The Computer As Catalyst: Experiences at the Art Gallery of Ontario[1]

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Visitors to art museums can frequently be heard to say, "I really don't know much about art," a declaration that seems to alleviate any responsibility for being "knowledgeable" about the masterpieces in the galleries. What is it that draws people to temples of high art, only to have them confess their perceived inadequacy at responding to the creative expression of other human beings?

There are many possible reasons why people visit art museums. Perhaps this phenomenon is due to the widely held belief that simple proximity to art is fundamentally "good" for personal development, quite apart from any actual fulfillment. There is some speculation that people visit art institutions in order to be perceived by their friends as "having been" to such an inherently enriching site (Kelly, 1984). For those few who have pursued advanced education in the visual arts, a museum visit may represent a desire to validate their acquired knowledge and understanding of art. Others may simply feel that museums are good places to take out-of-town guests. One truly satisfying thought would be that people visit art museums because the creative expressions of artists through the ages somehow resonate with the visitors' own creative and perceptual potentials, allowing them to see the world and themselves in a new light.

It will take a great deal of research to understand both what motivates individuals to visit art museums and what drives their reactions.[2] Defining the potentials of visitor experiences will be at least as difficult. But for the

[1] Parts of this paper are based on an article (Worts, 1989b), jointly published by Apple Canada Inc. and York University.

[2] For example, see Marilyn Hood's research into what motivates people to attend or not attend museums (Hood, 1985). Also, research currently underway at the Denver Art Museum compares expert viewers' approaches to the art gallery with the approaches of art novices and amateurs.

present, one thing is clear. Audience research (e.g., McDermott-Lewis, 1988; Worts, 1989a) shows that many visitors "graze" through art museums, spending only a few seconds with each work of art before moving on to the next. And there is evidence that many feel uncomfortable or inadequate in this process. Over the past several years, the Art Gallery of Ontario (AGO) has been attempting to make gallery visits more personally satisfying and meaningful for the public by experimenting with interpretive devices that better meet visitor needs. One of these devices has been the microcomputer.

In this paper we will begin by examining the issues raised when computers are integrated into art exhibits. Secondly, we will consider the impact of computers on visitors to an experimental art exhibit that used this technology to encourage visitor interaction with the art objects. Finally, we will examine a major collaboration between education and curatorial staffs using computers and other interpretive supports to enhance the public's involvement in a permanent collection gallery.

Computers in Art Museums: The Issues

To many, the thought of computers alongside a Picasso is nothing short of sacrilege—a direct threat to the "æsthetic integrity" of the art experience. Such pervasive attitudes within the art museum community have slowed the development of computer-based interpretive systems for visitors to art galleries. However, the few institutions pioneering such systems[3] have discovered some of the previously untapped potentials of computers for helping visitors understand and enjoy art experiences. They also have found that computers can have serious pitfalls when improperly used.

What are *legitimate* reasons for using computers in art exhibits? The answer to this question requires an examination of four different issues:

- The potential of art to affect people in a meaningful way
- The interaction of art and visitors within museums
- The capabilities of computers to direct a person's attention, provide relevant information, and otherwise build visitor confidence during interactions with art
- The pitfalls of computer-assisted exhibits.

The Potentials of Art and Art Museums

Over the centuries, the ways humanity perceives and interacts with its environment have found expression in art. Traditionally, the visual arts have reflected human thoughts and emotions, values and attitudes. Thus, looking at art can potentially provide insights into the human condition, both past and

[3] For example, the London Regional Art Gallery, London, Ontario, Canada.

present. But perhaps more importantly, art can provide, through its realistic and symbolic representations, opportunities for a viewer to reflect on the art experience itself from his/her own personal vantage point. Conscious personalization of the art experience may be a critical component in facilitating many peoples' appreciation of art objects, because it builds the viewer's confidence in his/her subjective reactions. Further, it can be argued that with this personal confidence comes greater motivation for a viewer to see the art object in the larger context of its artistic, social, political or economic milieu. In other words, every viewer is capable of bringing both a subjective and an objective perspective to the art experience. Furthermore, a viewer who responds to an artwork in both manners can generate a richer experience than if just one perspective is employed. For this to occur a viewer needs to enter into some kind of significant interaction with the art object. It is one of the responsibilities of the public art museum to create optimal conditions for this interaction to take place.

