

# THE EFFECTS OF LEVELS OF USER INTERNET SKILLS AND INTERACTIVITY ON ATTITUDE TOWARD THE WEBSITE

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## **Introduction**

Interactivity has been regarded as the unique characteristic of the Internet that distinguishes from traditional mass media, and it should be considered as an indispensable variable in the investigation of effects and effectiveness of interactive advertising (Leckenby and Li 2000). The notion of the active role of the consumer proposed by Pavlou and Stewart (2000) reflects the importance of interactivity in our understanding how interactive advertising works. As such, many studies have focused on the effects of interactivity on consumers' responses to interactive advertisements (e.g., a banner, or website) using different conceptualizations and operationalizations (e.g., Cho and Leckenby 1997; Fortin 1997; Ariely 1998; Novak et al 1999; Yoo and Stout 2001; Coyle and Thorson 2001). However, their findings are inconsistent. For example, Cho and Leckenby (1999) indicate that a higher degree of interactivity leads to a more favorable attitude toward the target ad. In contrast, Coyle and Thorson (2001) did not find any significant effect of interactivity on attitude toward the website. Such inconsistencies might result from a variety of reasons. Clearly, the way the construct of interactivity is conceptualized and operationalized differently by different researchers could be a contributing factor. But individual difference variables may moderate the effect of interactivity on attitude toward the website. Given the fact that a website visitor is also a computer user, it is proposed that user Internet skills be a very important moderating variable. The study reported in this paper represents an attempt to examine the main effects of user Internet skills and interactivity as well as the moderating effect of user Internet skills on interactivity's effect on attitude toward the website.

## **Theoretical Background**

### ***Interactivity***

The construct of interactivity has been extensively defined and redefined by researchers from a variety of disciplines in the humanities and social sciences (Wiener 1950; Chen 1984; Rice 1984; Rogers 1988; Rafaeli 1988; Williams, Rice and Rogers 1988; Newman 1991; Steuer 1992; Rafaili and Sudweeks 1997; Fortin 1997; Ha and James 1998; Ariely 1998; Roehm and Haugtvedt 1999; Frazer and MacMillan 1999). In this study, interactivity is defined as the potential to interact with users in providing information, entertainment or e-commerce functions. Its operational definition is equivalent to technical interactivity, or feature-based interactivity (Fraser and McMillan 1999; McMillan 2002), or actual interactivity characterized by the presence of interactive elements in a computer-mediated environment (Williams, Rice and Rogers 1988; Wu 2000). Interactive elements are enabled by interactive technologies. For example, a static banner with only one GIF or JPEG image is less interactive than an animated banner. A more sophisticated website equipped with recommendation engines has much high potential for visitors to interact with. The familiar case would be the Amazon.com website. Amazon.com provides users with personalized messages, product recommendations and unedited feedback of previous buyers' product usage experience. Such a website acts as a capable salesperson that almost engages in a real-time conversation with its visitors. The more

sophisticated and interactive elements a website has, the higher its potential to interact with its visitors or users, and the higher the level of website interactivity. Previous academic research on the effects of interactivity has implicitly acknowledged or manipulated the variable of interactivity along this line of thinking. For example, Hoffman and Novak (1996) consider interactivity and vividness as content characteristics. Also, Coyle and Thorson (2001) state that “if we apply the mechanical perspective of interactivity to on-line sites, then a web site that is described as interactive should have good mapping, quick transitions between a user’ input and resulting actions, and a range of ways to manipulate the content” (p. 67). Clearly, their progressive levels of interactivity were obtained by varying three technical elements in their experimental stimuli.

Apparently, the implementation of progressive levels of interactivity of a website means increasing costs of design, production and maintenance to the website owner (advertiser). This would suggest that online advertisers assume that a higher level of website interactivity might be more desirable and result in more favorable responses from the website users. The question arises naturally about whether online advertisers’ assumption is valid. It seems that previous research has produced mixed results. To shed more light on this topic, it is hypothesized that:

**H1:** Subjects exposed to a high level of website interactivity will have a more positive attitude toward the website than subjects exposed to a low level of website interactivity.

