

Use and evaluation of the web

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Use and Evaluation of the Web: A Case in Hong Kong

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Use and Evaluation of the Web: A case in Hong Kong

Abstract

The Web is an emerging medium for marketing communication and business transaction. There is a need to re-think the processes for designing communication messages and creative strategies in the new medium. This study reviewed the use of Internet among individuals and companies in Hong Kong and examined the impact of two design factors – interactivity and image-to-text ratio – on evaluative responses of Web sites. One hundred and forty-four respondents randomly browsed one of the four versions of two products. The findings supported Petty and Cacioppo's Elaboration Likelihood Model (1981). Under the low product involvement condition, respondents found Web sites with high level of interactivity more interesting than Web sites with low level of interactivity. Under the high product involvement condition, design factors were not related with audience evaluation. Product interest and Internet literacy had positive relation with respondents' evaluation of Web sites. Factor analysis based on mean scores of the fourteen evaluation statements indicated that the underlying dimensions of Internet evaluation were appreciation, information content and clarity of presentation. Implications for web advertisers were discussed.

1. Introduction

The continuing developments in the area of new media technology was considered to represent the most important influence on the future of the advertising industry over the next 10 to 15 years (Ducoffe, 1996; Ducoffe, Sandler and Secunda, 1996). In a survey of 500 US companies, 53 percent had a web server and the main functions were to communicate information about products, the companies and providing customer services (Feher and Towell, 1997). By making the information immediately available, web advertising can communicate with less waste and greater efficiency than what is possible through traditional media (Ducoffe, 1996).

Advertising on Internet has becoming more and more popular. According to a report compiled by US investment bank Goldman Sachs, advertising on the Internet will become a US\$1.5 billion industry in the Asia-Pacific region within the coming two years (Lo, 1999). The communication process and pattern of advertising on an interactive medium differs significantly from traditional advertising. Traditional advertising tends to be mass oriented and is difficult to tackle individuals with many different kinds of needs. Interactive advertising reaches individuals with the new dimension of one-to-one and two-way communication. Audience selected brand and product information based on his/her own needs and interest (Sissors and Bumba, 1996). An exploratory study of web site users indicated that the most commonly stated use and gratification for the Web was information. Users find content to be far more useful and enjoyable than the processes associated with Web use (Stafford and Stafford, 1998).

The Web is an emerging medium that is fueling a new kind of advertising and a new kind of consumer. There is a need to re-think on the process in designing communication messages, creative strategies and post campaign evaluation that are appropriate to the new medium.

The objectives of this study are,

- To study the impact of two design factors, interactivity and image to text ratio, on evaluative responses of web sites
- To study the influence of product involvement, gender and Internet literacy as moderating variables
- To explore the underlying dimension of respondents' evaluative responses

Results will benefit the future creative design of communication messages on web sites for marketers and advertisers. With solid research foundations, the industry will be better off to gain success in this new and important advertising medium.

2. Internet use in Hong Kong

According to the latest official statistics, there were currently 180 Internet service providers in Hong Kong. Broadband Internet access service was introduced in early 2000 and there were seven broadband access providers. The estimated number of registered customers with dial-up access in October 2000 was 2.68 million, representing nearly 40 percent of the population. Eighty-six of these Internet customers used narrowband Internet access and twelve percent of them were broadband customers. Average Internet traffic for January to November 2000 was 6.1 minutes per day for every resident (Office of the Telecommunication Authority, 2001). Internet traffic was highest in July and August, probably because students had more free time during the summer holidays.

According to a survey of 10,000 households on Internet use conducted by the Census and Statistic Department in 2000, 50 percent of all households in Hong Kong had personal computers at home and among them, 73 percent had their PC connected to Internet. In other words, the Internet penetration among Hong Kong households was 36 percent, which ranked Hong Kong among the cities with highest Internet access in the world. About 1.85 million persons aged over 10 years old (30 percent of persons in that age group) used the Internet in the twelve months before the survey. On Internet usage, about 76 percent of them used

Internet service at home, 37 percent at place of work and 19 percent at place of study.

