Educational and Research Applications of Video Technology in Support of Learning in the Museum

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Abstract

This paper investigates the current educational applications of video technology within the context of the museum. Two main categories of use are identified and examined: educational uses and research applications. Educational applications of video technology seek to orient, inform, or educate the visitor in such a way as to enhance the quality of his or her visit. This type of application includes: (i) interactive and non-interactive video orientation systems, (ii) interactive and non-interactive video exhibits, and (iii) videos used as an addendum to an exhibition. Research applications of video are used mainly as data collection strategies for various types of visitor studies focusing on learning in the museum. Four examples are presented and discussed: (i) visitor observation, (ii) computer-tracking of videodisc usage, (iii) structured video recall, and iv) informant-made video recordings.

Abrégé

Ce papier étudie les réalisations éducatives en cours de la technologie du vidéo dans le contexte d'un musée. L'auteur identifie et examine deux catégories principales de l'emploie du vidéo: la valeur éducative et l'application pour la recherche. L'application éducative de la technologie du vidéo cherche à orienter, informer, ou enseigner le visiteur d'une manière que la qualité de l'expérience de la visite est mise en valeur. Ce genre d'application incorpore i) les réseaux vidéotroniques d'orientation interactive ou non interactives; ii) les expositions vidéotroniques interactives ou non interactives; iii) l'emploie des vidéos comme supplément à une exposition. D'habitude la recherche sur l'emploie du vidéo est liée aux stratégies pour ramasser des données qui identifient les variances des visiteurs ayant l'apprentissage comme but principal. Quatre exemples sont présentés et discutés: i) l'observation par le visiteur; ii) l'emploie de l'ordinateur pour surveiller l'usage du vidéo disque; iv) l'enrégistrement vidéotronique par ceux qui offrent des renseignements.

Introduction

For many in the museum community the arrival of the age of the new multi-media communication technologies promises a better and more adaptive response to the information and educational needs of museum visitors. For others, these developments also augur well for the elaboration of new avenues for research because these same technologies offer the potential of new methodologies for use in visitor studies. In this paper I make the case that video is in many respects a "new technology," one that is useful to museums as both an educational and a research tool. I then present an overview of some ways in which video and related technologies are presently being used for the purposes of visitor orientation, information, and education. I conclude by discussing examples of different ways in which video is currently being used for research into visitor behaviour.

Video: A New Technology?

It may be surprising to some to hear video described as a "new" technology. After all, video has been used for educational purposes in schools since the mid-1960's, and in television production for some time before that. However, even video products intended for the consumer-market have come a long way from the early days of the "port-a-pack" video camera systems in which a camera was coupled with a separate and cumbersome video-tape recorder. Early consumer-market cameras were reasonably low in cost, but recorded

exclusively in black & white, on half-inch open reels. Editing the images produced with such equipment was so unreliable that it was rarely attempted. Few non-professionals had access to cameras and editing equipment capable of producing a quality product. Recording in real time, without the benefit of editing, was the norm for industry outsiders such as educators, artists, and others interested in exploring the non-commercial, non-television potential of video (Gale, 1995).

Today's generation of consumer recorders and cameras have as much in common with the personal computer as they do with previous generations of video technology. Thanks to the miniaturization made possible by the silicon computer chip and other technological developments, contemporary camcorders combine, into a single hand-held unit, the two separate components - camera and video-tape recorder - of earlier generations of video systems. New tape formats, such as the VHS video cassette and the more recent 8mm cassette, have also contributed to a reduction in the size and weight of video cameras. So-called "palmcorders" can weigh less than 600 grams and, as their name suggests, they are small enough to fit into the palm of your hand. Super VHS cameras and high-band 8mm camcorders (Hi-8) offer enhanced colour picture resolution thanks to a Charged Coupled Device (CCD) imaging system consisting of more than 400,000 pixels (picture elements). Flying eraser heads ensure clean edits between scenes; auto white balance and autofocus systems virtually guarantee good colour and well-focused images (Cantada, 1992). Computer age technology has led to the development of camcorders that stabilize shaky images and produce special effects such as fades, mosaics, titling, black & white or sepia images, negative imaging, and even image enhancement or distortion. What truly characterizes this new generation of video recording systems, however, is the ease with which they can be operated - virtually anyone can operate a camcorder after only a few minutes of instruction.

