Less Clicking, More Watching: Results of the Iterative Design and Evaluation of Entertaining Web Experiences

Clare-Marie Karat, Claudio Pinhanez, John Karat, Renee Arora, John Vergo

IBM T.J. Watson Research Center
30 Saw Mill River Road, Hawthorne, NY, USA 10532

{ckarat, pinhanez, jkarat, arora, jvergo}@us.ibm.com

Abstract: Research on a web application intended to provide an entertaining and engaging cultural experience for users is described. Initial discovery phase research, using user-centered design, suggested that such an application should be designed with a "less clicking, more watching" approach. Two web tour prototypes were created and tested with 24 subjects in singles and pairs conditions to analyze user's ratings of engagement, entertainment, satisfaction with level of interactivity, subject matter appeal and their observed mouse activity. Results demonstrate that subjects who interacted less with the tours had higher subjective ratings on these variables. There were no significant differences between singles and pairs groups on subjective or observed measures. In the domain of cultural entertainment on the web, users may ask for much more control functionality than they really use in practice.

Keywords: Web experiences, iterative design and evaluation, entertainment

1 Introduction

Usability is a term that can be used to address a wide range of topics when interacting with a system. It is a measure of the quality of interaction with a system by someone trying to do something in a specific context, and includes both objective and subjective components. While we do not have design guidelines that enable us to produce usable systems without the hard work of understanding users and their tasks, we have solid guidance for processes that lead to the design of usable systems. If objective measures can be established and we follow user-centered design (UCD) processes, we can guide the design through the results of the evaluation to achieve design goals. But what happens when there is no clear task? When there is no specific user task to serve as a basis for measurement, it is difficult to determine success or failure. This is the space in which we find ourselves increasingly as systems move from being tools to increase productivity in the office place to pervasive components of all aspects of our lives. We are no longer designing systems just to enable well-specified tasks: we are designing systems with the primary objective of providing users with entertaining experiences. With these changes, the subjective aspects of usability are becoming the primary focus.

This paper reports on the UCD process of designing and evaluating a web site devoted to the provision of entertaining experiences about art and culture. The paper begins with a literature review of entertainment and related concepts. We follow by reporting the results of the first phase of our research, when we first detected the strong user interest in *watchable web experiences*. Next we briefly describe the design of the prototypes used in the second phase of our study, whose hypotheses, methodology, and results are detailed in the subsequent sections. These sections also report our investigation of other aspects of watchable web experiences including the roles of accessible related content and social context. We conclude by discussing the strengths and limitations of our results and by exploring possible consequences and applications of this research.

2 Entertainment Concepts

Defining "entertainment" is by no means an easy task. The term is often used in everyday language. People believe that they know what entertainment is because it seems to be a matter of common sense, but it is actually difficult to define (Dyer, 1992). For example, entertainment has been described as being "any activity without direct physical aim" (Langer, 1953) and as "anything people attend to simply because it interests them," (Langer, 1953). Whitehead defines entertainment as "what people do with their freedom" (Langer, 1953). Throughout our

design process, we have repeatedly been told by web designers and by the literature (Laurel, 1993, Murray, 1997) that people are entertained by computers only when actively interacting with the content. The classic examples of this kind of entertaining experiences are video games, role-playing games, and chat-rooms.

In general, we can say that people are entertained when they are voluntarily undergoing an experience that interests them and gives them some amount of pleasure or release. People have developed guidelines for the development of entertaining stories (McKee, 1997), but it is not clear how to extend these guidelines to the new interactive medium of the web. It is interesting that, in spite of the size of the entertainment industry, there is hardly any work trying to deepen our understanding of the subjective experience of entertainment, either in the behavioral science, social science, or human-computer interface literature. In fact, most of the published work deals with concepts related to entertainment, such as engagement, arousal, play, flow, and pleasure.

Engagement has been described as "seductive...making interaction with a computer a fulfilling experience" (Skelly, Fries, Linnett, Nass, & Reeves, 1994), and as a "state of mind that we must attain in order to enjoy a representation of an action...entails a kind of playfulness - that ability to fool around, to spin out 'what if' scenarios" (Laurel, 1993).