Younger persons, better-education persons and students were more likely to be Internet users (Census and Statistics Department, 2000). Hong Kong Internet users use the Internet for a limited purpose only. The same survey reviewed that more than seventy percent of Internet users use Internet for email or to gather information. Only 2 percent of all respondents had bought goods on line and 1 percent had booked tickets online. Less than 1 percent had tried online stock trading, banking, payment or auction services. The main reason cited by respondents for not using the Internet to shop or trade was concern about security. They hesitated to put credit card information on the Internet (Yiu, 2000).

Due to the reluctance of Hong Kong consumers to shop online, business relied solely on Internet transaction faced tremendous difficulties to survive. Internet-inspired supermarket adM@rt was forced to shut down in December 2000 after chalking up some HK\$1 billion (US\$128 million) in losses after about one year of operation. The company explained that the business failed because online shopping had not caught on at a satisfactory level and the margins for the products were razor-thin (Quak, 2000).

In another survey of 4,600 companies in Hong Kong conducted by the Census and Statistics Department in 2000, the penetration of personal computer and Internet among companies was 52 percent and 37 percent respectively. Despite of the high personal computer and Internet penetration among the companies, e-commerce was not fully developed in Hong Kong. About 7 percent of the companies surveyed had a web page or web site. As expected, medium and small companies lagged far behind in the development of company web pages. A predominant proportion (96 percent) of the web pages or web sites was used to communicate information. Only 1 percent served mainly as the channel for on-line business transactions. About 5 percent of the companies had ordered or purchased goods, services or information through electronic means such as telephone systems and the Internet.

About 35 percent of them had received goods and services through electronic means or had search for information on the Internet. About 8 percent of the companies had delivered their goods, services or information through electronic means. Only less than 0.5 percent of the companies had sold their goods, services or information through electronic means. The total amount of business receipts received from selling goods, services or information through electronic means in 1999 was estimated at HK\$4.6 billion, or 0.11 percent of the total business receipts of all selected sectors. The corresponding percentage was 0.07 percent in 1998 (Census and Statistics Department, 2000).

In a study of 250 commercial sites in Hong Kong, the primary purposes were advertising and building up corporate image (Cheung, 1998). Statistics indicated that most of the Hong Kong companies did not have web sites and most of the existing commercial web sites were not ready for e-commerce. The low level of interest in e-business technology among small and medium companies in Hong Kong was attributed to their lack of support to assist in technology transformation and constraints in the supply of financial resources too pay for the transformation (Chan and Kwong, 1999).

The Hong Kong Government launched the first phase of the Electronic Service Delivery scheme in October 2000 for the delivery of Government services online through the Internet. The public can eventually obtain various online services, twenty-four hours a day and seven days a week. Examples of services include filing of tax returns, payment of tax bills, renewal of driving and vehicle licences, voter registration, and changing personal information kept in various Government departments. The Government is also planning to expand the Electronic Services Delivery scheme to facilitate the private sector for the conduct of electronic transactions (Digital 21, 2001).

3. Literature review

This section summarizes several empirical studies that explore the influence of various design factors on web page effectiveness. Dreze and Zufryden (1997) examined four design attributes (background, image size, sound file display and celebrity endorsement) and related them to web users' viewing behaviors measured by the number of pages accessed and total time spent. Results indicated that a tiled background and celebrity endorsement had positive impact on number of pages accessed while large image size had negative impact on number of pages accessed. Green and tiled background, computer-specific sound file display had negative impact while celebrity endorsement had positive impact on the time spent. The long downloading time for large image size upset net surfers and caused them to leave a site despite its overall attractiveness. However, the study had the limitation that site visitor characteristics were not collected. Kent (1998) argued that effective organizational web sites must be easy to use, they must provide information that is useful to a variety of publics, and they must contain dialogue loops. In keeping with the intuitiveness or ease of use, Kent (1998) also suggested that a web site's content should be textual rather than graphical, as graphics and sounds are not useful tools for providing information.

