School of Design

To Inform and Engage: Museum Websites and Dynamic Delivery of Information

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Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

Signature

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Abstract

The World Wide Web has emerged as a powerful communications medium. With the development of new technologies, organizational websites are getting bigger and more complex, using design elements such as sound and motion to engage users' attention. This project will look at how users respond to the ways designers and developers present information on the web in a dynamic form which incorporates sound and motion. The research will focus on evaluating the communicative effectiveness of websites (particularly websites with different degrees of dynamic content in them), and will see if certain ways of presenting dynamic content are more effective than others. The method used will consist of observing users while they try to accomplish specific tasks on selected websites, through interviews, questionnaires and through verbal protocol ('think aloud') analysis. Effectiveness will be measured by such things as how long it takes them to complete each task, how successful they were in finding the necessary information, and the ease of use. Other factors which provide possible explanations for differences in effectiveness will also be measured; these will be drawn from two theoretical bases: communication theory (Fiske, 1982) and social psychology (Ajzen, 1991; Klobas & Morrison, 1999). The outcome of the research will be identification of problem areas associated with the effectiveness of information delivery by dynamic sites. Guidelines for communication designers, information architects and developers of websites, as they evaluate the success of dynamic sites, will be an appendix to the research.

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Chapter 1

This thesis will examine communicative effectiveness of websites with different degrees of dynamic content in them, to see how users respond to this content and if certain use and ways of presenting dynamic content are more effective than others. It also introduces the problem statement, the significance of this study, and outlines the research approach taken to complete this study.

Introduction

Since 1993, the number of people using the World Wide Web (WWW) globally for business, research, shopping, personal use, and communication has increased dramatically, from less than 90,000 to more than 304 million in 2000 (Moore & Murrey 2000, [online]). With over two billion unique indexed pages, the Internet has become a powerful research and communication tool. By the end of 2002, this number is expected to reach 655 million worldwide, according to the *E-Commerce and Development Report* released by the United Nations [online].

With the boom of commercial and non-commercial websites, we are getting bombarded with more and more information every day. With the development of new technologies, websites are becoming bigger and more complex, making it harder for the user to find the necessary information. How do we present this information so that it is easy to find and access, and how do we measure the effectiveness of a website for finding this information?

Web design is such a new concept that there is no general agreement among web designers and developers about which web design guidelines are correct. This is particularly true when it comes to the design of websites with dynamic elements – it seems that anything goes. The main purpose of most websites is to distribute information or promote products and to attract repeat users. Losing users because of poorly designed and hard to use websites could be catastrophic from a commercial and business point of view. How do we then present information with dynamic elements to our users as simply as possible?

Analysing and organizing material is the first part of the designing process. It means having good navigation, site structure and easy access to information. It means using and bringing traditional communication skills and incorporating these skills with new technologies, and learning new sets of skills that this technology demands. It is easy to lose users in tiled backgrounds, animated gifs and embedded audio files. Designers have to be careful not to

forget their primary goal, to engage and inform users. If the users get entertained in the process, all the better.

> To design is much more than simply to assemble, to order, or even to edit; it is to add value and meaning, to illuminate, to simplify, to clarify, to modify, to dignify, dramatize, to persuade, and perhaps even to amuse (Rand qtd. in Mullet and Sano 1995, p. 1).

This research is concerned with the relationship between dynamic elements of a website and the effectiveness of the site as a source of information. Dynamic elements of a site are those which use sound, animation and motion to deliver information to the user, elements that change or pop up when you move your cursor over them. In this study, dynamic sites are those which contain dynamic elements, and dynamic content is information content delivered using dynamic elements. Dynamicness refers to the extent to which dynamic elements are used in a dynamic site.

An understanding of the relationship between dynamic elements and effective information delivery requires an understanding of designers' reasons for including dynamic elements in sites, the potential problems associated with dynamic elements, and the relationship between those problems and the communicative effectiveness of a site, as experienced by the user. This section considers general problems with information access on the WWW before taking the designer's point of view to understand reasons for including dynamic content. The need to study effectiveness from the user's point of view is then considered before an introduction to two theories which may be used to build a clearer understanding of the relationship between dynamic content and effective information delivery.

Problem statement

The Internet is growing at an incredible rate, and it has become increasingly useful in today's world for research and communication. The strategies for effectively transmitting dynamic elements through a website are not well known or applied, and designers and developers of websites are constantly trying to improve them. With one click of a mouse we can buy a product, book a trip, do personal banking, send an e-mail, or access information that we need. But the accessibility and quality of information is getting more difficult and complex, at times even impossible to find.

In order to establish how to communicate effectively through a website, it is necessary to determine what constitutes an effective website. In books and articles that I have consulted, about how to design for the web, there has not been much research regarding content presented through dynamic elements and the impact it may have on the effectiveness of information delivery from a website. In order for designers, developers and information architects

to design effective and easy to use websites, more research is needed in this area. This study will contribute to our understanding of what constitutes an effective website, by examining users' responses to the dynamic elements included in museum websites.

Significance

Despite many articles and books that have been written about how to design for the web, and despite many design recommendations and guidelines for designing and building a usable website (Dumas and Redish 1993, Rubin 1994, Siegel 1996, Fleming 1998, Hackos and Redish 1998, Nielsen 1993, Nielsen 2000, Schriver 1997, Rosenfeld and Morville 1998, Lynch and Horton 1999, Spool et al. 1999, and Pearrow 2000), little has been written on usability and effective communication strategies from an information point of view, particularly where sites use dynamic content such as sound, video and animation. This represents a gap in knowledge for designers and communicators to design effective and easy to use websites, and to improve the website design process.

> Those who shape information for the masses–the media, marketers, designers, writers, information architects–do need to rethink the way information is delivered to the masses because people's information appetites are much more refined (Wurman 2001, p. 9).

This research takes a step toward rethinking the way information is delivered to the mass audiences of websites by examining the relationship between dynamic elements, which until now have been designed primarily to engage users and effective information delivery. It is particularly useful, in this context, to examine information delivery particularly from museum websites since most museums are funded by the public or through benefactors and foundations. Their sites are addressed to a mass audience, and their value is reflected in the extent to which people use the sites, get the information they are seeking, and are encouraged to return and to continue returning.

This research is particularly important because through introducing a theory base which goes beyond familiar notions of usability, it will introduce new ways of thinking about problems in the design of dynamic websites for communication of information. Guidelines drawn from this extended theory base will help designers and developers in their efforts to meet their dual goals, of engagement and information provision, and will serve as an appendix to the research.

Research approach

To achieve this, Chapter two examines literature written on the subject of information delivery through dynamic websites, and points to the lack of research in this area. It looks at dynamic versus static websites to see if one kind is more effective than the other. It looks at

virtual museums and user and task analysis. It examines different methods of usability testing, the studies conducted, and looks particularly at Spool's study on website usability. The main contributions of this thesis are the results of user studies that were conducted to evaluate dynamic websites. User evaluation is important because design plays an important role in determining whether we can use a certain product or not, and with what ease and satisfaction. The research questions will also be introduced.

The research methodology is outlined in Chapter three. It describes how websites and participants were selected, how user testing was conducted, and it looks at all the research instruments and questionnaires used. It talks about the pre-testing procedure, the outcome of it, and the procedure for data analysis. The results of the study are presented in Chapter four, looking at analysis and interpretation of data collected.

Chapter five, discussion, looks at the whole study, findings, reflections and items that were not expected or foreseen. Chapter six summarises the conclusion of the thesis' work, mentions things to consider, and presents a section on directions for further research in the field of dynamic websites.

Appendices follow Chapter six. *Appendix A* outlines design guidelines that were developed from the study. *Appendix B* presents a letter that was sent to the participants for the selection purposes while *Appendix C* is a script that was read to the participants before the testing started. *Appendix D* presents the scenario while *Appendix E* shows all the selected museum sites. *Appendix F* presents personal characteristics and experiences of the participants while *Appendix G* presents all the tasks performed for each website. *Appendix H* presents posttask questionnaires that were filled by participants after the tasks for each website were finished, while *Appendix I* outlines the interview questions that were asked after each website was tested. *Appendix J* presents part one of the two part posttest questionnaires that were filled by participants after testing all three sites. The part one questionnaire was for the subsites while *Appendix K,* a second part of that questionnaire, was for the evaluation of the main sites. Finally, *Appendix L* presents a table with summaries of times taken to finish each task, by each participant.

The following chapter discusses the literature review and lack of it. It looks at dynamic and static websites and dynamic elements such as sound, video and animation. It looks at communication theory and talks about virtual museums. It talks about user and task analysis, usability for the web, and looks at Spool's study that was done on information websites. Finally, it outlines the research questions of this study that I will try to answer.

Chapter 2

This chapter looks at the literature review, dynamic elements and their effect on information delivery, and the lack of research in this area. It also looks at dynamic and static websites, differences between them, and examines dynamic elements such as sound, video, animation and their uses. It looks at Shannon and Weaver's communication theory and how it applies to this research, and talks about virtual museums and what is being done in that area. It outlines the importance of user and task analysis and usable interfaces, and discusses web usability goals that are used in this study. It also looks at one study done by Spool et al. which is closely related to my study, and outlines the research questions.

Background

As a powerful communications medium, we have seen the World Wide Web emerge and continue to grow at an incredible rate. The Internet has become the communication medium of choice for business, research, education and personal use, with over two billion unique, indexed pages (Moore & Murrey 2000, [online]). One of the reasons the Internet is so popular and used by so many people is its vast resource of information. It is relatively easy to upload information onto the Web, information is constantly updated and available instantly and can be accessed 24 hours a day by anyone in the world from any desktop, assuming the server on which the information is stored is running.

With the idea of reaching millions of people all over the world at once, and with the advancement of new technologies, there has been an explosion of websites. Many companies in the past and some even today are putting up their websites without even taking into consideration users' needs and requirements (Sano 1996). This has resulted in many hard to use and sometimes unusable websites, leaving users lost in cyberspace while they search for information. It has also resulted in massive amounts of information that users have to go through every time they enter a word or words in a search engine. "There has not been an information explosion," Richard Saul Wurman (2001) writes in his book *Information Anxiety*, "but rather an explosion of noninformation, or stuff that simply doesn't inform." He goes on to say that "information is that which leads to understanding" (p. 19).

Information that is available on the net should not only be easy to use and access; it should also be credible. With everyone publishing on the Web, we have seen an increase in websites with low-quality information, as well as websites that are outright misleading (Fogg et al. 2001). It is getting harder and harder for a user to decide what's credible and what's not.

Spending an hour searching for information that is irrelevant or not credible can easily be an hour wasted for the user. So what makes websites credible? According to an empirical study and survey of over 1,400 web users conducted by Fogg et al. 2001, credibility is perceived as quality, and there are two key components – trustworthiness and expertise. They found that "websites which convey expertise can gain credibility in users' eyes." "Expertise" includes elements such as listing an author's credentials, and listing citations and references. As with expertise, their study suggests that "website elements that convey trustworthiness will lead to increased perceptions of credibility," and that "credibility can be defined as believability. Credible people are believable people; credible information is believable information" (Fogg et al. 2001, [online]). When a site lacks credibility, users will not remain on it for long, and they won't return (Fogg et al. 2002, [online]). Research at Stanford University on web credibility lists 10 guidelines for making websites more credible. They range from making it easy to verify the accuracy of information on a site, designing a site so that it looks professional or appropriate for a specific purpose, making a site easy to use or useful, to updating it's content and avoiding errors of all types (Stanford Web Credibility Research 2002, [online]).

This research will focus on the effects of site design, which is an important characteristic for credibility and effectiveness of information delivery. According to Fogg et al. (2002, [online]), users do evaluate websites by the visual design alone. In order for the site to be effective, we need to keep in mind and pay attention to such things as the layout, typography, images, dynamic elements, consistency and purpose of the site, when planning and designing websites. "Visual appeal is an important aspect of any communication medium" (Mohler and Duff 2000, p. 15).

Dynamic and static websites

In general, websites fall into two major categories: dynamic and static websites. Dynamic websites are sites that interact with the user. They change their appearance or behaviour based on user feedback or input. They consist of dynamic elements such as sound, video or animation, and they are interactive and nonsequential in nature. Static websites on the other hand do not have any interactive or dynamic elements in them and they resemble traditional documents, they are linear in nature. They contain navigation, graphics, text and links, and are basically a digitized version of a traditional document (Mohler & Duff 2000).

In their book *Designing Interactive Websites,* James L. Mohler and Jon M. Duff describe dynamic and static websites as digital publications and digitized publications.

> Digital publications are those which are designed around the positives of the Web. They are interactive and nonlinear. They are aesthetically pleasing ...they communicate very effectively and utilize the media efficiently.

> Digitized pages often look good, however, often they do not present depth in the medium. Often interactivity is lacking and the structure of content is very poor (Mohler & Duff 2000, p. 3).

With new technological advances we can see that the current design trend is moving towards dynamic websites, or interactive websites, as they are also referred to. Today, many companies are using dynamic elements in their websites, from simple pop up menus to full, animated home pages without any consideration for its communicative value (Mohler & Duff 2000). So, is dynamic representation more effective than static in terms of information delivery? Some companies, by using dynamic elements in their websites, are contributing to information being delivered on the Web and improving the message being communicated, while other companies are hindering information and the message being delivered, using dynamic elements in their websites without any purpose, appropriateness, or communicative value.

> Integrating animations or other graphical elements into a web page for the sake of doing so adds little. Above all other visual aspects or effects, communication is the most important aspect of a web page or site. All the other attributes should support, reinforce, or complement the message being conveyed to be effective (Mohler & Duff 2000, p. 4).

So how do we decide if dynamic elements should be included or excluded when designing websites? The best way is not only to look at your message but also at who your audience is and how to best communicate the message to them (Mohler & Duff 2000). Why are users coming to your site and what are they looking for? Every element integrated into a webpage should contribute to communication or enhance the content. If it does not, it should not be included. Interactivity should involve, engage, and motivate the user to explore the website. The best way to do this is through user testing and the asking of questions. Unclear buttons, links that are mislabelled, and icons that are confusing are some of the common mistakes in websites (Holmes 1995). The user can be frustrated by bad organization or too much information.

> User disappointment occurs with ill-conceived links, confusing routes, and incorrect labelling. By offering too much information, irrelevant choices, and confused routes, it is possible to alienate your audience from your content (Holmes 1995, [online]).

Dynamic elements

Dynamic elements do have their place in web design, as long as they are used appropriately, but in general, it is best to minimize their use (Nielsen 2000). According to Nielsen, most users say they are annoyed by animation, and almost all users hate text that moves. You have to decide what is appropriate and what will work by looking at the content. If you can communicate your message equally well without using animation, it is best not to use it.

Nielsen says that some users think the use of animation indicates that a lot of work has gone into designing a site. He adds that this would mean that animations are serving a function similar to that of marble columns in banks, visually demonstrating status and affluence.

Nielsen indicates that animation would be appropriate to use for the following purposes: to show continuity in transaction, to indicate dimensionality in transitions, to illustrate change over time, to visualize three-dimensional structures, or to attract attention. For example, showing continuity in transitions is appropriate when we show changes between two or more states. It is much easier for users to understand if these transitions are animated instead of instantaneous.

Nielsen believes that due to the bandwidth constraints, use of video on the web should be minimized; it should be used as a supplement to text and images rather than to provide the main content of a website. For example, video would be appropriate for promoting television shows or films, or to show a clip from a ballet. Because of the poor quality of streaming video, Nielsen suggests to digitize a higher-quality version of the video, and make it available on your site for download. He says if the video has any value, users will not mind waiting for a few minutes to download it.

Sound can be used to set a mood as in the game Myst (the non-linear game with 3D graphics and music blended together, where players explore scenes on a mystical island), or to provide a certain environment (Nielsen 2000). It could be used for voice recordings instead of video, to provide a sense of the speaker's personality. Using voice recordings instead of video results in smaller files and people often sound good even if they look dull, Nielsen says. Another example for the use of sound is recorded music sales, where users can listen to new recordings from their favourite artists before buying the album. This is where the interface, the look and feel of a website becomes very important; it is the means by which the audience interacts with your information. According to Nielsen, content is the main reason why users visit websites, not fancy animations or graphics.

> While I acknowledge that there is a need for art, fun and general good time on the Web, I believe that the main goal of most web projects should be to make it easy for customers to perform useful tasks (Nielsen 2000, p. 11).

Dynamic elements such as animation, video, and sound may be impressive at first; however, after the initial impact they can become irritating. When designing websites, we have to make sure that dynamic elements used are all meaningful and that they add to the content of a page (Lynch, Horton 1999).

Communication theory and the web

Communication is "social interaction through messages" (Fiske 1982). Research in communication theory (Fiske 1982) has explored the psychological and cultural characteristics of message senders and receivers, the structure of language systems, and the effectiveness of different coding techniques. All of these aspects have to be considered in communication-oriented design, in order to meet the communicative purpose of an organization's website.

Shannon and Weaver's *Mathematical Theory of Communication* (1949) "served as the paradigm for communication study, providing a single, easily understandable specification of the main components in the communication act" (Rogers, 1994, p. 438). According to communication theories based on Shannon and Weaver, the effectiveness of communication depends on four primary elements – source, message, channel and receiver (Fiske, 1982). Any one of these elements can be subject to interference or noise, affecting transmission of the message. This model of communication can be easily applied to website design, particularly to websites with dynamic content such as animation, video and sound. Using this theory, we can say that sound, animation or motion can be noise if they are not used to enhance the message being communicated. We can also say that if without purpose or used to bring attention to the element itself, or even for pure decoration, they are noise. If sound and motion have a purpose and are enhancing the delivery of the message, making it easier for the user or users to decode it, then they are not noise.

Views of communication based on Shannon and Weaver's theory define communication as "transmission of message." Fiske (1982) represents these views as "the process school" of communication theory. This school is concerned with how senders and receivers encode and decode and with "matters like efficiency and accuracy." This research takes the point of view of this school, representing communication as a process by which the information source or sender, in this case a designer or organisation, transmits a message by a communication process that is retrieved at the other end (destination) by a user. The designer's or organization's job is to encode the site's message or messages while the user's is to decode the message or messages.

> Communication is defined as the transfer of information from a source to a receiver. The goal of a communicator is to accomplish this process efficiently and effectively. Hence, communication theorists are committed to find and provide models by which communication can be enhanced. The challenge is to come up with the right combination of codes, media, and contexts in order to make the transfer of information fast, cost effective, and accurate. This process cannot be separated from the fact that humans are the ones that decode the information they receive through a particular medium in a specific context and make meaning out of it (Cólon 1995, [online]).

Looking at Shannon and Weaver's model of communication in Figure 2.1, we can see that the process is linear, from source to receiver. This study will not take the linear approach to communication but a dynamic one since communication in this study is viewed as a process rather than an act. Shannon and Weaver's model of communication can easily be adapted and applied to the web because it enables me to identify its components, from the information source (designers and developers) to the destination (the end users).

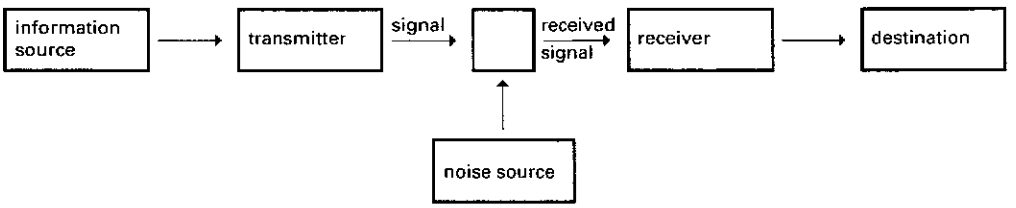

Figure 2.1 Shannon and Weaver's model of communication

For example, user input is required in order to access the message or information. Once the input is made, the success of retrieval will depend on the signal or interface. If the user is unable to decode the message, more input may be required. The effect, or user experience, will depend on how successful or satisfied the user was with the information retrieved. In this case, the user input is as important as the information retrieval. If the user does not know or understand what to do, the information retrieval may not be successful. It is a process that involves sending instructions or messages to the server, those instructions or messages being interpreted, processed and sent back through the same channels to the user.

Virtual museum

The World Wide Web has emerged as a powerful communication tool and museums were quick to see the opportunities offered by this new medium. Today, just having a website is no longer sufficient. Having a site that constantly meets and develops user expectations is essential (Peacock 2002, [online]). As competition in cyberspace becomes more intense, museums need to rethink how they deliver their online services. They need to understand and develop for their web audiences, to see how visitors explore and engage with their virtual content, and to improve user experience on their websites. According to Darren Peacock, Director of Information and Communication Technology at the National Museum of Australia, museum website evaluation is needed for future developments. Online visitor research is not as apparent as the evaluation applied to traditional visitor research, and in order to find out what online visitors need, more research is needed.

> In the online world, it is all too easy to let the technology drive the agenda. Evaluation pulls us back to the world of the user and commits us to an active engagement with our online visitors and their needs, expectations and experiences (Peacock 2002, [online]).

Peacock proposes a four level framework by which users access and explore a site. Each level has a set of log diagnostics which can be used to measure user satisfaction. The four levels are as follows: can I find it; does it work; does it have what I'm looking for; does it satisfy my needs?

Level one, can I find it, deals with how visitors get to the site. Is it by search engines, from other sites, or from museum promotion. Level two, does it work, examines the user experience from the perspective of site performance. It is concerned with fast and effective delivery of pages to potential users regardless of their operating systems and network connections. Level three, does it have what I'm looking for, is concerned with navigation and effectiveness of the content and its organisation, and level four, does it satisfy my needs, deals with customer satisfaction.

This study will use three levels proposed by Peacock, to examine museum websites: level two – does it work; level three – does it have what I'm looking for; and level four – does it satisfy my needs. Level two will examine user experiences through the use of dynamic elements; level three will examine the effectiveness of the information delivery through the use of dynamic elements; and level four will look at user satisfaction with information retrieval, using dynamic elements.

The National Museum of Australia used web log analysis to redesign their website. By using log data, the museum was able to test hypotheses about user behaviour and to develop new approaches to site structure and design. But some believe that web log data has its own limitations as a measurement tool. Web logs were originally used as traffic counters, but because of the way the web operates, particularly the process of caching, logs do not accurately count the total number of page requests or user sessions.

The National Museum of Australia analysed their web log data but they did not directly measure user satisfaction or user experience. Users do leave a lot of information when they visit a site, but since you cannot tell from a log if a user was successful or not at finding information, or if there were any problems associated with that search, it is hard to use this data effectively and measure user satisfaction.

Museum websites are becoming learning environments, designed to educate, inform and entertain, by using new technologies to communicate. Museums are able to reach diverse and remote audiences all over the world, providing people of all ages with access to information, for education and entertainment purposes. Exhibitions are one of the most common vehicles used by museums to communicate with the public. These range from dynamic exhibitions

online and three dimensional virtual tours, to online showcases of previous exhibitions and permanent collections.

By now, most museums have established their presence online. In order to make user access easy and more enjoyable and to attract repeat users, their websites need to be usable. According to Peacock (2002, [online]), extensive usability testing has been done with potential users using functions such as navigation and graphic design, but he adds that "usability testing is not the same as usefulness testing."

> To get to the heart of usability, we need to understand users' needs and motivations, not just their responses. We need to model those needs and to design and test accordingly, not just for functional effectiveness and efficiency, but for customer satisfaction (Peacock 2002, [online]).

Peacock adds that it needs to put the visitor at the centre of analysis rather than concentrate on site interface and technical design. Today, just having a site is no longer enough. Having a usable and well-designed site is essential for museums if they want to attract visitors and keep them coming back. In fact, for this same reason, most museums are redesigning their sites, concentrating more on creating experiences for visitors by making their websites more dynamic and interactive rather than just leaving them as "electronic brochures." Some good examples of this new trend are the Metropolitan Museum of Art, the Natural History Museum in London, and the Minneapolis Institute of Arts, just to name a few.

User and task analysis

The interface is what users see and work with when they use products such as a computers, software, websites, cellular phones, tutorials, paper forms and other documents. Depending on the interface, a product can either be effective or ineffective, usable or not usable. To design effective interfaces and therefore usable products, designers need to focus more on the user and not on technology (Hackos and Redish 1998).

An interface is the point of interaction between a user and product. It is the means by which users interact with a product to achieve their goals. To be usable, an interface must allow users working in their own environments to accomplish their goals and tasks, effectively and efficiently. "The truly usable interface is transparent to the work the user is trying to accomplish" (Hackos and Redish 1998, p. 6). In his book *The Humane Interface,* Jef Raskin (2000) talks about difficulties that people experience with everyday products, and says that an "interface is humane if it is responsive to human needs and considerate of human frailties" (p. 6). He adds that in order for designers to create a humane interface, they must have an understanding of how both humans and machines operate, and this is not a simple task.

To design usable products, there has to be a close connection between designers and users. Designers need to spend time with users, understanding who they are and observing them in action. This process of interaction between designers and users is called user and task analysis. User and task analysis focuses on understanding how users perform their tasks; what their goals are; what they are trying to achieve; what they actually do to achieve those goals; what personal, social and cultural characteristics they bring to the tasks; and how they are influenced by their physical environment (Hackos and Redish 1998). By interacting with users in their natural environments, and by performing user and task analysis, it is possible to design usable products.

In this study, I will focus on some of the key points of this approach, points such as trying to understand how users perform their tasks; what they are trying to achieve; what they actually do to achieve their goals; and personal characteristics they bring to tasks collected through interviews.

In his book, *The Design of Everyday Things,* Donald Norman (1988) talks about problems we all have with products in everyday life, as a result of bad design – from doors which open the wrong way to telephone calls which cannot be put on hold. Norman makes the point that well-designed objects are easy to use and understand because they contain visible cues for use, while poorly-designed objects are difficult to use and understand because they provide false or misleading cues. Norman believes that mistakes are made due to poor design principles and thinks that designers "make the mistake of not taking error into account" (p. 131). He says that designers should do the following: understand the causes of errors and design to minimize those causes; make it possible to reverse actions before errors occur; make it easier to discover the errors that do occur, and make them easier to correct; and change our attitude toward errors – there are many ways to deal with potential errors (Norman 1988).

User and task analysis has not been an integral part of interface design and product development (Hackos and Redish 1998). Therefore, it is very important to observe and study users because users decide whether or not to use a product, not designers. Users come with preconceived ideas based on previous experiences. They are people with habits, skills, education, experience, likes and dislikes. Norman calls this "information in the head." Users' prior knowledge and experiences do play a big part in how they use products.

> Cognitive psychology shows us that we must accept the users as reality because it is they and not the designers (nor their supervisors) who will in the end determine how the product is used (or not used) (Hackos and Redish 1998, p. 15).

When designing new products or interfaces, it is important to keep in mind who the end users will be. It is also important for designers to become better observers and ask the right

questions, listening to what users are saying. By doing all this, designers will be able to design better and more usable products that have "transparent interfaces."

Usability for the web

Usability is a feature of every product. According to Mark Pearrow (2000), "usability is a broad discipline of applying sound scientific observation, measurement, and design principles to the creation and maintenance of websites in order to bring about the greatest ease of use, ease of learnability, amount of usefulness, and least amount of discomfort for the humans who have to use the system" (p. 12). Garzotto, Matera and Paolini (1998, [online]) describe usability for websites as "the visitor's ability to use these sites and to access their content in the most effective way" [online]. For Dumas and Redish (1999), "usability means that the people who use the product can do so quickly and easily to accomplish their own tasks." They add that the definition rests on four points: (1) usability means focusing on users – knowing, understanding and working with people who are going to be users or potential users; (2) people use products to be productive – time needed to do what they want, or the number of steps they have to go through in order to accomplish a task; (3) users are busy people trying to accomplish tasks – users connect usability with productivity; and (4) users decide when a product is easy to use – users are the ones who decide whether the product is easy to use or not, not designers or developers.

One way to ensure the usability of products or websites is by involving users throughout the process (Dumas and Redish 1999) and by conducting formal testing with users. A typical usability test includes six to 12 participants in two or three subgroups (Dumas and Redish 1999). Nielsen (2000) claims that a usability test with five participants will typically identify 85% of the site-level usability problems, such as the home page, information architecture, navigation, links, etc., and he adds that additional participants are less and less likely to reveal new information. Rubin (1994), on the other hand, tries to test at least eight participants when he conducts his tests.

According to Rubin, the design of usability begins with high-level goals and moves towards specific objectives. In his book *Handbook of Usability Testing,* Rubin outlines four usability goals and objectives:

1. Usefulness – the degree to which a product or a site enables a user to achieve his or her goals, and an assessment of the user's motivation for using that product or site in the first place. Without the motivation, other measures will make no sense. The product or a site might be easy to use, easy to learn or even free, but if it doesn't meet any specific goals of the user, it isn't a successful product or a site.
2. Effectiveness – the "ease of use" of a product or a site. How quickly can users accomplish specific tasks without any errors.

3. Learnability – user's ability to use a product or a site with competence after some period of training. For example, is the site easy to use or navigate the second time around?
4. Attitude (likability) – what are the user's perceptions, feelings, and opinions of the product or a site captured through written and oral interrogation. Does the user like the product? (Rubin 1994 pp. 18-19)

This study will focus on three of the four goals and objectives outlined above. Usefulness – to see if a website enabled users to achieve their goals and if users will be motivated to return to the site again, to use it. Effectiveness – how quickly users accomplished their tasks, did they have any problems, and how easy did they find the site to use. Likability – what are users' perceptions and feelings of a site, and was the experience positive.

Designing products that users can use, with minimum stress and maximum efficiency, is referred to as user centered design (Rubin 1994). Usability testing is not user centered design (UCD) itself; it is one of several techniques helping to ensure good, user centered design. There are three basic principles of UCD according to Rubin: (1) an early focus on users and tasks – identifying users and tasks in a systematic and structured approach; (2) empirical measurement of product usage – behavioural measurements of ease of learning and ease of use early in the design process with actual users; and (3) iterative design whereby a product is designed, modified and tested repeatedly – the importance of design iteration through early testing.