The Interaction of Art and Visitors within Museums

'Why do people visit art museums?' and 'What do they get from a visit?' are important questions that have not been fully answered. While research and theoretical discussions are available (Chambers, 1988; Csikszentmihalyi, M. & Robinson, R., 1986; Hood, 1985; Edwards, *et al*, 1990; Housen, 1987; McDermott-Lewis, 1988; Screven, 1986; Williams, 1982, 1984, 1985), these studies fall short of providing full explanations for what actually happens to visitors during art museum visits. What does seem clear is that the museum visit is a complex experience affected by many variables. Among these are visitor learning styles, demographics, social relationships, building architecture, the micro-environment created by exhibit designs, the kinds of interpretive supports available, and so on.

Some of these variables are controllable by exhibit design processes. Others are a function of the individual visitor and are difficult, if not impossible, to change—these must be accepted and accommodated as much as possible. For example, 'learning style' is a major factor in how a person relates to the world—and people do learn in different ways. Some learn by exploring a particular problem and working their way towards a more abstract understanding of a subject. Others intellectualize learning by first establishing an abstract framework, within which they attempt to solve a particular problem. Both styles are valid and lead the learner to new understanding. However, it is difficult to design an exhibit that allows each learning style to function naturally without causing chaos for all. This situation is made more complex with the recognition that many people have learning styles that fall somewhere between the two poles outlined above. Although it may be impossible to design art exhibits that lead visitors with different

learning styles to intended cognitive and affective outcomes, it may be possible, with the aid of computer technology, to assist individuals to seek out and apply relevant information in their own way. This approach would give greater responsibility to the visitor for his or her own learning than traditional forms of support such as authoritative information panels and extended labels.

It must be remembered that learning style is only one of many variables that affect the visitors interaction with an exhibit. Whether the quality of visitor experiences in museums improves depends on the ability of museum staffs to understand and accommodate the significant forces in both the members of the public and in the museum environment. The challenge to design new interpretive systems to address visitor needs, including computer programs, will likely be an important frontier.

If audience research in art museums has revealed anything about visitors, it is that their behavior is similar to that observed in other types of museums—i.e., it is generally unfocused and even superficial. This "grazing" phenomenon suggests that, for many visitors, the potential for meaningful experiences is largely unrealized. Two major causes of the apparent superficiality of visitor attention to artworks are postulated here. The first is a lack of *contextualization* of the art by visitors, or the inability to put the objects into a meaningful context. This is often rooted in a lack of relevant information provided by the museum. The second is a lack of *personalization* of the art by visitors, which may stem from an absence of institutional validation of the visitor's personal experience and response. If the visitors can feel comfortable with their own personal reactions, seeing them as perfectly valid responses, they can then extend their personal perspective into a more objective understanding of the artwork. Then the possibility for reward is great.

But if the museum considers itself primarily as the arbiter of artistic "quality" in some objective sense, and if this role is accepted as legitimate by the public, then a fundamental conflict will arise whenever the objective perspective of the museum does not coincide with the subjective perspective of a visitor. This is a frequent occurrence in the area of contemporary art, when visitors cannot resolve the conflict between thinking that their child could do better and their fundamental belief in the authority of the museum to gauge "quality." When this conflict occurs, visitors can be left with very little motivation to focus attention, particularly when the museum takes no responsibility for the conflict.

Since art museums traditionally provide neither contextualization systems, nor validations of personal responses, it is little wonder that visitors spend only a few seconds with any given work of art. This situation is made worse by: (a) the tendency of art museums to offer an impossible number of things to look at during a visit; (b) the tendency of people to visit art museums

irregularly (at best); (c) the poorly developed visual literacy skills in society at large; as well as (d) the intimidating size and grandeur of much museum architecture.

But such difficulties are not insurmountable if art museums accept the idea that the educational impact of exhibits, understood in the broadest terms, can be improved significantly with better knowledge about the needs of all visitors. Such insights can lead to the development of strategies that will support people during their visits. Specifically, new approaches to museum exhibits that draw on such fields as environmental psychology, cognitive science and motivational psychology, may result in more effectively focusing visitor attention on art displays resulting in a greater sense of meaning. Computer technology is likely to be a critical vehicle for realizing these new strategies.