Important developments in video technology have not been limited to products intended mainly for the consumer market. For example, in the industrial sector the development of the laser videodisc has greatly increased the ability to store large amounts of videotaped information on a single storage unit. The use of such discs in combination with computer hardware and software programs has led to new utilizations for video. As a result, there has been a boom in the use of interactive video systems in such applications as video games, flight simulations, and the visitor orientation systems for use in shopping malls as well as museums. It is these recently developed characteristics of video, such as user-friendliness, miniaturization of equipment, and compatibility with computer technology, that has opened up so many new possibilities in terms of education and research.

Information and Education of Museum Visitors

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Video Orientation Systems

Many museums began to install visitor orientation systems within their public spaces in response to some of the findings of their visitor studies. These studies often pointed to a general malaise among individual visitors who often reported that they felt inadequately prepared to visit a museum: "We found some visitors intimidated by the size of the building, confused about gallery layout, and feeling inferior in understanding works of art" (Evans & Ross, 1989, p. 76). Evans and Ross concluded that this phenomenon was related to a growing shift in the kinds of audiences that museums attract.

> Only a few decades ago, the archetypical art museum visitor was well traveled, well educated, and comfortable with works of art and art history. Museums considered themselves scholarly institutions, closely related to academia...Now, however, the art museum is less related to the academic world than it is to entertainment. Major traveling exhibitions and increased marketing programs attract new visitors....These changes have brought art museums to the attention of a larger, different audience than that which once sought only contemplative communion. (p. 76)

In order to respond to the needs of this new, heterogeneous audience museums have had to re-evaluate their strategies for providing information to the visitor. Television is one of the primary sources by which most people in the industrialized world receive information on a daily basis. For this population, television represents both familiarity and comfort (Brown, 1989; Evans & Ross, 1989). For these reasons, within the professional museum community, video has come to be seen as a medium of choice for communicating with visitors for the purposes of orientation and education (Evans & Ross, 1989).

Non-interactive orientation systems. Non-interactive video systems still play an important part in many museums' overall strategies for communicating with their visitors. Such systems came into general use as a form of visitor orientation well before interactive systems became available. In general, non-interactive orientation systems consist of a short video presentation, 5 - 10 minutes in duration, presented in continuous screenings. In this type of video orientation the museum presents an overview of its collections, public spaces, and visitors services.

Non-interactive orientation systems have one important advantage over interactive systems: the orientation video can be presented on a number of television monitors in a configuration that will allow it to be seen simultaneously by a large number of people. An alternate mode of presentation consists of presenting the video on a large screen using a video projection system. As a rule, non-interactive systems generally require only conventional video equipment for the purposes of public presentation. For this reason, they are somewhat less expensive to set-up and operate than interactive systems, however, these systems do present one major inconvenience for the visitor. The visitor has no control

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over the playback of the video: the sequence in which information is presented is predetermined by the museum and cannot be altered. A visitor must sit through the presentation of all the parts of the video that precede the information that he or she is looking for.

An example of a non-interactive video orientation system is the one currently in use at the National Gallery of Canada, in Ottawa. A short video is presented in a small screening room, the Orientation Room, which is adjacent to the Great Hall, the access point to all of the Gallery's different collections. The video presents, in turn, an introduction to the Canadian, European, Inuit, Photography, Contemporary, and Special Exhibition Galleries, as well as information about the museum's restaurants and bookstore.

