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Carbery, M. G.; Hlady, A. M.; Kee, L.; Wilson, T.

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TELIDON/NATAL IN A MUSEUM VOLUNTEER TRAINING PROGRAM

M.G. Carbery
Videogenic Services
Ottawa, ON

A.M. Hlady
Division of Electrical Engineering
National Research Council of Canada
Ottawa, ON

L. Kee
Education & Cultural Affairs
National Museum of Man
Aylmer, PQ

T. Wilson
Technology & Policy Assessment
Dept. of Communications
Ottawa, ON

TELIDON/NATAL DANS LE CADRE DU COURS DE FORMATION POUR ANIMATEURS BÉNÉVOLES DU MUSÉE

Le présent document décrit un projet pilote, mis en oeuvre au Musée national de l'Homme, utilisant un module d'apprentissage assisté par ordinateur (AAO) pour la formation d'animateurs bénévoles au musée. Ce projet comprend la conception, la mise en oeuvre, l'exécution et l'évaluation d'un module de formation couvrant certaines parties d'un cours d'apprentissage des techniques pédagogiques muséales ainsi que le contenu des expositions du musée.

Le projet, qui fut mis en oeuvre en 1984-1985, est le fruit des efforts conjugués de quatre organismes fédéraux - le Musée national de l'Homme, le Centre du service au public du MAS, le Conseil national de recherches et le ministère des Communications - et de trois entreprises du secteur privé - Friesen, Kaye & Associates, Westerlund Emond Limited et Infomart. Chacun des participants a eu un rôle particulier à jouer dans le projet. Le document décrit ces rôles ainsi que les expériences positives et négatives de cette approche d'équipe dans l'élaboration d'un matériel de cours.

L'exploitation de ce module de formation s'appuie sur une combinaison de deux programmes canadiens: NATAL et Telidon.

NATAL (Langage national de programmation) a servi de langage pour la création et l'exécution du module, alors que le système Telidon permet de créer, de stocker et de présenter à l'étudiant des dessins en couleur et des informations. Ces deux techniques peuvent être conjuguées de diverses façons pour les applications de l'AAO. Le document décrit plusieurs possibilités et énumère les facteurs qui ont influé sur l'approche particulière choisie pour ce projet.

Le projet a abouti à la création d'un module de formation, en français et en anglais, d'une durée d'environ trois heures, qui est destiné à faire partie du cours que les bénévoles doivent suivre avant d'assumer leurs fonctions d'animateurs au musée. Tout au long des phases d'élaboration et de suivi, on a mis l'accent sur la réaction des utilisateurs finals. L'évaluation de ce projet a aidé à déterminer le rôle que joueront les techniques d'information assistées par ordinateurs, et l'AAO en particulier, dans le complexe du nouveau Musée national de l'Homme dont l'achèvement est prévu pour 1989.

TELIDON/NATAL in a Museum Volunteer Training Program

M.G. Carbery, A.M. Hlady, L. Kee, T. Wilson

Genesys Group Inc., National Research Council of Canada,
National Museum of Man, Department of Communications

BACKGROUND

As a result of a 1982 federal Cabinet mandate, the Department of Supply and Services (DSS) developed a number of TELIDON projects across the government. One of these projects was the Education and Training Project (ETAP). An objective of ETAP was to work with government departments to develop and implement computer-based training applications using TELIDON as a protocol for course delivery. Included in the project plan was the development of a working demonstration to support longer term project goals.

Selection of National Museum of Man

The National Museum of Man (NMM) Volunteer Training Program met the ETAP selection criteria. Currently constructing a new exhibition and curatorial facility, the NMM was exploring various applications of advanced technology, including its use in training and evaluation. The NMM had an established course to train their volunteer museum teachers. This course had a strong graphics orientation. The NMM also had some experience in the use of TELIDON.

A Partnership

The ETAP directors also saw this trial project as an opportunity to combine TELIDON with another Canadian technology - NATAL. NATAL (NATional Author Language)*, a high-level language developed specifically for computer-assisted learning and training applications, has resulted from the efforts of the National Research Council of Canada (NRC) and the NRC Associate Committee on Instructional Technology. TELIDON arose out of work at the federal Department of Communications (DOC) as a Canadian version of a videotex information storage and retrieval system. A major result of the DOC TELIDON program has been a Canadian and international standard coding technique (NAPLPS)[1] for the efficient representation of "pages" of information consisting of text and colour graphic pictures as a series of Picture Description Instructions (PDI's).

