence of learning activities to encourage online users to learn more and enjoy more, especially when online learning is not part of a formal undertaking.

The current study assumed that the concept of online learning-for-enjoyment would be appropriate for diverse online users with different backgrounds and various educational levels. The web pages selected for this study were about Chinese fine art. But, museums vary enormously. Ambrose and Paine (1994, p.7) have listed just a few: geology, archaeology, science, art, military, history, industrial, ethnography, and natural history. These different types of museum have created different types of online learning materials. Future research could compare various types of museum and other online learning websites.

References

Ambrose, T. and Paine, C. *Museum Basic*, Routledge, UK, 1994.

Arbuckle, J. L. *AMOS 6.0 User's Guide*, SPSS/Erlbaum, 2005.

Bailey, P., Konstan, A., and Carlis, V. "Designing Multimedia Applications with Interactive Storyboards", in *Proceedings of the 9th ACM International Conference on Multimedia*, Ottawa, Canada, 2001, pp. 241-250.

Beck, M. "The Cognitive Character of Aesthetic Enjoyment", *The Journal of Aesthetics and Art Criticism* (3:11/12), 1945, pp. 55-61.

Benyon, D., Turner, P., and Turner, S. *Designing Interactive Systems: People Activities, Contexts, Technologies*, Addison Wesley, 2005.

Bloom, S. *Taxonomy of Educational Objectives: The Classification of Educational Goals: Handbook 1: Cognitive Domain*, D. McKay Publishing Company, New York, 1963.

Blunsdon, B., Reed, K., McNeil, N., and McEachern, S. "Experiential Learning in Social Science Theory: An Investigation of the Relationship between Student Enjoyment and Learning", *Higher Education Research and Development* (22:2), 2003, pp.43-56.

Blythe, A., Overbeeke, K., Monk, F., and Wright C. (ed.) *Funology: From Usability to Enjoyment*, Kluwer Academic Publishers, Netherlands, 2003.

Blythe, A. and Wright, C. "Introduction - From Usability to Enjoyment", in *Funology: From Usability to Enjoyment*, Blythe, A., Overbeeke, K., Monk, F., and Wright C. (ed.), Kluwer Academic Publishers, Netherlands, 2003, pp. xiii-xix.

Brandtzeg, B., Folstad, A., and Heim, J. 2003, "Enjoyment: Lessons from Karasek", in *Funology: From Usability to Enjoyment*, Blythe, A., Overbeeke, K., Monk, F., and Wright C. (ed.), Kluwer Academic Publishers, Netherlands, 2003, pp. 55-65.

Byrne, B. M. Structural Equation Modeling with EQS: Basic Concepts, Applications, and Programming, (2nd ed.), Lawrence Erlbaum Associates, Mahwah, New Jersey, 2006.

Chen, J. "Flow in games (and everything else)", *Communications of the ACM* (50:4), 2007, pp. 31-34.

Cheung, W., Li, E. Y., and Yee, L. W. "Multimedia Learning System and its Effect on Self-Efficacy in Database Modeling and Design", *Computers and Education* (41:3), 2003, pp. 249-270.

Churchill, G. A. "A Paradigm for Developing Better Measures of Marketing Constructs", *Journal of Marketing Research* (16:1), 1979, pp.64-73.

Cooper, R. and Schindler, P. S. *Business Research Methods*, McGraw-Hill/Irwin, 2005.

Csikszentmihalyi, M. *Flow: The Psychology of Optimal Experience*, Harper Collins, New York, 1990.

Davis, D., Bagozzi, P., and Warshaw, R. "Extrinsic and Intrinsic Motivation to Use Computers in the Workplace", *Journal of Applied Social Psychology* (22:14), 1992, pp. 1111-1132.

Di Blas, N. and Poggi, C. "3D for Cultural Heritage and Education: Evaluating the Impact", *Museums and the Web 2006*, Retrieved 9th April 2008 from http://www.archimuse.com/mw2006/papers/diblas/diblas.html.

Dickey, M. D. "Ninja Looting for Instructional Design: the Design Challenges of Creating a Game-Based Learning Environment", *ACM SIGGRAPH 2006 Educators Program*, Boston, USA, 2006, Article No. 17.