Factors in the design process that can engage users include content, type of media, presentation, and control (Jaques, Preece, & Carey, 1995). Engagement currently appears to be measured by attention focus, curiosity, and intrinsic interest (Webster & Ho, 1997).

A concept similar to entertainment is the idea of play. Several definitions of play exist such as "behavior motivated by the need to avoid boredom and maintain arousal" (Ellis, 1973). Various theories of play exist, such as play as arousal-seeking behavior, caused by the need to generate interactions with the environment or self that elevate arousal towards an optimum for the individual (Ellis, 1973; Lieberman, 1977). Also, engagement and playfulness can overlap with attention focus, curiosity, and intrinsic interest (Webster & Ho, 1997).

Csikszentmihalyi's flow theory has a direct relation to the areas of engagement and playfulness. He describes flow as the "holistic sensation that people feel when they act with total involvement. This is experienced when the center of attention is on a limited stimulus" (Csikszentmihalyi, 1975). It has been reported that the overall quality of experience during daily life improved as the time spent in flow increased (Csikszentmihalyi, 1975).

Interestingly, watching TV is not very conducive to this idea of flow. Research has shown that passive viewing alone does not provide the emotional rewards found in more actively engaging activities such as sports and hobbies (Kubey & Csikszentmihalyi, 1990). It has been reported that challenging users may be necessary to engage viewers, or at least provide curiosity (Malone, 1981). In many ways, people seem to experience flow in an entertaining experience mainly when deeply engaged.

3 Discovery Phase

The research described in this paper originated from studies related to the creation of a web site for art and culture. The goal of this web site was to bring entertaining cultural content to users around the world. The web site's goal was not to be a database of cultural artifacts or knowledge, but instead to attract users by enabling entertaining experiences similar to those provided by a visit to a museum, the attendance of a performance, or the watching of a cultural TV program. Success of the web site was to be measured by its popularity and, specifically, by the proportion of repeated visits by users.

What kind of entertainment do people want from a web site on art and culture? To answer this question, we conducted a variety of UCD activities including interviews with curators and cultural programmers, focus groups sessions in different cities in the United States, data collection from visitors to two different museums in New York City, data collection from web surveys on three museum web sites, and usability walkthroughs of existing web sites and our own prototypes. The detailed description of these UCD activities and results is beyond the scope of this paper. We briefly mention some of the results that informed our design process below.

The usability walkthroughs were run in 12 sessions with a total of 70 participants ranging from 9 to 72 years in age who were screened for cultural interest and experience with the web. Subjects were first shown excerpts of existing web sites related to culture, and then they were presented mockups of new design ideas. The mockups of design ideas shown in the second part of the usability walkthroughs encompassed five different design approaches for exploring cultural content:

1. A filtering system based on direct manipulation of large databases with visual feedback (such as in Alberg & Shneiderman, 1994);
2. A set of lenses (tools) to manipulate the way content could be viewed (such as in Stone, Fishkin, and Bier, 1994);
3. A chat system where people could talk about a particular art work;
4. A notebook system where the user collects and comments on artistic content, and later publishes the notebook for public/private viewing;
5. A multimedia system where the user watches guided multimedia tours, interacting whenever interested in related information.

3.1 Less Clicking, More Watching

A major finding of the usability walkthroughs was that most of the participants did not express interest in web sites that involved active interaction with the content or other people, such as when using a filtering system, creating a notebook, or chatting. The guided tour format was clearly the best received among the design ideas. Among the existing web sites, there was a preference for sites where the user was guided through an experience or discovery process, and even in these cases, participants strongly suggested the replacement of text by audio.