* NATAL is a mark of Canadian Patents and Development Limited

In June 1984, an agreement to develop a working demonstration under the auspices of ETAP was jointly signed by DSS, NMM and NRC.

Fig. 1. Sample page from the training module.

The Training Environment

The educational programs at the NMM are designed to assist school groups in using the Museum's exhibitions, collections and research as a major learning resource for Canadian Studies.

The programs are delivered by a corps of about 90 volunteer museum teachers, managed and trained by four museum staff. Thirty per cent of the volunteers are francophone; 70% anglophone. The volunteers range in age from 30 to 70 and the majority have some post-secondary education. They donate at least one half-day per week of work to the Museum during the school year, presenting programs to over 13,000 students annually. In exchange, the volunteers seek an active and interesting learning environment; friendship, sociability, and social status. They see the Museum's programs as an opportunity to serve their community; to express their interest in and commitment to the Museum; and to gain an outlet for interests that cannot be pursued as a career. Others see the program as a means to gain experience for entering the work force.

The volunteers require both entry-level and skill-maintenance training. The latter is provided for all volunteers in monthly general meetings and workshops. Entry-level training is necessary for the approximately 30 new volunteers recruited annually. They follow a training program of two half-days per week for four months before beginning to teach. This training program poses several challenges:

- the large number of volunteers to be trained and evaluated in relation to the staff available.
- limited time for practice and reinforcement within the regular training schedule.
- a large body of complex subject matter, focused on the development of school students' skills in self-directed inquiry and the use of material culture as a research tool.
- the little commercially produced reference material on museum education.
- the high consequences of failure: volunteers are the Museum's primary contact with a key target audience. If the volunteers deliver poor quality programming, the Museum's reputation and its ability to attract and maintain this audience will be damaged.
- the training program itself being a key reward for volunteers: if it fails to meet their requirement for learning and self-fulfillment, they may withdraw their service.

A Role for CAL

In view of the challenges outlined above, the potential payoff of introducing Computer-Assisted Learning (CAL) into the NMM volunteer training program was high.

The flexible and self-paced nature of CAL suits the wide range of backgrounds and experience possessed by incoming volunteers, and meets the need to fit varied personal timetables and the requirement to practise and review the more complex aspects of the course content. Further, CAL could encourage volunteers to share the responsibility for their training, alleviate the problem of a turn-over in volunteers occurring during the training program, and generally lighten the teaching load of the small staff unit.

Technology

There are various ways in which the TELIDON and NATAL technologies can be combined for computer-assisted training applications. Certain aspects are best done by NATAL because of the flexibility and support features offered by that environment. These include control of branching, handling student input, response processing, providing continuity between sessions and maintaining student records. The TELIDON strengths, on the other hand, centre on the preparation and presentation of visual information. Some possible combinations are listed here in order of an increasing role for TELIDON.

1. The course could be created entirely as a NATAL module, largely independent of any specific terminal type but designed around certain functional characteristics such as colour graphics. By using an appropriate version of the NATAL delivery system, i.e., one supporting TELIDON terminals, the NATAL text and graphics are converted to PDI form as the course is delivered.

2. In addition to providing a method for displaying information to the student, TELIDON technology could be used to create static graphic material by means of a TELIDON page-creation system. The resulting PDI files could be converted into NATAL file format and accessed by NATAL. Those portions of the presentation that depend on delivery-time calculations or student input would be generated directly by the NATAL program.

3. As an extension of case 2, most or all text and graphics could be created as TELIDON "pages." A pseudo-dynamic presentation could be achieved by selectively calling up appropriate combinations of overlay "pages" consisting of short text and/or graphic segments and by using some of the special TELIDON features such as colour-table manipulation, blink-to-background colour and macros.

4. The TELIDON portion could be a complete videotex information system consisting of a large data base coupled to interactive software for handling user requests for accessing the data. The NATAL course delivery system could provide a "gateway" to the TELIDON computer and data base.

   The inverse of this case is also possible in which the TELIDON videotex subscriber would be provided with access to interactive training materials via a gateway to a NATAL environment.