Yeung (1996) conducted an experiment to investigate the impact of interactivity on effectiveness on homepage advertising in Taiwan. Results indicated that the level of interactivity had no impact on attitude toward the product/the brand and consumers' purchase intention. He argued that this might be due to the lack of interest for shopping on the Internet. Kuo, Choi, Lai and Tsao (1997) conducted an online field experiment on web users' evaluation of four versions of a web site of a monthly movie magazine in Taiwan. A 2x2 factorial design manipulating the level of interactivity and ratio of text-to-picture was adopted. An on-line survey of 481 respondents found that the level of interactivity had significant influence on the users' evaluation of the web site. A web site with hyperlinks was perceived

to be more interesting and the ratio of text-to-picture showed a moderate effect for female visitors only. Male visitors preferred text-rich sites than picture-rich sites. Users' gender and educational level influenced their evaluation of web sites, but not Internet literacy.

McLaughlin (1996) identified network embeddedness, openness and the design concept as three dimensions for categorizing attributes of web pages. Dholakia and Rego (1998) studied factors that influence the daily hit-rates (count of web site visitors) of 135 commercial home pages (the page that was first accessed when a company was searched for). Results indicated that number of links from the home pages to other pages, links from other web pages to the home page, and quarterly change to home page were positive predictors of categorized hit-rate. The number of clickable pictures and the total number of pictures on the home page were also positively related to the hit-rate.

Raman and Leckenby (1998) studied respondents' duration of visit of two web-ads (a single web page or a series of linked web pages that is/are accessed by a consumer clicking on a banner advertisement). Regression analysis indicated that utilitarianism web-ad characteristic was positively related with duration of visit. Web experience was negatively related with duration of visit. Product involvement was found not related with duration of visit.

Researches showed that communication effects were different according to product involvement level or the extent to which the buying decision was of personal importance (Petty and Cacioppo, 1981). Petty and Cacioppo (1981) proposed the Elaboration Likelihood Model (ELM) to explain two different routes of issue-relevant thinking to brand attitude change. It stated that under low product involvement situation, audience would have less active thinking about the purchase issue but pay more attention to peripheral attributes such as source attractiveness. However, under high product involvement situation, audience would involve in active thinking and pay less attention to peripheral attributes. Leung (1999) tested

the ELM model in the Hong Kong society and found use of celebrity endorser has greater effect on purchase intention in low product involvement condition.

Although the Elaboration Likelihood Model was basically used in examining the effects of celebrity endorsement in advertising, the author considers the model has the potential to apply to study web effectiveness. When applying the ELM to advertising, the outlook (or design) of the web will represent the source attractiveness variable in the ELM. So, we expect that under high product involvement condition, web surfers will pay more attention to the information and the design factors will have less influence on their evaluation. On the other hand, under low product involvement condition, web surfers will pay less attention to the information and the design factors will have more influence on their evaluation.

Advertising copy pre-test studies also pointed out that up to eighty percent of an advertisement's score on recall and/or persuasive measures depended on background variables such as whether or not people were interested in the product (Aaker, Batra and Myers, 1992). In other words, web site visitors who had a high interest in the product may evaluate it differently with casual visitors.

As the Internet is a new technology, review of literature indicates that there are a number of variables that are potentially related to web evaluation. Some variables are related to the basic design and some are related to the consumer characteristics. However, this study has selected the level of interactivity and text-to-graphic ratio as two fundamental variables to be manipulated in the experimental design. The two variables are chosen because they are relatively easier to manipulate.

4. Research method

The research design is based on a previous study conducted by Kuo, Choi, Lai and Tsao (1997). Four versions (2x2 factorial design) of web sites were produced for two selected products. A private car driving course represented product of high involvement and a

collection of electronic games represented product of low involvement. The web site for the driving course contained mainly detailed information about the course. External links connected the site to the government's transport departments, major routes map and automobile web sites. The web site for the electronic games was in the form of a product catalogue. Each page contained the product shot, the price and a short description. External links connected the site to some fun sites that were related to the product. The characteristics of the four versions of the two web sites were summarized in Table 1. The level of interactivity was manipulated by the presence or absence of hyperlinks. The ratio of graph to text was manipulated by either (a) the number of pictures used, or (b) the image size of the pictures. The web sites were placed in the server of the computer laboratory of the Communication Studies Department of the Hong Kong Baptist University.