This study focuses on these three principles of UCD. Potential users and tasks were identified early in the design process, before testing started, by a systematic and structured approach. By conducting structured interviews early on with users, and learning about their characteristics, it was possible to determine if users matched the study's criteria. If they did not match the criteria, they were not selected. Once users were selected, testing was conducted with those users to determine how the product worked (in this case a website), what problems they had while using the website, and how easy they found the website to use. The results were compiled through observations, think aloud protocol, structured interviews, and questionnaires. The results were then analysed and used to answer the research questions.

The Spool et al. study

Despite many books and recipes on how to design for the web, little has been written about the relationship between dynamic elements and the effectiveness of a site as a source of information. Since many more companies are developing dynamic websites, it is important to know how dynamic elements on a site have an effect on information delivery. There is a lack of research in the area, and there have been no studies conducted on this topic, as far as I know, so all research in this area should prove helpful.

One study that was conducted in 1999 and that is close to my study was done by Jared Spool et al. (1999). Spool evaluated nine different information-rich websites to see how well and how poorly they actually worked, when people used them to find specific information. In this section, I will look at Spool's study.

Spool wondered what made a website usable, so to find out he conducted research with nine different websites. He tested users who were familiar with a web browser by watching them perform on selected sites. The users had to answer four different types of questions by searching throughout the site, even if they knew the answers beforehand. Spool wanted to find out how users searched for their information and what factors of the site helped or hindered their search. In his book *Web Site Usability*, he states that looking for information on the web is an "intensely frustrating experience," (p. 6) and adds that it took users time and effort to answer simple questions, and that they were getting lost even in the small sites while searching for information.

Spool writes about major implications that he found out in his study. Here, I will look at some of his implications, starting with the first one, that graphic design neither helps nor hurts. Spool could not find any evidence in his study that graphic design helps users with information retrieval from a site, either positively or negatively. He says that several of the sites he tested had professional looking designs, but all of them scored low with users. On the other hand, sites that did well and scored at the top were mostly text sites. Spool adds that graphic design could be important in other ways, such as selling products or in marketing, but he claims that "graphic design is completely unrelated to the success at finding information on the websites" (p. 9).

Spool's second implication is about text links and how vital they are. He claims that while users navigate, they often try text links first, ignoring nearby graphics since graphics take longer to download; text links are usually the first things visible on a page. He says that text links are the way users prefer to navigate sites, and yet there are no guidelines on how to create effective text links. Spool also discusses links and says that they are closely tied to navigation.

> While navigation refers to the structure of the site and the patterns by which users traverse the site, links are the mechanism by which they move from one place to another. Successful link structures can help users navigate the site more effectively. (Spool et. al. 1999, p. 33)

In his study, Spool found out that the better users predicted where the link would take them, were more successful in finding information, and that their ability to differentiate one link from another, and from the link layout, can also affect user success.

Another of Spool's implications is that navigation and content are inseparable. He talks about the "shell strategy," a technique that lets developers design navigational structure and site hierarchy first and later plug in the content. To identify "shells," he suggests trying to take out more than half of the site's content without updating the home page. If you can do that, "it's most likely a shell site," he adds (p. 11). Based on his observations, there is no evidence which suggests that the shell strategy can work.

> The sites that were most successful were those where content and navigation were inextricably linked – where you couldn't remove content without updating all of the main navigation pages (Spool 1999, p. 12).

Spool's study focuses on information retrieval and not web surfing. His implication is that information retrieval is different from surfing. When users surf, they are just browsing and clicking on whatever looks interesting or cool, according to him. When users look for information, they are more focused – they tend to click on links that they believe will give them the information they are searching for. He found out that animation and advertisements were visual noise and that users were distracted by them while retrieving information. Some users found animation so irritating that they covered it up while they were searching for information. He claims that sites aimed at information retrieval need to be designed differently than sites aimed only for surfing (whatever this pure "surfing" may mean – do users ever just surf?).

Spool's last implication is about how websites are not like software. He assumed that the websites would be similar to software and could be tested similarly. When doing comparison testing with products, Spool found out that users usually preferred products they were most successful with, but when it came to websites, this was not the case. While some users chose sites that they were successful with, other users chose sites for their content and not for the sites' ability to help them in finding information. He goes on to say that "we don't yet know how to design for finding information" (p. 14).

Spool also writes about how "users don't form mental models of sites." He says that with software applications, users form mental models of how the software works, but this was not the case with websites. He expected users of websites to form a mental map of how the site was laid out and how the information was organized. He states that if users did map the site, he would have expected them to use the browser's back button when they got lost, and none of them did. Spool further indicates that there was no evidence suggesting that users ever attempted to understand the layout of the site; they did not think about the site's structure.

Spool also writes about user's frustrations with download time and while waiting for graphics. He says that users did not think images would provide valuable content, so they did not

wait for images to load and instead went to other parts of the site. On the other hand, those who waited for the graphics, thinking they would add to the content, became frustrated when they realized that graphics did not add anything.

Since more and more websites are heading towards rich interaction and dynamic display (Sano 1996), every website should be functional, easy to use and have aesthetic quality, in order to communicate effectively. To accomplish this, we need to focus more on the end user and not so much on technology when we design new products (Hackos and Redish 1998). We need to study users because the more we know about them, who they are, and how they think, the better we can design products for them. This study will look at users performing certain tasks and the use of dynamic elements in websites (how they may or may not impact on information delivery), by answering the following questions:

1. Can sound, video and animation (content presented through dynamic elements) impact on effectiveness of information delivery from a website?
2. What is the relationship between use of dynamic elements, user engagement with a site through interaction with dynamic elements, and the effectiveness of information delivery?
3. What are the problem areas, difficulties, weaknesses and areas for improvement (associated with the effectiveness of information delivery in dynamic sites) for web designers and developers?

The following chapter discusses different evaluation methods used to determine if a product is working or not, and outlines the usability evaluation process which I use. It also outlines the methodology used in this study, from website and participant selection to design of research instruments, data collection and analysis, all of which were used to answer the research questions.

Chapter 3

This chapter discusses different evaluation methods, such as usability testing, focus groups, and online/e-mail surveys that are used to determine if a product is working or not, and the methods I have used in the study and why. It also outlines the usability process I use and the methodology for this study. It describes the process for website and participant selection and discusses each of the research instruments used in this study. It talks about how data was collected, analysed and used to answer the research questions.

Methodology

There are different methods to determine if a product is working or not. Some of the methods are usability testing with real users, focus groups, online/e-mail surveys, and field studies. Each method yields different results and benefits and several methods can be used and combined during the development process. It is a good idea to analyse a site's needs and goals first, to determine which testing method would be most appropriate. With specific goals in mind, it is easier to design tasks towards that particular goal. For example, if you are looking for specific questions regarding specific features or areas within the site, usability testing may be more appropriate. Let us take a look at some of the methods and techniques outlined above.

The focus group is a discussion group with ten to 12 real users, conducted by a skilled moderator. The users are carefully chosen, as in usability tests, and they represent real users of the product. Focus group research is usually employed at the early stages of a project to evaluate initial concepts with representative users, and to provide information about users' opinions, attitudes, and preferences. However, focus groups do not usually give you information about what users would actually do with a product. According to Dumas and Redish (1999), a focus group is not a technique for verifying or assessing the usability of a product.

This study did not use this method for the reasons outlined above. In this study, I wanted to find out what participants did and how they did it to accomplish their tasks. Did they have problems while they were doing their tasks and if they did, what kind of problems did they have? I wanted to see the participants' reactions – frustration or enjoyment. With focus groups, this was not possible.

Surveys are used to learn about the preferences of a broad base of users regarding an existing or potential product. They use a large sample of users to represent an entire population and can be conducted by telephone, mail, e-mail, or online, to collect information about users'

opinions, attitudes and preferences. Surveys can be used at any time but are most often used during the early stages of a product, to better understand potential users. An important aspect of surveys is that their language must be very clear and understood in the same way by all readers, a task that is not that easy to accomplish without multiple iterations and adequate preparation time. Surveys cannot be used to observe and record what users actually do with a product.

Again, this study did not use this method because I wanted to observe and record what users actually did while they performed their tasks, and with surveys this was not possible.

A field study is a review of a product in its natural environment, such as an office or home. Often a favoured customer is used and asked to evaluate a certain product just prior to its release, to gather information about workflow process, user habits, possible limitations, and areas needing improvement. Data collected is used to modify the product prior to its release. These studies and tests, known as beta tests, are often conducted in an unstructured manner, which minimizes their effectiveness.

This study did not use this method because it was not appropriate for what I was testing. I was evaluating museum websites with real users, observing them while they were performing tasks. I needed to collect as much data as possible to answer questions about dynamic elements and the effectiveness of information delivery in websites. This was done through observation, structured interviews and three different sets of questionnaires.

Usability testing is concerned with observing potential users while they perform certain tasks using a product or website. The testing is performed to find out if a product is easy to learn and use, if it satisfies use, and if it meets the expectations of a representative users. Current research (Nielsen 2000, Dumas and Redish 1999, Virzi 1990) has shown that much can be achieved by conducting a series of tests with fewer users, early in the development cycle.

My study used the above mentioned method because it was the most appropriate for what I was evaluating. Below is the outline of this process.

There are many variations on how to conduct a usability test, but according to Dumas and Redish (1999), every usability test will have the following five characteristics: (1) the primary goal is to improve the usability of a product; (2) the participants represent the real users; (3) the participants do real tasks; (4) you observe and record what participants do and say; and (5) you analyse the data, diagnose the real problems, and recommend changes to fix those problems. This study uses the five characteristics that are outlined above for the evaluation of six museum websites.

The Usability Evaluation Process

Planning a usability test is a process which involves many activities. This section discusses some of these activities, based on several literature sources (Nielsen 1993, Rubin 1994, Dumas and Redish 1999, Pearrow 2000). The following list outlines some of the activities involved in planning a usability test:

- define usability evaluation goals and concerns
- identify participants
- recruit participants
- select and organize tasks to test
- create task scenarios
- decide how to measure usability
- prepare test materials
- prepare test environment
- conduct a pilot test and make changes as needed
- analyse and interpret usability data
- present results

Let us look at each of the above activities and see what is involved.

For each usability test, you need to decide what you want to learn by defining specific goals and concerns (Dumas and Redish 1999). The evaluator should clearly define these goals and concerns at the beginning of a study, to make the rest of the planning process easier. A goal is usually stated as a declarative sentence, for example, users will be able to find and view the video clip in less than a minute. A concern is usually stated as a question, for example, will users be able to find and view the video clip quickly and accurately?

Developing user profiles is the next step in the planning process. It is very important to select the right users for the usability test – users who actually use the product. When selecting users, you want to capture two types of characteristics: (1) those that all users will share; and (2) those that might make a difference among the users (Dumas and Redish 1999). When developing user profiles, you should consider factors such as users' work experience, education, age, computer experience, experience with the product, and so on.

Once you decide which group of users to include in your test, you have to find those users. You can recruit users by using employment agencies, market research groups, existing customers from in-house lists, advertising in local papers or college campuses. Regardless of whom you use to help you acquire participants, the more closely they represent actual users, the more useful your test will be.

Selecting tasks is the most crucial part of the usability testing (Nielsen 1993, Dumas and Redish 1999). You cannot test every possible task users can do with a product or website, but you can select and test tasks that explore areas of potential usability problems. You can also select and test tasks users will do with the product you are testing. "A good task to select is one that has the potential to uncover a usability problem" (Dumas and Redish 1999).

Once you decide which tasks to test, you should arrange them in the order in which participants will try and do them. There are two important points to consider: tasks should flow in the natural order in which participants will do them, and tasks that are important to the evaluation of the usability of a product or website should be early in the test rather than towards the end. By arranging tasks this way, participants will be able to finish important tasks first since some participants will not be able to finish all the tasks.

The next step in the evaluation process is to create task scenarios. Scenarios are short narrative descriptions of actual tasks that the participants would perform using a product. Scenarios are usually read to the participants before they begin their tasks. A good scenario should be short, easy to understand, and descriptive enough for participants to understand what they need to do.

The next step is to decide how to measure usability. In a usability test you are collecting both performance measures and subjective measures (Dumas and Redish 1999). Performance measures are quantitative in nature and they require careful observation of what is going on. For example, how much time do users take to complete a task, how much time do they spend figuring out navigation, how many errors do they make, how much time do they spend recovering from those errors, how many times do they repeat the same errors, etc. You would not use all of the above measures in your test – you would pick the ones that are relevant to your concerns and the product you are testing. Subjective measures can be either quantitative or qualitative. For example, you can give participants a five point scale and ask them to rate how easy or difficult a site is to use. The judgement is subjective, but the response is quantitative since you can get participants' average rating of a site. You might collect subjective measures in a usability test such as: ease of learning and using a product, ease of finding information, ease of doing a particular task, usefulness etc. You can also collect participants' comments by asking them to think aloud while they perform their tasks. Those comments are both subjective and qualitative.

Once you decide what you will be measuring and how, you will need to design all your test materials. These materials should be ready for pilot testing to see if participants will have any problems with them, and to fix those problems before testing starts. Materials may include such things as questionnaires, interview questions, task scenarios, or scripts. This

study uses the following test materials: letter to the participants, pretest questionnaire, scenario, tasks, posttask questionnaire, interview questions, posttest questionnaire part one and part two, and a cool down question.

The next step is to prepare the physical test environment. You will need to prepare an area where you will be conducting the usability test, and the people who will be conducting it. You will also need to arrange the equipment, props, product, and the data-logging materials. This study conducted its usability test in an office setting observing one participant at a time while they performed tasks.

After you prepare everything, you need to run a pilot test. The objective of a pilot test is to "debug" the equipment, materials, and the procedures you will use for the test. It also lets the test team practice all the activities they will be using during the test. In a pilot test, you treat participants exactly as you will treat them in the usability test. You should follow the same procedures as you will in the test. You collect the same data you will collect during the test, but you do not analyse this data or include it with the rest of your data that you collect during the test. If you find any problems, you should fix them before conducting the usability test.

Once the test is conducted, you need to analyse and interpret your data. You need to summarize and communicate your results. It may be as simple as creating a list of specific usability problems that were found, along with some recommendations. Interpreting results of the study is an essential part of evaluation. It means using the analysis of usability data to draw conclusions. For example, it may mean concluding that one design works better than another or one product is easier to use than another. It may also mean whether or not you have met the usability requirements.

Finally, when you have completed the test and analysed the data, you need to communicate your results to those who need to know them. How you communicate the results will depend on the test, what you uncovered, and your organization. It could be as simple as a list of recommendations for specific problems that were found. It could be a short or a long report, formal or informal. It will be up to you to decide what kind of report to use, to communicate your results quickly and clearly.

Design Methodology

This chapter addresses major activities associated with participant and website selection, along with the design instruments used, and the testing procedure. The study examines six different museum websites that were selected based on different levels of dynamic elements in them.

Website selection

Since the Internet is global in nature, six websites were selected from three different continents – North America, Europe, and Australia (Appendix E). Museum websites were selected because they use many forms and degrees of dynamic content, ranging from simple animation to dynamically changing three-dimensional reconstructions of historical locations (Garzotto, Alonzo, Valenti, 2000). Because many museum sites are addressed to a mass audience, their value is reflected in the extent to which people use the sites, get the information they are seeking, and are encouraged to return and continue to return, as well as by their enjoyment of use (Minghetti, Moretti and Micelli, 2001).

The criteria for site selection were based on selecting similar types of information on all sites and keeping the source characteristics (such as credibility) and message characteristics (such as quality of information) as similar as possible. For this reason, the selected sites had to fall within one group category such as art and art history, science or technology. This study focuses on art and art history museum websites. The amount of dynamicness, and therefore the potential amount of distraction and noise, will vary from site to site. Each site had to consist of at least five pages with links in them, and at least three navigation buttons, to ensure sufficient complexity to study user response to different degrees of dynamicness.

Participant selection

The criteria for participant selection were based on three things. Participants needed to be museum goers (so likely to be interested in museum sites), experienced web users (so as to prevent effects associated with novice users), and they could not be graphic designers (so as to prevent their specific interest in design).

Participants were selected from an in-house list of a freelance graphic designer's existing and past customers. In his book, *Handbook on Usability Testing,* Jeffrey Rubin writes that "your own company's list is an excellent source of participant candidates" (p. 135). According to Rubin, this way you don't get the very "best" people, as you might get from an agency or recruitment company. He goes on to say that regardless of the category of end user, whether they are novice or experienced, "you are sent the cream of the crop, the high achievers" (p. 130). The "best" end users typically possess the skills to go through even "the most hard-to-use products and perform admirably" (p. 131), therefore giving you a false sense of how well the product actually tested (Rubin 1994).

An introductory letter (Appendix B) was sent to the participants via e-mail. The letter explained what the study was all about without giving away too much detail, so that the participants wouldn't form any opinions that could influence the results of the study. As participants replied, they were interviewed over the phone to see if they met the study's

criteria. If they did, an appointment was made at that time for testing, and a number was assigned. So, whoever replied first (if they matched the user profile) became participant one. The second person who replied became participant number two, and so on.

Each participant evaluated three websites. The websites were assigned to the participants at the time they made their appointments for testing, starting with the first three websites. The target number of participants was 12 but 18 participants were selected in case some dropped out; none of the reserves were needed. A typical usability test includes six to 12 participants in two or three subgroups, depending on how many subgroups you need to satisfy your concerns (Dumas, Redish 1999). Research indicates that testing four to five participants will reveal the majority of usability problems (Rubin 1994), but Rubin points out that he is a bit uncomfortable testing only four participants, and he tries to test at least eight. Nielsen (2000) claims that a usability test with five participants will typically identify 85% of the site-level usability problems, such as the home page, information architecture, navigation, links, etc., and he adds that additional participants are less and less likely to reveal new information.

Once the 12 participants were selected, each participant evaluated three websites (which were chosen from Table 3.1). Each site was evaluated by six participants, a number that (following the practices outlined above) should be sufficient to identify most of the usability problems associated with site design. Although this study was not designed to identify usability problems in specific sites but to explore user response to the use of dynamic elements and their engagement, through interaction, with these elements, it was thought that six evaluations for each of the six sites – 36 evaluations in all – would identify a useful variety of patterns of user response to dynamic elements. To get the widest variety of evaluations as possible from 12 participants, the following table (Table 3.1) was used to assign sites to evaluators.

Table 3.1 Evaluations for each website

Websites	**Participants**											
	1	2	3	4	5	6	7	8	9	10	11	12
1 CH	x	x							x	x	x	x
2 VG	x	x	x	x							x	x
3 NGA	x	x	x	x	x	x						
4 MIA			x	x	x	x	x	x				
5 L					x	x	x	x	x	x		
6 NMA							x	x	x	x	x	x

Legend

CH = Cooper-Hewitt National Design Museum
VG = The Van Gogh Museum
NGA = National Gallery of Australia
MIA = Minneapolis Institute of Arts
L = Louvre
NMA = The National Museum of Australia

Design of research instruments

Selecting participants involves identifying relevant skills and knowledge of the person or persons who will use your product. This description is known as the user profile. To get appropriate users to evaluate the museum websites, a personal characteristics and experience questionnaire was designed (Appendix F). The questionnaire asked ten different things – from users' age to familiarity with museum websites, to find out as much as possible about the users. Table 3.2 outlines user profiles.

Table 3.2 User profile for museum websites

Characteristics	**Range and Percentages**			
Job title	instructor – 17%	teacher – 17%	manager – 25%	other – 41%
Age	25-35 – 8% 65 or older 17%	35-44 – 17%	45-54 – 50%	55-64 – 17%
Gender	female – 50%	male – 50%		
Education (highest completed)	college – 33%	university – 50%	master – 17%	PhD – 17%
Major area of study	arts – 50%	science – 33%	other – 17%	
Years using the internet	≥ than 2 years 100%			
Level of experience	familiar user – 25%	experienced user – 75%		
Frequency of use	every day – 58%	≥ than 3 times a week – 42%		
Familiarity with museum websites	novice user – 50%	familiar user – 33%	experienced user – 17%	

Next, the tasks were designed. There were six different tasks for each museum website (Appendix G). Tasks were simple fact questions, for which there was only one correct answer. They ranged from very simple tasks such as finding where the museum was located (physical address) to more difficult ones like finding information about specific exhibitions that were at the museum. The first four tasks were identical for all six websites while the last two were different, tailored specifically for special exhibitions that were hosted by the museums at that time. Table 3.3 looks at different levels of dynamic characteristics for each site and tasks that were associated with those dynamic elements.

The posttask questionnaire (Appendix H) was designed to find out how participants felt while they were performing the tasks. Did they find the tasks interesting or uninteresting, did they find the tasks easy or difficult, and so on. The questionnaire also asked what they thought of dynamic elements (sound, video and animation) while performing the tasks. Did these elements add to their enjoyment of using the site, to the content of the page, was it useful in conveying the information, or did it distract them while completing the tasks?

Since the first four tasks were always found on the main museum site, and the other two tasks on museum subsites, two different posttest questionnaires had to be designed in order

to evaluate the museum sites properly. The posttest questionnaire, part one (Appendix J), was designed for the evaluation of museum subsites which by nature had more dynamic elements in them than the main sites. Posttest questionnaire part two (Appendix K) was designed to evaluate the main sites.

Table 3.3 – Dynamic characteristics of websites

Websites	**Tasks**	**Characteristics**	**Dynamic** Yes	No
Cooper-Hewitt National Design Museum http://www.si.edu/ndm/	1	Static, linear		x
	2	Static, linear		x
	3	Static, linear		x
	4	Static, linear		x
	5	Animated introduction; interactive navigation; animated objects; have to use interactive navigation to answer both questions (5 and 6)	x	
	6		x	
Minneapolis Institute of Arts http://www.artsMIA.org/	1	Static, linear		x
	2	Static, linear		x
	3	Static, linear		x
	4	Static, linear		x
	5	Static, linear or by interactive navigation	x	x
	6	Video, sound	x	
Van Gogh Museum http://www.vangoghmuseum.nl/	1	Static, linear		x
	2	Static, linear		x
	3	Static, linear		x
	4	Static, linear		x
	5	Static, linear		x
	6	Animation, Interactive navigation	x	
Louvre Museum http://www.louvre.fr/	1	Static, linear		x
	2	Static, linear		x
	3	Static, linear		x
	4	Static, linear		x
	5	Static, linear		x
	6	Virtual tour, navigation through the pyramid	x	
National Gallery of Australia http://www.nga.gov.au/Home/index.cfm	1	Static, linear		x
	2	Static, linear		x
	3	Static, linear		x
	4	Static, linear or by interactive navigation		x
	5	Interactive navigation	x	
	6	Interactive navigation	x	
National Museum of Australia http://www.nma.gov.au/	1	Static, linear		x
	2	Static, linear		x
	3	Static, linear		x
	4	Static, linear		x
	5	Animation; sound; interactive navigation	x	
	6	Animation; sound; interactive navigation	x	

To get a better understanding of how participants found dynamic elements in a site, and to find out how they felt about the overall look and feel of each site, an interview questionnaire was designed (Appendix I). The interview questionnaire consisted of 15 questions which were asked after each participant completed the evaluation of a site and answered the posttask questionnaires. The interview questions were also designed to get participants to open up more and discuss the websites.

Another question that participants were asked was the cool down question. This question was asked at the very end when all the testing, interviews and questionnaires were completed. It was designed as an open-ended question, encouraging participants to continue to talk about their experiences while searching for information. By asking this open-ended question, the researcher was hoping to gather more information from participants about what they liked and did not like about a particular site they tested, and about dynamic elements in that site. The cool down question asked was: Are you going to look at museum sites any differently now, after this session?

Procedure for data collection

To find out how well the design instruments performed, pre-testing was conducted with two participants. I found out that some of the tasks were hard to understand and both pre-testers were confused about what they were looking for. Comments and suggestions from the two pre-testers were incorporated and the instruments were redesigned. After the instruments were redesigned, pre-testing was conducted again, this time with only one participant. The second pre-testing went well and no further problems were found.

The testing for all websites was completed in three weeks. Participants were observed and interviewed one at a time under identical conditions. Structured interviews were used and standard questions asked. Participants were allowed to elaborate, if they wished to give the investigator a broader picture. All interviews were conducted by a single investigator and were recorded using written notes and audio tapes. All raw data was kept confidential and the anonymity of the participants was maintained.

Testing took place in an office using a Macintosh G3 computer that was connected to a high speed internet connection (cable modem), running a Netscape Communicator 4.77 browser. A script was used to introduce the study and to guide interviews, reducing the possibility of bias introduced by the researcher (Appendix C). It was pointed out to participants that if at any time they felt uncomfortable, they could leave without finishing the tasks.

After the script was read, participants were introduced to a scenario (Appendix D) and instructed to go to a given site and perform certain tasks. Netscape Communicator's book-

marks were used for each site tested, so participants did not have to find out a site's URL or type it in. Each participant was observed (and notes were recorded) while performing tasks, to see how easy they thought it was to find information, how long it took them to find it, and to identify any false starts and hesitations. Times for each task and participant were recorded using a stopwatch. In order for the researcher to know when each participant completed a task, and since tasks were simple fact questions, participants were asked to give their responses verbally before they wrote them down. This way, the researcher knew right away if tasks completed were accurate or not. Thinking aloud was encouraged while participants performed tasks (that were also recorded), to gather information about their perceptions of and response to dynamic elements, their sense of engagement with the site, and their thoughts about effectiveness, as they interacted with the site. Prior to beginning their tasks, participants were given a short learning exercise in "thinking aloud," as described by Ericsson and Simon (1993).

After participants completed their tasks, they were given a short posttask questionnaire to fill out (Appendix H), followed by an interview before they moved on to the next site. The same procedure was followed for the second and third site (each participant tested three different sites). Once all three sites were tested, participants were given a posttest questionnaire, part one, to complete (Appendix J), followed by posttest questionnaire part two (Appendix K). While completing their part one and two questionnaires, participants were allowed to go back to the sites tested to refresh their memory if they were unsure about anything. By allowing participants to do this, the researcher was making sure that they were answering their questionnaires truthfully, and not second guessing. Seven out of 12 participants welcomed the opportunity and went back to the sites they examined.

After all the questionnaires and interviews were finished, a cool down question was asked. This question was asked to encourage participants to continue with their dialogue in a more relaxed atmosphere, over coffee and cookies. The researcher felt that since the testing was over, participants would be more relaxed and therefore more open to talking about their experiences.

Procedure for data analysis

In order to answer the research questions, data was collected using three different questionnaires, structured interviews, observations, times taken to complete tasks, a cool down question, and thinking aloud protocol. Data gathered from questionnaires was entered and tabulated in spreadsheet software where responses were summarized.

These data were categorized in three groups: positive or yes, negative or no, and undecided or neutral. If a participant agreed or strongly agreed with the statement asked, the response

was categorised as positive or yes, if a participant disagreed or strongly disagreed with the statement asked, the response was categorised as negative or no, and if a participant neither agreed nor disagreed with the statement asked, the response was categorised as undecided or neutral.

The interview responses were all transcribed and grouped by questions and websites. For example, all responses for a particular question and site were recorded in one place. These responses were then analysed by grouping similar responses together, such as all the positive responses together, all the negative responses together, and all the neutral responses together. If the participant had anything negative to say about the site or if they found something that did not work, or wanted to change anything about the site, their response was categorised as a negative response. On the other hand, if a participant did not have anything negative to say about the site, or if they did not have any problems with the site, the response was categorized as a positive response. Participants who couldn't decide one way or another had their responses categorised as neutral.

Comments from the cool down questions were also recorded and analysed, as were notes and observations from the thinking aloud protocol. They were all grouped by site and categorized as positive or negative. If a participant had problems with more than three tasks, in this case 50 percent of the tasks, the observation was classified as negative. If a participant had problems with three or less tasks, the observation was classified as positive. Observations of frustration and confusion were also classified as negative while observations of satisfaction were classified as positive.

Task timings were also recorded in order to find out how much time participants required to complete each task. To calculate the average time per evaluation, the following formula was used: total elapsed time for all evaluations divided by the number of tasks, in this case six tasks, which were all completed. In order to get results for each individual site and to see how they compared to each other, the following formula was used: total elapsed time for each task divided by the number of participants.

Research question one: can sound, video and animation (content presented through dynamic elements) impact on effectiveness of information delivery from a website? The answers to questions eight through 11 from the posttask questionnaire were considered together with the answers from interview questions five through 13. Also, questions from posttest questionnaire part one, eight to 11, were used as well as questions eight through 24 from posttest questionnaire part two. Comments were also used from user observations, the think aloud and cool-down questions.

Question two: what is the relationship between the use of dynamic elements, user engagement with a site through interaction with dynamic elements, and effectiveness of information delivery? This was answered by compiling user observations, the thinking aloud protocol, and interview questions five through 13. Also, answers to questions four to six, and eight through 12, from the posttask questionnaire, were used together with answers from posttest questionnaire part one, questions two, eight to 11, questions 22, 24, and 26, and posttest questionnaire part two, questions eight to 11.

Question three: what are the problem areas, difficulties, weaknesses and areas for improvement (associated with effectiveness of information delivery in dynamic sites) for web designers and developers? Answers to questions three through 12 from the posttask questionnaire were considered together with answers from the interview questions. All questions from posttest questionnaire part one were considered as well as all questions from posttest questionnaire part two. Comments from user observations, the think aloud and cool-down questions, were also used.

This chapter presented the methodology used in my study to design the research instruments, find the appropriate participants, and gather all data. The next chapter will present the results gathered using the above methodology and will try to discuss them in more detail.

Chapter 4

This chapter looks in detail at the results that were gathered through interviews, participant observations, and questionnaires, and tries to answer the three research questions outlined at the end of chapter two. It also looks at each dynamic element individually; how they are used, which ones are more effective, which ones are more distracting, and if so, why. It also looks at the relationship between dynamic elements and user engagement, and problems and difficulties associated with these elements.