### ***User Internet Skills***

If interactivity is defined as the potential to interact with users in providing information, entertainment or e-commerce functions, it can be reasonably assumed that websites with different levels of interactivity would present different challenges to users of different levels of Internet skills. There is no doubt that all websites are created unequal in terms of interactivity. In addition, it is a fact that online users’ Internet skills vary considerably. The US online adult population at 137 million by February 2002, accounting for 66% of all US adults and trending towards being more representative of the general population (Harris Interactive 2002). This individual difference variable would be expected to have considerable impact on users’ web browsing experience, which, in turn, could influence their responses to a website. Previous researchers have paid much attention to users skills. The level of the skills of the individual has been recognized as an important antecedent of the construct of flow (Csikszentmihalyi 1975 and 1977; Trevino and Webster 1992; Webster et al 1993; Hoffman and Novak 1996; Koufaris 2000). Skills are either conceptualized (e.g., Hoffman and Novak 1996 or measured (Koufaris 2000) as “perceived by the user and not through observation or a standardized test” (Koufaris 2000, p.212). It would be interesting, therefore, to see whether user Internet skills measured objectively using a standard test would influence users’ attitude toward the website.

The rapid changes and continuous innovation in computer and telecommunications technologies make it difficult for even highly technical users (e.g., web designers, or computer engineers) to keep up with, let alone an average web user. Web users are often told that they need a plug-in in order to view certain content. Downloading and installing such a plug-in might appear to be an easy task for some, but could be a very challenging one for others. The 10<sup>th</sup> Web User Survey (1998) by Georgia Institute of Technology’s GVU shows that user Internet skills differ much in performing 12 Internet-related tasks. Naturally, users with a high level of Internet skills tend to have more control over such technical tasks, experience less frustration, and form a more positive attitude than users with a low level of Internet skills. Therefore, the second hypothesis is formally stated as:

**H2:** Subjects with a higher level of Internet skills will have a more positive attitude toward the website than subjects with a lower level Internet skills.

It would be almost unimaginable for an average magazine or newspaper reader to “fight through pages,” or a TV viewer to make a very conscious effort to zap channels in order to read or view what

interests him or her. But it is not uncommon for a considerable number of Internet users to experience effort, frustration or even hopelessness on certain websites because they do not know how to have technical glitches resolved fast on their own. Interestingly, other users who have a higher level of Internet skills might feel completely immersed and gratified when accessing the same websites at the same time in the same physical room. On the other hand, the opposite scenario is likely to occur. Those Internet users with a higher level of skills may feel less satisfied when browsing a less interactive website than those with a low level of skills. Thus, it is hypothesized that:

**H3:** The effect of the level of interactivity on a website in terms of attitude toward the website would be different for users with a high level of Internet skills than for users with a low level of Internet skills.

## **Method**

### ***Design of the Experiment***

These hypotheses were tested in a hybrid 2 x 2 factorial design experiment. The variable of the level of website interactivity (high vs. low) was manipulated, and the variable of the level of user Internet skills was measured using a standard test. A total of 157 undergraduate students from a large southwestern university participated in the experiment for extra credit. A website of a fictitious brand of dietary supplement was considered appropriate for the sample of college students. College students are health-conscious, and they are familiar with this product category. In addition, a pretest with 30 participants from the same university indicated that eighty per cent of them found dietary supplement information on the website interesting and useful.

### ***Independent Variables and Experimental Stimuli***

*The level of website interactivity* This variable is conceptualized as potential for Internet users to interact with. The more interactive elements a website has, the more interactive it is. Consistent with previous research (e.g., Frazer and McMillan 1999), the level of website interactivity is operationalized by varying the presence or absence of interactive elements. Specifically, a high level of website interactivity is characterized by the presence of interactive elements, and a low level of interactivity website the absence of the same interactive elements. Two versions of the same dietary supplement site were created to represent a high level of website interactivity and a low level of website interactivity, respectively. Two coders were recruited to verify the level of interactivity for each version, and the inter-coder reliability was 100% (see Table 1 for a list of interactive elements). An email hot link acts as a feedback mechanism. Java-script enabled mouse-over effects refer to the changing of colors and/or images once a user's mouse moves onto the link. An online chat-room allows users to engage in a conversation in real-time. A searchable pull-down menu provides user with options to choose from. A product image gives users visual information. Dynamic creation of content is defined as content generated in real-time, which is typically supported by a database.

