

CHAPTER IX

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

The Web and its use is an important phenomenon. A growing number of rural communities operate Internet Web sites to inform people about their community's natural resources and cultural heritage. In fact, the tourism industry, including nature tourism, is the second biggest user of the Internet. What is it about the Web that engages people? Understanding the relationship between factors in Web development and people's experience with a Web site could help to maximize the effectiveness of the Web site in achieving its interpretive goals.

The main purpose of this dissertation was to evaluate empirically the experience and the effectiveness of an Internet virtual tour of a place to meet the basic functions of interpretive presentation. Specifically, this research attempted to determine whether an interpretive Web site could induce flow experience, what causes visitors to have an optimal experience while visiting a virtual tour Web site, and how the consequences of this experience help to meet the potential of environmental interpretation. This dissertation has successfully completed the following three tasks:

- (1). an evaluation of a place-based Web site with principles derived from the literature on environmental interpretation and Web site design,

- (2). the development of a flow model representing a series of hypotheses. The model functions to describe the relationship among different dimensions in Web development, including:
 - (a) their direct and indirect influence on flow experience,
 - (b) the direct and indirect effects of flow experience on the effectiveness of a Web site,
 - (c) measurements of these factors.
- (3). the testing and modification of the flow model with the structural equation modeling technique using data collected from an online survey.

The conceptual flow model characterized the interdependencies between eleven latent variables, including: experience with virtual Web sites, visitors' impression of the attractiveness of the Web site, speed, ease of use, interactivity, telepresence, challenge, skill, flow experience, learning about a place, and changes of attitude and behavior. This research intended to measure the direct, indirect, and total effects of various factors on flow experience, and the direct, indirect and total effects of flow experience on learning about a place, and on changes of attitudes and behavior. The changes of attitudes and behavior specifically refer to visitors' interest in acquiring more information about the place presented, coming back to the Web site, or visiting the "actual" place.

Analyzing the survey data and testing the flow model answered the three research questions:

- (1) Can an interpretive Web site induce flow experience?
- (2) What are the factors that affect flow experience?

- (3) What is the consequence of flow experience as it relates to the effectiveness of the Web site?

Conclusions

This research has involved a large number of tests, comparisons, and findings relative to results for a series of measurement and structural models. Three of the original paths were supported. They are: ease of use → interactivity, flow → learning about a place, learning about a place → changes of attitudes and behavior.

The model development process identified several paths that did not fit the data well. As a result, eight paths were removed from the original model. These paths are: experience with virtual tour Web sites → attractiveness, experience with virtual tour Web sites → ease of use, attractiveness → telepresence, speed → interactivity, interactivity → telepresence, telepresence → flow, challenge → flow, and skill → flow.

The model fitting process also discovered several important relationships that were not anticipated in the original flow model. The path that were added to the original model are: attractiveness → ease of use, attractiveness → flow, attractiveness → changes of attitude and behavior, speed → attractiveness, speed ↔ challenge, interactivity → flow, challenge → learning about a place, skill → changes of attitude and behavior, and flow → telepresence.

Based on the findings of this research, the following conclusions can be made:

1. An interpretive Web site that depicts a place can induce flow experience. Flow experience is characterized by enjoyment, time distortion, and unawareness of one's immediate environment.

2. Contrary to expectation, this research did not find that challenge and skill contribute to flow experience in a hypermedia environment of the Web.
3. Two factors were found to directly contribute to flow experience: attractiveness of the Web site and the interactivity facilitated by the Web site. Attractiveness is the most important factor that was found to affect the quality of people's online experience.
4. The research results support the original assumption of using time distortion and enjoyment to measure flow experience.
5. Telepresence, that is when a person experiences being present in a remote virtual environment through interactions with a computer, reflects one aspect of flow experience in a hypermedia environment of the Web. Thus, it could be used as one of the indicators to measure flow experience.
6. In a hypermedia environment of the Web, flow experience is positively related to increased learning about a place as presented in the content of a Web site.
7. The expected changes in visitors' attitude and behavior are strongly associated with people's learning about the attractions and resources of the place.
8. Although flow experience was found to be the largest contributor to learning about a place, this knowledge further led to positive and responsible actions; however, there are other factors that have positive influence on these outcomes.

- (1) Being attracted to the Web site is one among other factors that have direct positive impact on people taking positive and responsible actions.
 - (2) Periodically renewing a Web site's content with the intention to challenge visitors' knowledge base could help to improve the performance of the Web site for educational purposes.
 - (3) Visitors' domain knowledge and personal interest have a small direct impact on their subsequent actions after visiting a Web site.
9. Domain knowledge – difference in visitors' knowledge base about the topic presented in the Web site did not appear to have significant effect on the quality of their experience.
 10. Attractiveness was found to be the driver of the effectiveness of an interpretive Web site.
 11. Speed is one of the factors that affect people's impression of a Web site's attractiveness. It also correlates with people's impression of the Web site's content.