Capabilities of Computers in an Art Gallery

Modern computers greatly expand the ways information and ideas can be adapted to visitor needs and learning styles (Whitney, 1990). When properly utilized, the flexibility and power of computer technology can help visitors focus their attention on the art and motivate them to invest both intellectually and emotionally in the art experience. Because of the computer's capability to process information in a host of ways, it is theoretically possible to design software that allows the users themselves to define how the technology will support their exploration of the artworks. Stating questions or posing problems, followed by assistance in finding answers or solutions is one educational strategy that computers can facilitate. But computer technology, through the combined use of text, graphics and audio, can encourage exploration and discovery in countless other ways (Lee, 1968; Screven, 1986). Thus, computers can go beyond the impact of any one of these media. Unlike conventional labels and information panels, computer programs can generate a dialogue between the visitor, the art, and the artist that is individualized to the particular interests, backgrounds, and learning styles of visitors. And they can do so without taking up a lot of space in the exhibit.

The AGO's experimentation with computers as educational tools differs from applications at most art museums. Some institutions are using videodisks, CDs and computers to provide visitor access to extensive informational and visual databases as part of the museum experience.[4] However, these applications usually are not fully integrated into an art exhibit context, nor designed to function in conjunction with museum objects. In contrast, the AGO applications use the computer as a *catalyst* within the gallery environment,

[4] For example, the Getty Museum's interactive video disk on Greek vases and the developing work of the Museum Video-Disk Consortium under the chairmanship of Philip Yenawine, Museum of Modern Art, New York.

not for the primary purpose of imparting information, but rather to stimulate *interaction* between visitors and art objects. Thus, the AGO's computers are intended to serve the visitor's art experience, rather than to be a separate, self-contained learning activity.

Computers: the Pitfalls

There are potential pitfalls which must be faced when considering the use of computer technology in exhibits. The AGO experience has indicated that these pitfalls are not insurmountable and that the potential of enhancing visitor art experiences through the use of computers is worth the effort. To date, we have learned from this experience and have made adjustments accordingly. For example:

The danger of computers upstaging the works on display, and distracting visitors from looking closely at the art.

> Computers have great potential to attract visitor attention and stimulate mental processes. However, a computer program must communicate to the visitor that there is a third partner in the process—the artwork(s). Since it is the visitor and the computer that establishes the action/response dynamic in this relationship, it is all too easy for the artwork to be excluded from the dialogue. High resolution or animated graphics can compound this problem. A necessary component in limiting the effect of the computer is a careful consideration and articulation of the desired goals for the three-way interaction, keeping the artwork as a focus. AGO computer programs to date have avoided using high-resolution images, color screens, and animated graphics. Such features will eventually be used, but must wait until program designers can harness their power and direct it to serving the art experience.

The tendency for computer hardware and software design to require technical and financial resources beyond the reach of most museums.

> Although it is possible to spend a great deal of money to create computer programs, it is neither necessary nor desirable for museums to do so when they embark on this path. Easily used hardware (such as the Apple Macintosh) and quickly learned software (such as Hypercard), provide museum educators with inexpensive tools to begin their experimentation. For example, this writer, who has never had computer training, developed two simple Hypercard programs and installed them in an exhibit within one month of the software being released. Despite the inexpensive and friendly nature of such computer equipment, it does offer a great deal of power—more than

most of us novices will be able to tap. Educators need to become involved in developing their own computer programs because the unique applications called for in museums are unlikely to be developed effectively by people who do not fully understand the museum's mission.

The difficulty of designing the range of information delivery strategies and learning options to meet the diverse needs of the general public.

The diverse needs of museum audiences, our poor understanding of the variables in visitor experiences, and the lack of models for effective program development, all contribute to the difficulty of creating effective computer programs. Along with audience research to learn more about visitor experiences, the AGO is using three strategies to help develop its computer programs: the first is to extract useable educational strategies from existing programs, such as public gallery talks to encourage interaction with the public; the second is to examine other computer-supported learning systems[5] (Scardamalia, 1989; Scardamalia and Bereiter, 1989; Bereiter and Scardamalia, in prep.); and the third is trial and error. Such exploratory and experimental work will lead to both successes and failures, and the more museum educators share their experiences, the more progress there will be.

The existing fears and anti-computer attitudes of some visitors.

Although many people, both staff and visitors alike, seem to find the notion of computers in art exhibits unacceptable because they believe it threatens the purity of the "æsthetic" experience, this position is strongest when considered in the abstract. Research at the AGO has found that, when asked how they felt about the possibility of computers in an exhibition, few visitors were in favor—perhaps because they had never experienced such a thing and they really couldn't imagine what it would be like. However, when visitors were confronted with actual computer programs, there was a much more positive response, often with specific suggestions for how to improve what we had produced. The enthusiastic response to actual computer programs in an exhibit is more fully discussed in the next section.