[TABLE ONE ABOUT HERE]

A convenience sample of 144 Chinese speaking School of Communication students of the Hong Kong Baptist University was recruited as participants. Altogether eight browsing sessions were conducted in a laboratory fitted with personal computers over a three-week period in March and April 1999. All participants had the skill of accessing web sites on the Internet. Participants were randomly assigned to access one version of the four web sites for each product. They were asked to browse the two designated web sites for a period of 25 minutes and fill in a questionnaire. The questionnaire consisted of four parts: (1) perceived interest of the product and the perceived importance of the purchase decision on a five-point scale; (2) 15 evaluative statements about the web sites on a five-point scale used by Kuo, Choi, Lai and Tsao (1997); (3) overall evaluation of the web sites on a 100-point scale; and (4) personal information and Internet usage pattern information.

Data was analyzed using ANOVA and multiple analysis of variance methods. The dependent variables were the 15 respondents' evaluative response and overall evaluation of

the web sites. The independent variables were the version of web site, product interest, product involvement, gender and Internet literacy. Furthermore, factor analysis was used to explore the underlying dimension of respondents' evaluation of web sites and perception of web sites.

5. Findings

Respondents' profile and Internet usage experience. Altogether 144 students (33 males and 107 females) participated in the study. A majority (73%) had been using Internet for more than one year. About 40 percent of respondents spent two to seven hours a week on the Internet for non-academic purposes. The median time spent on the Internet for non-academic activities was 5.4 hours per week. The four most popular search topics on Internet were news (52%), recreation (42%), art (38%) and computer (37%). A majority of the respondents used a search engine (64%) and hyperlinks (60%) to search for information. About fifty percent and thirty eight percent used URL address and bookmarks to search for information respectively. Hotlist and yellow pages on line were not popular among respondents. Search engine (74%) and friends (73%) were most frequently reported as ways to find relevant web sites, followed by related web sites (65%), magazines (60%) and newspapers (45%). Respondents seldom use TV or newsgroups for locating web sites.

Product interest and involvement. Respondents' interest in the private car driving course and the mini-electronic games, represented on a five-point scale, were 3.54 and 3.26 respectively. Results of t-test indicated that there was no difference in product interest of respondents. Perceived importance of the purchase decision of the driving course and the electronic games, represented on a five-point scale, were 3.07 and 2.33 respectively. Results of t-test indicated that there was significant difference. As expected, respondents perceived the purchase decision of driving course more important than that of the mini-electronic games.

Participants' score on the perceived importance of purchase decision would be taken to represent their level of product involvement.

Version Table 2 and Table 3 summarize the respondents' score on the fifteen evaluative statements and the overall evaluation for the four versions of the web sites 1 and 2 respectively. Evaluative statements were arranged in descending order of their mean scores. F-tests were conducted to investigate whether the version of the web site had influence on the evaluative response.

The overall evaluation scores for web sites 1 and 2 were 55.0 and 61.2 respectively. Results of the F-tests showed that the overall evaluation scores for all four versions of both web sites were not significantly different. This showed that the design factors alone were not significant in differentiating the overall evaluation of the web sites.

From mean scores of the fifteen evaluative statements of the web site 1, respondents found all four versions easy to read and information easy to locate. However, they found the web sites boring and they were not interested to revisit. Only the evaluative statement 'the web is interesting' had significant F-statistics. Duncan pair-wise tests indicated that respondents found version 2 (high interactivity with low ratio of graph) more interesting than version 3 (low interactivity with high ratio of graph). The other thirteen evaluative statements had no significant F-statistics, indicating that respondents did not find the four versions different in these aspects.