Implications of the Findings

This research has implications for both Web site development practitioners and researchers in geography. The conceptual and methodological approaches employed in this research are appropriate to the nature of interpretive Web sites and the theoretical foundation for the flow phenomenon.

The theory on flow experience extends previous thinking about environmental interpretation and the related spatial presentation by incorporating the intrinsic motivational aspects of human interactions. It not only links elements of visitors' subjective experience of the interaction with the quality of presentation, but also provides a theoretical basis for understanding how viewers' experience is related to the presenters' intended outcomes.

Implications to the Practice of Web Site Development

This research has demonstrated that flow is a useful and practical tool to understand users' perceived experience while browsing a Web site. Flow experience appears to influence a number of important outcomes. Flow in this research had a positive impact on peoples' learning about a place. This new knowledge stimulated their interest in acquiring more information about the place, and an expressed desire to visit that place. Therefore, in order to maximize the effectiveness of a Web site, the goal should be the creation of a beneficial flow experience.

Then, how does one design a compelling Web site that transforms a random navigation into an exhilarating experience? Improving the quality of flow's contributors, attractiveness, interactivity and their precedent, speed and ease of use, can facilitate this experience. The close relationship between the occurrence of flow and its contributing factors of attractiveness and interactivity demonstrate that in the hypermedia environment of the Web, flow is associated not only with information retrieval, but also with situational interaction.

Traditional presentation on the Web is more content-based, rather than context-based. Content-based presentation is planned and formal, while context-based presentation encourages visitors' engagement and participation. Context-based presentation focuses on situating conditions for interaction and may be more informal, spontaneous, and non-sequential. It emphasizes interactivity and attractiveness. The findings from the final flow model show that these two factors directly contribute to the state of flow.

However, new technologies must be dependable (Beck and Cable 1998). The strong effect of ease of use on interactivity reported in this research implies that improving a Web site's interactivity should not sacrifice the Web site's usability. Ease of use is one of the important issues in a Web site's usability. Today, with more Web sites interested in facilitating high levels of interactivity, very often Web developers fail to pay adequate attention to the quality of their Web sites' usability. However, the results of this research indicate that interrupted usability could have a detrimental effect on the level of interactivity, which would work against a Web developer's desired outcome.

Implications to the Research on Flow Experience

Flow and its measurement

Scientists studying many different phenomena have embraced flow theory. It has been used to understand the experiential dynamics of a variety of activities, from playing video games to mountain climbing. Flow theory is very appealing because it makes sense intuitively. We all know that flow experience occurs when we see children enraptured by video games, or when we find ourselves spending untold hours surfing the Internet. The

theory on flow has broad implications. However, one of the weaknesses of this theory is “how to measure it,” as suggested by O’Leary (2001). Investigating and validating this theory without solid, repeatable measurement techniques is seriously limited in its application.

Previous research linking flow with structural equation modeling concluded that conceptually flow is a multidimensional construct, but with much less convincing results than this research (Trevino and Webster 1992). The results of this research provide compelling evidence that flow can be measured with structural equation modeling methods. Although one empirical study cannot purport to answer this question, the results of this study suggest that flow experience might well be measured if it is well constructed and rigorously tested with the structural equation modeling process. Of course, the direct implications of this research can only apply to the context of this research. Nonetheless, it seems plausible that, if researchers would deconstruct other contextual flow experience into theoretically derived components and utilize the modeling method employed in this research, other flow experience might be also measurable.

Telepresence

One of the most important discoveries of this research is to establish telepresence as one of the characteristics of flow experience in the hypermedia environment of the Web. Although Csikszentmihalyi (1998) believes that flow can occur in any activity of everyday life, most of the studies on flow experience have been about traditional activities such as mountain climbing, composing music, performing surgery, etc. Telepresence is a new phenomenon. It has evolved from an attempt to understand

people's engagement with computers. The state of telepresence is similar to the characteristics of flow, such as complete involvement, focused attention and loss of awareness. Consequently, it is not surprising that the modeling process of this research established telepresence as one of the measurement variables for flow in the context of human-computer interactions on the Web. However, more research is needed to confirm this finding.

Implications for Nature Tourism Interpretation Using the Web

As stated earlier, interpretive information is essential to the success of nature tourism. Thus, the effectiveness of an environmental interpretive Web site is one of the major concerns for communities using the Web for nature tourism development, especially for rural areas where the Internet is the most cost-effective means of marketing. The goals of environmental interpretation include providing basic site information, fostering awareness, and encouraging investigation and responsible actions (Beck and Cable 1998). The results of this research demonstrate that an interpretive Web site that depicts a place and induces flow experience will help to accomplish the goals of environmental interpretation. Therefore, helping people to experience flow is a highly desirable objective for environmental interpretation on the Web.