Interactive orientation systems. Computer-controlled laser videodiscs provide the technological basis for interactive video orientation systems. Unlike the non-interactive systems just described, interactive systems allow visitors to control the display of information about the museum. Most interactive systems consist of computer terminals that have monitors equipped with transparent, touch-sensitive screen overlays. When the screen is touched by a visitor the computer displays a main menu from which the visitor can select a topic of interest. The range of topics available for selection usually includes a calendar of events, information about museum activities, an overview of a museum's collections (sometimes presented collection-by-collection), information on visitor services, and information on museum membership. Once a selection is made the terminal presents a short video about the chosen topic. Visitors can browse, back and forth, through the matrix of information made available by the interactive video system according to a pathway that suits their personal needs and interests. This is the major advantage of an interactive system: individual visitors control the system and are able to get immediate access to the information that they need. In addition, the interactive system is inviting and easy to use. Evans and Ross (1989) discuss the way in which the system in use at the Dayton Art Institute in Ohio was designed to attract potential users:

> The technology at work is complex, but the system looks simple to the visitor. Only the television-like computer screen is visible in the selected wall-mounted configuration, with the remaining components of the system hidden....To attract the attention of visitors walking by, the system automatically and continuously cycles through short video clips that describe the museum galleries. Interspersed with these are text information screens. A message at the bottom of the screen invites those who approach to touch the screen. (p. 78)

As inviting as they may seem at first, interactive orientation systems do have some limitations. The initial cost of installing an interactive video orientation system can be prohibitive - anywhere from $30,000 to well over $100,000 - and these amounts do not include the cost of producing the video segments used in the system (Evans & Ross, 1989). An additional deficiency of the interactive system is the fact that each terminal can only be

used by one or two persons at a time; such a system cannot handle the large volumes of visitors that attend museums during major events, such as blockbuster exhibitions.

Video Components of an Exhibition

"Talking labels" is the term that Jennifer Schuessler (1992) has coined to characterize the use to which most forms of audio-visual technology are incorporated into the majority of museum exhibitions.

> Documentary films, video and audio-cassettes are the most common forms of audio-visual technology found in museums. They also tend to be the forms least integrated into the exhibits but, at the same time, the least foreign to the traditional museum. When well done, these "talking labels" can greatly enhance the visitor's appreciation and understanding of the objects on display by engaging the ear along with the eye or by presenting background material (music or newsreel footage, for example) that simply cannot be conveyed by the written word or still images. (p. 89)

Video addenda. A program of video-tapes about the life of an artist or about the origins and uses of an artifact is often presented as an addendum to an exhibition. Often relegated to the auditorium or sometimes screened in a room adjacent to the exhibition, video addenda only occasionally contain material that was produced specifically for inclusion in an exhibition. The primary sources of material for these programs, however, are documentary films or videos originally intended for television broadcast or for the public education system. Video addenda serve a useful purpose by allowing the public to become acquainted with the artist, or to observe how an artifact was once used; they can provide a social, cultural, or historical context for the content of an exhibition. Furthermore, these videos can convey to the visitor the special knowledge or insight that an expert - the Egyptologist, the astronomer, or the art critic - may have about an artifact, an exhibit, a natural phenomenon, or the work of an artist. An example of this use of video is the recent retrospective exhibition of the work of New York artist Louise Bourgeois held during the summer of 1996 at the Musée d'art contemporain in Montreal, Canada. As a complement to the exhibition a video interview with the artist was continuously screened in both French and English in two rooms adjacent to the exhibition. The video was well-appreciated by visitors because it provided an insight into the artist's motivations for producing many of the sculptures and installations included in the retrospective.

Video exhibits. Video exhibits are not simply adjuncts to an exhibition, they are the content of an exhibition or, at the very least, they are an important component thereof. Almost without exception the videos that are used as exhibits are produced specifically for that purpose. In addition, video exhibits may or may not be interactive. This application of video has gained widespread acceptance especially in ethnographic and science museums.

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One example of an interactive videodisc (IVD) exhibit is *Earth Over Time*, an exhibit about plate tectonics and related topics intended for an audience of children ages 10 to 12. Produced by the Interactive Video Science Consortium this videodisc is now used in fifteen science and technology museums around the world. In designing this exhibit the Interactive Video Science Consortium set out to create an interactive video simulation that provided groups of visitors with an opportunity to learn about environmental issues by engaging in a debate among themselves, as well as interacting with the videodisc display.