Ford, M. E. Motivating Humans: Goals, Emotions, and Personal agency Beliefs, Sage, 1992.

Gestwicki, P. V. "Computer Games as Motivation for Design Patterns", in *Proceedings of the 38th SIGCSE Technical Symposium on Computer Science Education*, Kentucky, USA., 2007, pp. 233-237.

Ghani, J. A. and Deshpande, S. P. "Task Characteristics and the Experience of Optimal Flow in Human-Computer Interaction", *The Journal of Psychology*, (128:4), 1994, pp.381-391.

Hair, J. F., Anderson, R. E., Tatham, R. L., and Black, W. C. *Multivariate Data Analysis*, (5th ed.), Prentice Hall, 1998.

Havlena, W. J. and Holbrook, M. B. "The Varieties of Consumption Experience: Comparing Two Typologies of Emotion in Consumer Behaviour", *Journal of Consumer Research*, (13), 1986, pp.394-404.

Heeter, C. "Interactivity in the Context of Designed Experiences", *Journal of Interactive Advertising* (1:1), 2000, pp.75-89.

ICOM (International Council of Museum) *ICOM Definition of a Museum*, Retrieved 9th April 2008: http://icom.museum/definition.html.

Iverson, M. E-Learning Games – Interactive Learning Strategies for Digital Delivery, Pearson Education, 2004.

Krathwohl, R. "A Revision of Bloom's Taxonomy: An Overview", *Theory into Practice* (41:4), 2002, pp. 212-218.

Lewis, R., Templeton, F., and Byrd, A. "A Methodology for Construct Development in MIS Research", *European Journal of Information Systems* (14:4), 2005, pp.388-400.

Lin, C. H. "Designing Websites for Enjoyment and Learning: A Study of Museum Experiences", Unpublished PhD Thesis, Australian National University, Canberra, Australia, 2008.

Lin, C. H. and Gregor, S. "Designing Websites for Learning and Enjoyment: A study of Museum Experiences", *The International Review of Research in Open and Distance Learning*, (7:3), 2006, 1-21.

Lin, C. H., Gregor, S., and Ewing, M. "Developing a Scale to Measure the Enjoyment of Web Experiences", *Journal of Interactive Marketing*, (22:4), 2008, Forthcoming.

Maslow, A. H. *Motivation and Personality*, (3rd ed.), Harper and Row, 1987.

Mason, R. L. "MIS Experiments: A Pragmatic Perspective", in *The Information Systems Research Challenge*, Benbasat, I. (ed.), Vol. 2: Experimental Research Methods, Harvard Business School Press, 1989, pp. 3-20.

Mathwick, C. and Rigdon, E. "Play, Flow, and the Online Search Experience," *Journal of Consumer Research* (31) 2004, pp. 324-332.

MDMA (Museum Domain Management Association) *Internationalized Domain Names (IDN) in .museum - Introduction*, Retrieved 9th April 2008: http://about.museum/idn/.

Meyers, S., Gamst, G., and Guarino, J. Applied Multivariate Research: Design and Interpretation, Sage, 2006.

Millar, S. *The Psychology of Play*, Penguin Books, 1976.

Nevo, D. and Wade, M. "How to Avoid Disappointment by Design", *The Communications of the ACM* (50:4), 2007, pp. 43-48.

Noell, G. H., Witt, J. C., LaFleur, L. H., Mortenson, B. P., Ranier, D. D., & LeVelle, J. "A comparison of two follow-up strategies to increase teacher intervention implementation in general education following consultation", *Journal of Applied Behavior Analysis* (33:1), 2000, pp.271-284.

Norusis, M. J. *SPSS 12.0 Statistical Procedures Companion*, Prentice Hall, 2003.

Novak, T. P., Hoffman, D. L., and Yung, Y. F. "Measuring the Customer Experience in Online Environments: A Structural Modeling Approach", *Making Science*, (19:1), 2000, pp.22-42.

Oman, S. D. and Seiden, E. "Switch-Back Designs", *Biometrika* (75:1), 1988, pp. 81-89.

Pace, S. "A Grounded Theory of the Flow Experiences of Web Users", *International Journal of Human-Computer Studies* (60:3), 2004, pp. 327-363.