We summarized these findings by hypothesizing that in this domain of entertaining web experiences, users wanted *less clicking, more watching*. Users seem to be very comfortable with the idea of a streaming web experience that leads them through artistic and cultural artifacts where, unlike television, the stream can be paused, replayed, or interrupted for further exploration. In fact, we found a strong desire for availability of related information through hypermedia links and in-depth analysis of the works of art. Interestingly, some of the participants viewed the more interactive design concepts and existing web sites as work-like experiences, not entertainment. This seemed to reflect an association between interactive tools that were presented in these designs and typical work-related applications from their real world experiences.

The usability walkthroughs also pointed out that users wanted a "human voice" behind the multimedia experience, that is, a personal viewpoint in the exposition of the content. In many ways, the participants in our research seemed to lean towards defining an entertaining web experience as something closer to traditional TV, but enriched by the opportunity to explore and find related information. However, our web surveys also indicated that to access the majority of our targeted audience today, such web experiences must be available to users who have modems of at least 56Kbps for their computers.

4 Web Site Prototype

Based on the results of the discovery phase, we developed a design concept for the cultural web site based on the idea of providing users multimedia tours guided by experts, artists, or celebrities. In our design, a tour presents information to the user continuously, from beginning to end, unless the user chooses to explore related material or to exercise control.

To cope with the requirement of minimum 56Kbps bandwidth, we decided to explore multimedia experiences primarily based on still pictures and sound with minimal use of video. At 56Kbps, a continuous video stream is of insufficient quality, but at that speed it is possible to download combined audio and images that have reasonable quality. The primary use of still photographs reduced production costs since shooting video is more expensive than using still pictures accompanied by recorded audio.

4.1 The Design of the Tours

In our design, the main multimedia experience, or main tour, is composed of multiple scenes connected linearly that play continuously to tell a story from the tour guide's perspective. The tours resemble a short documentary and play within a web browser window. The main tour is enriched by the addition of user controls such as pause/resume, a navigation map to enable scene changes, and by the inclusion of hot spots for two kinds of related content: side tours and branches. A side tour is a self-contained multimedia segment focusing in depth on some aspect of the tour. A branch is a static web page with text, pictures, and links to related information on a specific subject. Since side tours were more costly to produce than branches, we produced side tours only for highly desirable related information.

Figure 1 shows a snapshot of a tour. The majority of the screen area is filled with tour content (pictures, text, occasionally very short segments of video). On the bottom left-hand side, a pictorial navigation map gives the user an idea of their position in the tour, the duration of different scenes in the tour, and the proportion of the tour remaining. Rolling the mouse over the map presents textual information about each scene, while clicking on the picture of a scene interrupts the current scene and immediately starts the scene corresponding to the clicked image.

As the tour progresses, hot spots indicating the availability of side tours and branches appear on the screen. These hot spots remain for a minimum duration of 10 seconds and then fade away. The hot spots appear when the content relates to them and fade away after the related part of the tour has finished. When a side tour is selected, the main tour is interrupted and the side tour is played. When a side tour finishes, the main tour resumes from the point where it was left. A click on a branch pauses the tour and opens a new window on the browser, displaying the web page associated with the branch. To resume the main tour, the user must click on the pause/resume icon above the map.

Figure 1 Typical scene of a tour with its navigation map, including links to a side tour and two branches

All the tour content including the scenes from the main tour, side tours, and branches is available from the Explore Page at the end of the tour. Figure 2 depicts the Explore Page for the tour shown in Figure 1. Clicking on the tour map restarts the tour from the beginning of the scene that is clicked. Similarly, clicking on side tours and branches immediately starts them. The user can access the Explore Page at any time during a tour by clicking on the corresponding hot spot on the right of the map.

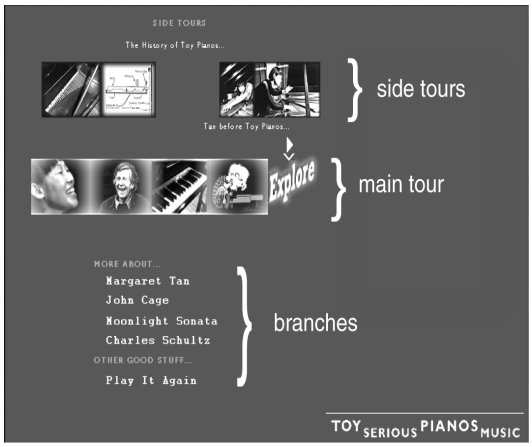

Figure 2: Exploration page that allows access to the main tour and all side tours and branches.