Can sound, video and animation (content presented through dynamic elements) impact on effectiveness of information delivery from a website?

An informational site can be effective only if it delivers the information the user is seeking, but effectiveness also involves the time taken to find the information and the ease with which the user finds it while navigating through the site (Fleming, 1998). In this study, effectiveness is measured through observations and task analyses, and is therefore defined as the extent to which users are able to find information they need, the length of time taken, and their perceptions as to how easy, enjoyable, or distracting it was to find that information.

Six different museum websites were selected for testing with different degrees of dynamic elements in them, such as sound, video and animation. There were twelve participants and each participant examined three different sites. This way, each website was evaluated by six different participants, having a total of 36 different evaluations instead of only 12. Below are the findings for dynamic elements found in the websites, starting with sound.

Sound

Six participants examined the National Museum of Australia website, which had background music for its subsite, the "*Harvest of Endurance Scroll*." This was the only site with sound but since I was examining different levels of dynamic elements in websites and not just sound, I believe this was adequate. To find out if sound added to the message being communicated or if it took anything away, if it added to the enjoyment of using the site or if it was distracting, each participant was asked the following question: While completing the tasks, what did you think of the sound?

- Added to my enjoyment of using the site
- Added to the content of the page
- Was useful in conveying information
- Distracted me from completing the tasks

After completing the tasks for each website, participants were asked to fill out a short Posttask questionnaire. This was followed by a Posttest questionnaire (part one and part two) and one on one interviews.

When asked what they thought of the sound while completing the tasks – did it add to their enjoyment of using the site – four (67%) out of six participants said yes. Three (50%) participants strongly agreed with the statement while one (17%) agreed. Two (33%) participants said no. Out of those two who said no, one (17%) participant strongly disagreed while the other (17%) disagreed with the statement (Table 4.1). Of the two participants who said no, one (17%) found sound not to be useful in conveying information or adding to the content while the other (17%) was neutral, neither agreeing nor disagreeing with the statement. However, both (33%) participants found sound to be distracting while they were looking for information.

Table 4.1 Did sound add to enjoyment of site use?

Median Response	Participants n	Percentage %
Strongly agree	3	50
Agree	1	17
Neutral	0	0
Disagree	1	17
Strongly disagree	1	17
Total	**6**	**101**

When asked did sound add to the content of the page, four (67%) out of six participants again said yes. Two (33%) participants strongly agreed with the statement while the other two (33%) only agreed. One (17%) participant said no, disagreeing with the statement, and one (17%) participant was neutral, neither agreeing nor disagreeing with the statement (Table 4.2). For this site, the same four (67%) participants found sound to be enjoyable and that it added to the content of the page.

Table 4.2 Did sound add to content of the page?

Median Response	Participants n	Percentage %
Strongly agree	2	33
Agree	2	33
Neutral	1	17
Disagree	1	17
Strongly disagree	0	0
Total	**6**	**100**

Was the sound useful in conveying information? Two (33%) participants thought it was while three (50%) were neutral – they neither agreed nor disagreed, and one (17%) participant disagreed with the statement (Table 4.3). While four (67%) participants found use of sound enjoyable, only two (33%) found it useful in conveying information. Out of those two who found it useful, only one (17%) strongly agreed both times. The same participant who found sound enjoyable – that it added to the content and was useful in conveying information – also found sound not to be distracting. We can conclude that for this particular site, sound was less useful than enjoyable.

Table 4.3 Was sound useful in conveying information?

Median Response	Participants n	Percentage %
Strongly agree	1	17
Agree	1	17
Neutral	3	50
Disagree	1	17
Strongly disagree	0	0
Total	**6**	**101**

When asked if sound distracted them from completing the tasks, three (50%) participants said no, two (33%) participants said yes, and one (17%) participant was neutral, neither agreeing nor disagreeing with the statement. Participants who said no (50%) all strongly disagreed with the statement while the two (33%) participants who said yes agreed that sound was distracting (Table 4.4). The two (33%) participants who found the site useful did not find the sound distracting. Two (33%) of those who did not find the site useful were distracted by the sound while the other two were not.

Table 4.4 Did sound distract from task completion?

Median Response	Participants n	Percentage %
Strongly agree	0	0
Agree	2	33
Neutral	1	17
Disagree	0	0
Strongly disagree	3	50
Total	**6**	**100**

Additional information about dynamic elements was gained from interviews with participants. When asked how they felt about sound, four (67%) out of six participants found sound to be annoying after a while. After about 30 seconds, some participants were looking for a

button to turn it off. Two (33%) participants liked the sound and thought that it added to the mood of the site (of that particular exhibition). Most of the participants (67%) agreed that you need to control the sound; an option to turn it off or at least down should be available. "After a while, it just gets to you and becomes irritating while you are looking for information," one participant noted. Another participant said "Enough is enough. Play a little bit, but give us a button to turn it off. It gets to you after a while." One participant commented on how he lost his concentration for a few minutes – he was listening to the music and not paying attention to what he was supposed to be doing: "The sound distracted me for a while."

After the interviews, participants were asked to fill out Posttest questionnaires for the main sites and subsites. From these questionnaires I found out more about dynamic elements (sound, video and animation), and here are the results for sound.

When asked was sound used appropriately, nine (75%) out of 12 participants said yes. Five (42%) strongly agreed while four (33%) only agreed. Two (17%) out of 12 participants disagreed while one (8%) participant was neutral, neither agreeing nor disagreeing with the statement (Table 4.5).

Table 4.5 Was sound used appropriately?

Median Response	Participants n	Percentage %
Strongly agree	5	42
Agree	4	33
Neutral	1	8
Disagree	2	17
Strongly disagree	0	0
Total	**12**	**100**

When asked did sound improve the message communicated, ten (83%) out of 12 participants said yes. Five (42%) participants strongly agreed and five (42%) agreed. One (8%) out of 12 participants disagreed while one (8%) participant was neutral, neither agreeing nor disagreeing with the statement (Table 4.6).

When asked did sound affect your ability to retrieve information, three (30%) out of ten participants agreed while four (40%) out of ten participants disagreed. Three (30%) participants strongly disagreed while one (10%) only disagreed. Three (30%) out of ten participants were neutral, neither agreeing nor disagreeing with the statement (Table 4.7).

Table 4.6 Did sound improve message communicated?

Median Response	Participants n	Percentage %
Strongly agree	5	42
Agree	5	42
Neutral	1	8
Disagree	1	8
Strongly disagree	0	0
Total	**12**	**100**

Table 4.7 Did sound affect your ability to retrieve information?

Median Response	Participants n	Percentage %
Strongly agree	0	0
Agree	3	30
Neutral	3	30
Disagree	1	10
Strongly disagree	3	30
Total	**12**	**100**

When asked would the site be better without sound, 11 (92%) out of 12 participants said no. Five (42%) participants strongly disagreed while six (50%) agreed. One (8%) out of 12 participants was neutral, neither agreeing nor disagreeing with the statement (Table 4.8). While 75% of the participants found that sound was used appropriately, 83% thought that it also improved the message being communicated. A majority of the participants (92%) thought that the site would not be better without sound while only 30% thought that sound affected their ability to retrieve information.

Table 4.8 Would site be better without sound?

Median Response	Participants n	Percentage %
Strongly agree	0	0
Agree	0	0
Neutral	1	8
Disagree	6	50
Strongly disagree	5	42
Total	**12**	**100**

As we can see from both survey and interview results, sound does play an important role in effectiveness of information delivery. It can have an impact on how successful we are in our search for information, or how enjoyable or frustrating our online experience is. By not having an option to control sound, 67% of participants found it to be annoying while less than half (33%) found sound to be distracting. Even though most participants found that sound set a mood for the site, they still found it annoying because they could not turn it off or down. We can conclude from the above results that even though sound was annoying for the majority of participants, it was not as distracting as it was annoying. When it came to enjoyment and usefulness, 67% of participants found that sound added to their enjoyment of using the site while only 33% found it useful in conveying information. Therefore, we can conclude that for this particular site sound was more enjoyable and less useful in conveying information.

Looking further at the results, we can see that 67% of participants found sound to be annoying while the same number (67%) found that sound added to their enjoyment of using the site. How can sound be annoying and enjoyable at the same time? From the interview results, I found that sound created a certain mood for the exhibition, and participants enjoyed that mood. They said that "it was like being at the exhibition in person." On the other hand, one participant added that "after a while, you know you have seen the exhibition and want to leave, but you can't." Sound was enjoyable for participants at the beginning (the mood that it set), but after listening to it for a while, the majority of participants wanted to turn the sound off or at least down. When they could not, they became annoyed.

Video

Six participants examined the Minneapolis Institute of Arts website which had a video for its subsite, "*Modernism.*" In the video, the curator David Ryan was talking about different art movements and showing examples of the art. Like the "Harvest *of Endurance Scroll*" website, which only had sound, this was the only site with video. Again, since I was examining different levels of dynamic elements in websites, I believe this was adequate.

When participants were asked what they thought of the video while completing the tasks – did it add to their enjoyment of using the site – five (83%) out of six said yes. Four (67%) participants strongly agreed with the statement while one (17%) agreed. One participant (17%) was neutral, neither agreeing nor disagreeing with the statement (Table 4.9). The four participants who strongly agreed about enjoyment also strongly agreed that the video added to the content of the page, and that it was useful in conveying information.

Table 4.9 Did video add to enjoyment of site use?

Median Response	Participants n	Percentage %
Strongly agree	4	67
Agree	1	17
Neutral	1	17
Disagree	0	0
Strongly disagree	0	0
Total	**6**	**101**

When asked did video add to the content of the page, five (83%) out of six participants again said yes. Four (67%) participants strongly agreed with the statement while one (17%) only agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement (Table 4.10). The same five participants who found the site enjoyable also thought that video added to the content of the page while the person who was neutral about enjoyment was also neutral about content.

Table 4.10 Did video add to content of the page?

Median Response	Participants n	Percentage %
Strongly agree	4	67
Agree	1	17
Neutral	1	17
Disagree	0	0
Strongly disagree	0	0
Total	**6**	**101**

Was the video useful in conveying information? Six (100%) out of six participants thought it was – five (83%) participants strongly agreed with the statement while one (17%) participant only agreed (Table 4.11). While five (83%) participants found the use of video enjoyable, all six (100%) participants found video useful in conveying information. The same participants who found video enjoyable – that it added to the content and was useful in conveying information – also found video not to be distracting. We can conclude that for this particular site video was enjoyable and useful.

When asked if video distracted them from completing the tasks, all six (100%) participants said no. Five (83%) participants strongly disagreed with the statement while one (17%) only disagreed (Table 4.12). All participants who found the site useful also did not find the video distracting.

Table 4.11 Was video useful in conveying information?

Median Response	Participants n	Percentage %
Strongly agree	5	83
Agree	1	17
Neutral	0	0
Disagree	0	0
Strongly disagree	0	0
Total	**6**	**100**

Table 4.12 Did video distract from task completion?

Median Response	Participants n	Percentage %
Strongly agree	0	0
Agree	0	0
Neutral	0	0
Disagree	1	17
Strongly disagree	5	83
Total	**6**	**100**

During the interview sessions participants were asked how they felt about the online museum tour given by David Ryan and were asked to comment on it. The results were very positive and almost identical to the survey results. Five (83%) out of six participants said that they really enjoyed the video clip provided by Ryan. Only one (17%) participant was disappointed with the video clip. The majority of participants said that it gave them a sense of being in the museum, almost like having a private tour. They said that it was better than reading – you could just relax and watch the video since it is tiring to read text on screen. "It was good and it gave you a lot of information in just a small video. The information was clear and well chosen," one participant noted. Another participant thought that the video would have been even better had Ryan walked around more through the rooms, talking about objects, but he still enjoyed the online tour, saying that it was very informative. Only one participant thought that the video was just a "talking head" and nothing more: "It could have been just a voice clip and a still photo of him. Seemed a bit of a waste of technology."

Looking at the Post Test questionnaires about dynamic elements (in this case video), this is what I found. When asked if video was used appropriately, five (83%) out of six participants said yes. Four (67%) strongly agreed while one (17%) only agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement (Table 4.13).

Table 4.13 Was video used appropriately?

Median Response	Participants n	Percentage %
Strongly agree	4	67
Agree	1	17
Neutral	1	17
Disagree	0	0
Strongly disagree	0	0
Total	**6**	**101**

When asked did video improve the message communicated, the results were identical to the appropriate use of video results. Five (83%) out of six participants said yes. Four (67%) strongly agreed while one (17%) only agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement (Table 4.14).

Table 4.14 Did video improve message communicated?

Median Response	Participants n	Percentage %
Strongly agree	4	67
Agree	1	17
Neutral	1	17
Disagree	0	0
Strongly disagree	0	0
Total	**6**	**101**

When asked did video affect one's ability to retrieve information, four (67%) out of six participants agreed. Two (33%) strongly agreed while two (33%) agreed. Two (33%) out of six participants strongly disagreed (Table 4.15).

Table 4.15 Did video affect your ability to retrieve information?

Median Response	Participants n	Percentage %
Strongly agree	2	33
Agree	2	33
Neutral	0	0
Disagree	0	0
Strongly disagree	2	33
Total	**6**	**99**

Would the site be better without video? Six (100%) out of six participants said no. Four (67%) participants strongly disagreed while two (33%) disagreed (Table 4.16). While 83% of the participants found that video was appropriately used, only 75% found sound to have been appropriately used. For sound and video, 83% of the participants found that they both improved the message being communicated. While 67% of participants found that video affected their ability to retrieve information, only 30% of participants said this for sound. Why is it that 100% of participants said no when asked would the site be better without video but at the same time, (67%) found that it affected their ability to retrieve information?

Table 4.16 Would site be better without video?

Median Response	Participants n	Percentage %
Strongly agree	0	0
Agree	0	0
Neutral	0	0
Disagree	2	33
Strongly disagree	4	67
Total	**6**	**100**

The majority of participants (83%) liked the video but most of them had a hard time finding the actual link to the video. The link was a graphic of a video camera with "video clip" written underneath in small type, placed next to the title of a particular art movement. All six participants were trying to click on the text, completely ignoring the graphic (Figure 4.1). Eventually all six participants found the video clip and viewed the video but complained that the link should have been on the first page where the title for the art movement was located. When shown that the link was actually there, next to the title, and when asked why they missed it, five out of six participants responded that they did not see it. They thought the graphic was part of the title since it was placed so close to it; they did not see the graphic at all but only text because the graphic was the same colour as the title. Four (67%) out of six participants said that when they look for links they look for text and not graphics, which in this case indicates why the majority of them did not see the link (graphic of a video camera).

As we can see from the survey and interview results, video was well chosen and, in this case, it was well used to deliver information. The only problem associated with it was the actual link for video clips, and not the video itself, as a medium. It was clear, concise, and to the point. All of the participants (100%) thought that the video was useful in conveying information and that it was not distracting. The results were identical to the ones for site enjoyment and content. The majority of participants (83%) thought that video added to the content and

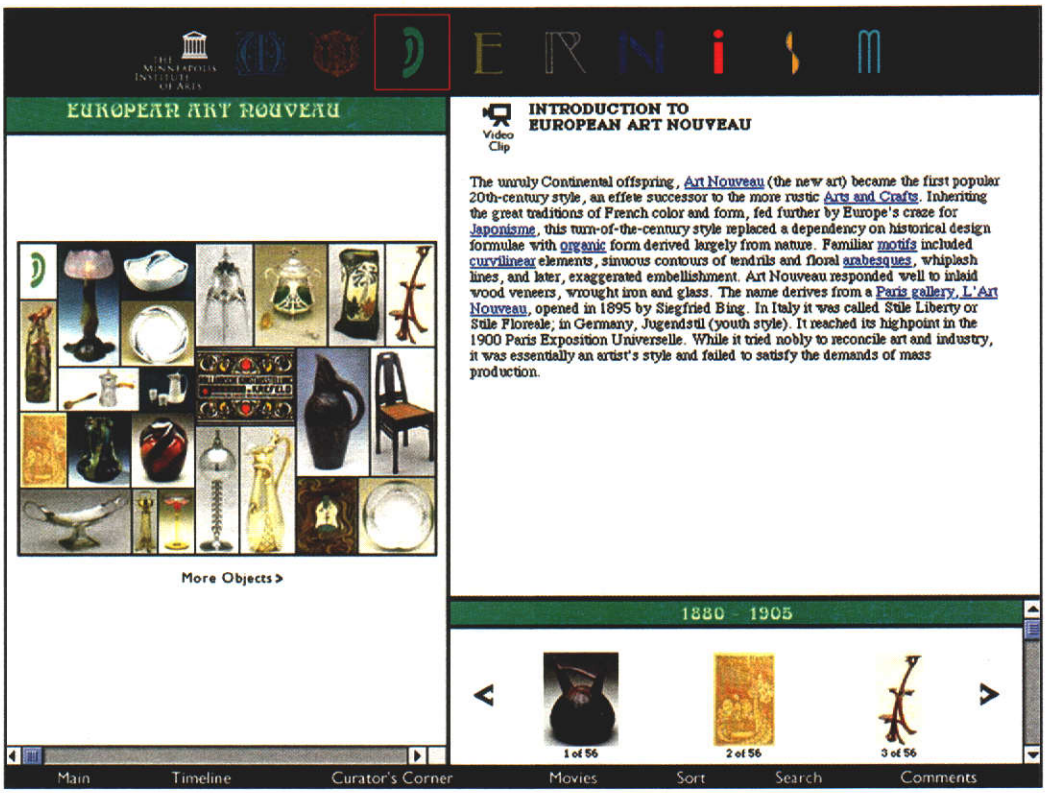

Figure 4.1 Screen from the Modernism site

to their enjoyment of using the site. Why are these results so different from the sound results? Participants did not have control over sound – but with video – they did. They could stop it any time, pause or replay it.

Animation

Five out of the six websites that were tested had some level of animation on them. Some just had an animated type banner running on the front page, some had their logo animated or their main page animated, while others had the whole exhibition animated, such as the National Museum of Australia website, the "Harvest *of Endurance Scroll,"* and the Cooper-Hewitt National Design Museum website exhibition, *"Glass of the Avant-Garde: From Vienna Secession to Bauhaus."*

Again, there were twelve participants and each participant examined three different sites. Each website was evaluated by six different participants, having a total of 36 different evaluations instead of only 12. One participant particularly liked the Minneapolis Institute of Arts subsite, *"Modernism,"* so she even went further into the site and explored on her own. She found objects that could be rotated from different angles and objects that were animated. Her results are included in this study, thus giving the study 31 evaluations for animation, instead of 30.

When asked what they thought of animation while completing the tasks – did it add to their enjoyment of using the site – the answer was yes for 19 (61%) out of 31 evaluations. Twelve evaluations (39%) strongly agreed with the statement while seven (22%) only agreed. Four (13%) evaluations did not agree with the statement. Out of those four that said no, three evaluations (10%) strongly disagreed while one (3%) only disagreed. Eight (26%) out of 31 evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.17).

Table 4.17 Did animation add to enjoyment of site use?

Median Response	Evaluations n	Percentage %
Strongly agree	12	39
Agree	7	22
Neutral	8	26
Disagree	1	3
Strongly disagree	3	10
Total	**31**	**100**

If we take another look at the results and compare site by site evaluations, we can see how well each website did compared to others, and which websites did not do as well (Table 4.18). Again, the results from one participant (who explored further on her own) are included here.

Table 4.18 Did animation add to enjoyment of site use? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	4	0	0	2	3	3
Agree	1	1	1	1	1	2
Neutral	1	0	3	2	1	1
Disagree	0	0	0	1	0	0
Strongly disagree	0	0	2	0	1	0
Total	**6**	**1**	**6**	**6**	**6**	**6**

Legend

CH = Cooper-Hewitt National Design Museum
MIA = Minneapolis Institute of Arts
VG = The Van Gogh Museum
L = Louvre
NGA = National Gallery of Australia
NMA = The National Museum of Australia

We can see from the above results that five (83%) out of six participants thought animation added to their enjoyment of site use for both the Cooper-Hewitt National Design Museum and National Museum of Australia. For Cooper-Hewitt, four (67%) out of six participants strongly agreed while one (17%) participant agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement. For the National Museum of Australia, three (50%) participants strongly agreed while two (33%) only agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement. For the National Gallery of Australia, four (67%) out of six participants said yes; three (50%) strongly agreed while one (17%) agreed. One (17%) participant was neutral while one (17%) strongly disagreed with the statement. For the Louvre, three (50%) out of six participants agreed – two (33%) strongly agreed while one (17%) agreed. Two (33%) participants were neutral while one (17%) participant disagreed with the statement. The Van Gogh Museum did not do as well. Only one (17%) participant agreed while two (33%) participants strongly disagreed. Three (50%) participants were neutral, neither agreeing nor disagreeing with the statement.

When asked if animation added to the content of the page, participants responded to this statement much in the same way they did for enjoyment. Nineteen out of 31 (61%) evaluations said yes; 13 (42%) strongly agreed with the statement while six (19%) only agreed. Five (16%) evaluations said no – three (10%) strongly disagreeing and two (6%) only disagreeing. Seven (23%) out of 31 evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.19). The same number, 19 (61%) evaluations out of 31, found animation to be enjoyable and that it added to the content of the page.

Table 4.19 Did animation add to content of the page?

Median Response	Evaluations n	Percentage %
Strongly agree	13	42
Agree	6	19
Neutral	7	23
Disagree	2	6
Strongly disagree	3	10
Total	**31**	**100**

Looking at the results again, but now comparing site by site evaluations (Table 4.20).

Table 4.20 Did animation add to content of the page? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	4	0	0	3	3	3
Agree	1	1	1	0	1	2
Neutral	1	0	1	3	1	1
Disagree	0	0	2	0	0	0
Strongly disagree	0	0	2	0	1	0
Total	**6**	**1**	**6**	**6**	**6**	**6**

Looking at these results, we can see that they are identical to enjoyment results for the Cooper-Hewitt National Design Museum, the National Museum of Australia, and the National Gallery of Australia. Again, five (83%) out of six participants thought animation added to content for both the Cooper-Hewitt National Design Museum and National Museum of Australia. For Cooper-Hewitt, four (67%) participants strongly agreed while one (17%) agreed. One (17%) participant was neutral, neither agreeing nor disagreeing. For the National Museum of Australia, three (50%) participants strongly agreed while two (33%) agreed. One (17%) participant was neutral, neither agreeing nor disagreed with the statement. For the National Gallery of Australia, four (67%) out of six participants said yes; three (50%) strongly agreed while one (17%) agreed. One (17%) participant was neutral and one (17%) strongly disagreed. For the Louvre, three (50%) out of six participants strongly agreed while three (50%) were neutral, neither agreeing nor disagreeing with the statement. Again, the Van Gogh Museum did not do as well compared to other sites. Only one (17%) participant agreed while two (33%) participants strongly disagreed. Three (50%) participants were neutral, neither agreeing nor disagreeing with the statement.

Was animation useful in conveying information? Seventeen (55%) out of 31 evaluations said yes while five (16%) said no. Of those who said yes, 12 (39%) strongly agreed with the statement while five (16%) only agreed. Of those who said no, three (10%) strongly disagreed and two (6%) disagreed. Nine (29%) out of 31 evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.21). Nineteen (61%) evaluations out of 31 found animation to be enjoyable while 17 (55%) out of 31 found it useful in conveying information.

Table 4.21 Was animation useful in conveying information?

Median Response	Evaluations n	Percentage %
Strongly agree	12	39
Agree	5	16
Neutral	9	29
Disagree	2	6
Strongly disagree	3	10
Total	**31**	**100**

Table 4.22 looks at the results comparing site by site evaluations.

Table 4.22 Was animation useful in conveying information? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	3	0	0	3	3	3
Agree	1	1	0	0	1	2
Neutral	2	0	2	3	1	1
Disagree	0	0	2	0	0	0
Strongly disagree	0	0	2	0	1	0
Total	**6**	**1**	**6**	**6**	**6**	**6**

We can see that the responses here are similar to the enjoyment responses, with the exception of the Van Gogh Museum. For the National Museum of Australia, five (83%) out of six participants thought animation was useful in conveying information. Three (50%) participants strongly agreed while two (33%) agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement. For the Cooper-Hewitt National Design Museum, four (67%) out of six participants said yes – three (50%) strongly agreed while one (17%) agreed. Two (33%) participants were neutral. The responses were similar for the National Gallery of Australia where four (67%) out of six participants also said yes – three (50%) strongly agreeing and one (17%) agreeing. One (17%) participant was neutral, neither agreeing nor disagreeing, while one (17%) strongly disagreed with the statement. For the Louvre, three (50%) out of six participants strongly agreed while three (50%) were neutral, neither agreeing nor disagreeing with the statement. For the Van Gogh site, participants did not find animation useful in conveying information. Four (67%) out of six participants said no. Two (33%) participants strongly disagreed while two (33%) disagreed. Two (33%) were neutral, neither agreeing nor disagreeing with the statement.

When asked if animation distracted them from completing the tasks, 22 (71%) out of 31 evaluations said no while seven (23%) said yes. Out of those who said no, 14 (45%) strongly

disagreed with the statement while eight (26%) only disagreed. Of those who said yes, six (20%) agreed and only one (3%) strongly agreed. Two (6%) out of 31 evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.23). From the results above, we can conclude that in this case (websites that were tested), distraction does not seem to be interfering with enjoyment or usefulness.

Table 4.23 Did animation distract from task completion?

Median Response	Evaluations n	Percentage %
Strongly agree	1	3
Agree	6	20
Neutral	2	6
Disagree	8	26
Strongly disagree	14	45
Total	**31**	**100**

Again, looking at the results and comparing site by site evaluations (Table 4.24).

Table 4.24 Did animation distract from task completion? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	0	0	1	0	0	0
Agree	0	0	4	0	2	0
Neutral	1	0	0	0	0	1
Disagree	0	0	1	3	2	2
Strongly disagree	5	1	0	3	2	3
Total	**6**	**1**	**6**	**6**	**6**	**6**

Did animation distract from task completion? Five (83%) out of six participants said no for the Cooper-Hewitt National Design Museum. All five strongly disagreed with the statement while one (17%) participant was neutral. For the National Museum of Australia, again five (83%) out of six participants said no; three (50%) strongly disagreed and two (33%) disagreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement. For the National Gallery of Australia, four (67%) out of six participants disagreed while two (33%) agreed. Out of those four who disagreed, two (33%) strongly disagreed while two (33%) only disagreed. For the Louvre, six (100%) out of six participants said no – three (50%) disagreed and three (50%) strongly disagreed. Looking at the Van Gogh results, we see that five (83%) out of six participants agreed with the statement. One (17%) strongly agreed while four (67%) only agreed. One (17%) participant disagreed with the statement.

Additional information about animation was gained from interviews with the participants. When asked how they felt about animation, eleven (44%) out of 25 evaluations liked it while twelve (48%) did not. Two (8%) out of 25 evaluations were neutral. Those who liked animation thought that it worked well with the subject matter and that it added to the content. One participant noted: "It kept your interest up, you didn't get bored with the site." Another participant said, "It was good. It worked and I thought it added to the content." Of those who didn't like animation, most of the negative comments came from the Van Gogh site. They found it to be distracting, frustrating and confusing. "I found it to be a bit distracting, there was no need for it, you could have the same information displayed without animation more effectively and clearly," one participant noted. Another participant asked, "What is the movement trying to achieve?"

All the neutral evaluations came from the Louvre site which had animated text moving in a rectangle on their main page, advertising the current exhibition. Some participants did not see the animated text at first so they had to go back to the main page to see it again, while others did not pay much attention to it, just continuing with their search. "I didn't see it, where was it? Text, well, I didn't pay any attention to it," one participant responded. Another participant said, "I didn't pay much attention, I was looking for the information," while another added, "I didn't care either way about the animation on the main page. You don't really pay attention to it."

More information about dynamic elements (sound, video and animation) was gained from the Posttest questionnaires. Here are the results for animation.

When asked if animation was used appropriately, 21 (64%) out of 33 evaluations said yes. Thirteen (40%) strongly agreed while eight (24%) only agreed. Three (9%) out of 33 evaluations disagreed while nine (27%) evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.25).

Table 4.25 Was animation used appropriately?

Median Response	Evaluations n	Percentage %
Strongly agree	13	40
Agree	8	24
Neutral	9	27
Disagree	3	9
Strongly disagree	0	0
Total	**33**	**100**

Looking at the results again, but this time comparing site by site evaluations (Table 4.26).

Table 4.26 Was animation used appropriately? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	4	1	1	3	1	3
Agree	1	0	2	1	2	2
Neutral	1	2	1	2	2	1
Disagree	0	0	2	0	1	0
Strongly disagree	0	0	0	0	0	0
Total	**6**	**3**	**6**	**6**	**6**	**6**

We can see from the above results that five (83%) out of six participants thought animation was used appropriately for both the Cooper-Hewitt National Design Museum and National Museum of Australia. For Cooper-Hewitt, four (67%) out of six participants strongly agreed while one (17%) participant agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement. For the National Museum of Australia, three (50%) participants strongly agreed while two (33%) only agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement. For the National Gallery of Australia, three (50%) out of six participants said yes; one (17%) strongly agreed while two (33%) agreed. Two (33%) participants were neutral while one (17%) participant disagreed with the statement. For the Louvre, four (67%) out of six participants agreed – three (50%) strongly agreed while one (17%) agreed. Two (33%) participants were neutral, neither agreeing nor disagreeing with the statement. For the Van Gogh site, three (50%) out of six participants also said yes; one (17%) strongly agreed while two (33%) agreed. One participant (17%) was neutral while two (33%) participants disagreed.