Perry, D. L. *The Concept of Pleasure*, The Hague, Mouton, 1967.

Pigeon, J. G. and Raghavarao, D. "Crossover Designs for Comparing Treatments with a Control", *Biometrika* (74:2), 1987, pp. 321-328.

Powell, A. T. *Web Design: The Complete Reference*, (2nd ed.), McGraw-Hill, 2002.

Ratkowsky, D. A., Evans, M. A., and Alldredge, J. R. *Cross-Over Experiments: Design, Analysis, and Application, Series of Statistics*, Textbooks and Monographs, Vol. 135, Marcel Dekker, 1993.

Scanlan, T. K. and Lewthwaite, R. "Social Psychological Aspects of Competition for Male Youth Sport Participants: IV. Predictors of Enjoyment", *Journal of Sport Psychology* (8:1), 1986, pp. 25-35.

Schaller, T., Allison-Bunnell, S., and Borun, M. "Learning Styles and Online Interactives", *Museums and the Web 2005*, Retrieved 9th April 2008: http://www.archimuse.com/mw2005/papers/schaller/schaller.html.

Smith, H. J., Milberg, S. J., and Burke, S. J. "Information privacy: measuring individuals' concerns about organizational practices", *MIS Quarterly* (20:2), 1996, pp.167-196.

Shin, N. "Online Learner's Flow Experience: An Empirical Study", *British Journal of Educational Technology*, (37:5), 2006, pp.705-720.

Steinkuehler, C. "Learning in Massively Multiplayer Online Games", in *Proceedings of the 6th International Conference of the Learning Sciences*, California, USA, 2004, pp.521-528.

Swinburne, R. "Desire", *Philosophy* (60), 1985, pp. 429-445.

Telfer, E. *Happiness*, The Macmillan Press, 1980.

Treiblmaier, H. and Pinterits, A. "Beyond Utilitarianism: Appealing to Customers' Hedonic Predispositions on Corporate Websites", *Special Interest Group on Adoption and Diffusion of Information Technology (DIGIT)*, December 10, 2007, Montreal, Canada.

Van der Heijden, H. "User Acceptance of Hedonic Information Systems", *MIS Quarterly* (28:4), 2004, pp. 695-704.

Veenhoven, R. *Conditions of Happiness*, Dordrecht Reidel 1984.

Venkatesh, V. "Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model," Information Systems Research (11:4) 2000, pp 342-365.

Warner, R. "Enjoyment", *The Philosophical Review*, (89:4), 1980, pp.507-526.

Webster, J. and Martocchio, J. J. "Microcomputer Playfulness: Development of a Measure with Workplace Implications", *MIS Quarterly* (16:2), 1992, pp.201-226.

White, A. R. "The Notion of Interest", *The Philosophical Quarterly*, (14:57), 1964, pp. 319-327.

Williams, E. R. and John, J. A. "Construction of Crossover Designs with Correlated Errors", *Australia and New Zealand Journal of Statistics* (49:1), 2007, pp. 61-68.

Zühal, O. "Edutainment: is Learning at Risk", *British Journal of Educational Technology* (34:3), 2003, pp.255-264.

Appendixes

Appendix A. The Subsequent Study on Online Learning-for-Enjoyment

Selected Website: Age of the Great Khan, NPM Taiwan [Two International Awards[#]]

Study	Scores in Average / Selected Web Pages		Engagement (7 points Likert scale)	Positive Affect (7 points Likert scale)	Fulfilment (7 points Likert scale)	Enjoyment (average of Engagement, Positive Affect, and Fulfilment)	Learning Outcomes (5 questions)	**A higher level of enjoyment is linked to more learning**
Field Study (**Global Online Cross-Over Experiment**) [Valid Paired-Samples **N=1,815**]	**Text-Based**		5.40	5.46	5.73	5.53	2.76	**Supported**
	Long Multimedia-Interactive		5.60	5.68	5.75	5.67	2.40	**Supported**
	Short Multimedia-Interactive		5.93	5.89	5.97	5.93	3.41	**Supported**

#. The 2004 Web Award for Website Standard of Excellence (US Web Marketing Association) and Honourable Mention [Art] in the 2004 MUSE (American Association of Museums).