4.2 Evaluating the Two Tours

The design concepts described above informed the design and development of two pilot tours that were the focus of the research described in this paper. The first tour featured the work of a toy pianist, Margaret Leng Tan. In the tour, the pianist talks about her involvement with toy pianos, how music is arranged for a toy piano, and her connections to Schröeder, the famous cartoon character created by Charles Schulz. Two side tours describe the history and mechanics of toy pianos and the work of Margaret Leng Tan before becoming a toy pianist. The main tour lasts 4:15 minutes and the side tours take 1:18 minutes and 0:50 minutes, respectively. The tour also includes five branches.

The second tour focused on Ludwig van Beethoven and his Ninth Symphony. Three side tours are provided; one about Beethoven's deafness, and two side tours enable the user to explore Beethoven's scores and his Heiligenstadt Testament. Beethoven's main tour lasts 10:10 minutes and the first side tour is 2:00 minutes in length. The other side tours, since they incorporate interactive elements, have no fixed duration, although their exploration typically took 1:00 minute each. There are also five branches available for user exploration.

We carried out an evaluation of the two tours with target users to understand what worked and what didn't in these web experiences. The evaluation focused on answering the following questions:

1. Can a web tour experience with "less clicking, more watching" be entertaining and engaging?
2. Are users satisfied with the level of interactivity designed in the web tours?
3. Do users who report higher subject matter appeal interact more and/or spend more time on the tour?
4. Do users look for related information during the streaming portion of the tour or from the Explore Page?
5. Does social context (singles or pairs) have an effect on reported levels of our subjective measures?

5 Method

There were two groups of subjects who took part in the experiment. In the first group the subjects experienced the web sites alone (Singles) while in the second group there were pairs of subjects viewing the web sites (Pairs). The procedures were very similar

for the two groups except for minor variations mentioned in the details below.

Subjects in our study completed three web experiences, based on our two pilot tours. For each of the two tour topics, we had constructed a low- and a high-interactivity version of the tour. Low-interactivity tours had limited play control (only pause and resume) and no side tours or branches. High-interactivity tours included all the elements described in the design section. Subjects first experienced both the low- and high-interactivity versions of one tour and then experienced the high-interactivity version of the other tour. Order of the tour presentation (Beethoven or Toy Pianos first) and level of interactivity (low or high) was balanced within conditions.

The subjects were recruited from the population of regular employees and student interns at the IBM TJ Watson Research Center in Hawthorne, NY. About half of the subjects in each of the two groups were students and half were regular employees of various backgrounds. About half of the subjects were women and half were men. The age range of the subjects was from 21-55 years old. All subjects were pre-screened to have attended at least one cultural event in the last year and to have used the Internet at least five hours a week. Eight subjects were randomly assigned to the Singles condition, and eight groups of two subjects each were randomly assigned to the Pairs condition. Subjects in the Pairs condition all knew each other before the experiment. The 24 subjects in the experiment were each given $25 merchandise certificates for their participation in the study.

On arrival at the usability laboratory, subjects were given a brief overview of the session structure and introduced to the usability studio setup by the experimenter. The five authors were the experimenters and ran the sessions. Subjects sat facing a 17-inch personal computer monitor placed on a table with a keyboard (which was not used) and a mouse. The sites that the subjects evaluated were presented in a full screen Netscape 4.7 browser window. The experimenter told them that they would be videotaped and asked them to sign a release form. Each subject then filled out a pre-session questionnaire (PreSQ) that collected demographic information. After subjects had filled out the questionnaire, the experimenter then set the browser to the first site, briefly introduced it, and then left the room to observe the session from the control room. After each tour, subjects filled out a post-session questionnaire (PosSQ) describing their experience. On finishing this questionnaire, the experimenter returned to the room to set the browser to the next tour and then left before the user began the tour. Subjects were instructed to spend as much time on each tour as desired and to tell the experimenter when they were done. After all three tours were completed, the experimenter interviewed the subjects using the debrief questionnaire (DQ).