When asked did animation improve the message communicated, 20 (61%) out of 33 evaluations said yes. Thirteen (40%) evaluations strongly agreed while seven (21%) only agreed. Four (12%) evaluations said no; three (9%) disagreed while one (3%) strongly disagreed. Nine (27%) out of 33 evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.27).

Table 4.27 Did animation improve message communicated?

Median Response	Evaluations n	Percentage %
Strongly agree	13	40
Agree	7	21
Neutral	9	27
Disagree	3	9
Strongly disagree	1	3
Total	**33**	**100**

Table 4.28 looks at the animation results comparing site by site evaluations.

Table 4.28 Did animation improve message communicated? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	3	1	1	2	2	4
Agree	2	0	2	1	1	1
Neutral	1	2	1	3	1	1
Disagree	0	0	1	0	2	0
Strongly disagree	0	0	1	0	0	0
Total	**6**	**3**	**6**	**6**	**6**	**6**

Looking at these results, we can see that they are similar to the appropriate use results. Five (83%) out of six participants thought that animation improved the message communicated for both the Cooper-Hewitt National Design Museum and the National Museum of Australia. For the Cooper-Hewitt National Design Museum, three (50%) participants strongly agreed while two (33%) agreed. One (17%) participant was neutral. For the National Museum of Australia, four (67%) participants strongly agreed; one (17%) agreed while one (17%) was neutral. For the National Gallery of Australia and for the Louvre, three (50%) out of six participants said yes; two (33%) strongly agreed while one (17%) only agreed. For the National Gallery of Australia two (33%) participants disagreed and one (17%) participant was neutral, neither agreeing nor disagreeing with the statement while three (50%) participants were neutral for the Louvre. For the Van Gogh site, three (50%) out of six participants said yes, two (33%) agreeing with one (17%) strongly agreeing. Two (33%) out of six participants said no. One (17%) strongly disagreeing and one (17%) disagreeing. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement.

When asked did animation affect one's ability to retrieve information, nine (27%) out of 33 evaluations agreed. Three (9%) strongly agreed while six (18%) agreed. Sixteen (48%) out

of 33 evaluations disagreed. Six (18%) disagreed while ten (30%) strongly disagreed. Eight (24%) out of 33 evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.29).

Table 4.29 Did animation affect your ability to retrieve information?

Median Response	Evaluations n	Percentage %
Strongly agree	3	33
Agree	6	33
Neutral	8	0
Disagree	6	0
Strongly disagree	10	33
Total	**33**	**99**

Again, looking at the results and comparing site by site evaluations (Table 4.30).

Table 4.30 Did animation affect your ability to retrieve information? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	1	0	0	0	1	1
Agree	0	0	4	0	0	2
Neutral	0	2	1	2	2	1
Disagree	3	0	0	1	2	0
Strongly disagree	2	1	1	3	1	2
Total	**6**	**3**	**6**	**6**	**6**	**6**

Did animation affect your ability to retrieve information? Five (83%) out of six participants said no for the Cooper-Hewitt National Design Museum. Two (33%) participants strongly disagreed while three (50%) participants disagreed. One (17%) participant strongly agreed. For the National Gallery of Australia, three (50%) participants said no, two (33%) disagreeing with one (17%) strongly disagreeing. Two (33%) participants were neutral, neither agreeing nor disagreeing with the statement while one (17%) participant strongly agreed. For the National Museum of Australia, two (33%) out of six participants said no, both strongly disagreeing. Three (50%) out of six participants said yes. Two (33%) participants agreed while one (17%) participant strongly agreed with the statement. One (17%) participant was neutral. For the Louvre, four (67%) out of six participants disagreed – three (50%) strongly disagreed while one (17%) disagreed. Two (33%) participants were neutral, neither agreeing nor disagreeing with the statement. For the Van Gogh site, four (67%) out of six participants agreed; one (17%) strongly disagreed while one (17%) participant was neutral.

Would the site be better without animation? Twenty six (76%) out of 34 evaluations said no. Thirteen (38%) evaluations strongly disagreed while another 13 (38%) disagreed. Six (18%) of the 34 evaluations said yes. Five (15%) evaluations agreed while one (3%) strongly agreed. Two (6%) out of 34 evaluations were neutral, neither agreeing nor disagreeing with the statement. (Table 4.31)

Table 4.31 Would site be better without animation?

Median Response	Evaluations n	Percentage %
Strongly agree	1	3
Agree	5	15
Neutral	2	6
Disagree	13	38
Strongly disagree	13	38
Total	**34**	**100**

Again, looking at the results and comparing site by site evaluations (Table 4.32).

Table 4.32 Would site be better without animation? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	0	0	1	0	0	0
Agree	0	0	2	0	2	1
Neutral	1	0	0	1	0	0
Disagree	3	2	1	3	2	2
Strongly disagree	2	2	2	2	2	3
Total	**6**	**4**	**6**	**6**	**6**	**6**

When asked would the site be better without animation, five (83%) out of six participants said no for the Cooper-Hewitt National Design Museum, the Louvre and the National Museum of Australia. For the Cooper-Hewitt National Design Museum and the Louvre, two (33%) participants strongly disagreed, three (50%) participants agreed and one (17%) participant was neutral. For the National Museum of Australia, three (50%) participants strongly disagreed, two (33%) disagreed and one (17%) participant agreed with the statement. For the National Gallery of Australia, four (67%) out of six participants said no; two (33%) strongly disagreed and two (33%) disagreed. Two (33%) out of six participants said yes, both agreeing. For the Van Gogh Museum, three (50%) out of six participants said yes; one (17%) strongly agreed while two (33%) agreed. Three (50%) out of six participants said no. Two (33%) strongly disagreed while one (17%) disagreed.

Table 4.33 Levels of dynamic elements for each site

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Low		x		x		
Moderate	x				x	x
High			x			

Looking at the overall results, we see that 64% of evaluations found animation to have been used appropriately, while 75% found sound and 83% found video to have been used appropriately. While 83% of evaluations found that both sound and video improved the message being communicated, only 61% of evaluations found that to be true for animation.

If we look at individual sites tested, we can see from the results that it depends on how well they did on the use and level of animation. Looking at the Louvre with only text animated on the main page, the majority of participants either did not see it or did not pay much attention to it. Why is that? Are dynamic elements only noticed when they intrude or when they do not work? The Louvre had animated text only on their main page. Once you selected something from their main menu, situated on the left hand side, you moved on to the next screen and the animated text disappeared. You never saw that text again unless you went back to the main page. If that text was animated on every screen, I believe participants would have noticed it and the results would have been quite different. On the other hand, the Van Gogh site had more animation. Their navigation was completely animated and participants had a hard time figuring out how to use it. If you did not have your cursor at the right spot, there was no indication of how to get into the site. By not knowing how the site works and trying to figure things out by trial and error, many participants became frustrated; but once they found out how the navigation worked, they were able to find the information they were searching for. From the results, we can see that 22 (71%) out of 31 evaluations did not find animation distracting while completing tasks, even though they found it frustrating at times. Only seven (23%) evaluations found it to be distracting. Nineteen (61%) out of 31 evaluations thought that animation added to the enjoyment of site use, as well as to the content of the page while seventeen (55%) evaluations also found animation to be useful in conveying information. Twenty six (76%) out of 34 evaluations said no when asked if the site would be better without animation.

Impact of dynamic elements on effectiveness

As we can see, dynamic elements such as sound, video and animation can have an impact on effectiveness of information delivery from a website. Depending on how dynamic elements are used in a website, we can get positive or negative results. One little thing such as a button, where you can turn the sound on or off, can make a difference in the information

search. Before we look more closely at each site that was tested, let us take a look at the level of dynamic elements associated with each of those sites which is illustrated in Table 4.33.

Table 4.34 Dynamic elements and overall level of enjoyment, usefulness and distraction *(site by site analysis)*

Median Response		Websites CH	MIA	VG	L	NGA	NMA
Enjoyment	*yes*	83%	86%	17%	50%	67%	75%
	no	0%	0	33%	17%	17%	17%
	neither	17%	17%	50%	33%	17%	8%
Usefulness	*yes*	67%	100%	0%	50%	67%	58%
	no	0%	0%	67%	0%	17%	8%
	neither	33%	0%	33%	50%	17%	33%
Distraction	*yes*	0%	0%	83%	0%	33%	17%
	no	83%	100%	17%	100%	67%	67%
	neither	17%	0%	0%	0%	0 %	17%
Total		**6**	**7**	**6**	**6**	**6**	**6**

The National Museum of Australia

The National Museum of Australia website has sound and animation on its subsite, the *"Harvest of Endurance Scroll."* When you enter the site, you hear the big "gong" sound and the scroll opens up. After a second or two, the beautifully illustrated, animated scroll starts to roll from left to right with music playing in the background. You can watch the scroll as it rolls by, and you can pause it or rewind it in the other direction. The background music still remains on, even if you pause on the scroll. Once you click on the "View the scroll" link, you start to view the scroll by timeline. At this time, the animation stops, but the music still plays in the background. Most of the participants found that sound on the *"Harvest of Endurance Scroll"* website set a mood for the exhibition, but after a few minutes of listening to the music, they were trying to figure out how to turn it off. They said that after a while it was annoying and they were getting irritated, some of them even losing concentration. If there was a button somewhere on the website to turn the music off or down, participants would have had a more positive experience while they were at the site, looking for specific information. While the majority of participants found sound to be annoying, only 33% found it to be distracting; 33% thought that sound was useful in conveying information while 67% thought that it added to their enjoyment. We can conclude that for this particular site sound was more enjoyable than useful.

While 33% of evaluations found sound to be distracting, no one found animation to be distracting. What was the difference between the two? Sound could not be turned off or down and was present all the time while you were at the site. On the other hand, once you

moved off the main page, the animation disappeared and you viewed the scroll, section by section, through the timeline. If the scroll was moving all the time, I believe participants would have found it distracting, just like sound. Eighty three percent of evaluations found animation to be both enjoyable and useful as well as adding to the content. The scroll was about the history of Chinese immigration to Australia; a 50 metre long Chinese scroll illustrated stories of hardship and survival in the traditional style of Chinese painting. We can see from the above results that the presence or absence of dynamic elements on a screen will determine how users enjoy or react to the site. In this case, we can see that participants reacted more positively with animation than sound; 83% of evaluations enjoyed the animation while only 67% enjoyed sound. Animation was only present on the main page of the *"Harvest of Endurance Scroll"* exhibition while sound was present throughout the exhibition. Table 4.34 illustrates dynamic elements for each site and overall level of enjoyment, usefulness and distraction.

Minneapolis Institute of Arts

The Minneapolis Institute of Arts website had a video on its subsite, *"Modernism."* The majority of participants liked the video where curator David Ryan discussed different art movements. The video was simple to use; once you located the link for the video and clicked on it, you could view it. Participants liked the video because they could just sit and listen to it, and they did not have to read anything on the screen. They also found Ryan to be credible; he was a curator (not just anybody talking about art) and was believable. No one found video to be distracting because it had buttons to pause, replay, and quit. Six (100%) out of six participants found video to be useful in conveying information while five (83%) out of six found that video was used appropriately, that it added to the content and to their enjoyment of using the site. We can see from the above results that participants reacted positively towards the video. They found that the video was used well and since they could control it, no one found it distracting. We can conclude that when dynamic elements are used appropriately and when they help with the message being communicated, participants do not find them confusing or distracting.

Louvre

The Louvre museum had a low level of dynamic elements on its website. On the main page, there was animated text announcing the current exhibition that was moving across in a rectangle, dissolving and repeating again. The animated text was at the top of the screen and more towards the right while the main menus were all on the left hand side. Once you chose a link from the menu, you moved on to a different screen and the animated text disappeared; you did not see it again unless you went back to the main page. There was no need to go back to the main page since the main menu that was on the left appeared on every screen,

and you had access to it at all times. Since the majority of participants spent less than a minute on the main page, they either did not notice the moving text or ignored it completely. When asked what they thought of animation – one participant responded "I didn't see it, where was it? Text, well I didn't pay any attention to it." Are dynamic elements only noticed when they intrude or do not work? I believe this is true, and we can see this from the results. Six (100%) out of six participants did not find animation to be distracting on this site while only three (50%) out of six participants thought that the animation was useful and enjoyable. We can conclude that if the level of dynamic elements is low, or not present at all, we get very little or no distraction, plus the level of enjoyment can also decrease or remain low.

The National Gallery of Australia

The National Gallery of Australia, with a moderate level of animation, had an interactive navigation for its subsite, "*The Book of Kells and the Art of Illumination.*" Once you entered the site, there were instructions on how to navigate through the various manuscripts. Each participant read the instructions before they started their tasks, but everyone still had problems with the interactive navigation; most of them had to go back and read the instructions again. The instructions read: "You can navigate through to the various manuscripts by clicking on the map to the right. To return to this map click on the small map that will appear in the top left corner." There was no mention that once you got to the manuscripts, in order to view them in larger format or read about them, you needed to move the cursor over the active manuscript thumbnails that were at the top of the screen. Participants were still clicking on different cities on the map, but since there were no links, nothing was happening.

From the observations, it was visible that some of the participants were clearly frustrated. It was taking them longer to figure out how this site worked and longer to find the information they were looking for. While the majority of participants complained about interactive navigation and links that were not clearly visible, once they figured out how it worked, four (67%) out of six participants liked the interactive navigation. One participant said "I liked it, once I saw how it worked. I liked how the manuscripts got exposed when you moved your cursor over the icons." The majority of participants, four (67%) out of six, also found the site to be enjoyable and useful while 33% found it to be distracting. If we compare these results with the Minneapolis Institute of Arts results, we can see that these ones are a bit lower for both enjoyment and usefulness. The Minneapolis Institute of Arts website had a low level of dynamic elements on it (only video) while the National Gallery of Australia had a moderate level of dynamic elements. Again, we can see that the level of dynamic elements present on a website will affect the level of enjoyment or distraction that a user will have.

The Cooper-Hewitt National Design Museum

The Cooper-Hewitt National Design Museum exhibition, *"Glass of the Avant-Garde: From Vienna Secession to Bauhaus,"* had animation and interactive navigation. The main page announcing the exhibition was animated and once the animation finished there was a pause for about 15 seconds before the actual exhibition came up. The interactive navigation was simple to use. The main menu bar consisted of small glass objects that were dimmed. Moving your cursor over the dimmed objects made them light up and exposed what period the objects were from. When participants clicked on one of those small icons, the glass objects moved in, one by one, from left to right. If you clicked on another icon, the same thing would happen. It was consistent and simple to use and a majority of the participants thought so too. There was only one way to get to the information and that was by using the interactive navigation located at the bottom.

With the National Gallery of Australia, which also had interactive navigation for its subsite, "The *Book of Kells and the Art of Illumination,*" participants found interactive navigation harder to use at first and they had problems with it. What was the difference between the two interactive navigations? The *"Book of Kells and the Art of Illumination"* navigation was more complex. Once you clicked on the map to get to the manuscripts you had to use a second set of navigational tools (in this case small manuscript icons) to see each individual manuscript. With the *"Glass of the Avant-Garde: From Vienna Secession to Bauhaus"* exhibition, there was only one way to navigate; there were no alternatives. Five (83%) out of six participants found the *"Glass of the Avant-Garde: From Vienna Secession to Bauhaus"* exhibition enjoyable while four (67%) out of six participants found it useful. None of the participants found the site distracting. For the *"Book of Kells and the Art of Illumination,"* four (67%) out of six participants found it enjoyable and useful while 33% found it distracting. We can see that even if we have the same navigation for both sites, results are quite different when it comes to enjoyment and distraction.

The Van Gogh Museum

The Van Gogh museum had animation on its subsite, *"The Light"* exhibition. This site was the most difficult to use for the majority of participants. When you selected the English version of the exhibition, it was hard to figure out what was happening or what to do next. The only indication that a user had was the word "light" in a rectangle, with the light fading in and out behind it. By moving your cursor over the word "light," another word appeared that said "start." Once you clicked on the start, the main menu bar, designed as a timeline, started to move, and depending on where your cursor was at the time, it could either move slowly or quickly. You didn't know what to do or how to stop it. All six (100%) participants were quite surprised at the sudden movement and they all tried to stop it unsuccessfully. All six participants tried to click on the years that were in the timeline, and since these were not

links, participants were once again unsuccessful. By moving their cursors all over the screen, some participants found actual links by accident. If you moved your cursor over the main headings that were outside this timeline, you exposed the actual links that were previously hidden. As soon as you moved your cursor just a bit off the main heading, the hidden links disappeared again. Only one (17%) out of six participants found this site enjoyable. Half (50%) of the participants were neutral while 33% said they did not enjoy the site; the results were identical with regards to content. None of the six participants found animation useful on this site; 67% found animation not useful while 33% were neutral. The majority (83%) of participants found animation to be distracting while the same participant (17%) who enjoyed the site did not find animation distracting.

What is the difference between this participant, who liked the animation and did not find it distracting, from the rest of the participants who found animation distracting? This particular participant had been using the Internet for more than two years, about two hours every day. The participant was familiar with dynamic elements and quickly figured out how to navigate the site, having no problems with it and finishing the tasks in less than a minute and a half (1:50). Other participants, who had trouble with the site, took anywhere from a minute and thirty seven seconds (1:37) to 12:39 seconds to complete the tasks. While some of the other participants used the Internet every day, they did not use it as intensely, giving the above participant an advantage over them when it came to familiarity with dynamic elements. Again, we can see from the results that when we have a high level of dynamic elements, or if they are more complex, results are not as positive as they are with low or moderate levels.

Looking at the results, we can see that sound, video, and animation (content presented through dynamic elements) can have an impact on effectiveness of information delivery. Depending on the level of dynamic elements that are present in a website, on their complexity, and on how they are used, they can either have a positive or negative effect on information delivery. We saw that the participant who was familiar with dynamic elements quickly figured out how to navigate the site, found the information quickly, and liked animation – not finding it distracting, while other participants who were not familiar with dynamic elements took longer to complete their tasks and found dynamic elements not that easy to use. The amount and level of dynamic elements on a webpage and a user's level of experience will determine whether or not dynamic elements will be a distraction for the user.

What is the relationship between use of dynamic elements, user engagement with a site through interaction with dynamic elements, and the effectiveness of information delivery?

It is true that delivering dynamic elements such as sound, video and animation on the Web is limited due to bandwidth, but with faster connections and better file compression we are seeing more and more of these elements used, and sometimes overused by designers and developers. When a user comes across a webpage that is full of animations and other dynamic elements, taking forever to download, the site loses its effectiveness (Mohler and Duff 2000). According to them, every element used on a webpage should contribute to communication, design, or navigation, and they add that the inclusion of elements on a page for no apparent reason will distract and confuse users.

In our study of museum websites, participants appeared to be distracted and confused at times. This was already apparent at the beginning while they were completing their tasks. Participants had to complete six different tasks on each website. The first four tasks were identical for all six sites, while the last two tasks were different for each site. The last two tasks were also more complex in nature and had dynamic elements associated with them. Participants did not have much trouble with the first four tasks, but when it came to do the last two tasks, some participants had more difficulty. When asked: Which task did you find the most difficult, the majority of the evaluations, 32 (86%) out of 36, said task five and six. Twelve, (33%) out of 36 evaluations, found task five to be the most difficult while 20 (53%) out of 36 evaluations found task six to be the most difficult. One (3%) out of 36 evaluations found tasks one, two, three and four to be the most difficult (Table 4.35).

Table 4.35 Which tasks did you find the most difficult?

Tasks	Evaluations n	Percentage %
One *(static)*	1	3
Two *(static)*	1	3
Three *(static)*	1	3
Four *(static)*	1	3
Five *(dynamic)*	12	33
Six *(dynamic)*	20	55
Total	**36**	**100**

If we take another look at the results and compare site by site evaluations, we can see how well each website did. Table 4.36 looks at the results, comparing site by site evaluations.

Table 4.36 Which tasks did you find the most difficult? *(site by site analysis)*

Tasks	Websites CH	MIA	VG	L	NGA	NMA
One *(static)*	0	0	0	1	0	0
Two *(static)*	0	1	0	0	0	0
Three *(static)*	0	0	0	1	0	0
Four *(static)*	0	0	0	0	0	1
Five *(dynamic)*	5	0	2	1	2	2
Six *(dynamic)*	1	5	4	3	4	3
Total	**6**	**6**	**6**	**6**	**6**	**6**

We can see from the results that the majority of evaluations found tasks more difficult to complete which were more challenging and contained dynamic elements.

When participants were asked to explain why they found a particular task the most difficult, here is what they had to say. For the Cooper-Hewitt National Design Museum, two (33%) out of six participants said it was because it took them longer to find the answer. Three (50%) out of six participants did not know where to click or how to navigate while one (17%) participant was impatient and just clicked through. For the Minneapolis Institute of Arts, two (33%) out of six participants found that sitting through two videos to answer a question was hard, but not difficult. One (17%) participant found links difficult; one (17%) was frustrated because it took very long to find information; one (17%) participant read the question wrong; and one (17%) participant found information in one place inconsistent and therefore, confusing. For the Van Gogh site, two (33%) out of six participants did not know Van Gogh's period; three (50%) participants did not know how to use the animated navigation or where to click while one (17%) participant went to the wrong section and was trying to figure out where the answer was without reading all the information that was there.

For the Louvre site, three (50%) out of six participants found QuickTime symbols to be confusing – not knowing which one to click on to get information. One (17%) participant found the type hard to read because of its size and typeface used; one (17%) participant expected to find information under a particular section but it was not there, therefore resulting in a longer search, while one (17%) participant was impressed by the virtual tour and continued looking at it for information that was not there. For the National Gallery of Australia, it was mostly the interactive navigation and links that gave participants trouble. Three (50%) out of six participants did not know how to navigate while two (33%) participants found the links confusing. One (17%) participant found the introduction confusing; it was not labelled well. For the National Museum of Australia, participants found different things that did not work. Two (33%) out of six participants found instructions unclear on

how to get from one part of the site to another; one (17%) found that there was too much information to go through; one (17%) did not know how to view hot spots which revealed the right information; and one (17%) found that terminology was used differently on this site, making the site more confusing.

Was the most difficult task worth your effort, compared to other tasks? Twenty nine (81%) evaluations out of 36 said yes while seven (19%) evaluations said no (Table 4.37). Even though participants found tasks with dynamic elements more difficult to do than static tasks, the majority of evaluations said that it was worth their effort in the end.

Table 4.37 Was most difficult tasks worth your effort?

Median Response	Evaluations n	Percentage %
Yes	29	81
No	7	19
Total	**36**	**100**

Let us look at the results and compare site by site evaluations (Table 4.38).

Table 4.38 Was most difficult tasks worth your effort? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Yes	6	6	3	4	4	6
No	0	0	3	2	2	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

Participants found all tasks to be worth their effort for the Cooper-Hewitt National Design Museum, the Minneapolis Institute of Arts and the National Museum of Australia. For the Louvre and National Gallery of Australia, participants found four tasks to be worth their effort while the other two were not, and for the Van Gogh site, participants found only three tasks worth their effort while the other three were not.

When participants were asked which task they enjoyed the most, the majority of evaluations, 29 (81%) out of 36, said tasks five and six. Thirteen (36%) out of 36 evaluations chose task five while 16 (45%) evaluations chose task six as the most enjoyable. Three (8%) out of 36 evaluations chose task four while four (11%) evaluations chose task one as the most enjoyable (Table 4.39). As we can see from the results, the majority of evaluations (86%) found the same tasks to be the most difficult and enjoyable at the same time. How can this be? Is it possible for the same tasks to be difficult and enjoyable at the same time? According to our results, yes, it is highly likely. The majority of evaluations found tasks five and six to be the

Table 4.39 Which tasks did you enjoy the most?

Tasks	Evaluations n	Percentage %
One *(static)*	4	11
Two *(static)*	0	0
Three *(static)*	0	0
Four *(static)*	3	8
Five *(dynamic)*	13	36
Six *(dynamic)*	16	45
Total	**36**	**100**

most difficult tasks, but when they successfully completed those tasks, they were pleased with what they had accomplished. Also, tasks five and six contained more interesting information, so when participants completed those tasks, they enjoyed the end result because of the information gathered.

Looking at the same results and comparing site by site evaluations (Table 4.40).

Table 4.40 Which tasks did you enjoy the most? *(site by site analysis)*

Tasks	Websites CH	MIA	VG	L	NGA	NMA
One *(static)*	0	1	1	1	1	0
Two *(static)*	0	0	0	0	0	0
Three *(static)*	0	0	0	0	0	0
Four *(static)*	0	0	1	0	2	0
Five *(dynamic)*	5	1	2	2	1	2
Six *(dynamic)*	1	4	2	3	2	4
Total	**6**	**6**	**6**	**6**	**6**	**6**

Looking at the above results, we can see that for the Cooper-Hewitt National Design Museum and for the National Museum of Australia, all six participants chose dynamic tasks five and six as the most enjoyable. For the Minneapolis Institute of Arts and the Louvre, five out of six participants chose dynamic tasks five and six as the most enjoyable while one participant chose task one. For the Van Gogh, four out of six participants chose tasks five and six; one participant chose task one; and one chose task four as the most enjoyable task. For the National Gallery of Australia, only three out of six participants found tasks five and six enjoyable; two participants chose task four; and one participant chose task one as the most enjoyable task. As we can see from the results, participants did not find dynamic tasks on the National Gallery of Australia site as enjoyable as those on the other sites. The National Gallery of Australia site had an interactive navigation which many participants did not know

how to use. Instructions were provided online on how to navigate the site (which all participants read), but as they started to move from one part of the site to the next, it became apparent that they did not know how to navigate, clicking often on non-linked text. All six participants had to go back and reread the instructions on how to navigate the site.

When participants were asked if there were distractions on a page, 12 (33%) out of 36 evaluations said yes. Eleven (31%) evaluations strongly agreed while only one (3%) evaluation agreed with the statement. Nineteen (53%) out of 36 evaluations said no. Eleven (31%) evaluations strongly disagreed while eight (22%) evaluations disagreed with the statement. Five (14%) out of 36 evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.41).

Table 4.41 There were distractions on a page?

Median Response	Evaluations n	Percentage %
Strongly agree	1	3
Agree	11	31
Neutral	5	14
Disagree	8	22
Strongly disagree	11	31
Total	**36**	**101**

If we look at the same results and compare site by site evaluations (Table 4.42), we can see how each site did.

Table 4.42 There were distractions on a page? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	0	0	1	0	0	0
Agree	0	2	4	2	1	2
Neutral	1	0	1	0	2	1
Disagree	2	2	0	1	2	1
Strongly disagree	3	2	0	3	1	2
Total	**6**	**6**	**6**	**6**	**6**	**6**

We can see from the results that for the Cooper-Hewitt National Design Museum, five (83%) out of six participants disagreed. Three (50%) participants strongly disagreed while two (33%) participants disagreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement. For the Minneapolis Institute of Arts, four (67%) out of six participants disagreed. Two (33%) strongly disagreed while two (33%) disagreed. Two

(33%) out of six participants agreed with the statement. For the Van Gogh site, five (83%) out of six participants agreed with the statement; one (17%) strongly agreed while four (67%) agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement. For the Louvre, four (67%) out of six participants disagreed with the statement; three (50%) strongly disagreed while one (17%) disagreed. Two (33%) participants agreed with the statement. For the National Gallery of Australia, three (50%) out of six participants disagreed; one (17%) strongly disagreed while two (33%) disagreed. One (17%) participant agreed while two (33%) participants were neutral, neither agreeing nor disagreeing with the statement. For the National Museum of Australia, three (50%) out of six participants disagreed; two (33%) strongly disagreed while one (17%) disagreed. Two (33%) participants agreed while one (17%) participant was neutral, neither agreeing nor disagreeing with the statement.

Looking at the results, we can see that the majority of participants (83%) agreed that there were distractions on the Van Gogh site. What were those distractions? The site did not have any spinning logos or any animated graphics flashing on a page. This site had animated horizontal navigation, and participants found that to be distracting. They did not like the way it moved horizontally across the page; some of the participants pointed out that it was very hard to read and follow movement at the same time.

When participants were asked if they were satisfied with the amount of information they were able to retrieve from the site, 32 (89%) out of 36 evaluations said they were. Thirteen (36%) evaluations were very satisfied while 19 (53%) were satisfied. Two (6%) evaluations were dissatisfied with the information they retrieved and two (6%) were neutral, neither satisfied nor dissatisfied (Table 4.43).

Table 4.43 Were you satisfied with the amount of information you retrieved?

Median Response	Participants n	Percentage %
Very satisfied	13	36
Satisfied	19	53
Neutral	2	6
Dissatisfied	2	6
Very dissatisfied	0	0
Total	**12**	**101**

If we look at the same results and compare site by site evaluations (Table 4.44), we can see how each site did.

Table 4.44 Were you satisfied with the amount of information you retrieved? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Very satisfied	4	4	1	0	1	3
Satisfied	2	2	1	6	5	3
Neutral	0	0	2	0	0	0
Dissatisfied	0	0	2	0	0	0
Very dissatisfied	0	0	0	0	0	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

We can see from the results that for the Cooper-Hewitt National Design Museum, the Minneapolis Institute of Arts, the Louvre, the National Gallery of Australia and the National Museum of Australia, all six (100%) participants were satisfied with their information retrieval. For the Van Gogh site, only two (33%) out of six participants were satisfied while two (33%) were dissatisfied with the information retrieval. Two (33%) participants were neutral, neither satisfied nor dissatisfied with the information retrieval.

Why is it that only two out of six participants were satisfied with the information retrieved at the Van Gogh site while at the rest of the sites, all six participants were satisfied? Participants did not have problems accessing information on the main Van Gogh site, but at its subsite, the *Light* exhibition. The site had animated and interactive navigation, a more complex navigation than the other sites. Participants did not know where to click or how to go about looking for information, and got frustrated in the process, thus taking longer to complete their tasks. While the other subsites also had interactive navigation, it was not as complex as the one on the *Light* subsite. We can conclude that for this particular site, the greater complexity of dynamic elements played a major role in how successful the information retrieval was.