**Table 1. Two Versions of the Website**

<i>Interactive Elements</i>	<i>High /Low interactivity</i>
1. email hot-link	Presence/Absence
2. JavaScript-enabled mouse-over effects	Presence/Absence
3. online chat-room	Presence/Absence
4. searchable pull-down menu	Presence/Absence
5. product image	Presence/Absence
6. dynamic creation of content	Presence/Absence

*\* Adapted from Frazer and McMillan (1999)*

Several days prior to the experiment, subjects were asked to sign up for a specific time slot at a reserved computer lab. Subjects were then randomly assigned to two versions of the dietary supplement website. They were instructed to browse the website as they normally would do for a maximum of 30 minutes. After they felt their browsing was over, they filled out an online questionnaire hyper-linked from the site. A total of 30 sessions were conducted in the computer lab with each session having 5 to 15 participants.

*User Internet Skills* Table 2 shows the skill test used in the GVU 8<sup>th</sup> Survey. This skill test has 12 items, each of which represents a specific Internet-related task. The level of skills required to perform each of the 12 varies, and it is reasonable to apply different weights to different tasks when computing an Internet skills score. A high percentage of respondents who have completed a particular task (e.g., placed an order, 74%) in the GVU 98 survey (see Table 3 numbers in parentheses) suggests that placing an order online is relatively less difficult to do among all users in the sample. In contrast, a low percentage (e.g., making a telephone call on the Internet, 16.9%) implies that making a telephone call on the Internet is more difficult to perform. Therefore, it would be reasonable to assign a relatively lower weight to the former than the latter. For example, the completion of the task of placing an order online would receive a weight of 0.26 (100% - 74%) while that of making a telephone call would be assigned a weight of 0.831 (100% - 16.9%). The raw score for each completed task is assigned to be 100. Thus, the weighted score for placing an order online would be 100 \*.26, which equals 26; the weighted score for making a telephone call on the Internet would be 100 \* .831, which equals 83.1. A user Internet skills score would be the sum of weighted scores for all tasks they have done before. The conventional median-split method was used to obtain two groups.

**Table 2. Skill Test Items**

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Which of the following have you done? Please check all that apply.

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1. order a product/service from a business, government or educational entity by filling out a form on the web (74%)
  2. made a purchase online for more than \$100 (46%)
  3. created a web page (58.1%)
  4. customized a web page for yourself (e.g. MyYahoo, CNN Custom News) (47.9%)
  5. changed your browser's "startup" or "home" page (80.5%)
  6. changed your "cookie" preferences (63.5%)
  7. participated in an online chat or discussion (not including email) (65.9%)
  8. listened to a radio broadcast online (57.9%)
  9. made a telephone call online (16.9%)
  10. used a nationwide online directory to find an address or telephone number (80.0%)
  11. taken a seminar or class about the Web or Internet (26.1%)
  12. bought a book to learn more about the Web or Internet (52.7%)
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Source: Gvu of Georgia Tech.

Available at [http://www.cc.gatech.edu/gvu/user\\_surveys/survey-1998-10/graphs/general/q88.htm](http://www.cc.gatech.edu/gvu/user_surveys/survey-1998-10/graphs/general/q88.htm)

Note: The numbers inside parentheses are percentages of respondents who have checked that box. They are not included in the original questionnaire.

### ***Dependent Variables ---Attitude toward the Website***

Subjects were told to treat the website as an advertisement and rate the website using eleven 7-point semantic differential items from Olney, Holbrook and Batra (1991). This scale is made up three components: Hedonism, (fun to see/not, (un)/pleasant, entertaining/not, enjoyable/not), Interestingness (important/not, helpful/not, informative/not, useful/not), and Utilitarianism (curious/not, boring/not, interesting/not). The Cronbach alpha for this measure is .93.

## **Results**

### ***Manipulation Checks***

Subjects were asked to indicate their degree of agreement on a five-point Likert-type scale (1 = strongly disagree and 5 = strongly agree) with the statement "I perceived the website to be highly interactive." There was a significant difference ( $F = 23.02$ ,  $d.f. = 1,153$ ,  $p < .00$ ) between subjects exposed to a high level of interactivity website (mean = 3.59) and those to a low level (mean = 2.77). Thus, the manipulation of the level of website interactivity was successful.

The purpose of this study is to examine the effects of the level of website interactivity and the level of user Internet skills and a possible interaction effect between these two in terms of attitude toward the website. Table 3 shows the cell means of the dependent measure. Table 4 reports the results for a two-way factorial analysis of variance. All missing data were excluded during the statistical analysis.