The use of new technologies will bring with it many new challenges. But if we confront them as simply obstacles that need to be overcome, rather than

[5] For example, a research project, called "Computer Supported Intentional Learning Environment" or CSILE, conducted at the Ontario Institute for Studies in Education in Toronto.

reasons to halt our explorations and experimentation, then both art museums and the public can benefit.

The *Viewpoints* Exhibition

In the fall of 1987, the Exhibit Interpretation and Programming Department at the Art Gallery of Ontario organized an exhibition entitled "Viewpoints: Approaches to Contemporary Art." More than just a display of contemporary art, *Viewpoints* was a unique laboratory for testing the impact of interpretive devices on visitor experiences. It was also the first time that we conducted systematic audience research into visitor use of an exhibit.

Viewpoints was designed as a two-phase project. In phase 1 (September — November, 1987), eight artworks (painting, sculpture, photography) of varying styles were installed with conventional identification labels. In phase 2

Figure 1. View in phase 2 of *Viewpoints* exhibit.

(November 1987—May 1988), the same artworks each were supported by at least one interpretive device, and sometimes by as many as four. Figure 1 shows one phase 2 layout with three interpretive devices (computer, flipper, and audio). All other aspects of phase 2 (*i.e.*, exact placement of the works, lighting, etc.) remained constant throughout both phases.

Materials and Methods

The interpretive devices (also referred to as "animation") in phase 2 included eight "flippers" (hinged interrogative print labels),[6] three micro-computers,

[6] For a description of principles underlying the flip-label approach to interactive label designs, see Screven, 1986, pp. 129-131.

four audio tapes and three wall panels. Each device was designed to direct visitor attention to the artwork and to enhance the viewing experience—not simply to provide information about the artist's life and times, unless there was a direct link to the artwork itself. Figures 2ab and c illustrate several introductory frames presented by the computer to help alert visitors to the mood of the painting. In recognition of the heterogeneity of our audiences and their needs, various types of information, educational strategies and delivery systems were utilized.

Using random sampling methodologies, 131 visitors were chosen randomly for study during phase 1. These visitors were unobtrusively tracked and then surveyed as they left the exhibit. One in three of these visitors was additionally interviewed at length to determine his/her attitudes towards contemporary art in general and the exhibit in particular.

Phase 2 carried out the same procedure with 134 randomly chosen visitors.

Fig. 2a-c. Introductory screens for one of three computer programs in the *Viewpoints* exhibit.

Results and Discussion

Total mean time spent during a visit to the exhibit increased from 5.4 minutes in phase 1 to 16.3 minutes in phase 2. Virtually all visitors used at least some of the interpretive devices, and many patrons made extensive use of them. The computers were the most popular: 96% used at least one of the three computers available throughout the exhibition and over 20% used all three. The percentage of visitors who used the computers, flippers and other interpretive supports at the eight exhibit areas is shown in Figure 3. Note that wall panels generally were used least frequently, while computers and flippers were used most frequently (computers were present only in three exhibit

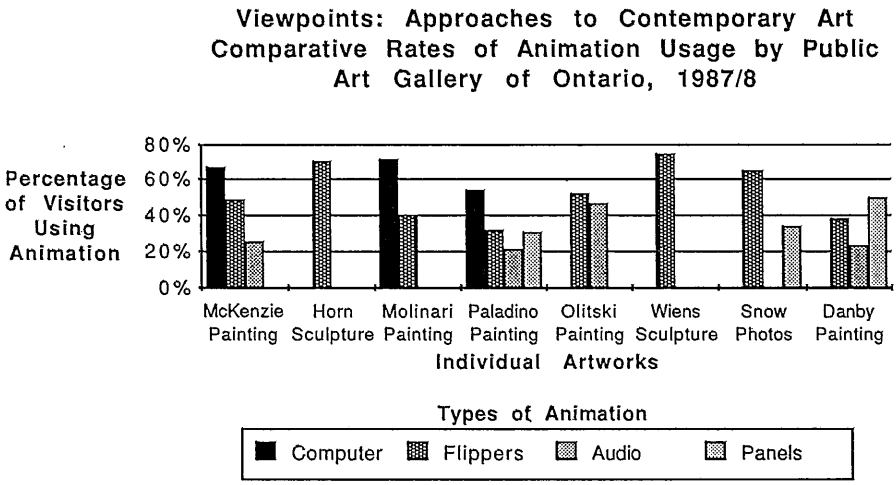

Figure 3. Percentage of visitors using computers, flippers, and other interpretive supports at the Viewpoints exhibit (computers were only present at 3 exhibits).

areas). The increased time spent in phase 2 was evident in all categories of visitors (members/non-members, those with art backgrounds and those without, those with high levels of education and those with lower levels, and frequent/infrequent visitors).