When asked if it was easy to find specific information, 27 (75%) out of 36 evaluations agreed. Eleven (31%) evaluations strongly agreed while 16 (44%) agreed. Six (17%) of the 36 evaluations disagreed. Five (14%) evaluations disagreed while one (3%) strongly disagreed. Three (8%) out of 36 evaluations were neutral, neither agreeing nor disagreeing with the statement. (Table 4.45)

Table 4.45 It was easy to find specific information?

Median Response	Participants n	Percentage %
Strongly agree	11	31
Agree	16	44
Neutral	3	8
Disagree	5	14
Strongly disagree	1	3
Total	**36**	**101**

Again, looking at the results and comparing site by site evaluations (Table 4.46).

Table 4.46 It was easy to find specific information? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	4	5	0	1	0	1
Agree	1	1	2	4	4	4
Neutral	1	0	1	0	1	0
Disagree	0	0	2	1	1	1
Strongly disagree	0	0	1	0	0	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

When asked if it was easy to find specific information, six (100%) out of six participants said yes for the Minneapolis Institute of Arts. Five (83%) participants strongly agreed while one (17%) agreed. For the Cooper-Hewitt National Design Museum, the Louvre and the National Museum of Australia, five (83%) out of six participants said yes. For the Cooper-Hewitt National Design Museum, four (67%) participants strongly agreed while one (17%) participant agreed. For the Louvre and National Museum of Australia, one (17%) participant strongly agreed while four (67%) participants agreed. For the National Gallery of Australia, four (67%) out of six participants agreed, one (17%) participant disagreed and one (17%) was neutral, neither agreeing nor disagreeing with the statement. For the Van Gogh Museum, three (50%) out of six participants said no; one (17%) strongly disagreed while two (33%) disagreed. Two (33%) participants agreed while one (17%) participant was neutral.

We can see from the above results that the Van Gogh site did not do as well, compared to the other sites. Again, these results are for the *Light* subsite and not for the main Van Gogh site. Half of the participants said that it was hard to find specific information because of the site's animated navigation. They did not know how to use the navigation that was constantly moving horizontally across the screen, and parts that participants needed to click on were quickly disappearing off the screen. They did not know how to stop the movement, and the

harder they tried to stop or slow it down, the faster it moved. Participants were getting frustrated because they had no control over what was happening. Four (67%) out of six participants just sat and waited for something to happen. They did not know that they had to move their cursor over the blinking "start" word to activate the animated menu. Figure 4.2 shows animated navigation on the *Light* website.

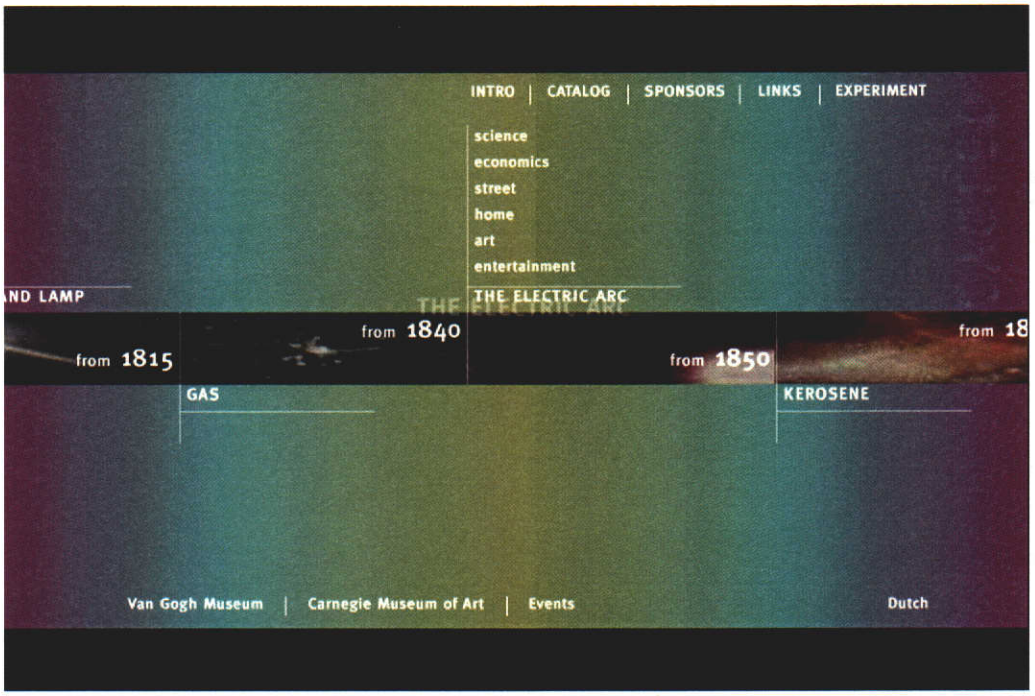

Figure 4.2 Screen from the Van Gogh *Light* site

We can see that the use of dynamic elements in websites can have an affect on the effectiveness of information delivery. If user engagement is positive, information gathering is also positive, and therefore, the effectiveness of information is positive. But, on the other hand, if user engagement is negative through the use of dynamic elements, information gathering is also negative, and therefore, the effectiveness of information is negative. This was clearly indicated by the *Light* website where participants took longer to complete their tasks and were frustrated while doing those tasks.

When asked if the website was easy to use, 27 (75%) out of 36 evaluations agreed. Twelve (33%) evaluations strongly agreed while 15 (42%) agreed. Three (8%) out of 36 evaluations disagreed while six (17%) evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.47).

Table 4.47 Website was easy to use?

Median Response	Participants n	Percentage %
Strongly agree	12	33
Agree	15	42
Neutral	6	17
Disagree	3	8
Strongly disagree	0	0
Total	**36**	**100**

Again, looking at the results and comparing site by site evaluations (Table 4.48).

Table 4.48 Website was easy to use? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	5	4	0	1	0	2
Agree	1	2	1	4	4	4
Neutral	0	0	3	1	1	0
Disagree	0	0	2	0	1	0
Strongly disagree	0	0	0	0	0	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

When asked if the website was easy to use, six (100%) out of six participants said yes for the Cooper-Hewitt National Design Museum, the Minneapolis Institute of Arts and the National Museum of Australia. For the Cooper-Hewitt National Design Museum, five (83%) participants strongly agreed while one (17%) agreed; for the Minneapolis Institute of Arts, four (67%) participants strongly agreed while two (33%) agreed, and for the National Museum of Australia two (33%) participants strongly agreed while four (67%) agreed. For the National Gallery of Australia, four (67%) out of six participants agreed, one (17%) participant disagreed and one (17%) was neutral, neither agreeing nor disagreeing with the statement. For the Louvre, one (17%) participant strongly agreed; four (67%) participants agreed while one (17%) participant was neutral. For the Van Gogh Museum, one (17%) out of six participants agreed; two (33%) participants disagreed while three (50%) participants were neutral, neither agreeing nor disagreeing with the statement.

When participants were asked how easy or difficult they found dynamic elements (sound, video and animation) on the website to use, 20 (55%) out of 36 evaluations said they found it easy. Twelve (33%) evaluations found it very easy while eight (22%) found it easy. Ten (28%) out of 36 evaluations found dynamic elements difficult to use while six (17%) found it neither easy nor difficult (Table 4.49).

Table 4.49 How easy or difficult were dynamic elements to use?

Median Response	Evaluations n	Percentage %
Very easy	12	33
Easy	8	22
Neutral	6	17
Difficult	10	28
Very difficult	0	0
Total	**36**	**100**

If we look at the results for each individual site, we can see how they compared to each other (Table 4.50).

Table 4.50 How easy or difficult were dynamic elements to use? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Very easy	4	2	0	2	2	2
Easy	1	4	0	0	2	1
Neutral	0	0	3	2	0	1
Difficult	1	0	3	2	2	2
Very difficult	0	0	0	0	0	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

Six (100%) out of six participants found dynamic elements easy to use (in this case video) for the Minneapolis Institute of Arts. Two (33%) participants found dynamic elements very easy to use while four (67%) found that it was easy. For the Cooper-Hewitt National Design Museum, five (83%) out of six participants found dynamic elements easy to use (in this case animation). Four (67%) participants found it was very easy while one (17%) participant found that it was easy. Only one (17%) out of six participants found dynamic elements difficult to use for this site. For the National Gallery of Australia, four (67%) out of six participants found dynamic elements easy to use; two (33%) participants found that it was very easy while the other two (33%) found it was easy. Two (33%) out six participants found dynamic elements difficult to use. For the National Museum of Australia, three (50%) out of six participants found dynamic elements easy to use; two (33%) participants found it was very easy to use while one (17%) found it was easy. One (17%) participant was neutral; two (33%) out of six participants found dynamic elements difficult to use. For the Louvre, two (33%) out of six participants found dynamic elements very easy to use; two (33%) were neutral while two (33%) found dynamic elements difficult to use. The Van Gogh Museum did not do as well. Three (50%) out of six participants thought that dynamic elements, in this

case animated and interactive navigation, were difficult to use while three (50%) out of six participants were neutral.

When asked if all dynamic elements (sound, video, animation) added to their user experience, 23 (64%) out of 36 evaluations said yes. Twelve (33%) evaluations strongly agreed while 11 (31%) only agreed. Six (17%) out of 36 evaluations said no, all disagreeing with the statement while seven (19%) evaluations were neutral (Table 4.51).

Table 4.51 Did all dynamic elements add to your user experience?

Median Response	Evaluations n	Percentage %
Strongly agree	12	33
Agree	11	31
Neutral	7	19
Disagree	6	17
Strongly disagree	0	0
Total	**36**	**100**

Again, looking at the results and comparing site by site evaluations (Table 4.52).

Table 4.52 Did all dynamic elements add to your user experience? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	1	4	1	1	1	4
Agree	4	1	1	2	2	1
Neutral	1	1	1	2	1	1
Disagree	0	0	3	1	2	0
Strongly disagree	0	0	0	0	0	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

We can see from the above results that five (83%) out of six participants thought that dynamic elements added to their user experience for the Cooper-Hewitt National Design Museum, the Minneapolis Institute of Arts, and the National Museum of Australia. For the National Museum of Australia and the Minneapolis Institute of Arts, four (67%) out of six participants strongly agreed while one (17%) participant agreed. In both cases, one (17%) participant was neutral, neither agreeing nor disagreeing with the statement. For the Cooper-Hewitt National Design Museum, one (17%) participant strongly agreed while four (67%) participants agreed; one (17%) participant was neutral. For the National Gallery of Australia, three (50%) out of six participants said yes; one (17%) participant strongly agreed while two

(33%) agreed. Two (33%) out of six participants disagreed while one (17%) participant was neutral. For the Louvre, three (50%) out of six participants found that dynamic elements added to their user experience, one (17%) strongly agreeing with two (33%) agreeing. Two (33%) out of six participants were neutral while one (17%) disagreed. For the Van Gogh Museum, two (33%) out of six participants found that dynamic elements added to their user experience; one (17%) participant strongly agreed while the other (17%) only agreed. One (17%) out of six participants was neutral while three (50%) out of six participants disagreed with the statement.

When asked if all dynamic elements (sound, video, animation) had a positive influence on them, 22 (61%) out of 36 evaluations said yes. Eleven (31%) evaluations strongly agreed while 11 (31%) only agreed. Nine (25%) out of 36 evaluations said no, all disagreeing with the statement while five (14%) evaluations were neutral (Table 4.53).

Table 4.53 Did all dynamic elements have a positive influence on you?

Median Response	Evaluations n	Percentage %
Strongly agree	11	31
Agree	11	31
Neutral	5	14
Disagree	9	25
Strongly disagree	0	0
Total	**36**	**101**

Again, looking at the results and comparing site by site evaluations (Table 4.54).

Table 4.54 Did all dynamic elements have a positive influence on you? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	2	2	2	1	2	2
Agree	2	2	1	2	2	2
Neutral	1	2	0	1	0	1
Disagree	1	0	3	2	2	1
Strongly disagree	0	0	0	0	0	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

We can see from the above results that four (83%) out of six participants thought that all dynamic elements had a positive influence on them, for the Cooper-Hewitt National Design Museum, the Minneapolis Institute of Arts, the National Gallery of Australia and the

National Museum of Australia; two (33%) participants strongly agreed while the other two (33%) agreed. For the Cooper-Hewitt National Design Museum, one (17%) participant disagreed while one (17%) was neutral, neither agreeing nor disagreeing with the statement. For the Minneapolis Institute of Arts, two (33%) out of six participants were neutral. For the National Museum of Australia, one (17%) participant was neutral and one (17%) participant disagreed, while for the National Gallery of Australia, two (33%) participants disagreed with the statement. For the Louvre and Van Gogh Museum, three (50%) out of six participants said yes; one (17%) strongly agreed and two (33%) agreed for the Louvre while two (33%) strongly agreed and one (17%) agreed for the Van Gogh Museum. For the Louvre, two (33%) out of six participants disagreed while one (17%) was neutral; for the Van Gogh Museum, three (50%) out of six participants disagreed with the statement.

While 50% of evaluations found dynamic elements easy to use, 64% of evaluations thought that dynamic elements added to their user experience and 61% found that all dynamic elements had a positive influence on them.

When asked, of all websites tested, which one they found the most difficult to use, five (42%) out of 12 participants said the Van Gogh website; three (25%) out of 12 participants said the Louvre and the National Museum of Australia, and one (8%) participant said the National Gallery of Australia. Two sites that participants did not find difficult to use were the Cooper-Hewitt National Design Museum and the Minneapolis Institute of Arts (Table 4.55).

Table 4.55 Which website did you find the most difficult to use?

Websites	Evaluations n	Percentage %
CH	0	0
MIA	0	0
VG	5	42
L	3	25
NGA	1	8
NMA	3	25
Total	**12**	**100**

When participants were asked to explain why they found that particular site the most difficult to use, here is what they had to say. For the Van Gogh site, three participants blamed it on navigation. They said it was hard to navigate; navigation was frustrating and thus information was hard to find. One participant commented that there was too much dynamic content which was not necessary while another participant added that the entire site was confusing.

For the Louvre, two participants found two different sizes of QuickTime symbols confusing – links not labelled well – while one participant could not find simple information such as the physical address for the museum. For the National Museum of Australia, one participant found the "hot spots" hard to use since they were not immediately evident; one participant found the site to be colourful but distracting while one participant did not comment. For the National Gallery of Australia, one participant found the placement of links unclear and difficult to find.

Additional information was gained from interviews with participants. When asked how they felt about animated and interactive navigation, here is what they had to say. For the Cooper-Hewitt National Design Museum, four (67%) out of six participants liked the navigation; two participants found it easy to navigate. Two (33%) out of six participants did not like the navigation. They said there was no indication to tell you where to go or what to do. One participant noted that "if you didn't move around with your mouse to find out for yourself, you could have been sitting and waiting for something to happen forever, and it didn't. I think there should be some kind of indication on how to use it or where to start." For the Van Gogh subsite, the *Light* exhibition, all six (100%) participants said that they did not like it. One participant said, "you really need to spend some time on the site to figure it out, and most people do not have that much time if they are looking for information." Another participant added, "interactive navigation drove me nuts. It felt like it was a game where you had to catch something and shoot it."

For the National Gallery of Australia, four (67%) out of six participants liked the interactive navigation on their subsite, the *Book of Kells and the Art of Illumination,* while two (33%) participants did not like it. The two participants who did not like the interactive navigation found it confusing. One participant who had trouble with navigation said "I was focusing more on the actual information in the text, than on the dynamic navigation. Maybe that's how I started ignoring some of the navigation." There were more instances like this one throughout this study where participants tried to come up with an excuse when they had trouble with something or did not know how to do something. In his book, the *Design of Everyday Things,* Donald Norman (1988) talks about how he studied people making errors and he says that "people feel guilty and either try to hide the error or blame themselves for 'stupidity' or 'clumsiness'." (p. 34) For the National Museum of Australia, five (83%) out of six participants said that they did not like the interactive navigation in their subsite, the *Harvest of Endurance Scroll.* They said they needed time to figure out how the navigation worked, and this slowed them down. One participant said that "once you figured out how it worked, it was quite good." Another participant noted that "you might find things more by accident than by design." One (17%) participant liked interactive navigation, commenting that "you can quickly move from year to year and see what happened in that period."

When asked in what way did sound, video and animation add to their experience as users, here is what participants had to say. For the Cooper-Hewitt National Design Museum, five (83%) out of six participants liked the animated objects on its subsite, the *Glass of the Avant-Garde: From Vienna Secession to Bauhaus.* They said it was not just a boring site; animation made it more enjoyable. One (17%) participant thought that animation did not add to the experience. For the Van Gogh site, five (83%) out of six participants did not think that animated navigation added to their experience. In fact one participant said "it took away from the overall experience." They said it was frustrating. Only one (17%) participant said that, at the end, it was a positive experience. For the National Gallery of Australia, four (67%) out of six participants liked the interactive navigation. They said that information was immediate once you moved your cursor over the manuscript; you did not have to wait for it, focusing on it right away. One participant (17%) said that it did not add to the experience while another (17%) participant was neutral.

For the Minneapolis Institute of Arts site, four (67%) out of six participants thought that video added to their experience. One participant said that "it's a nice break to hear someone give you this information instead of always reading." One (17%) participant did not think the video added to the experience while one (17%) was undecided and did not think much of it. For the Louvre site, one (17%) out of six participants said that the virtual tour added to their experience. "You can go from room to room and see how the museum looks. You can see how the museum looks from outside and how massive it is," one participant said. Three (50%) out of six participants thought it was hard to say because there was not much there except animated text on the main page and the virtual tour. Two (33%) participants were undecided. The Louvre site had dynamic elements on it, but less than the other sites. Participants did not pay much attention to these elements and most of them did not notice that there was animated text on the main page. Are dynamic elements only noticed if they intrude or when they do not work? We can conclude from the results that for this particular site, this seems to be the case. For the National Museum of Australia, five (83%) out of six participants thought that sound and animation added to their experience. One participant said that "it gave it more dimension. It peaked my interest and my attention right away. I wanted to explore it and see more." Another participant added that "it brought you into the mood of what you were looking at; it created a scenario." One (17%) participant did not think sound and animation added to the experience. "When I'm searching for detailed information, it's such a nuisance," the participant added.

When asked what impact did dynamic elements have on the effectiveness of information gathering, here is what participants had to say. For the Cooper-Hewitt National Design Museum, three (50%) out of six participants said dynamic elements had a positive impact on information gathering while the other three (50%) said that it did not have any impact while

they were looking for information. For the Van Gogh site, five (83%) out of six participants did not like the animated navigation. They said that it basically slowed them down in finding the information, that it was confusing, and that it was frustrating while they were looking for information. Only one (17%) participant said that, at the end, the information gathering was positive. For the National Gallery of Australia site, two (33%) out of six participants said dynamic elements had a positive impact in information gathering while four (67%) said that it did not have any impact. For the Minneapolis Institute of Arts site, four (67%) out of six participants thought dynamic elements helped in information gathering while two (33%) participants said it did not. For the Louvre site, one (17%) participant said dynamic elements helped in information gathering while one (17%) participant said they did not. The other four (67%) participants said dynamic elements had no impact because they did not notice them. For the National Museum of Australia, two (33%) out of six participants said that dynamic elements helped in information gathering; two (33%) participants said it did not while two (33%) participants said dynamic elements neither helped nor hindered their search.

When asked would they like to see more or less dynamic elements in websites, or about the same amount, here is what participants had to say. For the Cooper-Hewitt National Design Museum, two (33%) out of six participants said about the same amount; two (33%) participants said more if it is appropriate to the content while one (17%) participant wanted to see more dynamic elements. One (17%) participant wants to see less dynamic elements in websites. For the Van Gogh site, three (50%) out of six participants said less; two (33%) participants said more while one (17%) participant said about the same amount. For the National Gallery of Australia site, two (33%) out of six participants said more; two (33%) participants said more if it is appropriate to the content; one (17%) participant said less; and one (17%) participant said about the same. For the Minneapolis Institute of Arts site, two (33%) out of six participants said about the same amount; two (33%) participants said more if it is appropriate to the content; one (17%) participant wanted to see more dynamic elements while one (17%) participant wanted less. One participant commented that "if the information is well laid out and easy to read and find, I would get more enjoyment through that then if I had music in the background and things moving all over." For the Louvre site, two (33%) out of six participants said less; three (50%) participants said more if it is appropriate; one (17%) participant said more. For the National Museum of Australia, two (33%) out of six participants said about the same amount; one (17%) participant said more if it is appropriate to the content; two (33%) participants said less while one (17%) participant was undecided.

We can see from the above results that 28% of the evaluations want to see less dynamic elements used in websites; 23% of the evaluations want to see more; 28% of the evaluations

want to see more if it is appropriate and if it adds to the content while 22% of evaluations want to see about the same amount they saw in the sites they had tested.

When asked did they have fun while using this site, here is what participants had to say. For the Cooper-Hewitt National Design Museum, four (67%) out of six participants said yes; one (17%) participant said no while one (17%) participant said it was okay. For the Van Gogh site, four (67%) out of six participants said no while two (33%) participants said yes. For the National Gallery of Australia site, four (67%) out of six participants said yes; one (17%) participant said no while one (17%) participant said it was okay. For the Minneapolis Institute of Arts site, four (67%) out of six participants said yes; one (17%) participant said the site was good while one (17%) participant said "if I go to a site it's to find information, not to have fun." For the Louvre site, four (67%) out of six participants said yes; one (17%) participant said no and one (17%) participant said "I don't know if I could call it fun, I have an interest in it." For the National Museum of Australia, five (83%) out of six participants said yes while one (17%) participant said: "I don't know if I had fun, but it caught my attention."

Looking at the overall results, we can see that there is a link between use of dynamic elements, user engagement with a site through interaction with dynamic elements, and the effectiveness of information delivery. The relationship between dynamic elements and user engagement can be a positive or negative one, depending on the final outcome of information retrieval. Some participants appeared to be distracted and confused with tasks that had dynamic elements, compared to static tasks, but the majority (81%) of evaluations chose tasks with dynamic elements as the most enjoyable. Dynamic tasks contained more interesting information so when participants completed those tasks, they enjoyed the end result; they were pleased with what they had accomplished. The majority (86%) of evaluations also found tasks with dynamic elements to be more difficult but at the same time, 81% of evaluations said that, at the end, those tasks were worth the effort because they were successful in their search. We can conclude that if the information retrieval is positive, even if participants were frustrated in the process, the overall experience is positive, but if the information retrieval is negative, the experience is also negative.

What are the problem areas, difficulties, weaknesses and areas for improvement (associated with the effectiveness of information delivery in dynamic sites) for web designers and developers?

The main purpose of a website is to communicate. The way the information is organized, structured and designed will determine how successful the communication will be. A well-designed, easy to use site will help you communicate your message better than a more complex and difficult to use site. Design "can make information less threatening. If the design is simple, functional, and yields to a lot of information, users will be satisfied...to continue their interest" (Wurman 2001, p. 108). This section will look at some of these problem areas, difficulties and weaknesses found by participants who evaluated museum websites.

In order to find out as much as possible about dynamic elements and their impact on information delivery, this study evaluated both the main museum website and its subsites (if there was one), for different exhibitions. Below are the findings from my study.

When asked if the website was easy to use, 32 (89%) out of 36 evaluations agreed. Seventeen (47%) evaluations strongly agreed while 15 (42%) agreed. Four (11%) of the 36 evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.56).

Table 4.56 Website was easy to use? *(main sites)*

Median Response	Participants n	Percentage %
Strongly agree	17	47
Agree	15	42
Neutral	4	11
Disagree	0	0
Strongly disagree	0	0
Total	**36**	**100**

Again, looking at the results and comparing site by site evaluations (Table 4.57).

When asked if the website was easy to use, six (100%) out of six participants said yes for the Cooper-Hewitt National Design Museum, the Minneapolis Institute of Arts and the National Museum of Australia. For the Cooper-Hewitt National Design Museum, five (83%) participants strongly agreed while one (17%) agreed; for the Minneapolis Institute of Arts, four (67%) participants strongly agreed while two (33%) agreed, and for the National Museum of Australia, two (33%) participants strongly agreed while four (67%) agreed. For the National Gallery of Australia, five (83%) out of six participants agreed; three (50%) strongly agreed

while two (33%) agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement. For the Louvre, one (17%) participant strongly agreed; four (67%) participants agreed while one (17%) participant was neutral. For the Van Gogh Museum, two (33%) out of six participants strongly agreed; two (33%) participants agreed while two (33%) participants were neutral, neither agreeing nor disagreeing with the statement.

Table 4.57 Website was easy to use? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	5	4	2	1	3	2
Agree	1	2	2	4	2	4
Neutral	0	0	2	1	1	0
Disagree	0	0	0	0	0	0
Strongly disagree	0	0	0	0	0	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

When asked how easy or difficult the screen technology was to understand, 25 (70%) out of 36 evaluations said it was easy. Ten (28%) evaluations said it was very easy while 15 (42%) evaluations said it was easy. Nine (25%) out of 36 evaluations said it was difficult. Eight (22%) evaluations said it was difficult while one (3%) evaluation said it was very difficult. Two (5%) evaluations were neutral (Table 4.58).

Table 4.58 How easy or difficult was the screen terminology to understand?

Median Response	Participants n	Percentage %
Very easy	10	28
Easy	15	42
Neutral	2	5
Difficult	8	22
Very difficult	1	3
Total	**36**	**100**

Again, looking at the results and comparing site by site evaluations (Table 4.59).

When asked how easy or difficult the screen terminology was to understand, six (100%) out of six participants said it was easy to understand for the Minneapolis Institute of Arts site. Three (50%) participants said it was very easy while three (50%) participants said it was easy. For the Cooper-Hewitt National Design Museum, five (83%) out of six participants said it was easy; three (50%) said it was very easy while two (33%) said it was easy. One

Table 4.59 How easy or difficult was the screen terminology to understand? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Very easy	3	3	0	2	0	2
Easy	2	3	3	2	4	1
Neutral	0	0	1	1	0	0
Difficult	1	0	1	1	2	3
Very difficult	0	0	1	0	0	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

(17%) participant said it was difficult to understand. For the National Gallery of Australia and for the Louvre, four (67%) out of six participants said it was easy to understand. For the National Gallery of Australia, four (67%) participants said it was easy while two (33%) said it was difficult to understand. For the Louvre, two (33%) participants said it was very easy while two (33%) participants said it was easy. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement while one (17%) said it was difficult to understand. For the Van Gogh Museum, three (50%) out of six participants said it was easy to understand; two (33%) participants said it was difficult, one (17%) saying it was very difficult to understand while one (17%) participant was neutral, neither agreeing nor disagreeing with the statement. For the National Museum of Australia, three (50%) participants said it was easy; two (33%) said it was very easy while one (17%) said it was easy. Three (50%) out of six participants said screen terminology was difficult to understand.

Participants were also asked to evaluate navigation. When asked if navigation was consistent throughout the sites tested, 27 (75%) of 36 evaluations agreed. Ten (28%) evaluations strongly agreed while 17 (47%) agreed. Six (17%) of the 36 evaluations disagreed. Five (14%) disagreed while one (3%) strongly disagreed. Three (8%) out of 36 evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.60).

Table 4.60 Was navigation consistent throughout?

Median Response	Participants n	Percentage %
Strongly agree	10	28
Agree	17	47
Neutral	3	8
Disagree	5	14
Strongly disagree	1	3
Total	**36**	**100**

Looking at the results and comparing site by site evaluations (Table 4.61).

Table 4.61 Was navigation consistent throughout? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	3	2	1	1	1	2
Agree	3	4	2	3	2	3
Neutral	0	0	1	1	1	0
Disagree	0	0	2	1	1	1
Strongly disagree	0	0	0	0	1	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

When asked was navigation consistent throughout, six (100%) out of six participants agreed for the Cooper-Hewitt National Design Museum and for the Minneapolis Institute of Arts. For the Cooper-Hewitt National Design Museum, three (50%) participants strongly agreed while three (50%) agreed. For the Minneapolis Institute of Arts, two (33%) participants strongly agreed while four (67%) agreed. For the Van Gogh Museum and for the National Gallery of Australia, three (50%) out of six participants agreed; one (17%) participant strongly agreed while two (33%) agreed. For the Van Gogh Museum, two (33%) participants disagreed while one (17%) was neutral, neither agreeing nor disagreeing with the statement. For the National Gallery of Australia, two (33%) participants disagreed; one (17%) participant strongly disagreed while one (17%) was neutral. For the National Museum of Australia, five (83%) out of six participants agreed; two (33%) strongly agreed while three (50%) agreed. One (17%) participant disagreed with the statement.

When asked if navigation was easy to use, 28 (78%) out of 36 evaluations agreed. Eleven (31%) evaluations strongly agreed while 17 (47%) agreed. Six (17%) of the 36 evaluations disagreed. Five (14%) disagreed while one (3%) strongly disagreed. Two (5%) out of 36 evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.62).

Table 4.62 Was navigation easy to use?

Median Response	Participants n	Percentage %
Strongly agree	11	31
Agree	17	47
Neutral	2	5
Disagree	5	14
Strongly disagree	1	3
Total	**36**	**100**

Again, looking at the results and comparing site by site evaluations (Table 4.63).