> In *Earth Over Time*'s first activity, "Save the Beach", a simulated newscast reports on the demise of the coastline of Oceanville, which has been ravaged by hurricanes, and notes that a vote on how to save Oceanville's beaches is being held. Museum visitors are invited to "talk" with residents of the community, each of whom favors a different solution to the problem of shoreline erosion. Museum visitors can telephone each resident to hear how the erosion-saving methods work, and they can vote, using a touch-screen ballot. After the vote, a newscast takes the viewer into the future and reports on how the selected solution fared over time. (Tillotson, 1991, p. 66)

Interactive computer games and exhibits have often been criticized for the isolation they create because, under most circumstances, users "tune out" other people around them as they become engaged in activities with the computer. The social dimension of the interactivity of *Earth Over Time*'s "Save the Beach" activity is extremely interesting from an educational point of view: it is an exemplar of the way interactive videodiscs can be used to promote learning through a process of technology-based interaction in combination with social interaction.

The same interactive newscast format utilized in the "Save the Beach" activity is combined with actual video footage in other *Earth Over Time* activities to permit young visitors to explore, in turn, the following topics: the sea floor, volcanoes, and earthquakes. In other activities a video game format encourages viewers to explore such topics as plate tectonics (Tillotson, 1991).

While many science and technology museums have readily integrated interactive videodisc applications into the core content of their exhibitions the situation is somewhat different in many fine arts museums. In such museums, videos by artists tend to be the most common kind of video exhibition component. Videos by artists are works of art in their own right. As such, they are exhibited in much the same manner as other forms of contemporary art: considerable attention is given not only to the selection of the videos exhibited but also to the manner in which they are presented.

In the first section of this paper the principal uses of video in orienting, informing, and educating the museum visitor have been presented and discussed. Although not intended to be exhaustive, this survey does present a general overview of some educational applications of video technology in the museum. While many readers will be familiar with

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a few or all of the aforementioned applications, they may not be as familiar with the research applications of video because these have not been the focus of extensive consideration in the past.

A Tool for Museum Research

Advancements in video and computer technology have led to the production of video cameras and recorders that offer numerous advantages when such equipment is used in research. As mentioned earlier, the latest generation of video equipment is extremely sophisticated and reliable yet affordable and easy-to-use. The following is an overview of some of the ways in which this new technology has been put to use in research.

Visitor Observation

It is fairly straightforward to use a video camera in such a way as to unobtrusively observe museum visitors as they interact with museum exhibits or as they interact among themselves, however, a major ethical concern must be addressed prior to undertaking any video-taped observations of visitors. Ethical guidelines and standards require that researchers obtain prior, informed consent from all persons participating in a study. Whether signs informing visitors that they are being observed is adequate as a method of obtaining informed consent is debatable but that is the method that Morrissey (1991) used to infer consent from the visitors she observed for her study conducted at the Michigan State University Museum in 1989.

The objective of Morrissey's study was to observe visitors' usage of an Interactive Video Program (IVD) presented in the hallway outside the exhibition "Birds in Trouble in Michigan." A video camera, mounted in full-view on an exhibit case, provided a view of the IVD computer station, the entrance to the exhibition, and the first wall inside the exhibition area. During observation periods the video camera recorded the behaviour of groups of visitors as they interacted with the IVD[1], first as they entered the exhibition, and subsequently as they viewed the exhibits installed along the first wall of the gallery. From the recordings made by the video camera Morrissey was able to calculate the total amount of time that each group spent within the exhibition area and the amount of time spent viewing two specific bird mounts. By comparing the data for the control group with the data for the experimental group Morrissey was able to determine that the visitors who used the interactive video display before entering the exhibition actually spent more time viewing the exhibition. Morrissey also used the video recordings to determine what kind of group was most likely to use the program and whether gender was a factor in the use of the IVD station. She found that "groups with children were more likely to use the program" and that "groups with boys were at least twice as likely to use the program as groups with girls" (Morrissey, 1991, pp. 114-115).