Immediately before the first experience with a high-interactivity tour, the experimenter asked the subjects to make sure that they took at least one branch and one side tour during the main tour, and also told them that they could explore as much of the information as they wanted on the Explore Page. For the subjects in the Pairs condition, the experimenter asked that they each take turns controlling the mouse and that they make sure that each of them take at least one side tour or branch selection. Before the final (high-interactivity) experience, subjects were told to interact with the tour as much or as little as they wanted.

The main part of the PosSQ was a set of four questions asking the users to rate the level of engagement, entertainment, satisfaction with the level of interactivity and subject matter appeal of each of the tours they experienced, using a seven point Lickert scale. We did not provide definitions of the terms. The actual questions were:

1. How engaging was the multimedia experience for you? (1 = Not engaging at all, 7 = Very engaging)
2. How entertaining was the multimedia experience for you? (1 = Not entertaining at all, 7 = Very entertaining)
3. How satisfied were you with the level of interactivity in the multimedia experience? (1 = Not satisfied at all, 7 = Very satisfied)
4. How appealing was the subject matter of the multimedia experience to you? (1 = Not appealing at all, 7 = Very appealing)

For each tour experience, we analyzed the videotapes and logged the user's mouse activity as follows. We counted the number of times the subjects moved the mouse pointer so that it was located on an object that could be selected (rollovers), and the number of times an object was actually selected. The objects could have been branches, side tours, or navigation map scenes including the Explore Page. We obtained counts for each of these types of selections. Also, we broke the interactions into two groups - those that occurred during the main tour presentation, and those that occurred after the subject had reached the end of the tour (i.e., from the Explore Page).

We also calculated a normalized "time in exploration" as the total time the subjects spent on the tour, minus the base time of the main tour itself (if no branches, pauses or side tours were taken).

Time (normalized) = Time (total) - Time (base)

Where, Time (total) = the total time a user spent on the tour, from the moment they started until they announced they were done. Total time included the time spent with the tour, pauses, plus the time spent on all branches and side tours.

6 Results

The results in this section are gathered from the PostSQ, the DQ, and the analysis of user mouse activity. They reflect the data from the third, high-interactivity tour presented to each subject or pair of subjects. For this third tour the users were provided a fully interactive tour and were free to interact with it however they desired. The first two tours were used as learning trials to give users experience with low- and high- interactivity tours before their final tour experience.

6.1 User Ratings of Tours

The means for user ratings of the four aspects of the tours (how engaging, entertaining, satisfied with the level of interactivity, and appealing the subject matter was) were all above neutral (4.0), ranging from 4.63 to 5.56 (see Table 1). There were no significant differences between the means for singles and pairs on any of the four subjective measures. In further analyses we found that the Beethoven tour was slightly more positively rated than the Tan tour on all four measures, however, there were no statistically significant differences.

Entertainment, engagement, satisfaction with interactivity, and subject matter appeal were all positively intercorrelated, with engagement and entertainment the most highly so. The range of the intercorrelations was 0.59 to 0.89. This suggests that entertainment and engagement were very similar concepts for our subjects

Means	Singles	Pairs	Total
Engagement	5.56	5.50	5.52
Entertainment	5.00	5.38	5.25
Satisfaction with Interactivity	5.37	4.63	4.87
Subject Matter Appeal	5.12	5.19	5.17

Table 1: Means for Singles, Pairs and All Users on Engagement, Entertainment, Satisfaction with Interactivity, and Subject Matter Appeal.