[TABLE TWO ABOUT HERE]

From mean scores of the fifteen evaluative statements of the web site 2, respondents found all four versions easy to read and information easy to locate. However, they did not think that the web sites had good interactive communication. Two evaluative statements had significant F-statistics. Results of the Duncan pair-wise tests indicated that respondents browsing version 3 (low interactivity with more images) were less likely to visit the web site

again than respondents browsing version 1 (high interactivity and more images) and version 2 (high interactivity with fewer images). Respondents browsing version 1 (high interactivity and more images) felt the web site had good interactive communication in contrast with respondents browsing version 3 (low interactivity with more images) and version 4 (low interactivity with fewer images). Respondents browsing version 3 (low interactivity with more images) also found it more boring than respondents browsing version 1 (high interactivity and more images). The design factor on interactivity was more important than the design factor on ratio of graph to text in differentiating the evaluation on value for re-visit, interactive communication and whether the web was boring.

[TABLE THREE ABOUT HERE]

Respondents' evaluations of both web sites did not differ significantly for the four different versions. We therefore expect that consumer-defined variables such as product interest and product involvement may have influence on the web evaluation in addition to the tested design factors. Four independent variables including gender, product interest, product involvement and Internet literacy are introduced as moderating variables. Product interest and product involvement was both grouped into two levels in such a way that each group carried nearly equal proportion of respondents. Internet literacy was measured by adding respondent's Internet experience and usage time and grouped into two levels, using the mean score as the dividing line. The results of the multiple analysis of variance with significant F-values are shown in Table 4 and Table 5 for web sites 1 and 2 respectively.

For the web site 1, Internet literacy was found to be an important moderating variable on respondents' evaluation, followed by product involvement and product interest. These three variables had a greater influence on respondents' evaluation than the gender variable and the design factors.

Respondents who were more familiar with Internet liked the web more and were less likely to find it boring. They were also more likely to re-visit the web and considered the web worth spending time. Respondents who considered the enrolment of driving course an important decision (high product involvement) liked the web more and found it has good interactive communication. They were also more likely to enroll in the course. Respondents who had a high interest in the product liked the web more, and were more likely to enroll. Female respondents were less likely to enroll in the course. Respondents browsing version 1 (high interactivity with more images) and 2 (high interactivity with fewer images) found it more interesting than respondents browsing version 3 (low interactivity with more images).

[TABLE FOUR ABOUT HERE]

For the web site 2, product involvement and design factors stood out to be the main variables that had significant influence on the evaluative response. Respondents who considered the electronic game an important purchase decision liked the web and the product more. They were also more likely to buy. They were more likely to consider the web has good interactive communication.

[TABLE FIVE ABOUT HERE]

Respondents browsing version 3 (low interactivity and bigger images) found it more boring and less likely to revisit than respondents browsing version 1 (high interactivity and bigger images). Respondents browsing version 1 (high interactivity and bigger images) considered it had better interactive communication than respondents browsing versions 3 (low interactivity and bigger images) and 4 (low interactivity and smaller images). Respondents browsing version 2 (high interactivity and smaller images) also considered it had better interactive communication than respondents browsing version 4 (low interactivity and smaller images). In all cases when the version had a significant effect, there was no difference in web site evaluation for respondents browsing versions 1 and 2, and respondents

browsing versions 3 and 4. This indicates that interactivity has greater influence on web site effectiveness than image-to-text ratio. Female respondents were more likely to perceive the web has good icon. Respondents with high product interest liked the web more.

Factor analysis of evaluation statements. We were also interested to know how respondents evaluated the web sites. Factor analysis with varimax rotation based on mean scores of the 14 evaluation statements was conducted across individuals and as across two web sites using 288 observations. The results are given in Table 6.

[TABLE SIX ABOUT HERE]

Factor analysis across individuals and web sites reported a three-factor solution. The eigen values for the three factors were 5.2, 1.7 and 1.2. The first three factors together explained 58 percent of the total variance of mean evaluation. The first factor alone contributed nearly two thirds of the variance explained. The underlying dimensions of respondents' evaluation revealed by the three factors were labelled: appreciation, information and clarity.