Previous NRC collaborative projects had demonstrated case 1 to be a viable approach and the museum project presented an opportunity to try a different NATAL/TELIDON combination. Technically, case 4 is the most interesting and challenging but it was beyond the scope and resources of the project. For this project, it was decided to proceed with a NATAL/TELIDON combination closest to case 2 but with both static text and graphics created in TELIDON form. The case 2 approach permitted the project to take advantage of the significant private sector experience and expertise on the design and creation of visual materials suited to the TELIDON format gained through the DOC program.

COURSE DEVELOPMENT

Management Team and Roles

The variety of expertise required by the project dictated a team approach to development. DSS gave overall funding, project management and TELIDON experience. NMM provided museum training experience and the volunteer training course, while NRC supplied NATAL expertise and access to an implementation of microNATAL [2] on a Data General MV/8000 computer. DOC provided TELIDON terminals and later, additional funding to complete the French module and to undertake overall project evaluation.

Three private sector companies were hired - Friesen, Kaye and Associates to develop the instructional design, Infomart to do the page creation and NATAL programming, and Westerlund-Emond to act as training consultants. Behavioural Team, under a subsequent DOC contract, undertook evaluation of the completed product.

Development Process

Development of the English version of the training module was undertaken in late July 1984. Operating within a $70,000 budget and a very tight time frame of four months established by ETAP, the team faced a number of challenges. The time frame would only permit staff assessment of the volunteers' training needs. The content of the overall training program, traditionally delivered in a workshop format, was not available in written form. This increased the time required to select those elements of the program thought to be particularly suited to CAL and to translate them into specific objectives, teaching points and a course structure. The tight schedule also required fast-tracking production. Development of the individual lessons was undertaken simultaneously, each progressing through instructional design, page creation and programming independently of the others. During the course development, the number of planned lessons was reduced to keep within budget. Formative evaluation was limited to a brief field test of each programmed lesson by a group of experienced volunteers. With completion of the English version, the French module moved immediately into production utilizing as many of the same graphics and structures as possible. By March 1985, the two modules were complete.

Despite the reduction in size of the module and the fast-tracking approach, the project required a deadline extension of five months and additional funds.

Product

The final product, aimed at the new volunteer, focused on the basic principles and skills of museum education, using a single exhibition as a case study. The introduction and four lessons, each taking one half to one hour to complete, touched on such topics as the functions of a museum and the role of a museum teacher; the use of material culture as a learning resource; and skill development in facilitating student-directed investigation through the use of questions, the teaching collections and the exhibitions. Figure 1 illustrates a page from the module.

The module was implemented with several commands the student could use to move around within the module. A main menu allowed the student to select a particular lesson. Each of the four lessons was divided into roughly 15 segments. Special commands could be used to skip forward to subsequent segment(s) or to move backward to review the previous segment(s). The student was able to leave the course at any time and resume at the same segment. A "help" page could be accessed up at any time to review the special commands. Because of the nature of the course material, two types of response processing were used: keyword/multiple-choice and free form. For multiple-choice questions and those in which the correct responses contained words or word combinations that could be anticipated, response analysis and categorization were done by the NATAL program. For free-form responses, in which it was difficult to anticipate particular keywords and have the program judge "correctness," it was left to the student to judge. In this case, the student was able to call up the response(s) expected by the course authors for comparison. Incorrect responses resulted in branching back to an appropriate segment of the lesson. However, because of time and budget constraints, more elaborate branching was not included.

APPLICATION AND EVALUATION

Course Delivery

The training module was delivered on two Microtel VTX 208 TELIDON terminals placed in a study area within the volunteers' work room. The terminals were connected to the Data General MV/8000 at NRC.

Staff introduced the module and its objectives to the volunteers at a general meeting. Slides of representative course pages were used to outline themes of each lesson and to explain how to use the keyboard.

Volunteers, each registered and assigned a password using a NATAL registration utility program, followed the course in their free time. They were encouraged to work through the lessons one at a time and in sequence. A paper version of the "help" feature was posted next to the terminal, and the volunteers could also request assistance from staff.