Table 4.63 Was navigation easy to use? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	4	3	0	1	0	3
Agree	2	3	2	4	4	2
Neutral	0	0	1	1	0	0
Disagree	0	0	3	0	1	1
Strongly disagree	0	0	0	0	1	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

When asked was navigation easy to use, six (100%) out of six participants agreed for the Cooper-Hewitt National Design Museum and for the Minneapolis Institute of Arts. For the Cooper-Hewitt National Design Museum, four (67%) out of six participants strongly agreed while two (33%) participants agreed. For the Minneapolis Institute of Arts, three (50%) participants strongly agreed while three (50%) agreed. For the Louvre and for the National Museum of Australia, five (83%) out of six participants agreed. For the Louvre, out of those who agreed, one (17%) participant strongly agreed and four (67%) agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement. For the National Museum of Australia, out of those who agreed, three (50%) participants strongly agreed and two (33%) agreed. One (17%) participant disagreed. For the National Gallery of Australia, four (67%) out of six participants agreed; one (17%) participant strongly disagreed while one (17%) disagreed. For the Van Gogh Museum, two (33%) out of six participants agreed; three (50%) participants disagreed while one (17%) was neutral, neither agreeing nor disagreeing with the statement.

We can see that these results are similar to those for the question: was navigation consistent throughout? We can also see that at the Van Gogh Museum, the *Light* subsite did not do that well, compared to the other sites. Three (50%) out of six participants found animated navigation on the *Light* subsite difficult to use. Other websites had interactive navigation, but it was not as complex as the one on the *Light* subsite. Participants not only found navigation at the *Light* subsite difficult to use, they were also frustrated.

When asked if they were able to move around the site without getting lost, 27 (75%) out of 36 evaluations agreed. Fifteen (42%) evaluations strongly agreed while 12 (33%) agreed. Seven (20%) of the 36 evaluations disagreed. Six (17%) disagreed while one (3%) strongly disagreed. Two (5%) out of 36 evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.64).

Table 4.64 Were you able to move around site without getting lost?

Median Response	Participants n	Percentage %
Strongly agree	15	42
Agree	12	33
Neutral	2	5
Disagree	6	17
Strongly disagree	1	3
Total	**36**	**100**

Again, looking at the results and comparing site by site evaluations (Table 4.65).

Table 4.65 Were you able to move around site without getting lost? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	5	4	0	2	0	4
Agree	1	2	2	3	3	1
Neutral	0	0	2	0	0	0
Disagree	0	0	1	1	3	1
Strongly disagree	0	0	1	0	0	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

When asked was navigation easy to use, six (100%) out of six participants agreed for the Cooper-Hewitt National Design Museum and for the Minneapolis Institute of Arts. For the Cooper-Hewitt National Design Museum, five (83%) out of six participants strongly agreed while one (17%) agreed. For the Minneapolis Institute of Arts, four (67%) participants strongly agreed while two (33%) agreed. For the Louvre and for the National Museum of Australia, five (83%) out of six participants agreed. For the Louvre, out of those who agreed, two (33%) participants strongly agreed while three (33%) agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement. For the National Museum of Australia, out of those who agreed, four (67%) participants strongly agreed while one (17%) agreed. One (17%) participant disagreed. For the National Gallery of Australia, three (50%) out of six participants agreed while three (50%) disagreed. For the Van Gogh Museum, two (33%) out of six participants agreed, with two (50%) participants disagreeing, one (17%) strongly disagreeing, and two (33%) being neutral, neither agreeing nor disagreeing with the statement.

When asked if graphics were relevant to subject matter, 35 (97%) out of 36 evaluations agreed. Nineteen (53%) evaluations strongly agreed while 16 (44%) agreed. One (3%) out of 36 evaluations was neutral, neither agreeing nor disagreeing with the statement (Table 4.66).

Table 4.66 Were graphics relevant to subject matter?

Median Response	Participants n	Percentage %
Strongly agree	19	53
Agree	16	44
Neutral	1	3
Disagree	0	0
Strongly disagree	0	0
Total	**36**	**100**

Again, looking at the results and comparing site by site evaluations (Table 4.67).

Table 4.67 Were graphics relevant to subject matter? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	5	4	2	2	3	3
Agree	1	2	3	4	3	3
Neutral	0	0	1	0	0	0
Disagree	0	0	0	0	0	0
Strongly disagree	0	0	0	0	0	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

When asked if graphics were relevant to subject matter, six (100%) out of six participants agreed for the Cooper-Hewitt National Design Museum, the Minneapolis Institute of Arts, the Louvre, the National Gallery of Australia, and the National Museum of Australia. For the Cooper-Hewitt National Design Museum, five (83%) out of six participants strongly agreed while one (17%) agreed; for the Minneapolis Institute of Arts, four (67%) participants strongly agreed while two (33%) agreed; for the Louvre, two (33%) participants strongly agreed while four (67%) agreed; for the National Gallery of Australia and National Museum of Australia, three (50%) participants strongly agreed while three (50%) agreed. For the Van Gogh Museum, five (83%) out of six participants agreed; two (50%) participants disagreed while three (50%) agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement.

When asked if links were easily identifiable, 30 (84%) out of 36 evaluations said yes. Eleven (31%) evaluations strongly agreed while 19 (53%) agreed. Four (11%) out of 36 evaluations disagreed while two (5%) out of 36 evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.68).

Table 4.68 Were links easily identifiable?

Median Response	Participants n	Percentage %
Strongly agree	11	31
Agree	19	53
Neutral	2	5
Disagree	4	11
Strongly disagree	0	0
Total	**36**	**100**

Again, looking at the results and comparing site by site evaluations (Table 4.69).

Table 4.69 Were links easily identifiable? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	4	3	0	1	0	3
Agree	2	3	3	4	5	2
Neutral	0	0	2	0	0	0
Disagree	0	0	1	1	1	1
Strongly disagree	0	0	0	0	0	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

When asked if links were easily identifiable, six (100%) out of six participants said yes for the Cooper-Hewitt National Design Museum and the Minneapolis Institute of Arts. For the Cooper-Hewitt National Design Museum, four (67%) out of six participants strongly agreed while two (33%) agreed. For the Minneapolis Institute of Arts, three (50%) participants strongly agreed and three (50%) agreed. For the Louvre, the National Gallery of Australia, and the National Museum of Australia, five (83%) out of six participants agreed. For the Louvre, one (17%) participant strongly agreed while four (67%) agreed. One (17%) participant disagreed. For the National Gallery of Australia, five (83%) participants agreed while one (17%) disagreed. For the National Museum of Australia, three (50%) out of six participants strongly agreed while two (33%) agreed. One (17%) participant disagreed. For the Van Gogh Museum, three (50%) out of six participants agreed; one (17%) participant disagreed while two (33%) were neutral, neither agreeing nor disagreeing with the statement.

We can see from the results that for the Van Gogh site, only 50% of participants thought that links were easily identifiable, compared to 100% for the Cooper-Hewitt National Design Museum and Minneapolis Institute of Arts, and 83% for the Louvre, National Gallery of Australia, and National Museum of Australia.

When asked if the site was informative, 35 (97%) out of 36 evaluations said yes. Twenty two (61%) evaluations strongly agreed while 13 (36%) agreed. One (3%) out of 36 evaluations was neutral, neither agreeing nor disagreeing with the statement (Table 4.70).

Table 4.70 Was site informative?

Median Response	Participants n	Percentage %
Strongly agree	22	61
Agree	13	36
Neutral	1	3
Disagree	0	0
Strongly disagree	0	0
Total	**36**	**100**

If we look at the results, comparing site by site evaluations (Table 4.71)

Table 4.71 Was site informative? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	5	4	1	4	3	5
Agree	1	2	4	2	3	1
Neutral	0	0	1	0	0	0
Disagree	0	0	0	0	0	0
Strongly disagree	0	0	0	0	0	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

When asked if the site was informative, six (100%) out of six participants said yes for the Cooper-Hewitt National Design Museum, Minneapolis Institute of Arts, Louvre, National Gallery of Australia, and National Museum of Australia. For the Cooper-Hewitt National Design Museum and National Museum of Australia, five (83%) out of six participants strongly agreed while one (17%) agreed. For the Minneapolis Institute of Arts and the Louvre, four (67%) participants strongly agreed while two (33%) agreed. For the National Gallery of Australia, three (50%) out of six participants strongly agreed while three (50%) agreed. For the Van Gogh Museum, one (17%) out of six participants strongly agreed while four (67%) agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement.

When asked if the site was entertaining, 27 (75%) out of 36 evaluations said yes. Twelve (33%) evaluations strongly agreed while 15 (42%) agreed. Eight (22%) out of 36 evaluations said no. Seven (19%) out of 36 evaluations disagreed while one (17%) evaluation strongly

disagreed. One (3%) out of 36 evaluations was neutral, neither agreeing nor disagreeing with the statement (Table 4.72).

Table 4.72 Was site entertaining?

Median Response	Participants n	Percentage %
Strongly agree	12	33
Agree	15	42
Neutral	1	3
Disagree	7	19
Strongly disagree	1	3
Total	**36**	**100**

Again, looking at the results and comparing site by site evaluations (Table 4.73).

Table 4.73 Was site entertaining? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	3	3	1	1	1	3
Agree	2	1	2	4	3	3
Neutral	0	1	0	0	0	0
Disagree	0	1	3	1	2	0
Strongly disagree	1	0	0	0	0	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

When asked if the site was informative, six (100%) out of six participants said yes for the National Museum of Australia. Three (50%) participants strongly agreed while three (50%) agreed. For the Cooper-Hewitt National Design Museum and the Louvre, five (83%) out of six participants said yes. For the Cooper-Hewitt National Design Museum, three (50%) participants strongly agreed while two (33%) agreed. One (17%) participant strongly disagreed with the statement. For the Louvre, one (17%) participant strongly agreed while four (67%) agreed. One (17%) participant disagreed. For the Minneapolis Institute of Arts and National Gallery of Australia, four (67%) out of six participants said yes. For the Minneapolis Institute of Arts, three (50%) participants strongly agreed while one (33%) agreed. One (17%) participant disagreed while one (17%) was neutral, neither agreeing nor disagreeing with the statement. For the National Gallery of Australia, one (17%) out of six participants strongly agreed while three (50%) agreed. Two (33%) participants disagreed. For the Van Gogh Museum, three (50%) out of six participants said yes. One (17%) participant strongly agreed while two (33%) participants agreed. Three (50%) participants disagreed with the statement.

Again, we can see from the results that only 50% of participants thought the Van Gogh site was entertaining. The site contained a lot of information but participants had a hard time figuring out how the site worked; they had trouble with navigation and were frustrated. In the end, they concluded it was not that entertaining.

When participants were asked if they would use the site in the future, 23 (64%) out of 36 evaluations said yes. Six (17%) evaluations strongly agreed while 17 (47%) agreed. Four (11%) out of 36 evaluations said no. Three (8%) out of 36 evaluations disagreed while one (17%) evaluation strongly disagreed. Nine (25%) out of 36 evaluations were neutral, neither agreeing nor disagreeing with the statement (Table 4.74).

Table 4.74 Will you use the site in the future?

Median Response	Participants n	Percentage %
Strongly agree	6	17
Agree	17	47
Neutral	9	25
Disagree	3	8
Strongly disagree	1	3
Total	**36**	**100**

Again, looking at the results and comparing site by site evaluations (Table 4.75).

Table 4.75 Will you use the site in the future? *(site by site analysis)*

Median Response	Websites CH	MIA	VG	L	NGA	NMA
Strongly agree	0	2	0	2	1	1
Agree	3	3	1	4	3	3
Neutral	2	1	4	0	0	2
Disagree	0	0	1	0	2	0
Strongly disagree	1	0	0	0	0	0
Total	**6**	**6**	**6**	**6**	**6**	**6**

When asked if they would use the site in the future, six (100%) out of six participants said yes for the Louvre. Two (33%) participants strongly agreed while four (67%) agreed. For the Minneapolis Institute of Arts, five (83%) out of six participants said yes; two (33%) participants strongly agreed while three (50%) agreed. One (17%) participant was neutral, neither agreeing nor disagreeing with the statement. For the National Gallery of Australia and National Museum of Australia, four (67%) out of six participants said yes, one (17%) participant strongly agreeing and three (50%) of them agreeing. For the National Gallery of

Australia, two (33%) out of six participants disagreed while for the National Museum of Australia, two (33%) participants were neutral. For the Cooper-Hewitt National Design Museum, three (50%) out of six participants said yes, all agreeing. One (17%) participant strongly disagreed while two (33%) participants were neutral. For the Van Gogh Museum, one (17%) out of six participants said yes. One (17%) participant disagreed while four (67%) were neutral, neither agreeing nor disagreeing with the statement.

All six participants agreed that they would use the Louvre site in the future, compared to other sites. What was different with this site? This was the Louvre and participants were very impressed with its size and collection. Everyone has heard of the Louvre, but only five (42%) out of 12 participants visited the actual museum. The majority of participants said they will go back and see the rest of the collection, as one participant commented: "this is as close as I will ever get to the museum."

When participants were asked which website they found the easiest, of all websites tested, five (42%) out of 12 participants said the Minneapolis Institute of Arts. Four (33%) out of 12 participants said the Cooper-Hewitt National Design Museum. Two (17%) out of 12 participants said the Louvre and one (8%) said the National Museum of Australia. None of the 12 participants chose the National Gallery of Australia or the Van Gogh website (Table 4.76).

Table 4.76 Which website did you find the easiest to use?

Websites	Evaluations n	Percentage %
CH	4	33
MIA	5	42
VG	0	0
L	2	17
NGA	0	0
NMA	1	8
Total	**12**	**100**

When participants were asked to explain why they found that particular site easiest to use, this is what they had to say. For the Minneapolis Institute of Arts, participants liked the consistent navigation throughout the site and the fact that there was more than one way of retrieving information. They said it was well organized and entertaining, and that information could be easily found. Pages were very clean and it was easy to see where you were going. For the Cooper-Hewitt National Design Museum, participants liked the simple balance between information and interactivity. They said that information was very simple and direct and that it was easy to figure out the navigation. They also thought that the site

was straightforward and very interesting. For the Louvre, it was the virtual tour of the museum – interior and exterior – that was interesting. They said it was easy to find information and there were not too many elements; it was straightforward. For the National Museum of Australia, they liked it because it was not too cluttered and had interesting content.

When participants were asked which website they preferred the most, of all websites tested, four (33%) out of 12 participants said the Cooper-Hewitt National Design Museum and Minneapolis Institute of Arts. Three (25%) out of 12 participants said the National Museum of Australia and one (8%) said the Louvre. None of the 12 participants chose the National Gallery of Australia or the Van Gogh website (Table 4.77).

Table 4.77 Which website did you like the best?

Websites	Evaluations n	Percentage %
CH	4	33
MIA	4	33
VG	0	0
L	1	8
NGA	0	0
NMA	3	25
Total	**12**	**99**

When participants were asked to explain why they liked that particular site the best, this is what they had to say. For the Cooper-Hewitt National Design Museum, participants liked the site because it was the easiest to use, looked good, was nice, and had a very clean design, simple balance between information and interactivity. For the Minneapolis Institute of Arts, participants thought the graphics were well done, that it was intriguing, informative, and easy to navigate. They said it was most interesting because of video, rotation of images, clarity of organization and ease of use. Pages were very clean, interactive and well displayed. For the National Museum of Australia, they liked it because it was not too cluttered and had interesting content. They said there was a lot of information and good use of animation. They also liked the colour and style of the website. For the Louvre, it was the very clear virtual tour of the museum and excellent pictures, of the paintings, that they liked.

When participants were asked which website they liked the least, of all websites tested, three (25%) out of 12 participants said the National Gallery of Australia, the Van Gogh, and the Louvre site. One (8%) out of 12 participants said the National Museum of Australia, the Cooper-Hewitt National Design Museum, and the Minneapolis Institute of Arts (Table 4.78).

Table 4.78 Which website did you like the least?

Websites	Evaluations n	Percentage %
CH	1	8
MIA	1	8
VG	3	25
L	3	25
NGA	3	25
NMA	1	8
Total	**12**	**99**

When participants were asked to explain why they liked that particular site the least, this is what they had to say. For the National Gallery of Australia, they said it was because of navigation; they did not like the navigation. They also said they had difficulty finding information because of poor organization. For the Van Gogh site, it was mostly the navigation. Participants found the navigation very hard to use and they also found it confusing. For the Louvre, participants who visited the actual museum thought that the website did not reflect the greatness of the museum. Other participants wanted more interactive elements on the site. For the National Museum of Australia, one participant thought that the layout was busier than the layout on the other websites; for the Cooper-Hewitt National Design Museum, and for the Minneapolis Institute of Arts, participants thought that the site was boring and that there was too much text.

Additional information was gained from interviews with participants. When asked would they change anything about this site, here is what they had to say. For the Cooper-Hewitt National Design Museum, one (17%) out of six participants did not want to change anything on the main site or subsite. Two (33%) out of six participants thought that the animated introduction to the *Glass* exhibition was too long. They said visitors should be allowed to skip the intro if they do not want to wait. One participant said: "it takes too long and you don't know what will happen next." Two (33%) participants did not find the site all that appealing. One participant thought that the *Glass* site was boring looking and colourless while the other participant found that the main page of the main site "doesn't grab your attention. It needs to be spiced up." One (17%) out of six participants found reversed text on light blue background hard to read, in the *Glass* subsite. For the Van Gogh subsite, the *Light* exhibition, five (83%) out of six participants said they would like to change the animated navigation. They found it hard to use and confusing. One participant said: "it drove me nuts. Have menus stationary, not moving like that." Another participant added: "navigation was confusing because it was moving, you don't know what started it, why it's moving or how to stop it." One (17%) out of six participants wanted information organized more up front in the *Light* subsite, so you can find it more quickly.

For the National Gallery of Australia, two (33%) out of six participants thought that information was not organized well in the *Book of Kells* subsite. What was labelled the introduction was how to navigate the site, instead of it being a real introduction, and participants had a hard time finding specific information located in the real introduction. It took these participants more than ten minutes to find this information for task five, while it took the same participants less than two and a half minutes to complete task six. Three (50%) out of six participants did not know about interactive navigation buttons on the top and some had a hard time distinguishing links between the text, the actual layout placement of links on a page. One (17%) participant found navigation not consistent on the main web page. It was at the top on the main page and in colour, but when you got to the secondary pages, it was on the bottom and in black. This particular participant completely ignored navigation on the bottom and used the browsers back button to move around the site. "I didn't see it on the bottom, and since it was a different colour from the one on the top, I didn't pay any attention to it. I thought it wasn't part of the site." For the Minneapolis Institute of Arts, three (50%) out of six participants did not want to change anything on the site. Two (33%) out of six participants found admission information not where they expected it; it was bold, in colour and placed next to a photo. Participants thought it was part of a picture and ignored it. One (17%) participant did not like the colours of the website but thought it was well laid out.

For the Louvre, three (50%) out of six participants were confused with two different sizes of QuickTime symbols, and they wanted clear identification on what each is. They assumed that it was the same information for both symbols since they were not labelled, but this was not the case. One participant said: "One has no idea what each symbol refers to unless you go in and click on both of them. The obvious thing to me was to click on the large symbol, but it was wrong." One (17%) participant did not want to change anything at that moment and added, "I would have to come to this site quite a lot to give you an idea. I like this one, the actual museum." One (17%) participant did not want to see French publications mixed with English; they should have been separated and not mixed together according to this one participant. One (17%) participant would like to change the virtual tour to be able to zoom in on the paintings and see them up close. For the National Museum of Australia, two (33%) out of six participants did not like the sound on the subsite, the *Harvest of Endurance Scroll*; they wanted a button to control it or turn it off. Two (33%) participants wanted an animated logo on the main site not to loop. They said it was annoying and distracting and that there was no need for it to continuously loop. One (17%) participant thought the main page on the main site was not inviting, while the other participant found that some of the information did not stand out and was hard to find.

When asked would they change anything about this site's design, three (50%) out of six participants said no for the Cooper-Hewitt National Design Museum. They said it was simple

and that it worked. One (17%) participant wanted to change the animated introduction while one (17%) participant wanted to make the main front page more interesting. According to this participant, "it doesn't grab your attention." One (17%) participant wanted to change "the general overall deadness of it." For the Van Gogh, six (100%) out of six participants wanted to change the animated navigation on the *Light* subsite. One participant said: "Movement was distracting. It made me wander onto information that I wasn't really looking for. I wasn't able to be as focused."

For the National Gallery of Australia, one (17%) out of six participants liked the site as it was. Three (50%) out of six participants did not like the interactive navigation and said that they would improve it. One (17%) participant would change the links and make them clearer, and one (17%) participant would organize the information differently, designing it so the introduction stands out more, directing you to go there first. For the Minneapolis Institute of Arts, three (50%) out of six participants did not want to change any part of the design. They said it worked well and that it was fairly simple to navigate. One (17%) participant did not like the main page; it was too busy and everything was competing for your attention. "It needs to be a bit more organized. There is no hierarchy to things." Two (33%) participants wanted identification and placement of links laid out differently so as to be more noticeable.

For the Louvre, two (33%) out of six participants did not want to change anything. They said it was a nice and clean design. Two (33%) participants did not like the serif typeface. They thought it was hard to read on the screen and that the text was too small for the average person. One (17%) participant wanted to improve on the two different sizes of QuickTime symbols, that were confusing, while one participant wanted a search function. For the National Museum of Australia, four (67%) out of six participants did not want to change anything. They liked the subsite, the *Harvest of Endurance Scroll*, especially the way all elements worked together and created a mood. One (17%) participant would change animation in the *Harvest of Endurance Scroll* subsite while one participant did not like the main site's design, and added: "Too many elements competing for your attention on the front page. You need to have something to grab your attention and there is nothing there." This same participant also found type on the menu bar to be on the small size.

When asked what was the worst thing about the site, for the Cooper-Hewitt National Design Museum three (50%) out of six participants said the *Glass* animated introduction, because one could not control it. One (17%) participant liked everything, so there was no worst thing. One (17%) participant found white text on light background the worst while one participant thought the worst thing was "the general overall deadness of it." For the Van Gogh site, five (83%) out of six participants found the animated navigation on the *Light* subsite the worst.

One (17%) participant could not find the *Yellow House* on the main site; it took a long time, so that was the worst thing.

For the National Gallery of Australia, one (17%) out of six participants did not find anything wrong with the site. Two (33%) out of six participants found the interactive navigation on the *Book of Kells* subsite the worst while one (17%) participant found the links in the same subsite the worst. One (17%) participant thought the worst thing was that the important information was not up front, while another participant said "the worst thing was that I couldn't find the information I was looking for." For the Minneapolis Institute of Arts, three (50%) out of six participants found simple information like the admission to the museum the worst because they had a hard time finding it. One (17%) participant did not find anything wrong with the site while one (17%) participant was neutral. One participant found navigation to be the worst.

For the Louvre, three (50%) out of six participants thought it was the QuickTime symbols, two different sizes being confusing. One (17%) participant did not want to change anything; one (17%) thought the worst thing was that they did not have a search engine while one thought the type was the worst because it was hard to read. For the National Museum of Australia, two (33%) out of six participants found sound too annoying because they could not control it. One (17%) participant did not find anything wrong while one (17%) found there was too much information for an average user per page. One (17%) participant found animation on the main site to be very annoying while one participant found that simple information was not up front; one needed to click a few times to access it.

When asked what was the best thing about the site, for the Cooper-Hewitt National Design Museum three (50%) out of six participants said the animation in the *Glass* exhibition. They liked how the glass objects came in and how the information was grouped. Two (33%) participant liked the navigation, both on the main site and subsite. They said it was easy to use. One (17%) participant did not find anything best except that the glass exhibition was interesting. For the Van Gogh site, five (83%) out of six participants liked the colour choice, the layout and the way information was organized. It was easy to find information and it was easy to navigate the main site. Out of those five, one participant liked the layout of the *Light* subsite, the way it was organized with a bit of information and a picture. One participant was neutral, neither agreeing nor disagreeing with the statement.

For the National Gallery of Australia, two (33%) out of six participants liked the dynamic features of the subsite, the *Book of Kells*. Two (33%) out of six participants found that information was easy to access, especially important information such as museum hours and admission fees, while one (17%) participant found navigation easy to use. One (17%)

participant was undecided, not being able to tell what the best thing was about the site. For the Minneapolis Institute of Arts, six (100%) out of six participants found information well organized and the site very informative. They liked that there were different ways of accessing information and that one did not have to dig deep to get it. They liked the subsite, Modernism, and one participant commented that "you had all kinds of information on one page, but it was not cluttered." They also thought that the type was easy to read.

For the Louvre, six (100%) out of six participants liked the cleanliness of the site and the uncluttered design. "It's clean, and you can see quickly where you are," one participant said. Participants also liked the virtual tour because it shows you how big the museum really is. One participant said "it was easy, it was not a loud site. Another participant noted: "I'm prejudiced, I love the Louvre." For the National Museum of Australia, three (50%) out of six participants liked the animations and the drawings in the subsite exhibition. One (17%) participant liked the audio in the same site while one (17%) participant found the main site clean and easy to use. One (17%) participant found hot spots on the subsite interesting and the information that was revealed, using those hot spots.

When participants were asked would they use this site in the future, here is what they had to say. For the Cooper-Hewitt National Design Museum, four (67%) out of six participants said yes while two (33%) participants said no, that they would not use the site again. For the Van Gogh Museum and National Gallery of Australia, three (50%) out of six participants said yes; one (17%) participant said maybe and two (33%) participants said no. For the Minneapolis Institute of Arts and the Louvre, six (100%) out of six participants said they would use the site in the future. For the National Museum of Australia, five (83%) out of six participants said yes while one (17%) participant said no.

When participants were asked would they go and visit the actual museum in the future, here is what they had to say. For the Cooper-Hewitt National Design Museum, five (83%) out of six participants said yes they would while one (17%) participant said no. For the Van Gogh Museum, three (50%) out of six participants said yes; two (33%) participants said maybe and one (17%) participant was neutral. Out of those who said yes, two participants said that it was not because of the websites that they would go and visit the actual museum. They like museums and if they were in that particular city, they would visit a museum. For the National Gallery of Australia, five (83%) out of six participants said yes while one (17%) participant said maybe. For the Minneapolis Institute of Arts and the Louvre, six (100%) out of six participants said they would go to the actual museum. For the National Museum of Australia, five (83%) out of six participants said yes while one (17%) participant was undecided.

More comments were gathered from the cool down question. When participants were asked are they going to look at museum sites any differently now, after this session, this is what they had to say. Eight (67%) out of 12 participants said yes, one (8%) participant said no and two (17%) participants said maybe. Out of those who said yes, one participant commented: "I never thought that they were so interesting, that you can get so much information from them. I might look at other museum sites because of this now." Another participant said, "I will be even more critical of the design and the look now," while another added: "I will look more closely at things such as navigation, organization of information, and content. I never really paid that much attention to that. I just go and look for information and when I can't find things, I get frustrated. I didn't know why I got frustrated, but now after this session, I know why." Out of those who said maybe, one participant said "I might be looking more at the navigation from now on to see whether or not it's effective or whether it distracts or slows me down from getting the information that I want."

Looking at the overall results, we can see that the main problems associated with the web-sites tested are navigation, organization of information, layout of links, and individual web pages. As soon as the navigation got a bit more complex, participants had trouble figuring out how to use it – they were frustrated because it took them longer to access the information. Websites that did not have complex navigation, such as animated navigation or interactive navigation, did much better. Participants preferred websites that were easy to use and navigate, websites where they did not have to spend extra time and figure out how to navigate. They wanted to go to a site and be able to find information they were looking for, quickly and easily. On some of the websites tested, this was certainly not the case.

Another thing that participants had trouble with was the organization of information. Participants found that some sites were better organized than other sites. Simple information such as the admission fee to the museum was not where participants expected it to be, thus resulting in longer searches and participant frustration. On another site, when participants expected to find an introduction and instead found instructions on how to navigate the site, they were very confused and frustrated. It seemed that on some websites important information was not up front but buried underneath a few layers. It took participants a long time to find simple information because they did not know where to look for it.

Links and the placement of links was another concern of participants and the sites tested. In some instances, participants did not know which were the active links because they were not well identified, while in other instances it was the placement or layout of the links in relation to the text that participants had trouble with. In the latter case, participants completely ignored the links, not knowing that they were there and continued to search, clicking on unrelated links thinking they would somehow get to the right information. When they

realized they were lost, they tried to blame themselves for making mistakes and not knowing where to go. But what participants complained about the most, next to problems in navigation and organization of information, was the overuse of elements and graphics that did not add anything to the content. Participants complained about some sites that had very busy pages. They said it was hard for them to concentrate on one thing when there were so many element competing on a page for their attention. They wanted to see simpler and cleaner pages rather than busy and complex ones. When asked about their web preferences, they always chose sites that were clean and not too complex. So, as we can see, websites do not need to be complex and full of dynamic elements in order to work and attract users. Websites that are clean, well organized, not too complex, and utilize only dynamic elements to enhance the message being communicated, are the websites that participants in this study preferred. In order for us to design better and more usable websites, we need to listen to our users and try to implement all their concerns.

Three questions have been addressed, regarding dynamic elements in websites, their impact on the effectiveness of information delivery, the relationship between dynamic elements and user engagement with a site through such elements, and problems and concerns that should be kept in mind by web designers and developers. However, further research is still required to gain a better understanding of dynamic elements and their effects on user engagement with websites. The next chapter looks at the Spool et al. study, conducted in 1999, which is in some respect similar to my study.

Chapter 5

This chapter will look at some unexpected participant comments; for example, it was surprising to find out that many participants were not fully aware of what museum websites had to offer (they were particularly surprised by the amount of information available, which was both educational and entertaining). This chapter will also pay attention to Spool's study.

Discussion

This study evaluated six museum websites. Each website was evaluated by six participants, and each participant had to perform six tasks. Tasks ranged from very simple to more difficult ones, as they progressed. The first four tasks were identical for all six sites while the last two tasks varied from site to site. Participants were observed while they performed their tasks. This study found that the majority of participants did not have many difficulties with the easy tasks. Most of them completed their tasks quite quickly and were happy about their results. Tasks that participants found more difficult were tasks with dynamic navigation and dynamic elements in them. Participants could not figure out how the interactive navigation worked. They were clicking all over the place to figure out how it worked, spending much more time figuring out how to solve their task, and getting frustrated in the process.