Appreciation This factor combines the concepts of liking, interesting, worth recommending to others, not boring, worth browsing and revisiting, and effective (the respondents indicated greater appreciation of the product/service and were more likely to consider purchasing). It suggests that the audience showed appreciation toward the web sites. This factor integrates the 'hedonism' and 'interest' characteristics proposed by Raman and Leckenby (1998).

Information This factor brings together the concepts of finding the web site information-rich, can easily find the relevant information and having good interactive communication. All these are related to the information content of the web sites. This factor is very similar to the 'utilitarianism' characteristic proposed by Raman and Leckenby (1998).

Clarity This factor includes concepts of not getting lost, easy to read and good icons. All these are related to the organisation and presentation of information, and the visual design of the web sites.

To summarize, respondents evaluated web sites based on their entertainment value, information content and the organization of information.

6. Discussions and conclusion

Some of the findings in Table 1 looked a bit strange at first sight. For example, why did respondents rate versions 1 and 2 of the driving course web site the same as 3 and 4 on “the web site has good interactive communication” when 1 and 2 had 25 external hyperlinks while 3 and 4 had none? The result reflects that respondents did not consider the presence of external hyperlinks the only criterion in the evaluation of interactivity. One possible explanation is that for a web site of product with high involvement, respondent has a high information need. He or she is so absorbed in searching for information on the web that he or she does not care whether the web site has external links to other related sites. However, for a web site of product with low involvement, the information need is minimal. The respondent will have a stronger expectation on the vitality of the web represented by the presence of external links to other interested sites. When the web cannot fulfill the desire, the respondent will find the web boring and does not want to return.

Many web designers have put much emphasis on interactivity and image balance in designing web sites. The current study showed that design factors played a variety of roles in consumer purchase decision situations. Under the high product involvement condition, consumer-defined variables including Internet literacy and product interest played a more important role than design factors in influencing web site effectiveness. The good news for web advertisers is that an audience with higher product involvement evaluated the site more positively in terms of liking and purchase intention. This was found in both web sites and was

independent on the versions they browsed. This indicated that audiences with high product involvement are in need of information and obtaining such information on the web will increase their likelihood to purchase. The web should be rich in content and well organized so that audience will find it easy to understand and efficient to use. In practical terms, this means the sites should be textual based rather than graphic based.

Under low product involvement condition, design factors played a more important role. Interactivity was more important than image-to-text ratio in influencing web site effectiveness. Respondents considered web sites with external links provide a more interactive environment, less boring and more likely to revisit. Web designers should place an emphasis on making the web highly attractive. As larger and more images did not correlate with more positive evaluation, advertisers should consider the use of smaller images to keep the impatient web surfers happy.

The different impact of design factors on web effectiveness for products of different involvement level leaned to support the Elaboration Likelihood Model proposed by Petty and Cacioppo (1981). Design factors were important only when audience did not have a strong desire for information and took a peripheral route of issue elaboration.

As product interest and product involvement was positively related with web effectiveness, advertisers should encourage potential customers to access their web sites. This can be achieved by promoting the web address in traditional media and other marketing communication channels. Advertisers also need to find ways to encourage web surfers to take immediate action after viewing the web sites.

Internet literacy was positively related with perceived web site effectiveness. This indicates that experienced Internet users are not more critical. Instead, they are more likely to appreciate the web sites. Raman and Leckenby (1998) argued that experienced Internet users

are probably more efficient information searchers. It is good to know that better search skills on the Internet are related with greater appreciation of the medium.

The audience evaluated the web sites on three dimensions. In addition to the entertainment and curiosity values found in previous study by Raman and Leckenby (1998), clarity is a new dimension found for web evaluation. This dimension concerns about how the information are organized and presented visually. Advertisers who want to design effective web should make it interesting by providing lots of related links, make it informative and providing good icons.

The study has three major limitations. The first one is that unobtrusive measures of web effectiveness including duration of visit and number of pages accessed were not measured. The second one was only two design factors are included. Other design factors such as the use of sound and video presentation, background characteristics were not tested. The third limitation is the over-representation of female respondents in the sample. Further study should explore more design factors (such as typography and color) and consumer-defined factors.