In brief, the added interpretive devices had a positive effect on almost all visitors, as reflected by overall time spent and usage of the devices. However, when considered by itself, it was not clear that the greater time spent in phase 2 reflected richer experiences, simply longer ones. Observers noted a significant change in the "social atmosphere" of the gallery environment from phase 1 to phase 2. During phase 1, visitors were more quiet and subdued, whereas in phase 2 there were increased levels of several behaviors: animated conversation; a visitor calling a friend over to see something; and pointing at selected parts of the artworks. This observational data gives support to the notion that the increase in phase 2's holding time was tied to a higher level and quality

of engagement with the exhibit.[7]

Further evidence of the greater level of phase 2 involvement and satisfaction with the exhibit experience was indicated by the indepth interviews. During these interviews, visitors spontaneously expressed their pleasure that the AGO had made attempts to bridge the gap between visitors and the contemporary art. The overall attitude towards phase 2 was expressed in visitor ratings. In phase 1, only 23% of the visitors rated Viewpoints as "above average." In phase 2, this figure was 70%.

It is difficult to say just what lies at the foundation of the changes in behaviors and attitudes from phase 1 to phase 2. No attempt was made to measure cognitive gains. Instead, an emphasis was placed on the affective impact and how the exhibit stimulated spontaneous visitor expressions of involvement and satisfaction. However, this is not to say that the cognitive impact of visitor experiences is not important. Indeed, the results of the *Viewpoints* experiment increased staff interest in understanding better the relationship of cognition and affect in visitor responses to artworks.

The *Viewpoints* exhibition was a valuable exercise. It clarified some general issues associated with the use of computers and other interpretive materials and with conducting audience research within the art museum environment. It also provided a prototype that strengthened a burgeoning partnership between educators and curators in the development of "enhanced" permanent collection exhibitions at the AGO. The "Group of Seven" exhibition is an example of this development.

The Group of Seven Exhibition

As a result of the experiments into improved visitor experiences in exhibits, of which the *Viewpoints* exhibition is one, a full-scale education/curatorial collaboration was instigated between the AGO's Curator of Canadian Historical Art and the Exhibit Interpretation and Programming Department. Specifically, a project was established to "enhance" the "Group of Seven" exhibit, a permanent collection gallery involving early 20th century landscape paintings by seven of Canada's best known artists. The enhancements included a range of alterations to the exhibit, including wall color and surfaces, placement of walls, lighting, visible storage, and perhaps most significantly, the introduction of interpretive devices. In an effort to help visitors interact with and interpret the exhibition, the following interpretive devices were introduced: computers,[8] flippers, digital audio systems,

[7] Given the nature of the interpretive devices, which encouraged repeated interaction with both the artworks and the educational aids, time spent viewing artworks could not be separated from total viewing time.

[8] This application was partially sponsored by TransCanada Pipe Lines Inc., through their Arts Development Program.

signage, photographs, maps, and wall panels. All of these materials were designed to be discreet and non-intrusive upon the artworks themselves, yet accessible. Given the diverse audience at the Gallery, some of whom do not want or need assistance, the range of delivery systems and their optional character was critical.

The computers (two Apple Macintoshes using Hypercard software) are placed in the exhibit adjacent to the paintings. Using 15 Hypercard stacks, they offer visitors various choices in exploring a range of issues related to the paintings on display and provide feedback to them as they interact with the paintings:

- explore a single painting (Figures 4a-e)
- compare/contrast pairs of paintings (Figures 5a-c)
- access information on artistic and literary sources for the artists
- access information on significant events for the Group of Seven
- access biographical information
- access information on where the artists travelled and worked *via* an electronic map (Figures 6a-c) and
- type personal comments about the works (via the keyboard) and access comments by other visitors

A trackball allows visitors to communicate with the computer as visitors navigate through the programs. A keyboard is also available as an option for selected functions.

Several of these options are databases, but each provides a different way for accessing information. The biographical material, for example, is accessed by selecting an artist and reading the information that is delivered. Interactive maps (Figs. 6a,b) use pop-up text (6c) to show where the artists travelled and worked.