We explored the relationship between normalized time spent on the tours and the user's subjective ratings of the tours. Subjects spent an average of 3:52 minutes of normalized time on Beethoven and 6:12 minutes on Tan ($p>0.12$). There were no statistically significant differences on the amount of time spent on the tours by singles and pairs. Also, there were no significant correlations between the four subjective measures and the normalized time spent on the tours. Thus the amount of time subjects spent in exploring related information was not a factor in their subjective ratings of the tours.

We analyzed the videotapes of user mouse activity and the summary data are reported in Table 2 below. The results show that users interacted an average of 16 times during each of the tours. The number of interactions before reaching the Explore Page was similar to the number of interactions after reaching the Explore Page, thus our assumption that users would interact both during and after the tour was supported. There were no statistically significant differences in the types of user activity.

User Mouse Activity	Means
Grand Total User Mouse Activity	16.20
Total Acts Before Explore Page	8.29
Branches Taken	1.91
Side Tours Taken	.83
Scene Changes Made	1.75
Rollovers Made	3.79
Total Acts After Explore Page	7.91
Branches Taken	2.33
Side Tours Taken	1.58
Scene Changes Made	1.25
Rollovers Made	2.75

Table 2: Summary of User Mouse Activity During the Final Tour.

We next analyzed the relationship between user mouse activity and the user's four subjective ratings of the tours. Results show that user mouse activity was negatively correlated with engagement and entertainment both before and after the Explore Page (see Table 3). Subject matter appeal was negatively correlated with mouse activity after the Explore Page. This means that users who watched the tours more, and interacted less, were more engaged and entertained, and found the material more appealing. From the DQ, results showed that 18 out of 24 subjects said they would like to have the multimedia experiences similar to this again.

	Engage	Enter	Interact	Appeal
Total Mouse Activity	-.44*	-.48*	-.44*	-.45*
Mouse Acts Before Explore Page	-.41*	-.35	-.29	-.01
Mouse Acts After Explore Page	-.46*	-.44*	1.19	-.43*

Table 3: Correlations of User Mouse Activity with Engagement, Entertainment, Satisfaction with Interactivity, and Subject Matter Appeal.
*Correlations significant at the $p < 0.05$ level.

6.2 A Comparison of Singles and Pairs

We analyzed our data for differences between single participants and pairs of participants. We found no differences between singles and. pairs on the four subjective user ratings or on mouse activity of any type. In the debrief questionnaire, 10 out of 16 pair subjects reported that they thought the

experience was more fun as a pair than it would have been had they experienced it alone. Of the 18 out of 24 subjects who said they would return to the site, 12 said they would want to do it with family and friends rather than alone.

6.3 User Debrief Data

At the end of the sessions, all 24 users reflected on their experiences and answered a set of open-ended questions from the experimenter. The top responses are reported below. To the question "what did you think of the experience?" users replied that the web experiences flowed well and were entertaining. They thought the navigation map worked as expected and was valuable. However, they said the navigation map would be better if continuous control over the flow of the experience were provided through rewind, fast forward, and jump capabilities to position the tour anywhere within a scene.

When asked about the side tours, users responded that the side tours were valuable and worked as expected. Users thought that the side tours would be better if they were more in-depth and contained more content. They were adamant that the web experiences should be just one level deep in terms of access to related information. They generally thought the branches were valuable and worked as expected. Branches would be better if users were provided with better information about where they were going and understood how the branches related to the tours.

When asked what they liked best about the multimedia experience, users said they liked the integration of the various forms of media with the presentation of the story, and the user control and interactivity choices they had.

When asked what would make the tours better, users stated that they wanted finer control over the tours including fast-forward, rewind, and jump capabilities and greater content depth in the related material available to explore as desired.

7 Discussion

In this research we designed and evaluated entertaining web experiences with storylines that gave users the freedom to interact as much as they desired. The data support the "less clicking, more watching" design approach identified in the discovery phase. Our results suggest that we achieved our goal of providing entertaining experiences. We think this is at least in part due to our focus in the tour design on telling a story from a tour guide's perspective and providing different types of opportunities for interaction (Pinhanez, 2000).