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Table 1 Description of the four versions of the web sites

Web site 1: private car driving course (22 pages; can view in English or Chinese)

	High image to text ratio	Low image to text ratio
High interactivity	Version 1 25 hyperlinks 10 pictures	Version 2 25 hyperlinks 6 pictures
Low interactivity	Version 3 no hyperlink 10 pictures	Version 4 no hyperlink 6 pictures

Web site 2: electronic games (12 pages, Chinese only)

	High image to text ratio	Low image to text ratio
High interactivity	Version 1 11 hyperlinks 11 bigger pictures*	Version 2 11 hyperlinks 11 smaller pictures
Low interactivity	Version 3 no hyperlink 11 bigger pictures*	Version 4 no hyperlink 11 smaller pictures

* the picture size is about doubled that of the smaller pictures

Table 2 Evaluation of four versions of the web site 1

Evaluative statement @	web site 1 (driving course)				Mean	F-value	Sign. level	Duncan pair-wise test
	version 1	2	3	4				
The web is easy to browse	3.6	3.6	3.8	3.7	3.7	0.6	N.S.	
The web is boring	3.4	3.6	3.8	3.7	3.6	1.2	N.S.	
Information in the web is easy to locate	3.6	3.3	3.7	3.4	3.5	1.6	N.S.	
I am not going to return to this site	3.4	3.2	3.6	3.5	3.4	1.4	N.S.	
The web contains much information	3.3	3.3	3.3	3.0	3.2	1.1	N.S.	
The icons are easy to follow	3.0	2.7	2.8	2.8	2.8	0.4	N.S.	
I fell get lost	2.6	2.6	2.3	2.5	2.5	0.7	N.S.	
The web has good interactive communication	2.7	2.5	2.5	2.5	2.5	0.5	N.S.	
I like the course more after viewing the web	2.4	2.5	2.3	2.4	2.4	0.6	N.S.	
I'd like to recommend the web to others	2.6	2.4	2.3	2.4	2.4	0.7	N.S.	
It is worth spending time on this web	2.5	2.4	2.3	2.4	2.4	0.6	N.S.	
I like the web	2.4	2.4	2.2	2.2	2.3	1.0	N.S.	
I am more likely to enroll in the course after viewing the web	2.3	2.4	2.2	2.4	2.3	0.6	N.S.	
The web is interesting	2.2	2.3	1.9	2.1	2.1	2.6	N.S.	2>3
Overall evaluation score (0-100 marks)	55.0	55.0	53.3	57.0	55.0	0.5	N.S.	

@ on 5-points scale 1=disagree very much, 5=agree very much; translated from the Chinese questionnaire

N.S. Not significant

Table 3 Evaluation of four versions of the web site 2

Evaluative statement @	web site 2 (electronic games)				Mean F-value	Sign. level	Duncan pair-wise test
	Version 1	Version 2	Version 3	Version 4			
The web is easy to browse	3.8	3.6	3.7	3.9	3.7	0.7	N.S.
Information in the web is easy to locate	3.4	3.3	3.3	3.4	3.4	0.4	N.S.
The web is interesting	3.4	3.3	3.1	3.0	3.2	1.3	N.S.
The web contains much information	3.2	3.0	2.8	3.1	3.0	1.1	N.S.
I am not going to return to this site	2.6	2.9	3.4	3.1	3.0	3.6	0.05 3>1, 3>2
I like the web	3.1	3.1	2.8	3.0	3.0	0.9	N.S.
The icons are easy to follow	2.9	3.0	3.1	3.0	3.0	0.1	N.S.
I'd like to recommend the web to others	3.3	2.9	2.8	2.8	3.0	1.9	N.S.
It is worth spending time on this web	3.0	2.8	2.8	2.8	2.8	0.4	N.S.
I like the course more after viewing the web	2.9	2.8	2.9	2.6	2.8	0.5	N.S.
The web is boring	2.5	2.6	3.0	2.9	2.7	2.7	N.S. 3>1
I am more likely to buy the product after viewing the web	2.7	2.6	2.7	2.5	2.6	0.2	N.S.
The web has good interactive communication	2.9	2.7	2.3	2.3	2.56	3.5	0.05 1>3, 1>4
I feel get lost	2.1	2.4	2.2	2.2	2.2	0.9	N.S.
Overall evaluation score (0-100 marks)	64.7	63.5	57.3	58.5	61.2	1.9	N.S.