In the case of selecting a single painting to explore (Figures 4a-d), the artwork is chosen from a perspective drawing on the screen representing paintings in the immediate area. The visitor then sees a scanned image of the painting and some brief instructions. Thus, if the visitor selects *Old Houses, Toronto, Winter* by Lawren Harris, the visitor can "click" in the appropriate box to explore one of three aspects of Harris's painting. If the visitor clicks "Sense of Warmth", a screen appears with a brief discussion of the warmth and a listing of three features Lawren Harris used to establish the "warm" atmosphere. By selecting one or more of these features, the visitor can call up further questions and information on the series of complex decisions that the artist made to create the sense of warmth. Visitors explore the painting by choosing to move between different features of the work, responding with

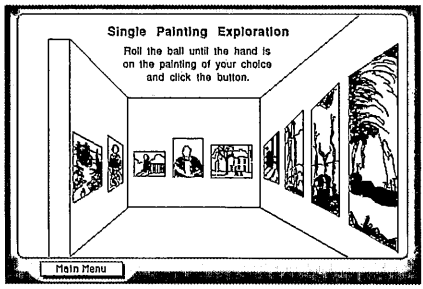

Figure 4a

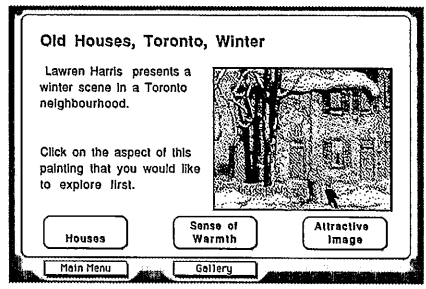

Figure 4b

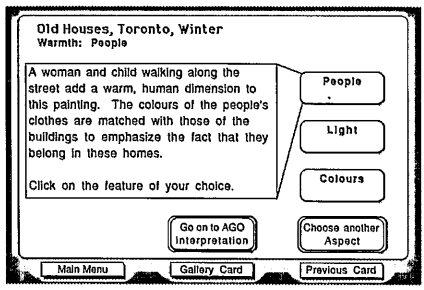

Figure 4c

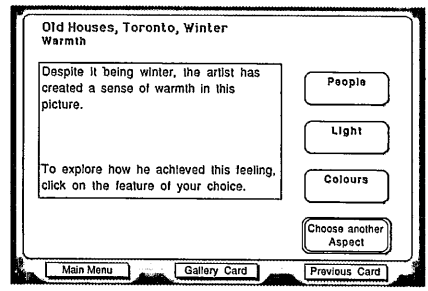

Figure 4d

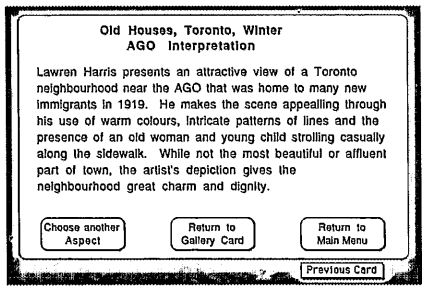

Figure 4e

Figure 4. Screens from "Nature and Spiritual" area for single painting program (4a), first level (4b), second level (4c), third level (4d) and, AGO's interpretation mode (4e).

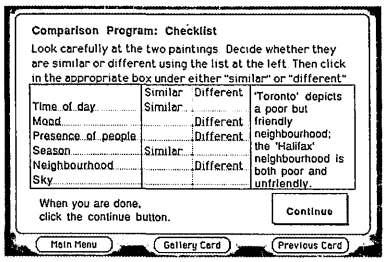

Fig. 5a

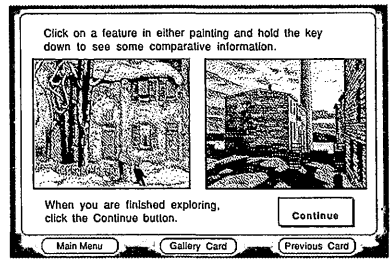

Fig. 5b

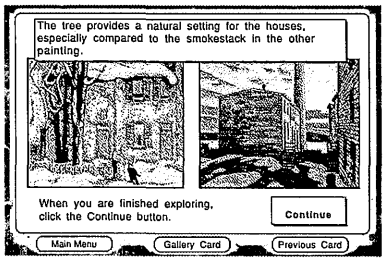

Fig. 5c

Figure 5. Screens for comparison/ contrast option for "Nature and Spiritual" area. Part of the checklist for focusing attention (5a), images of two paintings (5b) have transparent "buttons" over selected parts that visitors can "point and click" on for pop-up text; examples of pop-up text about trees (5c).