Participants were timed while they performed tasks, and their time was recorded when they completed each task. Before participants started to evaluate websites, this was all explained to them and they did not have any problems with it. However, when the testing was over, the majority of participants said that since they knew they were being timed, they felt pressured and tried to finish their tasks as fast as they could. They did not want to be seen as taking too long to finish a task. This is certainly something that needs to be taken into consideration for future research. If participants felt pressured to perform well, this may have affected their results. When they could not find certain information, perhaps it was because they were thinking about the time elapsed and not concentrating on what they were doing, thus prolonging their search and frustration. It would be interesting and worthwhile to test one group without telling them they are being timed, to see if the results would be any different then.

Participants were encouraged to "think aloud" while they performed their tasks, to gather more information from them regarding their thoughts and feelings at the time. Some participants did better than others, talking throughout the session while other participants had to be reminded from time to time to say what they were thinking. Some comments were gathered from this session, but not as much as was hoped. What I did get from this session was how participants actually felt, their frustrations and confusions at the time. It was obvious, at

times, that participants were lost – when they did not know where to click or where to go next. This is where they did not mind talking aloud. When they could not find information they were looking for, some of them commented: "I'm at the right place but the information is not here, it should be here." They would go and reread the question to make sure that they did not misunderstand anything, but when they could not find information again they said that "this is very frustrating. I know the answer should be here, but I don't see it. I must be doing something wrong." It seems that when participants had trouble finding something, some of them blamed themselves, saying it was their fault. Other participants said that "this is very confusing site, it is not designed for your average user."

Participants were also given an opportunity to go back to the sites tested and review them before answering the posttest questionnaire. Since each participant tested three sites, it was a while before they answered the posttest questionnaire; the researcher felt that it was better for participants to see the sites again, if they needed to refresh their memory or were unsure about something. By allowing participants to do this, the researcher was making sure that they were answering their questionnaires truthfully, and not second guessing. Not all participants took up the opportunity, but seven out of 12 participants did and said that it was a good idea since they were not sure about everything.

One thing that was surprising in this study was how open and talkative the participants were, once they were finished with all their testing, interviews and questionnaires. During coffee break, participants continued to talk about sites they just tested, going back and forth between the sites and explaining what they did and did not like, and where they had problems. This is where they said that they felt pressured to perform well, since they were being timed, and that they were not as relaxed as they were now. They said that even though they knew I was not evaluating them, they could not help but think about it. When asked if they thought this had any influence on their performance, all of them said no.

Another thing that was surprising were the comments from the cool down question. Some of the participants did not think they could actually go to a museum website and check out their exhibitions and collections. They were surprised how rich most of the sites were with valuable information they offered, and their large collections. One participant said, 'I learned something about Van Gogh's life besides looking at his paintings. That was very informative." Another participant said, "I will go back to some of these sites when I get home and check them out in more depth. There are a lot of interesting things to see here, I was pleasantly surprised." Some participants said that they would certainly go and look up sites for the museums that they might go and visit. They said it is a good way to find out the current exhibitions at the museum, what is coming in the future, and where the museum is located.

This study was conducted at the end of 2001 and beginning of 2002, and completed in three weeks. Since there have been no studies conducted on the topic of dynamic elements and information delivery, as far as I know, results from this research should be helpful to anyone interested in museum websites and dynamic delivery of information. One study that was conducted in 1999, by Jared Spool et al., evaluated nine different information-rich websites. In this chapter, I will be looking at Spool's study and at my own results to see if there are any similarities and differences.

The first difference between my study and Spool's is his first implication, that graphic design is "completely unrelated to the success at finding information on the websites" (p. 9). In my study this was not the case.

Before I go any further, I will try to define what graphic design is. The American Heritage Dictionary of the English Language: Fourth Edition (2000) defines it as "the practice or profession of designing print or electronic forms of visual information, as for an advertisement, publication, or website." According to the Association of Registered Graphic Designers of Ontario, "graphic design is an interdisciplinary, problem-solving profession that combines visual sensitivity with skill and knowledge in areas of communications, technology and business."

Graphic design plays a big role in the success of finding information on websites. Graphic design is not just pretty pictures and animated gifs on a web page. It is the visual communication of messages through images and words. It is the complete layout, how the webpage looks and feels. It is the arrangement of text and graphics on a webpage, the choice of typefaces and type sizes, the colour of the text, graphics and background, and white space or lack of it. All these elements play a big role when it comes to information retrieval and effective communication.

In my study of museum websites, I found that graphic design did play a role in information retrieval. For example, the Louvre website was a very clean looking site with a lot of white space. The choice of typeface (in this case serif), and the type size, which was very small on the browser that I used, frustrated many participants. The majority of participants complained that it was very hard to read the small text and because the designers of the website chose a serif typeface instead of sans serif, participants found it even harder to read. Figure 5.1 shows a screen shot of one of the webpages from the Louvre museum.

Another example from the Louvre website, where graphic design slowed, confused and frustrated participants while they were looking for information, was the use and placement of QuickTime icons. There were two different sizes of QuickTime icons placed one next to the

other on the virtual tour page (Figure 5.2). All participants clicked on the bigger QuickTime icon, thinking that both icons contained the same information. Participants chose the bigger icon because they thought that this indicated a bigger and better virtual tour. The two sets of icons were not only different in size but also different in content. The bigger QuickTime icon contained only the virtual tour, which was in a larger format, while the smaller QuickTime icon contained the smaller format of the virtual tour, plus information about that particular view. For example, if you chose the smaller icon for the virtual tour of the pyramid, you would get the virtual tour, plus information about the pyramid's architect and construction

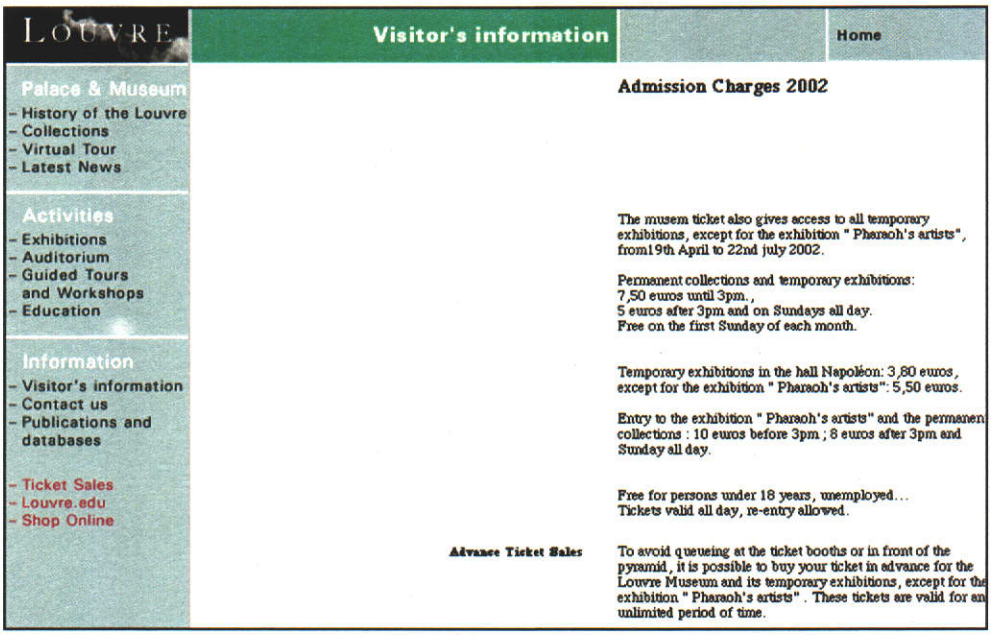

Figure 5.1 Screen from the Louvre site

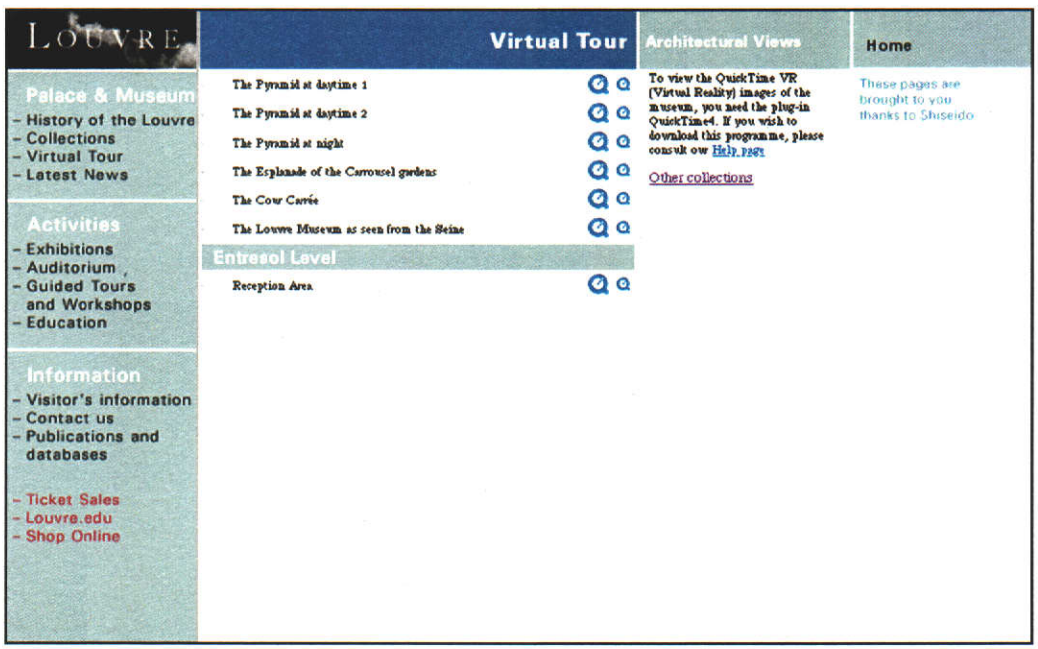

Figure 5.2 Screen from the Louvre site

materials used. One of the tasks participants needed to do was to find out which architect designed the pyramid, and what the pyramid was composed of. All of the participants had a hard time finding this information because they never clicked on the small QuickTime icon, which linked to the information, and this resulted in a longer search.

Another good example where graphic design was a factor in information retrieval was the Minneapolis Institute of Arts website. On this particular site, participants had a hard time finding out what the admission fee was for the museum. The admission to the museum was free, and this was emphasized in bold type and brown colour. It was also placed next to a picture and away from the rest of the visitor information. Participants looked all over the place for this and were quite frustrated because they could not find such simple information. Eventually, when they found it, the majority of them said that they did not look there or pay that much attention to it, because they thought it was a part of the picture. Because the text was emphasized in colour and placed next to a picture, participants thought that it was a title for the picture and thus ignored it (Figure 5.3). We can see that little things such as emphasis on text and its placement can have an impact on how successful a search is.

Figure 5.3 Screen from the Minneapolis Institute of Arts site

Spool's second implication is about text links and how users often try them first, ignoring nearby graphics, since graphics take longer to download. In my study of museum websites, I also found that participants preferred text links over graphical ones, but not because text links downloaded first. This study used a fast Internet connection (cable modem) so there was no wait for graphics to download; both text and graphics downloaded together, but participants still chose text links over graphic ones. The majority of participants used text links to move from page to page. This was indicated well at the Minneapolis Institute of Arts subsite, *Modernism*. On the main page they had nine art movements, represented by nine stylised letters designed to represent each movement. Above each letter, there was the name of that particular movement (for example, Bauhaus, De Stijl, etc.), and below the stylised letters were the years of that particular movement. The majority of participants went directly to the name above the stylised letters and clicked on it (Figure 5.4). When they found out that this was not a link, they moved down to the years and tried that. Finally, when they realized this was not a link either, they went to the stylised letters and clicked there. The stylised letters were right in the middle of a page, closer to the cursor than the above text, but participants went first to the above text links, even though they were further away. Why was this? When participants were asked to find out what the basic difference was between the European and American Art Nouveau, they looked for those words first and as soon as they found them, they went and clicked on them, even though there were instructions on the main page to click on the stylised letters. The stylised letters were not as recognizable, participants not knowing which letter was from which movement, so it was safe and easy to click on the actual text that said "European Art Nouveau." When we search for something, we usually scan an area quickly and read bits and pieces, here and there. When we do that, we usually

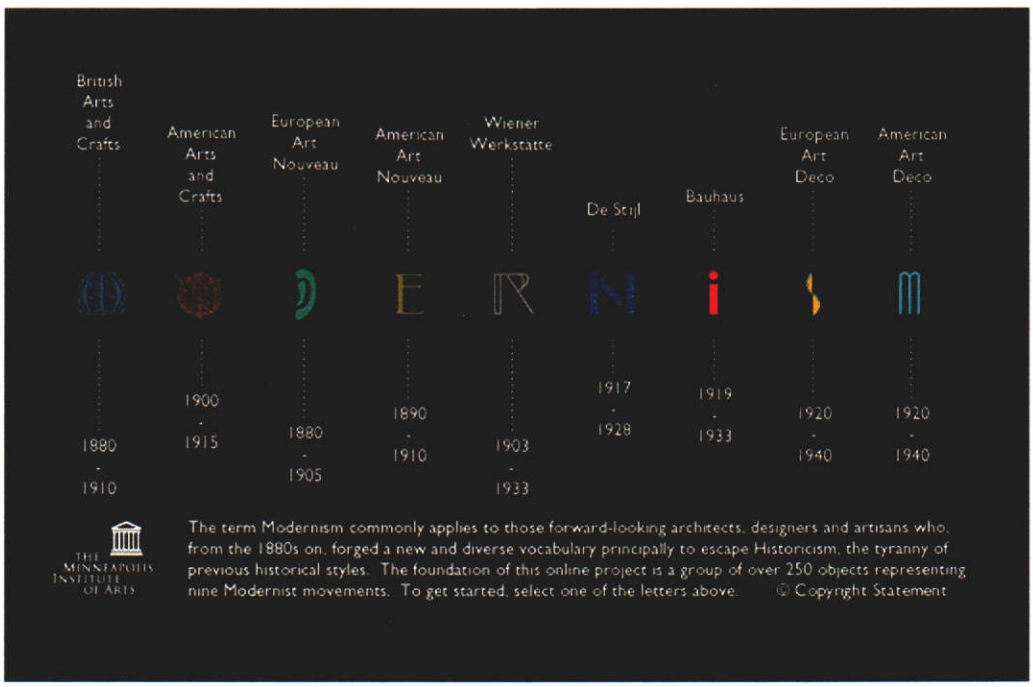

Figure 5.4 Screen from the Minneapolis Institute of Arts site

scan text but not necessarily graphics, since graphics are not as recognizable as text or actual letters, and so, it is only natural that we see text links first and want to click on them. Of course, this would have to be followed up in future research.

The same thing happened on the Louvre website. On their virtual tour page, links were illustrated by an image and text. For example, for their "architectural views" section, they had a small picture of the pyramid from outside and a colour bar underneath the picture, followed by text under the picture that said "architectural views." The small picture, the coloured bar and the text, were all one gif image and the whole image was a link. Again, the majority of participants clicked on the text and not on the image, even though the whole image was a link.

The findings were a bit different on their collections web page. The collections page had the same layout as the virtual tour page and the links were identical. Their paintings section was represented by the Mona Lisa picture, with "paintings" written underneath the picture. When participants were asked, "The Louvre museum has more than 6,000 European paintings in its collection, but where is the Mona Lisa located within the museum?," all of the participants (100%) clicked on the picture of the Mona Lisa instead of the text underneath the picture, that said "paintings." Because the Mona Lisa is so recognizable by everyone, and because participants had to locate her painting, they immediately clicked on her image to get there without reading the information underneath. Participants associated her picture with the actual words that they were searching for, in this case, the Mona Lisa. I believe that people involved in the design and production of the Louvre site took that into consideration when they included her picture to represent the paintings section. The two links within the Louvre museum were identical, but participants clicked on whatever they recognized first. In this case, since participants were searching for the Mona Lisa location, it was her image that was more recognizable and they clicked on the image instead of on the words underneath, "paintings. " For the Minneapolis Institute of Arts subsite, *Modernism,* participants did not easily recognize the stylised letters that said "European Art Nouveau," so they clicked on what they could easily recognize, and that was the text instead of the fancy letters.

Spool also writes about navigation and content, and how inseparable they are. In this study, I found out that this was certainly true with some sites I tested. It was particularly true with sites that had dynamic elements – elements that were neither navigable nor content related. It was also true with the site that had interactive navigation, the *Light* subsite. Participants rated this site very low because they just did not know how to navigate and retrieve the information. Not only did they find this site hard to navigate, they also found it confusing because the links were not taking them to the content; they still had to scroll in order to find the right information. Participants did not know they had to scroll; they thought they were at the

wrong place and went back and started their search again. This was the site that participants had the most problems with, and this was due to interactive navigation that did not add to the content.

Spool's study focuses on information retrieval, not surfing and he indicates that information retrieval is different from surfing. This study also looked at information retrieval and not "surfing." When people look for information, it is usually for education, research, business, or leisure. They want to find it quickly and easily and go back to whatever they were doing. Any distractions on the page will probably affect retrieval of information. In my study, I found that participants were irritated with sound on one website because they could not turn it off – some even losing their concentration for a while. Other participants were frustrated by some of the dynamic elements (a logo that was looping on the main page of one of the websites), but none of the participants went so far as to cover up those elements, as in Spool's study. As for sites that need to be designed "differently" for information retrieval and surfing, I have no evidence of this and further research would be required to confirm this. I believe sites should be designed differently, depending on who the audience is. A medical website will and should be different from a music site because the audiences are different. Even surfers, when surfing, are looking for something – otherwise they would not be there.

Spool's last implication is that users preferred products that they were most successful with. In this study of museum websites, I found that to be true. More participants preferred sites they were successful with and that were easy to use, rather than ones they had trouble with. Participants found one site very difficult to use, with dynamic navigation. The site had interesting content, but participants were frustrated with the information retrieval, and when asked if they would use this site again, the majority said no. In my study, I found that participants got frustrated quite quickly if they could not find the information they were looking for. If they had trouble with a particular site, they hesitated to go back to it.

Another factor that Spool brings up is how users in his study did not have the domain name or business area knowledge needed to navigate the site, thus rating these sites low. In my study of museum websites, I chose participants who had computer experience and who were interested in museums. I wanted to use the kind of target users that the museums sites are aiming for, and not someone who is knowledgable about museums such as museum workers. I also stayed away from graphic designers and web developers because of their knowledge about websites. None of the participants in my study had any problems with the domain name or business area when navigating sites. Participants did have navigational problems but they were associated with other things and not the domain names.

Spool also writes about how "users don't form mental models of sites." In my study, when participants got lost, they constantly used the browser's back button to go back and start their search over again. According to Spool's theory and the use of a browser's back button, participants in my study did have a mental map of the site's structure. Participants not only used the browser's back button when they needed to get back to the start point, but they were also aware of the overall site's structure and layout. This was evident from the comments that we collected from the "think aloud" protocol. Participants commented how on one site the navigation not only changed position from the top to the bottom of a page, but also the colour was different. They said that navigation worked better at the top of the page and that the colour was also better. Since the navigation on the bottom was black, most of the participants ignored it, thinking it was not part of the site structure. Other participants commented on how some sites were better organized than others, and how they liked the way some pages looked. This may indicate that participants are aware of the site's structure, and how the information is organized and laid out on a webpage – the layout.

Spool writes about links and how closely they are tied to navigation. In my study of museum sites, I found out that participants did not have problems with links in most of the sites they tested. However, there were some instances where participants did not know what was the link and where they had to go. This was more evident in sites that used interactive navigation or interactive links. Images that participants needed to go over with their mouse, to expose more text, were ignored because participants did not know that those images were links leading to more text. Also, participants had problems with links that were represented with icons and surrounded either by text or other links. For example, on one site participants had to view a video. The link was right there on the same page indicated by a movie camera icon, and underneath the camera icon was a small text that said "video clip." All six participants tried to click on the text next to the camera icon which was not the link, and not on the active icon itself. When asked why they did not use the camera icon, the majority of participants said they did not see it because of its placement (Figure 4.1).

Spool also writes about problems with download time and waiting for images to download. In my study of museum sites, I did not have any problems with download time and loading of images. I was connected to the Internet by a high speed cable modem, and all images loaded at the same time as text, so participants did not have to wait. If I had a slower connection, maybe I would have had the same results as Spool.

Websites should be accessible and usable by everyone. In order for us to design easy to use websites that communicate clearly and effectively, we need to keep our users in mind when designing. We need to know who they are and what their goals and concerns are, and we need to get out into the users' world and see what it is like to be one of them.

The final chapter looks at the whole study and tries to summarise the overall findings. It also outlines problems and concerns that users had and offers some guidelines in *Appendix A* resulting from this study, for designers and developers to design better websites.

Chapter 6

Conclusion

This study examined six different museum websites with different levels of dynamic content in them, to find out the relationship between dynamic elements and effective information delivery. Looking at the overall results, the conclusion of this study is that dynamic elements such as sound, video and animation (content presented through dynamic elements) do play a major role in information delivery and its effectiveness, and we as designers need to reconsider how we present this information to users, in order to communicate more effectively. *Appendix A* presents design guidelines from this study; how to improve the design process.

I have learned from the user studies that, depending on the level of dynamic elements present in a website, their complexity, and their application, such elements can either have a positive or negative effect on information delivery. For example, participants who were familiar with dynamic elements could quickly figure out how to navigate the site, and find the needed information quickly while participants who were not so familiar with dynamic elements took longer to find the same information, and at the same time found dynamic elements not that easy to use. Also, participants who were familiar with dynamic elements did not find them as distracting as those participants who were less familiar. The amount and level of dynamic elements on a webpage and a user's level of experience will determine whether or not dynamic elements will be a distraction, for that particular user. If dynamic elements were used well and they added to the content or message being communicated, participants did not have as much trouble using them. Also, they did not find them as distracting. On the other hand, if dynamic elements could not be controlled by participants, such as turning off the sound, they became annoying, even if adding to the content.

There were also instances where dynamic elements were used but participants did not notice them. On one website, animated text was used to announce the current exhibition at the museum. Participants did not notice the moving text and were not distracted while they were looking at that page. Are dynamic elements only noticed when they do not work or when they are distracting? It seems to be true in this case. Dynamic elements such as sound, animation and video can be distractions or visual noise if they do not have a purpose, or if they are used for pure decoration. If they have a purpose or help in the delivery of a message, then they are not noise.

In his study, Spool writes about how one banner ad on one of the sites he tested contained the answer to one of the questions asked, but users covered it up because they found it annoying. Can we say then that this ad, which contained valuable information but was distracting, is

noise? Yes we can. According to Fiske (1982), the concept of noise has been extended to mean "anything that makes the intended signal harder to decode accurately," (p. 8) even an uncomfortable chair during a lecture, for example. When we see banner ads on websites, we automatically think of them as distractions, and click them off. We do not think they contain important information. We can say that, in this case, the emphasis on the message being communicated was wrong; therefore, it resulted in noise. Looking at all dynamic elements, we see that it is not the element itself but rather the use of it that will affect the effectiveness of information delivery, in the end.

The relationship between dynamic elements and user engagement is also related to the effectiveness of information retrieval. Some participants appeared to be more distracted and confused while using dynamic elements, compared to other users. They found tasks with dynamic elements to be more difficult, thus resulting in longer searches and user frustration. However, if at the end they were successful in their search, they said it was a positive experience – even though it took them longer and they were frustrated in the process. We can conclude that the final outcome of information retrieval will determine if a user's experience is positive or negative, regardless of possible participant frustration.

From looking at the user studies, I have also learned what some of the problems and difficulties the participants had. The problems ranged from navigation, organization of information, and layout of links, to individual web pages. Participants had trouble navigating as soon as the navigation became more complex. They had trouble figuring out how to use it and were frustrated in the process. Participants preferred websites that were easy to use and navigate, over more complex ones. They wanted to be able to retrieve information quickly and easily and move on. Another major problem was the organization of information or lack thereof. Some sites had busy pages, so that it was hard for some participants to find important information. They said it was hard to search for information when there were so many elements competing on one page, for their attention.

Spool suggests that the reason we are having problems with information retrieval is because "we don't yet know how to design for finding information." The problem is not that "we don't yet know how to design for finding information," the problem is how we go about presenting this information. The way information is presented and organized is as important as content. Interpretation of this information may be difficult or even confusing, depending on how it is presented and organized. According to Wurman (2001), there are only five different ways to organize information: by location, alphabet, time, category and hierarchy. He goes on to say:

> In the Digital Age, you need to focus on the connections among all of your design elements: medium, words, pictures, and sound. You'll have to look at

each message and explore all the ways to communicate it. Then, in your quest to stay connected, don't forget to be clear, too" (Wurman 2001, p. 93).

Effective design can make information seem less imposing (Wurman 2001). If the design is simple, functional, and appropriate, users will find needed information, but if the design is full of empty decorations, users will have problems finding it. According to Jef Raskin (2000), we can represent the same information in different ways, and some representations will be more effective than others. "It is our job as designers to create effective representations of information for human consumption."

Learning how to represent and deliver information effectively, using dynamic elements, requires that we understand who our users are and what they need. It means using traditional communication skills and also incorporating those skills with newer technologies, learning new sets of skills demanded by such technology. We need to listen to what users are telling us and we must include their concerns, never forgetting our primary goal as designers, to inform and engage users. The focus should be on users when we are designing and not on technology, because effective design only happens when users are included in the process.

Future Research

Further research should be done regarding dynamic elements on a site and the effectiveness of a site as a source of information, with a greater number of users. It would be worthwhile to talk to designers and developers of such websites to find out what their goals and objectives were, and what their reasons were for including some dynamic elements. It would also be beneficial to talk to museum people, who are in charge, and show them results from this study to see if they are interested in improving their sites, or at least to compare these results with their own studies, if such exist. Some museum sites that I tested have since been redesigned. It would be of interest to test these newer sites again with the same participants, to see if the results would be any different now, and it must be stressed that my study took place in a limited environment. To learn more about how applicable my observations actually are, further research would be required with a larger sample of users and greater number of websites. Still, it is my hope that this thesis will be of some use to those who are interested in creating effective and easy to use websites.

Appendix A

Guidelines

The following design guidelines are based on research from this study. These guidelines are presented in no particular order, and are intended for designers and developers of websites, to be used and applied as needed in order to build more efficient and better sites.

Aim for simplicity and clarity when it comes to navigation.
Create navigation systems so users can move through the site easily, without getting lost and frustrated. Do not include directions on how to navigate; even when users try to follow these directions, they get lost and give up. If you need to include directions on how to navigate, redesign the navigation system. Also, do not make users guess how to navigate. They do not want to guess and most of them are not good at guessing. Offer users different choices to get to the same information.

Keep navigation consistent.
Keep navigation elements and controls consistent and visible throughout the site. If you decide to place your navigation controls on the top of a page, keep them there throughout the site. Do not place then on the bottom on the next page, and do not change their colour. If the navigation elements are not consistent on every page, users get confused. They do not know how to move around and end up using the browser's back button to go back to the first page, to resume their search from there.

Make links visible and label them clearly.
Show links clearly; do not make users guess where and what they are. Position them so they are easily seen; do not bury them with the rest of the page layout. Links should be clearly indicated so that there is no uncertainty on the part of users, as where to click. Links that are not evident are missed by users because of this. Use text links instead of graphic or picture links unless you have a graphic or a picture that is recognizable all over the world, like the Mona Lisa. If there is a text link and graphic link, users usually go for the text link.

Present a clear, consistent and easy to use interface.
Webpages should work and look the same throughout a site. Users should always know where they are, where they can go next, and where they have been. Make it easy for them to find what they need.

Include a search feature and a map of your site.
If it is a large site, include a key word search of your site. When users have trouble finding something, or when they get lost, they usually end up looking for a search or a site map to help them. Make sure users have access to one on every page.

Present a clear and simple layout.
Be consistent with your layout from page to page. Establish a visual identity throughout your site by using the same visual elements, such as colour, typeface, and hierarchy for your headings. Reduce page clutter by eliminating anything that does not contribute directly to the message being communicated. Use white space to provide visual breaks for users. Users prefer clean and simple layouts over more complex and cluttered ones, and they find information more easily on sites that are not complex or cluttered.

Include only what users need.
Include only what is important in order to communicate your message. Every design element that you use should contribute to your message. Exclude any text and visual elements not necessary and that may add to information overload, confusing the user. If you can say the same thing without extra text and elements, your message may be more effective. Include only text and visual elements that will directly contribute to more effective communication.

Organize your information so it is easy to find, understand and use.
Organize information in a way that will make sense to your users. Group similar information together and use a visual hierarchy to emphasize what is important, such as your main message, your primary messages and your secondary messages. Use headings that clearly communicate what is in the section. Place important information up front and not several levels down; do not make your users search for it.

Use text that is easy to scan and read.
Use sans serif type instead of serif. It is much easier to read sans serif type on screen. When using reverse text on a coloured background, make sure the background colour is dark enough so you can easily read the text. Try to avoid text that scrolls horizontally. Users find this very distracting and hard to read.

Using dynamic elements effectively.
Use dynamic elements such as sound, video and animation only to enhance what you are trying to communicate. If these elements do not have a purpose and are used for pure decoration, they become visual noise. If you have to use any of them, provide users with the choice to control them and turn them off, if they distract users.

Appendix B

Letter to the Participants

Hi there,
Would you be willing to participate in my research? I am doing a study about websites to find out how the information is delivered electronically, and to assess the effectiveness of the site as a source of information. I will examine museum websites (five to six) and look at such things as navigation, ease of use and the overall look of the site.

I am looking for participants who have experience using the Internet and are interested in evaluating museum sites. The evaluation of these sites will take approximately two hours, with a short pre- and post-evaluation questionnaire. If you know how to use the Internet and are interested in evaluating museum websites, please let me know via e-mail.