As demonstrated by Morrissey's study, the video-assisted observation of visitors can be used for a number of different kinds of data analysis. The recordings made during video observation sessions can be utilized for calculating the amount of time that each visitor spent viewing an object or an exhibition. Video observations can provide the basis for studying the role of social interaction within a museum visit and how such interaction differs from one type of group to another: parent-child, teen-adult, adult-adult, school groups, and so on. It can provide the means for examining how visitor behaviour correlates with gender. Finally, video observations can assist in tracking visitors as they walk through various galleries in order to determine which exhibits attract attention and which do not.

Unlike other methods based on manned observation, video observation is tireless; this is an important advantage when observation periods last for days, weeks, and even months. Contrary to manned observations, which require that observers judge and classify behaviours as they are witnessed, video observations yield a permanent record that can be studied at leisure and over-and-over again if required. These are but some of the many reasons why researchers often prefer to use video observation over other, more traditional methods.

Computer-tracking of Videodisc Usage

The computer programs that control IVDs are also capable of recording the pathways that visitors take as they explore the many options offered by the IVD program. In the study just discussed Morrissey was able to use this feature to track the use of the IVD program by the groups of visitors that she was studying. Based on the information recorded automatically by the computer station Morrissey was able to determine that "75% of the users created unique paths through the program" (p. 116). She also established that users who described themselves as very interested in birds were most likely to explore the second level of the program which provides additional information about the topics selected. The computer-tracking of videodisc usage provides valuable information that museum educators can use to evaluate the ways in which IVD programs are used by visitors; in turn, these evaluations can be used to initiate changes to the programs in order to make them more effective.

Structured Video Recall

Structured video recall (Kerr, Cowan, & George, 1988) is a research method in which a video-taped recording of an event is presented to research subjects in order to trigger their recall about that event. This method is a variation of the technique of Interpersonal Process Recall developed by Kagan (1975) in order to obtain information about personal interaction and its role in student learning during workshops and lectures.

George and Stevenson (1991) applied the technique of structured video recall in

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their evaluation of the "Discovery Room" at the Royal Museums of Scotland. A sequential, gallery-by-gallery compilation of the exhibits in the Discovery Room was video-taped from the viewpoint of the subject. This compilation contained panning shots of each section of the gallery followed by a number of 10-second still shots of each exhibit in each section.

Twenty-five visitors were interviewed following their visit to the Discovery Room. In order to trigger the recall of the subject's experience in the Room the video recording was replayed to each subject as he or she was being interviewed by the researchers. Viewing the video helped visitors recall pertinent information about their experiences that otherwise would have been forgotten (George & Stevenson, 1991).

In addition to the structured video recall method George and Stevenson used questionnaires and tracking maps to study visitor behaviour in the Discovery Room. In comparing the three methods of data collection they observed that visitors' responses to the questionnaire, while useful as research data, were "bland and almost invariably politely favorable" (p. 207). The two researchers eventually abandoned the use of the tracking maps because "this technique was impossibly inefficient in staff time for the results produced" (p. 207).

> The structured video recall, by contrast, proved a rich source of qualitative data, in that it gave vivid insights into visitors' experience in the Discovery Room. The insights provided feedback in all three areas identified at the start of the project [practicality of the exhibition, educational effectiveness of the Discovery Room, and effectiveness of structured video recall as an evaluative tool]....It was the insights provided by the structured recall interviews which provided direct access to the experience of visitors and laid bare the bones of that success. In this context, this technique therefore was a unique and valuable source of the facts upon which formative evaluation could and should be based. (George & Stevenson, 1991, pp. 207-208)

Structured video recall is an interesting and exciting new development in museum research methodology. In addition to its use in formative evaluation this approach is promising for use in a wide-range of studies in the museum including those focusing on visitor behaviour, exhibition design, as well as object- and information-based learning.

Informant-made Video Recordings

Inquiries based on Informant-Made Video (IMV) recordings (Lachapelle, 1999) is another recently developed investigative method that holds great promise for use in museum research. To collect data using an IMV protocol researchers train study participants to document their own art-viewing or museum-visiting experiences by using a camcorder to create video tape recordings. These recordings are then used by the researcher as the data base for his or her study. Informant-made videos are proving useful for the study of visitors' responses to museum exhibits; they can also be used to study the self-directed learning that takes place when adults visit museums.