Implications to the Research in Geography

The theory of optimal experience is well grounded in the psychological literature on human motivation. It has also gained attention in the realm of interpretation. This research with its inter-disciplinary application of the optimal experience theory will prove

to be a valuable contribution to the research in geography. The knowledge gained from this research should provide a basis for further exploration of this topic. It will justify the linkage of environmental interpretation of places, the Web, and flow experience as a powerful, timely, and fruitful area of inquiry in the field of geography. Understanding the determinants of flow will help geographers design human-centered and experience-oriented programs.

In summary, for people, such as general Web designers, interpretive programmers or educators in geography using the Web as a medium for communication, who want to draw visitors deeper into their Web sites, careful consideration should be given to creating a flow experience. If they want their visitors to be more susceptible to messages presented, and be influenced by those messages in their attitude and behavior through psychological impact, they need to be thinking about how to provide visitors flow experience.

Recommendations for Future Research

Attractiveness

This research has discovered that attractiveness is the most significant contributor to flow experience in the context of human-computer interactions in the hypermedia environment of a Web site. It has proved the longstanding notion that presentation is everything. This research did not attempt to define or describe attractiveness of an interpretive Web site. However, research about what elements contribute to Web sites' attractiveness should be a high priority for future research. Future research should

identify individual components of a Web site and their impact on people's perceptions of attractiveness. It should also investigate what features that enhance the attractiveness of a Web site are consistent across gender, cultural and educational background.

Challenge and Skills in the Environment of the Web

Challenge and skill are complex variables. They play a central role in the first flow model proposed by Csikszentmihalyi (1975). According to Csikszentmihalyi, a higher level of challenge and skill produces a higher level of flow. However, flow experience in this research appeared to be highly associated with attractiveness, ease of use and interactivity. This result does not necessarily imply that Csikszentmihalyi's flow model will not work in the Web environment. One could argue that this result was due to issues related to the measurement of challenge and skill. How to operationally define these two variables has always been a challenge in the research on flow experience. The content of challenge and skills varies according to the context where flow occurs. In a hypermedia environment like the Web, what constitutes a real challenge? What special skill is required in a hypermedia environment to meet this challenge and make a difference in people's experience?

In this research, challenge was represented by the Web site contents. Skill was represented by visitor's knowledge about birding and the place. The rationale for these representations was based on the fact that browsing the Web is mainly an information-seeking activity, the content of the Web site and visitors' background knowledge would apparently be measures of challenge and skill. This approach appears to be more reliable

than past studies about the Web, which asked visitors about their computer-related skills (Hoffman and Novak 1996). However, the results of this research suggest that future research needs to specifically investigate the nature of the Web environment and the characteristics of people's interactions with it.

Subjectivity

Intuitively, subjectivity should also play an important role in peoples' experience with the Web. "What you see is not what I see" (Snowdon 1995). The flow model employs users' experience with virtual tour Web sites to measure one aspect of visitors' individual differences, and their impact on evaluating the attractiveness of the Web site and ease of use. The results did not show a significant impact of their experience on these two factors. However, the result is inconclusive because there were indications that the measurement of this factor was problematic. Future research should redefine the measurement of this factor and have it included in the model. Future research should examine visitors' demographic characteristics and their impact on the occurrence of flow experience.

Techniques for Intuitive Spatial Information Presentation

In the process of investigating how to effectively use the Web as an interpretation media to present place based information, it is imperative to develop techniques for the explicit representation of spatial information. While "space" in a hypermedia environment is still metaphorical (Erickson 1993), the interest of an explicit spatial representation using 2-D and 3-D graphics has been increasing (Hand 1996; Benford and

Fahlen 1993). Further research should examine the effect of a virtual environment where users will find it natural and intuitive to navigate virtual spaces, such as three-dimensional environments, and how such environments are related to the experience of flow.

Research to Validate Findings of this Research

The findings of this research must be interpreted with caution. First, the parameter estimates obtained can be interpreted only in the context of the variables included in the flow model. Factors were measured with a self-rating instrument. Although the results provide conceptual inferences, it would be more useful in practice if these factors could be measured with more objective measures.

Second, future research should cross-validate the final flow model with new data. Cross validation could help to avoid problems with significance levels when hypothesis are formulated and tested using the same data (Cox 1982).

If possible, future research should also include multiple Web sites. A cross examination of the different components in the Web sites, and testing the flow model with those Web sites will improve the credibility and usability of the findings of this research.

Third, a special caution should be noted regarding the potential affects of people's geographical location and their responses to a research project such at this. About half of the respondents were from Texas. Further research is needed to examine if, and in what way, respondents' geographical location affect their responses and subsequent actions after visiting a Web site.