Findings from this research will be included in my Master of Arts thesis and in resulting publications. The identity of participants will not be released. The results of my research will be used to help designers improve web design.

Appendix C

Script

The purpose of this study is to examine different museum websites and get your opinion about them. You will be asked to perform certain tasks on these websites, and I would like you to perform them as you normally would in your own home or office. For example, try to work at the same speed and with the same attention to detail that you normally do. Please "think aloud" (verbalize whatever thoughts cross your mind as you're browsing). While you are completing the tasks, I will be observing you and taking notes. It is important to remember that I will be evaluating that particular site, and not you the viewer. If something is unclear, you can always ask questions. Let's begin.

Appendix D

Scenario

You are planning a trip abroad and you want to check out the museums that are located in the city that you are visiting. You want to find out as much information as possible about a particular museum before you get there. You will look for this information on the Internet to prepare for the trip.

Appendix E

Selected Museum Sites

Cooper-Hewitt, National Design Museum – New York, NY
http://www.si.edu/ndm/

The Minneapolis Institute of Arts – Minneapolis, Minnesota
http://www.artsMIA.org/

The Van Gogh Museum – Amsterdam, Netherlands
http://www.vangoghmuseum.nl/

Louvre – Paris, France
http://www.louvre.fr/

National Gallery of Australia - Canberra, Australia
http://www.nga.gov.au/Home/index.cfm

The National Museum of Australia - Canberra, Australia
http://www.nma.gov.au/

Appendix F

Personal Characteristics and Experience

Participant # _____

Date _____

1. Name _____

2. Job title _____

3. Age ☐ under 25 years ☐ 25 – 34 ☐ 35 – 44 ☐ 45 – 54
   ☐ 55 – 64 ☐ 65 or older

4. Gender ☐ Male ☐ Female

5. Education *(highest completed)* _____

6. Major area of study _____

7. Years using the Internet
   ☐ less than 6 months ☐ 6 months to 2 years ☐ more than 2 years

8. Level of expertise
   ☐ novice user ☐ familiar user ☐ experienced user

9. Frequency of use
   ☐ every day ☐ more than 3 times a week ☐ less than 3 times a week

10. Familiarity with museum web sites
    ☐ novice user ☐ familiar user ☐ experienced user
    ☐ designer ☐ developer ☐ sponsor/manager

Appendix G

Tasks

Cooper-Hewitt National Design Museum

Participant # _____

Date _____

Go to: http://www.si.edu/ndm/

1. Where is the museum located *(address)*?

   _____

2. What is the general admission fee? _____

3. How late is the museum open on Tuesday? _____

4. What are the current featured exhibitions at the museum? *(name two)*

   _____

   _____

5. Check out Glass of the Avant-Garde – From Vienna Secession to Bauhaus exhibition.
   While you are browsing, find out: Who founded the Wiener Werkstatte, and when?

   _____

6. Secession style favoured shapes of what kind? _____

The Minneapolis Institute of Arts

Participant # _____

Date _____

Go to: http://www.artsMIA.org/

1. Where is the museum located *(address)*?

   _____

2. What is the general admission fee? _____

3. How late is the museum open on Tuesday? _____

4. What are the current featured exhibitions at the museum? *(name two)*

   _____

   _____

5. How many different Modernist movements are represented in the online collection? _____

6. Curator David Ryan talks about these movements in his videos. View the video, and find out:
   What is the basic difference between the European Art Nouveau and the American Art Nouveau?

   _____

The Van Gogh Museum

Participant # _____

Date _____

http://www.vangoghmuseum.nl/

1. Where is the museum located *(address)*?

   _____

2. What is the general admission fee? _____

3. How late is the museum open on Tuesday? _____

4. What are the current featured exhibitions at the museum? *(name two)*

   _____

   _____

5. Van Gogh's work is organised chronologically into five periods, each representing a different phase of his life and work. Name the period in which he painted his *Yellow House*?

   _____

6. Check out the *Light* exhibit that was held at the museum from October 20, 2000 to February 11, 2001. Which European city was the slowest to adopt gas street lighting and one of the first to experiment with electric arc lighting?

   _____

Louvre

Participant # _____

Date _____

http://www.louvre.fr/

1. Where is the museum located *(address)*?

   _____

2. What is the general admission fee? _____

3. How late is the museum open on Tuesday? _____

4. What are the current featured exhibitions at the museum? *(name two)*

   _____

   _____

5. The Louvre museum has more than 6,000 European paintings in its collection. Where is the *Mona Lisa* painting located within the museum?

   _____

6. The Grand Louvre Project took over fifteen years to complete (1981-1999). Which architect designed the pyramid, and what is the pyramid composed of? Check out the virtual tour of the pyramid.

   _____

National Gallery of Australia

Participant # _____

Date _____

http://www.nga.gov.au/Home/index.cfm

1. Where is the museum located *(address)*?

   _____

2. What is the general admission fee? _____

3. How late is the museum open on Tuesday? _____

4. What are the current featured exhibitions at the museum? *(name two)*

   _____

   _____

5. Check out the previous exhibition that was held at the gallery in 2000, the *Book of Kells (Ireland)*. Originally, the *Book of Kells* was a single bound volume, but in 1953 the manuscript was divided into how many volumes?

   _____

6. Which of the manuscripts in the exhibition is believed to have been created in Cologne between 1450 and 1475?

   _____

The National Museum of Australia

Participant # _____

Date _____

http://www.nma.gov.au/

1. Where is the museum located *(address)*?

   _____

2. What is the general admission fee? _____

3. How late is the museum open on Tuesday? _____

4. What are the current featured exhibitions at the museum? *(name two)*

   _____

   _____

5. The Online Showcase features stories and multimedia programs about Australian landscapes and its people. Check out the *Harvest of Endurance Scroll* exhibit. The scroll is painted in a *gong bi* style. What is the meaning of *gong bi*?

   _____

6. During the gold rush (1850-1870), Chinese gold diggers used large shallow pans to sieve for gold. What did they use the Puddling Mill or Tub for? Check out some of the scroll's 'hotspots'.

   _____

Appendix H

Website _____

Participant # _____

Date _____

Post Task Questionnaire

Please check one

1. How interesting were the tasks?

Very interesting	Interesting	Neither interesting nor uninteresting	Uninteresting	Very uninteresting

2. How easy or difficult were the tasks to understand?

Very easy	Easy	Neither easy nor difficult	Difficult	Very difficult

3. How easy or difficult was it to complete the tasks?

Very easy	Easy	Neither easy nor difficult	Difficult	Very difficult

4. Which task did you find the most difficult?

Task 1	Task 2	Task 3	Task 4	Task 5	Task 6

Explain _____

_____

5. Was the most difficult task worth your effort, compared to the other tasks?

☐ Yes ☐ No

Explain _____

_____

6. Which task did you enjoy the most?

Task 1	Task 2	Task 3	Task 4	Task 5	Task 6

Explain _____

_____

7. How easy or difficult was the screen terminology to understand?

☐ Very easy ☐ Easy ☐ Neither easy nor difficult ☐ Difficult ☐ Very difficult

8. How easy or difficult did you find dynamic elements *(sound, video, animation)* on the websites to use?

☐ Very easy ☐ Easy ☐ Neither easy nor difficult ☐ Difficult ☐ Very difficult

9. While completing the tasks, what did you think of the sound? *(NMA only)*

Added to my enjoyment of using the site

☐ Strongly agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Strongly disagree ☐ Not applicable

Added to the content of the page

☐ Strongly agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Strongly disagree ☐ Not applicable

Was useful in conveying information

☐ Strongly agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Strongly disagree ☐ Not applicable

Distracted me from completing the tasks

☐ Strongly agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Strongly disagree ☐ Not applicable

10. While completing the tasks, what did you think of the video? *(MIA only)*
Added to my enjoyment of using the site

☐ Strongly agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Strongly disagree ☐ Not applicable

Added to the content of the page

☐ Strongly agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Strongly disagree ☐ Not applicable

Was useful in conveying information

☐ Strongly agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Strongly disagree ☐ Not applicable

Distracted me from completing the tasks

☐ Strongly agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Strongly disagree ☐ Not applicable

11. While completing the tasks, what did you think of the animation? *(NMA, CH, VG, L)*
Added to my enjoyment of using the site

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Not applicable
☐	☐	☐	☐	☐	☐

Added to the content of the page

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Not applicable
☐	☐	☐	☐	☐	☐

Was useful in conveying information

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Not applicable
☐	☐	☐	☐	☐	☐

Distracted me from completing the tasks

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Not applicable
☐	☐	☐	☐	☐	☐

12. Were you satisfied with the amount of information you were able to retrieve from the site?

Very satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Very dissatisfied
☐	☐	☐	☐	☐

Appendix I

Website _____

Participant # _____

Date _____

Interview questions

1. Would you change anything about this site?

_____

_____

2. Would you change anything about the site's design?

_____

_____

3. What was the worst thing about this site?

_____

_____

4. What was the best thing about this site?

_____

_____

5. Tell me how you felt about the virtual tour? *(Louvre only)*

_____

_____

6. Tell me how you felt about the interactive navigation? *(CH, NGA, NMA, VG only)*

_____

_____

7. Tell me how you felt about the on-line museum tour given by David Ryan? *(MIA only)*

8. Tell me how you felt about sound? *(NMA only)*

9. Tell me how you felt about animation? *(CH, VG, NMA only)*

10. In what way did sound, video and animation add to your experience as a user?

11. What impact did they have on the effectiveness of information gathering?

12. Did you have fun while using this site?

13. Would you like to see more or less dynamic elements *(sound, video, animation)* in websites, or about the same amount? Why? What has led you to this conclusion?

14. Would you use this site in the future?

15. Would you go and visit the actual museum in the future?

Appendix J

Participant # _____

Date _____

Post Test Questionnaire *(part I)*

Legend

SA = Strongly agree
A = Agree
N = Neither agree nor disagree
D = Disagree
SD = Strongly disagree
NA = Not applicable

Legend

CH = Cooper-Hewitt, National Design Museum
MIA = Minneapolis Institute of Arts
VG = The Van Gogh Museum
L = Louvre
NGA = National Gallery of Australia
NMA = The National Museum of Australia

Please use this questionnaire for the *Glass of the Avant-Garde, Modernism, Light, Book of Kells* and *Harvest of Endurance Scroll* exhibitions.

Please circle one answer for each website

1. It was easy to find specific information.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

2. The website was easy to use.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

3. The navigation was consistent throughout the site.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

4. The navigation was easy to use.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

5. I was able to move around the site without getting lost.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

6. The graphics were relevant to the subject matter.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

7. The links were easily identifiable.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

8. There were distractions on the pages.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

9. Sound was used appropriately.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

10. Video was used appropriately.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

11. Animation was used appropriately.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

12. Sound improved the message communicated.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

13. Video improved the message communicated.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

14. Animation improved the message communicated.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

15. Sound affected my ability to retrieve information.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

16. Video affected my ability to retrieve information.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

17. Animation affected my ability to retrieve information.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

18. The site would be better without sound.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

19. The site would be better without video.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

20. The site would be better without animation.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

21. All dynamic elements *(sound, video, animation)* added to my experience as a user.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

22. All dynamic elements *(sound, video, animation)* had a positive influence on me.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

23. The site was informative.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

24. The site was entertaining.

CH	**MIA**	**VG**	**L**	**NGA**	**NMA**
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

25. I will use the site in the future.

CH	**MIA**	**VG**	**L**	**NGA**	**NMA**
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

26. Of all the websites you've tested, which one did you find the most difficult to use?

CH	MIA	VG	L	NGA	NMA
☐	☐	☐	☐	☐	☐

Explain _____

_____

27. Which one did you find the easiest to use?

CH	MIA	VG	L	NGA	NMA
☐	☐	☐	☐	☐	☐

Explain _____

_____

28. Which one did you like the best?

CH	MIA	VG	L	NGA	NMA
☐	☐	☐	☐	☐	☐

Explain _____

_____

29. Which one did you like the least?

CH	MIA	VG	L	NGA	NMA
☐	☐	☐	☐	☐	☐

Explain _____

_____

Appendix K

Participant # _____

Date _____

Post Test Questionnaire *(part 2)*

Legend

SA = Strongly agree
A = Agree
N = Neither agree nor disagree
D = Disagree
SD = Strongly disagree
NA = Not applicable

Legend

CH = Cooper-Hewitt, National Design Museum
MIA = Minneapolis Institute of Arts
VG = The Van Gogh Museum
L = Louvre
NGA = National Gallery of Australia
NMA = The National Museum of Australia

Please use this questionnaire for the main part of the websites.

Please circle one answer for each website

1. It was easy to find specific information.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

2. The website was easy to use.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

3. The navigation was consistent throughout the site.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

4. The navigation was easy to use.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

5. I was able to move around the site without getting lost.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

6. The graphics were relevant to the subject matter.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

7. The links were easily identifiable.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

8. There were distractions on the pages.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

9. Animation was used appropriately.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

10. Animation affected my ability to retrieve information.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

11. The site would be better without animation.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

12. The site was informative.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

13. The site was entertaining.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

14. I will use the site in the future.

CH	MIA	VG	L	NGA	NMA
SA	SA	SA	SA	SA	SA
A	A	A	A	A	A
N	N	N	N	N	N
D	D	D	D	D	D
SD	SD	SD	SD	SD	SD
NA	NA	NA	NA	NA	NA

Appendix L

Times taken to complete each task

Participant	Website	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6
1	CH	0:30	0:03	0:04	0:11	2:42	0:25
	VG	0:41	0:14	0:13	1:26	7:08	5:18
	NGA	0:11	1:06	0:08	0:41	2:30	4:24
2	CH	0:18	0:08	0:09	0:32	2:48	0:28
	VG	0:26	0:23	0:27	1:23	10:18	12:39
	NGA	0:09	0:57	0:09	4:07	11:12	4:45
3	VG	0:11	0:13	0:29	1:01	4:46	6:12
	NGA	0:17	3:02	0:11	0:34	10:49	1:43
	MIA	0:21	0:06	0:03	0:27	0:46	4:34
4	VG	0:19	0:07	0:16	1:36	1:37	2:21
	NGA	0:14	0:06	0:22	0:08	5:53	2:46
	MIA	0:09	0:09	0:47	0:18	0:25	2:18
5	NGA	0:07	1:38	0:14	0:32	8:19	5:12
	MIA	0:25	0:05	0:09	0:36	0:38	5:11
	L	0:46	0:52	0:39	0:39	1:40	2:24
6	NGA	0:40	2:00	0:03	1:05	3:39	2:48
	MIA	0:47	0:08	0:15	0:34	1:11	4:14
	L	0:29	0:30	1:25	0:18	0:48	7:31
7	MIA	0:23	0:37	0:04	0:06	0:57	1:23
	L	0:32	0:26	0:10	0:06	0:21	1:21
	NMA	0:14	0:08	0:15	0:19	1:34	1:30
8	MIA	0:05	1:25	0:05	0:07	1:47	1:03
	L	0:51	0:20	0:49	0:17	0:53	1:40
	NMA	0:28	0:07	0:14	0:28	2:03	1:03
9	L	0:15	0:10	0:16	0:13	0:17	3:13
	NMA	0:11	0:16	0:13	0:14	2:24	3:42
	CH	0:09	0:05	0:05	0:22	2:11	0:14
10	L	1:01	0:25	0:44	1:11	3:45	0:11
	NMA	0:34	0:11	0:18	0:15	1:39	0:39
	CH	0:05	0:04	0:03	0:07	1:47	0:42
11	NMA	0:44	0:10	0:11	0:41	4:22	4:22
	CH	0:20	0:04	0:03	0:12	2:24	0:43
	VG	1:20	0:05	0:06	0:16	0:50	4:53
12	NMA	0:11	0:07	0:43	0:08	1:40	0:58
	CH	0:09	0:06	0:05	0:05	0:22	0:12
	VG	0:05	0:07	0:43	0:08	1:40	0:58

Bibliography

Ajzen, Izaak 1991, "The Theory of Planned Behavior", *Organizational Behavior and Human Decision Processes,* vol. 50, pp. 179-211.

Andres, Clay 1999, *Great Web Architecture,* IDG Books Worldwide Inc., Foster City.

Barbieri, T. and P. Paolini 2001, *Co-Operation Metaphors For Virtual Museums,* Museums and the Web Conference, March 15-17, Seattle, [Online], Available: http://www.archimuse.com/mw2001/papers/barbieri/barbieri.html [2002, November 8].

Black, Roger 1997, *Web Sites That Work,* Adobe Press, San Jose.

Booth, Wayne C., Colomb, Gregory G., & Williams, Joseph M. 1995, *The Craft of Research,* The University of Chicago Press, Chicago.

Bouma, Gary D. & Atkinson, G.B.J 1995, *A Handbook of Social Science Research,* Oxford University Press, New York.

Brinck, Tom, Gergle, Darren, & Wood, Scott D. 2002, *Designing Web Sites That Work: Usability for the Web,* Academic Press, San Diego.

Cohen, Louis & Manion, Lawrence 1994, *Research Methods in Education,* 4th edn, Routledge, London.

Colón, Carlos 1995, Communication Science vs. Semiotics, [Online], Available: http://ezinfo.ucs.indiana.edu/~ccolon/Semiotics/ccolon1.html [2002, November 3]

Comber, Tim 1995, *'Building usable web pages: An HCI perspective',* In Proceedings of the First Australian World Wide Web Conference, [Online], Available: http://ausweb.scu.edu.au/aw95/hypertext/comber/index.html [2002, September 26].

Conger, Sue A. & Mason, Richard O. 1998, *Planning and Designing Effective Web Sites,* Course Technology, Cambridge.

Coupland, Ken 2000, *Webworks: Navigation,* Rockport Publishers Inc., Gloucester.

Creative Good 1999, *White paper one: Building a great customer experience to develop brand, increase loyalty and grow revenues,* [Online], Available: http://www.creativegood.com/creativegood-whitepaper.pdf [2002, September 26].

Downes, Edward J. & McMillan, Sally J. 2000, 'Defining Interactivity', *New Media and Society,* Sage Publications, London,Vol 2(2): pp. 157-179.

Druker, Johanna 1994, *The Visible Word,* Chicago University Press, Chicago.

Dumas, Joseph S. & Redish, Janice C. 1993, *A Practical Guide to Usability Testing,* Ablex Publishing Corporation, Norwood.

Ericsson, Anders K. & Simon, Herbert A. 1993, *Protocol Analysis: Verbal Reports as Data,* Revised Edition, The MTI Press, Cambridge.

Evans, David 1995, *How to Write a Better Thesis or Report,* Melbourne University Press, Melbourne.

Faraday, Peter 2000, *Visually critiquing web pages.* In Proceedings of the 6th Conference on Human Factors & the Web, Austin, TX, [Online], Available: http://www.tri.sbc.com/hfweb/faraday/FARADAY.HTM [2002, October 11].

Fisher, Phil & Sless, David 2000'Improving information management in the insurance industry: A case study of the Capita Financial Group', *Design Seminar 691: Readings: Issues in Design Research,* (ed) Cal Swann, Curtin University of Technology, pp. 1-46.

Fiske, John (ed) 1982, *Introduction to Communication Studies,* Methuen & Co., London.

Fleming, Jennifer 1998, *Web Navigation: Designing the User Experience,* O'Reilly, Sebastopol.

Fogg, B. J., Marshall, Jonathan, Laraki, Othman, Osipovich, Alex, Varma, Chris, Fang, Nicholas, Paul, Jyoti, Rangnekar, Akshay, Shon, John, Swani, Preeti, and Treinen, Marissa 2001. 'What makes web sites credible?: A report on a large quantitative study'. *In Proceedings of the ACM CHI'01 Conference on Human Factors in Computing Systems,* volume 1, 61-68, New York ACM Press.

Fogg, B. J. 2002, *Stanford Guidelines for Web Credibility. A Research Summary from the Stanford Persuasive Technology Lab,* Stanford University, [Online], Available: http://www.webcredibility.org/guidelines [2002, October 11].

Fogg, B. J., Kameda, T., Boyd, J., Marshall, J., Sethi, R., Sockol, M., and Trowbridge, T. 2002, *Stanford-Makovsky Web Credibility Study 2002: Investigating what makes Web sites credible today.* A Research Report by the Stanford Persuasive Technology Lab & Makovsky & Company, Stanford University, [Online], Available: http://www.webcredibility.org [2002, October 11].

Frascara, Jorge 1997, *User-centred Graphic Design: Mass Communication and Social Change,* Taylor and Francis, Bristol.

Garzotto, Franca, Alonzo, Francesco & Valenti, Sara 2000,*'3D temporal navigation on the web: How to explore a virtual city along multiple historical dimensions'* Museums and the Web 2000, [Online], Available: http://www.archimuse.com/mw2000/abstracts/prg_80000215.html [2001, July 15].

Gilster, Paul 1996, *Finding it on the Internet: The Internet Navigator's Guide to Search Tools and Techniques*, Jon Wiley & Sons Inc., New York.

Goto, Kelly & Cotler Emily 2002, *Web ReDesign: Workflow that Works*, New Riders Publishing, Indianapolis.

Hackos, JoAnn T. & Redish, Janice C. 1998, *User and Task Analysis for Interface Design,* John Wiley & Sons, Inc., New York.

Head, Alison J. 1999, *Design Wise: A guide for evaluating the interface design of information resources,* CyberAge Books, New Jersey.

Heller, Steven & Drennan, Daniel 1997, *The Digital Designer: The Graphic Artist's Guide to the New Media,* Watson-Guptill Publications, New York.

Holmes, M. 1995, *Interactivity primer: Exploring the essence of good interactivity,* [Online], Available: http://www.multimediator.com/publications/write014.shtml [2001 November 23].

Honeywill, Paul 1999, *Visual Language for the World Wide Web,* Intellect, Exeter.

Hlynka, D., and Welsh, J. 1996, *What Makes an Effective Home Page? A Critical Analysis,* [Online], Available: http://www.umanitoba.ca/faculties/education/cmns/aect.html [2002, July 12].

Jacobson, Robert (Ed) 1999, *Information Design USA,* MIT Press.

Klobas, Jane, & Morrison, David 1999, 'A planned behavior in context model of networked information resource use,' In H. Bullinger & J. Ziegler (Eds.), *Human-Computer Interaction: Communication, Cooperation, and Application Design* (Vol. 2, pp. 823-827). Mahwah, New Jersey: Lawrence Erlbaum Associates.

Klobas, Jane, Renzi, Stefano, Antonioli, Magda, & Covini, Andrea 2000, 'The Impact of Hotel Web Sites on Intended Visits to Hotels: An Application and Extension of the Planned Behaviour in Context Model of Information Resource Use. Discussion Paper,' The Graduate School of Management, The University of Western Australia.

Kristof, Rey & Satran Amy 1995, *Unteractivity by Design: Creating and Communicationg with New Media,* Adobe Press, Mountain View.

Krug, Steve 2000, *Don't Make Me Think! A Common Sense Approach to Web Usability,* Que, Indianapolis.

Lau, Teresa 1997, 'Toward a User-Centered Web Design: Lessons Learned from User Feedback', *1997 IEEE International Professional Communication Conference,* IEEE Professional Communication Society, Salt Lake City, 149-53.

Lupton, Ellen & Miller, Abbott 1999 *Design Writing Research: Writing on Graphic Design,* Phaidon, London.

Lynch, Patric J. & Horton, Sarah 1999, *Web Style Guide: Basic Design Principles for Creating Web Sites,* Yale University Press, New Haven.

Marcus, Aaron 1992, *Graphic design for electronic documents and user interfaces,* ACMPress, New York.

Marion, Craig 1999, *What is Interaction Design and What Does It Mean to Information Designers?,* [Online], Available: http://www.chesco.com/~cmarion/PCD/WhatIsInteractionDesign.html [2000, September 26].

Minghetti, Valeria, Moretti, Andrea & Micelli, Stefano 2001 'Intelligent museum as value creator on the tourism market: Toward a new business model' *Information and Communication Technologies in Tourism 2000* (eds) Daniel R. Resenmaier, Stefan Klein & Dimitrios Buhalis, Springer-Verlag, Vienna.

Mohler, James L. & Duff Jon M. 2000, *Designing Interactive Web Sites,* Delmar, Albany.

Moore, Alvin & Murrey, Brian H 2000, *Sizing the Internet: A Syveillance Study,* [Online], Available: http://www.cyveillance.com/reso [2000, September 12].

Morgan, John & Welton, Peter 1992, *See What I Mean?: An Introduction to Visual Communication* , 2th edn, Edward Arnold, London.

Mullet, Kevin & Sano, Darrell 1995, *Designing Visual Interfaces: Communication Oriented Techniques*, SunSoft Press, Englewood Cliffs.

Nielsen, Jakob 2000, *Designing Web Usability: The Practice of Simplicity,* New Riders Publishing, Indianapolis.

Nielsen, Jakob 2000, *Test With 5 Users,* [Online], Available: http://www.zdnet.com/devhead/alertbox/20000319.html [2000, April 3].

Nielsen, Jakob 1993, *Usability Engineering,* Academic Press, San Diego.

Norman, Donald A. 1988, *The Design of Everyday Things,* Doubleday, New York.

Patterson, Jeff and Melcher Ryan 1998, *Audio on the Web: The Official IUMA Guide*, Peachpit Press, Berkeley.

Peacock, Darren 2002, *Statistics, Structures & Satisfied Customers: Using Web Log Data To Improve Site Performance,* Museums and the Web Conference, April 17-21, Boston, [Online], Available: http://www.archimuse.com/mw2002/papers/peacock/peacock.html [2002, November 8].

Pearrow, Mark 2000, *Web Site Usibility Handbook,* Charles River Media, Rockland.

Penman , Robyn 1994, *Communication News* 6(4), July/August.

Proença, Alberto, Brito, Mário, Ramalho, Teresa and Regalo, Helena 1998, *Using the Web to Give Life to Museums,* Museums and the Web Conference, April 22-25, Toronto, [Online], Available: http://www.archimuse.com/mw98/papers/proenca/proenca_paper.html [2002, November 8].

Rand, Paul 1993, *Design, Form, and Chaos,* Yale University Press, New Haven.

Raskin, Jef 2000, *The Humane Interface: New Directions for Designing Interactive Systems*, Addison-Wesley, Reading.

Raskin Jef, 2000, *There is No Such Thing as Information Design,* [Online], Available: http://www.taskz.com/ucd_no_info_design_indepth.php [2002, November 14]

Rogers, Everett, M. 1994, *A History of Communication Study: A Biographical Approach,* The Free Press, New York.

Rosenfeld, Louis & Morville, Peter 1998, *Information Architecture: for the World Wide Web,* O'Rilley and Associates, Sebastopol.

Rubin, Jeffrey 1994, *Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests,* John Wiley and Sons, New York.

Sano, Darrell 1996, *Designing Large-Scale Web Sites: A Visual Design Methodology*, John Wiley & Sons, Inc., New York.

Sather, Andrew, Ibañez, Ardith, DeChant, Bernie & Pascal 1997, *Creating Killer Interactive Web Sites*, Hayden Books, Indianapolis.

Schriver, Karen A. 1997, *Dynamics of document design,* John Wiley and Sons, New York.

Shedroff, Nathan 1999, 'Information Interaction Design: A Unified Field Theory of Design', *Information Design,* (ed) Robert Jackson. The MIT Press, Cambridge, pp. 267-92.

Shannon, Claude E. & Weaver, Warren 1949, *The Mathematical Theory of Communication*, University of Illinois Press, Urbana.

Siegel, David 1996, *Creating Killer Web Sites: The Art of Third-Generation Site Design*, Hayden Books, Indianapolis.

Siegel, David 1997, *Secrets of Successful Web Sites*, Hayden Books, Indianapolis.

Sless, David 1981, *Learning and Visual Communication*, Halsted Press, a Division of John Wiley & Sons, Inc., New York.

Spool, Jared M., Tara Scanlon, Will Schroeder, Carolyn Snyder and Terry DeAngelo 1999, *Web Site Usability: A Designer's Guide*, Morgan Kaufmann Publishers Inc., San Francisco.

Swann, Cal 1999, 'Translating action research into design practice', *UIAH Conference*, Tuusula.

Teather, L. 1998, *A museum is a museum is a museum or is it: Exploring museology and the web,* Museums and the Web Conference, April 22-25, Toronto, [Online], Available: http://www.archimuse.com/mw98/papers/teather/teather_paper.html [2002, November 8].

The American Heritage Dictionary of the English Language: Fourth Edition. 2000, [Online], Available: http://www.bartleby.com/61/ [2002, November 14].

The Association of Registered Graphic Designers of Ontario, *What is graphic design?,* [Online], Available: http://www.rgdontario.com/ [2002, November 14].

Tufte, Edward 1990, *Envisioning Information,* Graphics Press, Chesire.

Tufte, Edward 1997, *Visual Explanations,* Graphics Press, Chesire.

United Nations 2002, *E-Commerce and Development Report, Executive Summary,* [Online], Available: http://www.nua.ie/surveys/?f=VS&art_id=905358575&rel=true

Veen, Jeffrey 2001, *The Art and Science of Web Design*, New Riders, Indianapolis.

Virzi, R. A. 1990, 'Streamlining in the design Process: Running Fewer Subjects', *Proceedings of the Human Factors Society*, pp. 291-94.

Weise Moeller, Elisabeth 1997, 'Designing a Winning (and Usable) Web Site', *1997 IEEE International Professional Communication Conference*, IEEE Professional Communication Society, Salt Lake City, pp. 109-14.

Wildbur, Peter & Burke, Michael 1999 *Information graphics*, Thames & Hudson, London.

Wurman, Richard Saul 2001, *Information Anxiety 2*, Que, Indiana.

Wurman, Richard Saul 1996, *Information Architects*, Graphis Press Corp., Zurich.