In some ways, informant-made videos are better than audio-taped interviews[2]. Contrary to other data collection methods an IMV recording yields a visual record in the form of a videographic image of the exhibit or work of art that the study participant is responding to. With this feature informant-made videos provide a set of data that is cohesive and whole. Additional sources of information, such as reproductions of works of art and gallery floor plans, are not required in order to analyze the recordings; background information about each study participant is the only external source of data that may be necessary in some cases. The visual information provided by IMVs represents a major research advantage because the investigator need not rely to the same extent on his or her recall of specific research sessions in order to fully understand informants' verbal remarks.

Furthermore, when documenting their verbal responses to works of art using the IMV approach, study participants tend to automatically zoom-in with the video camera on those parts of the art object that are the focus of their attention and criticism. By providing this kind of detailed visual documentation to complement their statements, informants further reduce the chance of a misunderstanding regarding which part of the work their comments are about.

Finally, informant-made video recordings also contain evidence of the manner in which the study participant negotiates the physical space within an exhibition. The informant records this type of material, called kinesthetic data, without any deliberate effort as he or she moves about the gallery while taping with the video camera. Informant-made video recording is the only method of data collection used in visitor studies that yields, at the same time and without additional effort, these kinds of related visual data along with the requisite audio recording of participants' comments (Lachapelle, 1999). Accordingly, "this unique characteristic of informant-made videos provides a basis for multiple methods of data analysis - tracking, discourse analysis, study of gestures, and physical relationships - using one single, primary source of information" (p. 243).

In 1993 I conducted a research project in order to determine if an approach based on informant-made videos is effective as a method of studying the aesthetic responses of adult museum visitors (Lachapelle, 1994). During the course of this study volunteer informants first participated in individual training sessions on the use of the camcorder[3]; then they produced videotapes about two different works of art. The content of these videos was compared to the content of an audio-taped interview conducted with each participant prior to the production of the video tapes.

The study demonstrated that the informants had little or no problem making effective use of the camcorder to document and convey their individual interpretations of selected works of art. Based on discourse analysis, a comparison of the video-taped and audio-taped sessions of some of the informants provided evidence that the informants' videos were as effective as the audio-taped interviews for collecting verbal statements about

the works of art. Furthermore, all informants reported that it was relatively easy to communicate their ideas about the works of art using the camcorder.

The visual data contained in the informant-made videos provided new information about the process underlying adult visitors' aesthetic experiences. The IMV tapes clearly demonstrated that the way in which visitors approach a work of art is influenced by its scale and physical characteristics. Differences in the way informants interacted with two- and three-dimensional works were also documented. The study established that follow-up sessions during which the researcher and the informant viewed the IMV recordings together were useful to both parties as opportunities for clarifying the statements or images captured on the videotape and for exploring new insights into the works of art.

In sum, this information illustrates some of the important advantages of a research protocol based on informant-made videos. These characteristics of the new methodology were verified during the course of this study, and they have proved to be helpful in understanding informants' responses to works of art encountered in a public museum. Along with the three other examples presented earlier, this study demonstrates the power, as well as the usefulness, of video as a research tool.

This paper has examined the ways in which video technology has proved useful to museums. First and foremost, video has been extremely helpful in providing a number of new ways of communicating with the public for the purposes of information, orientation, and education. In addition, video is now becoming more and more invaluable as a research tool that is particularly well-suited to the study of visitor behaviour. Finally, with the uses of video technology profiled in this paper as a starting point, we have every reason to expect that new and more refined applications of video technology will continue to be developed and that these will also be advantageous when applied to the needs of the museum.

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Endnotes

1. On control days, when observations were made of the control group for the study, the interactive video system was removed from the hallway.

2. The traditional method for studying visitors' responses to museum exhibits is to conduct oral interviews with visitors as they look at various exhibits. These interviews are documented with an audiotape recorder.

3. The study was conducted using an 8mm Sony CCD-TR51 video camcorder.

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