@ on 5-points scale 1=disagree very much, 5=agree very much; translated from the Chinese questionnaire

N.S. Not significant

Table 4 Summary of multiple analysis of variance of respondents' evaluation of web site 1 with significant F-values

Evaluative statement	Independent variable	F-value	Sign. level	Duncan pair-wise test
I like the web	Internet literacy	5.1	*	2>1
It is worth spending time on this web	Internet literacy	7.9	**	2>1
The web is boring	Internet literacy	4.8	*	1>2
I am not going to return to this site	Internet literacy	4.8	*	1>2
I like the web	Product involvement	8.1	**	2>1
I am more likely to enroll in the course after viewing the web	Product involvement	7.5	**	2>1
The web has good interactive communication	Product involvement	6.2	*	2>1
I like the web	Product interest	5.6	*	2>1
I am more likely to enroll in the course after viewing the web	Product interest	8.2	***	2>1
I am more likely to enroll after viewing the web	Gender	7.2	**	1>2
The web is interesting	Version	3.1	*	1>3, 2>3

Version (4 types described in Table 1), gender (2 levels, 1=male 2=female), product interest (2 levels, 1=low 2=high), product involvement (2 levels, 1=low 2=high), Internet literacy (2 levels, 1=low 2=high)

*<0.05; **<0.01; ***<0.005

Table 5 Summary of multiple analysis of variance of respondents' evaluation of web site 2 with significant F-values

Evaluative statement	Independent variable	F-value	Sign. level	Duncan pair-wise test
The web has good interactive communication	Product involvement	4.5	*	2>1
I like the web	Product involvement	4.3	*	2>1
I am more likely to buy the product after viewing the web	Product involvement	4.1	*	2>1
I like the product more after viewing the web	Product involvement	3.9	*	2>1
The web has good interactive communication	Version	3.8	*	1>3, 1>4, 2>4
I am not going to return to this site	Version	3.0	*	3>1
The web is boring	Version	2.4	*	3>1
The icons are easy to follow	Gender	10.8	***	2>1
I like the web	Product interest	5.2	*	2>1

Version (4 types described in Table 1), gender (2 levels, 1=male 2=female), product interest (2 levels, 1=low 2=high), product involvement (2 levels, 1=low 2=high), Internet literacy (2 levels, 1=low 2=high)

*<0.05; **<0.01; ***<0.005

Table 6 Factor analysis of evaluative statements across individuals and web sites (288 observations)

	Mean	Factor			Communality
		1	2	3	
<i>Factor 1: Appreciation ($\alpha=0.90$)</i>					
Like	2.7	0.83	0.12	0.06	0.71
Interesting	2.7	0.82	-0.08	0.12	0.70
Recommend	2.7	0.77	0.15	0.13	0.64
Worthwhile	2.6	0.72	0.26	0.11	0.61
Action	2.5	0.69	0.21	-0.04	0.53
like product	2.6	0.67	0.25	0.11	0.53
Revisit	3.2	-0.62	-0.29	-0.06	0.48
not boring	3.2	-0.77	0.02	-0.14	0.61
<i>Factor 2: Information ($\alpha=0.56$)</i>					
informative	3.1	0.18	0.76	-0.06	0.60
find what I want	3.4	-0.05	0.67	0.53	0.74
communicate	2.6	0.26	0.60	0.05	0.43
<i>Factor 3: Clarity ($\alpha=0.48$)</i>					
easy to read	3.7	0.09	0.13	0.72	0.54
good icon	2.9	0.33	0.13	0.44	0.32
get lose	2.4	-0.04	0.11	-0.79	0.64
Variance explained (%)		37	12	9	
Cumulative variance explained (%)		37	49	58	