**Table 3 Cell Means of the Dependent Measure ( $A_{st}$ )\***

	Low level of site interactivity		High level of site interactivity	
	Low Skills	High skills	Low Skills	High skills
A <sub>st</sub>	4.46 (.83)	4.70 (1.27)	5.08 (1.03)	5.42 (1.02)
N in Cell	25	31	32	25

\* A<sub>st</sub> is attitude toward the website on a 7-point semantic differential scale, with high numbers being more positive

\*\* Standard deviations are in parentheses

\*\*\* Missing data were excluded from analysis, so the cell N total differs from the number of 157 participants

**Table 4. Two-Way Factorial Analysis of Variance**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Observed Power
Corrected Model	13.74	3	4.58	4.07	.009	.833
Intercept	2691.46	1	2691.46	2691.25	.000	1.000
Level of (I) Interactivity	12.35	1	12.35	10.97	.001	.907
Level of Skills (S)	2.42	1	2.42	2.15	.146	.306
I x S	.061	1	.061	.054	.816	.056
Error	122.69	109	1.126			
Total	2863.13	113				
Corrected Total	136.43					

Computed using alpha = .05

### ***Test of Hypotheses***

H1 states that subjects exposed to a high level of website interactivity will form a more positive attitude than those exposed to a low level of website interactivity. The results of a two-way factorial analysis of variance in Table 4 indicate that the level of website interactivity simple main effect is significant as hypothesized ( $F = 10.97$ ,  $d.f. = 1$ ,  $p < .009$ ). H1 is supported. H2 states that subjects with a high level of Internet skills will have a more attitude toward the website than those with a low level of

Internet skills. The level of user Internet skills main effect was not significant ( $F = 2.15$ ,  $d.f. = 1$ ,  $p < .146$ ). The interaction effect was not significant ( $F = .054$ ,  $d.f. = 1$ ,  $p < .816$ ). Thus, the moderating effect of the level of user Internet skills on the level of website interactivity in terms of attitude toward the website was not found as hypothesized.

## **Discussion**

This study examined the effects of the level of website interactivity and the level of user Internet skills on the measure of attitude toward the website. The study has provided additional evidence that Internet users do form a more positive attitude toward the website in terms of three components: hedonism, interestingness, and utilitarian (Olney, Holbrook and Batra 1991). In other words, a more interactive website tends to be more fun to see, more interesting, more useful, entertaining than a less interactive website. This appears to lend empirical support to advertising and marketing practitioners' intuition of "the more interactive the better," or at least with all other conditions being equal. In fact, today's Fortune 500 companies' websites are much more interactive than ever before because they have incorporated many more interactive elements. In particular, Macromedia Flash technologies are very commonly used, and they come at a premium cost. The implication for this finding is clear: online marketers know what they are doing.

It is somewhat surprising to see that the level of user Internet skills did not influence users' attitude toward the website, and that it did not moderate the effect of the level of website interactivity. The level of user Internet skills and the level of website interactivity are intertwined because both are related to new media and interactive technologies in the context of interactive marketing and advertising communication. Some previous research (e.g., Koufaris 2000) indicated that users' perceived level of skills positively influences their evaluation of a visited website. This study measured users' actual level of skills in using the Internet, which did not have any direct effect on attitude toward the website or any moderating effect on interactivity of a website. This may be due to the possibility that the level of user Internet skills may influence users' attitude via a mediating variable such as perceived interactivity of a website. With these speculations in mind we now turn to the implications and limitations section.

### ***Implications of the Findings***

The obvious implication for the findings of this study is that the concept of interactivity plays a very important role in understanding interactive communication. In addition, we have found more empirical evidence to support the notion of "the more interactive the better" among both practitioners and academicians. Another finding is that the actual level of users skills does not seem to influence users' attitude toward the website. This is counter-intuitive and deserves further research.

### ***Limitations and Directions for Future Research***

This study has several limitations. The design is a hybrid 2 x 2, which makes it inconclusive to draw conclusions about the non-experimental factor (the level of user Internet skills). Another limitation is that the GUV skill test may not be robust enough to measure users' actual level of Internet skills. The last limitation is that the level of website interactivity is manipulated at either a high or low level. An intermediate level of website interactivity might be needed to assess its impact on attitude measures. Future research may address these imitations to generate more conclusive results concerning the effects of website interactivity and user Internet skills.

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