We found an interesting design dilemma. Users want to have continuous control over cultural web experiences, however, those who report the highest satisfaction with the experiences use the controls the least. Users may ask for much more control functionality than they really use in practice in cultural entertainment experiences on the web. For entertainment applications that are game-like, user control is a critical factor. And games are a central part of the entertainment domain on the web today. New types of entertainment on the web are emerging though and more will be created. This research shows that for some cultural entertainment experiences on the web, a more passive experience results in higher perceived entertainment and engagement. A topic for future research is to examine related entertainment domains to understand the generalizability of the current results.

The iterative design of the navigation controls and related information links was generally successful. Users responded positively to the presence of side tours and branches, both within the main tour and on the Explore Page. Users selected side tours and branches both during and at the end of the tours, leading us to conclude that offering the related information at both places is valuable. Users did offer concern about getting lost or losing focus that suggests to us that there should not be a more complicated scheme than is presented in these prototypes for cultural web experiences.

Certainly the tour content has an impact on how entertaining users perceive the tours to be. Both of our tours had musical themes and our users had different levels of interest in music. We expected that people who were more interested in a topic would spend more time on a tour by exploring more related information. The results did not support this idea. We found that subject matter appeal was not related to the duration of the experience, but was negatively correlated with the level of interactivity by the users. These surprising results warrant further investigation.

The research showed that web tours were experienced positively both in an individual viewing setting and in a social context. There were no significant differences on the subjective measures for singles as compared to pairs of users. The majority of both singles and pairs also reported that they would like to have similar experiences again in the future.

In this research we employed a UCD methodology and utilized the results from the discovery phase in our implementation of the cultural prototypes. A primary result was that "less clicking, more watching" was a useful design guideline for entertaining cultural experiences on the web. This work represents initial research on this topic. The web enables a wide range of entertaining experiences for users. There is so much more to learn about the potential for entertainment on the web. Future research can help to build the framework for understanding this topic.

References

Alberg, C. & Shneiderman, B. (1994). Visual information seeking: Tight coupling of dynamic query filters with starfield displays. *Proceedings of CHI '94* (Boston MA, April 1994), ACM Press, 313-317.

Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety*. San Francisco: Jossey-Bass.

Dyer, R. (1992). *Only entertainment*. London: Routledge.

Ellis, M.J. (1973). *Why people play*. Englewood Cliffs, NJ: Prentice-Hall.

Jacques, R., Preece, J., & Carey, T. (1995). Engagement as a design concept for multimedia. *Canadian Journal of Educational Communication*, 24 (1), 49-59.

Kubey, R. & Csikszentmihalyi, M. (1990). *Television and the quality of life: How viewing shapes everyday experience.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Langer, S.K. (1953). *Feeling and Form.* New York: Charles Scribner's Sons.

Laurel, B. (1993). *Computers as Theatre*. Reading, MA: Addison-Wesley.

Lieberman, J. N. (1977). *Playfulness: Its relationship to imagination and creativity*. NewYork: Academic Press.

Malone, T.W. (1981). Toward a theory of intrinsically motivated instruction. *Cognitive Science*, 4, 333-369.

McKee, R. (1997). *Story*. New York: Wiley.

Murray, J.H. (1997). *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*. New York, NY. The Free Press.

Pinhanez, C. (2000) Physically Interactive Story Environments. *IBM Systems Journal, 39, 3-4, 438-455.*

Skelly, T.C., Fries, K., Linnett, B., Nass, C. & Reeves, B. (1994). Seductive interfaces: Satisfying a mass audience. *CHI '94 Conference Companion* (Boston MA, April 1994), ACM Press, 359-360.

Stone, M., Fishkin, K., & Bier, E. The movable filter as a user interface tool. . *Proceedings of CHI '94* (Boston MA, April 1994), ACM Press, 306-312.

Webster, J. & Ho, H. (1997). Audience engagement in multimedia presentations. *The Data Base for Advances in Information Systems*, 28 (2). 63-77