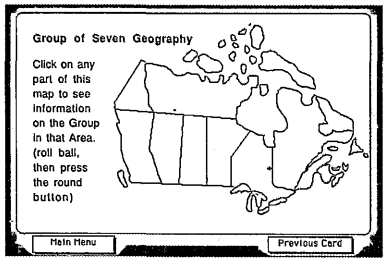

Fig. 6a

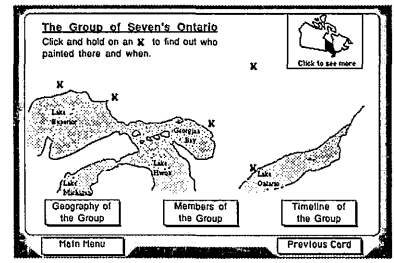

Fig. 6b

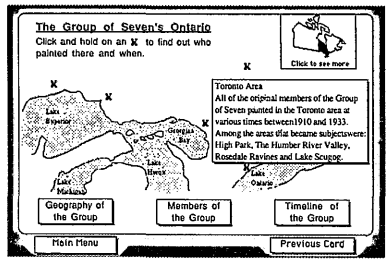

Fig. 6c

Figure 6. (6a) Screens for geography information from "Who Were the Group of Seven" area; (6b) Map of Ontario; and (6c) Toronto area.

their own personal reactions to each. Having done this, the visitor may click a button on the screen to compare his/her responses with the AGO interpretation.[9] AGO's interpretation is available only after visitors have explored the work on their own. At all times, the visitor may back up to previous screens, or return to the beginning to choose another program.

The "Comparison/Contrast" option (Figs 5 a-c) assists visitors in exploring a particular artwork by using a second painting of a related subject to help them notice differences in small details that contributed to different effects. The purpose is not to provide factual information, but to direct visitor observations to important details and contrasts that would provide richer visual comprehension of the paintings. The visitor can choose among two approaches:

(1) The computer screen presents a checklist of features of the pair of paintings (Fig. 5a) which visitors use in deciding if the paintings seen in the exhibit are *similar* or *different*. After clicking either *similar* or *different* (5a), text appears on screen that provides feedback on the visitor's selection.

(2) The visitor selects an actual feature of either painting, both of which appear on the screen (5b), then clicks on that part of the painting she or he is interested in exploring. "Pop-up" text (5c) then appears adding more information about the selected feature and how it compares/contrasts with the other painting.

Note that these programs do *not* provide information about the artworks as a prerequisite to viewing. Rather, they direct visitors to look at and examine the actual paintings in the exhibit.

Developers of the programs were conscious of both the cognitive and affective components of visitor interaction. Accordingly, this interaction is expected not only to include processing information and directions, but also to draw on visitors' personal experiences in their attempts to relate to art objects. In summary, these programs hope to focus visitor attention by pointing out key features, raising central issues, and encouraging visitors to use the visual evidence from the artworks and their own experiences.

Evaluation is underway in The Group of Seven exhibit., examining the impact of the computers and the other interpretive devices on visitor behavior and attitudes. Preliminary results indicate that visitors are spending, on average, over twice the time in the exhibit than was the case before the "enhancements." As was found earlier in the *Viewpoints* evaluation, tracking

[9] In previous experiences with such approaches to information, visitors have frequently expressed their interest in comparing their responses with an "authoritative" interpretation of the art.

studies are indicating that this increased time is spent not just at the computers, audio, flippers and maps, but also at the art objects. It is interesting to note that comments made during interviews and in Visitor Comments Books often include explicit references about visitor enjoyment and appreciation of the interpretive devices.

Conclusions

The use of computers as educational tools within art museums is in its infancy. The full potential for innovative and highly interactive programs that utilize text and digitized sound, as well as both static and dynamic graphics components, has yet to be charted. User-friendly features of today's powerful computers and their supporting software now allow museum professionals themselves to play much more active roles in designing, experimenting, testing, and refining ways of employing computers that are suited to their particular messages and goals. And fortunately, new computer authoring languages have greatly reduced dependence on computer experts to develop, maintain, and modify programming. Museum staff can now develop computer-based learning programs simply as another aspect of their regular professional duties.

Extensive audience research will be necessary as museum educators learn how best to support the diverse audiences we serve. In art museums, it is important to better understand the cognitive and affective processes that can lead a visitor to feel a sense of excitement, empowerment, and direct personal relevance. It is also important to understand the obstacles that museums create, perhaps unintentionally, which often prevent visitors from achieving a meaningful engagement with the art. Computer technology can be a tremendous aid in creating bridges between people and art because computers can engage the public in discovery activities with artworks, ask questions, and provide information that is pertinent to their individual experiences and interests.

AGO staff are now aware that there is a lot to learn about how to design and utilize interpretive devices and educational strategies so that they can effectively support the wide-ranging needs of art audiences. We believe this challenge has to be accepted by all art museums if they are to fulfill their role as public educational institutions. Therefore, exploring the limits and potentials of object-focused interpretive devices, including computers, is now an important direction for the AGO.

It is important to return to the question raised at the beginning of this paper, and ask ourselves what all of this "enhancement" activity means for the visitor who is only too quick to say, "I really don't know much about art." Educators at the AGO believe that the current initiatives are achieving two goals. The first is that visitors are finding the educational support materials

in exhibits helpful to them as they explore the art collections in a more personally fulfilling way. Second, and perhaps more important, the availability of relevant educational material is beginning to dispel some of the aura of ineffable "greatness" often associated with museum objects. In its place, many visitors appear to be developing greater confidence in their ability to relate to cultural objects in a personal way. If the kind of new approaches to museum exhibits described here can help the general public to overcome the sense of inadequacy when confronted with "high art," then the potential for visitors to have valuable experiences with our collections may be increased significantly.

References

Bereiter, C., & Scardamalia, M., Creative expertise. Chapter 7 in Bereiter, C., Scardamalia, M., *Expertise as Process* (in preparation), Toronto: OISE.

Chambers, M. (1988). Improving the aesthetic experience for art novices: A new paradigm for interpretive labels. *Program Sourcebook.* Washington, D.C.: American Association of Museums (pp. 215-227).

Csikszentmihalyi, M. and Robinson, R. E. (1986). *The Art of Seeing: Toward an Interpretive Psychology of the Aesthetic Experience.* MSA Report to J. Paul Getty Foundation.

Edwards, R. W., Loomis, R. J., Fusco, M. E. & McDermott, M. (1990). Motivation and information needs of art museum visitors: A cluster analytic study. *ILVS Review: A Journal of Visitor Behavior, 1* (2).

Hood, M. G. (1985). "Staying away: Why people don't visit museums" *Museum News,* April, 1985.

Housen, A. (1987). Three methods for understanding museum audiences, *Museum Studies Journal, 2* (4), 41-49.

Kelly, R. (1984). Museums as status symbols II: Attaining a State of Having Been. In R. Belk (ed), *Nonprofit Marketing.* Greenwich, CT: JAI Press.

Lee, R. A. (1968). The future of the museum as a learning environment. In: Bowles (ed), *Computers and their potential applications in museums.* (Proceedings of a conference at the Metropolitan Museum of Art, pp. 367-387) New York: Aino Press.

McDermott-Lewis, M. (1988). Through their eyes: What novices value in art experiences. *Program Sourcebook.* Washington, D.C.: American Association of Museums. 135-162.

Scardamalia, Marlene (1989). Computer-supported intentional learning environments, *Journal of Educational Computing Research, 5* (1), 51-68.

Scardamalia, M., & Bereiter, C., (1989). Schools as knowledge-building communities. Paper delivered at Workshop on Development and Learning Environments, University of Tel Aviv, October, 1989. To be published in S. Strauss (ed.) *vol. 5, Human Development.* Norwood, NJ: Ablex.

Screven, C. G. (1974).*The Facilitation of Learning in Museums: An Experimental Analysis.* Washington: D.C.: The Smithsonian Press (pp. 65-68).

Screven, C. G. (1986). Exhibitions and information centers: Some principles and approaches. *Curator, 29* (2), 109-137.

Whitney, P. (1990). The electronic muse: Matching information and media to audiences. *ILVS Review: A Journal of Visitor Behavior, 1 (2).*

Williams, P. (1982). Object-oriented learning in art museums. *Roundtable Reports, 7,* 12-15.

Williams, P. (1984). Object contemplation: Theory into practice. *Roundtable Reports, 9,* 10-12.

Williams, P. (1985). Educational excellence in art museums: An agenda for reform. *Journal of Æthetic Education, 19* (2), 105-123.

Worts, D. (1989a). Shaking the foundations: Recent audience research at the Art Gallery of Ontario, *Visitor Studies: Theory, Research and Practice, Volume 2,* (Proceedings of the 1989 Visitor Studies Conference (pp. 203-210), Jacksonville: Center for Social Design.

Worts, D. (1989b). A computer at an art exhibit. *Minds in Motion,* Toronto, Canada: York University and Apple Computer.