Evaluation of Course

About one third of the volunteer corps comprising 10 anglophone inexperienced, 9 francophone inexperienced and 11 francophone experienced individuals participated in the formal evaluation of the CAL module. A pre- and a post-questionnaire was administered to participants as well as questionnaires after each of the four CAL lessons. The pre-questionnaire assessed reasons for becoming a volunteer and familiarity with and reaction to computers. The post-questionnaire measured reaction to computers and perceived usefulness of the program. Questions at the end of each lesson assessed perception of difficulty and usefulness of elements of the CAL program.

The pre-questionnaire revealed that 75% of the volunteers had joined at least in part to gain experience to assist their career, while 30% or fewer joined because of interest in Canadian heritage, for social reasons, to do something worthwhile, or to learn about the collections. About half were familiar with a typewriter keyboard but 75% had used a computer only once or twice or never. On a five-point ascending scale, volunteers rated potential usefulness of a computer for their training on average as 4, while the overall reaction toward computers was extremely positive by 25% of volunteers and negative by 60%.

In the post-questionnaire extremely positive and negative perceptions of the usefulness of computers dropped to 15% and 10%, respectively.

Volunteers split equally into three groups on whether they would like to work with a partner - never, sometimes and always - when learning at a terminal. In the development of skills, volunteers rated the computer as 3 on a five-point ascending scale for increasing understanding of their role as a museum teacher, the use of the hands-on collection, the selection of displays, and questioning techniques. The program was rated 2 for increasing understanding of handling students in a group. Just over half did not want to use the CAL module again in reviewing information learned in preparation for teaching; the rest voiced conditional acceptance of the notion. For such review the computer was definitely the least preferred, while reading a booklet and talking with staff or other volunteers were about equally preferred. Forty per cent of volunteers expressed desire for more training before embarking upon teaching and 80% a willingness to use computers to obtain museum-related information.

Questionnaires based upon the individual lessons revealed the following information. On lesson one after initial instruction 80% required additional assistance from museum staff and about 15% from another museum volunteer. About one in six had keyboard-related trouble - pages flipping too quickly, problems typing in answers and in using the control key to go back to the main menu as well as difficulties reading text on the screen and feeling comfortable in the physical surroundings. One in three or four had difficulty in signing on, correcting typos, using the control key to go back quickly, and signing off. Over half had difficulty in using the control key to compare answers with the suggested response.

By lesson four, none required assistance from museum staff after initial instruction, but about 15% required assistance from another museum volunteer. Difficulties with page flipping, using the control character to go forward, getting to the main menu, reading text on screen and feeling comfortable in the physical surroundings had disappeared. Individuals reporting difficulties in signing on, correcting typos and using the control character to go back quickly had decreased to 7%. However, after four lessons practice, 70% still reported difficulty in using the control key to compare answers, 20% in typing in answers and 13% in signing off.

The logic and coherency of the text in the lessons, the ease of recognition of graphics, and the relevance of the graphics, the usefulness of the multiple-choice and the open-ended questions were rated 4 on an ascending five-point scale throughout the four lessons. However, the rated usefulness of the anticipated-response questions was consistently lower throughout the four lessons at 3 and the acceptance of rate of speed at which graphics were drawn on the screen dropped from a somewhat low 3 to an even lower 2 by the fourth lesson. The number of graphics, amount of text and number of questions were rated as about right.

Finally a question asking preference for using computer or booklet to learn revealed a slight negative shift of 60% preferring the computer to 50% preferring it.

How are these results to be interpreted? Because of the small numbers of volunteers involved and the relatively small shifts of ratings, few if any results would show significance in the statistical sense. However, the general picture appears to have three components.

First, volunteers began instruction as unsophisticated users with 25% positive about computers at the start of the program and 60% negative. By the end of the program both the strongly positive and negative opinions of computers had moved toward more moderate values. Experience with the CAL program tended to reduce the perceived usefulness and preference for use of the computer for museum training of this type. This finding suggests that this particular computer application in the museum environment was not ideal.

Second, while many features of the NATAL program were relatively easily assimilated by unsophisticated users, ongoing difficulties indicating required design modifications were noted in signing on and off, typing in answers, using the control character to go back quickly and most importantly, using the control character to compare answers and the presentation of anticipated responses as a method of answering questions. With regard to the TELIDON features, the slow rate of graphics formation was an increasing problem as people developed experience with the system.

Third, the expressed motivation of the volunteers, largely to further their career, was surprising. This result combined with their expressed desire for more training and willingness to use computers for further learning in the museum environment even though their preference for and rating of computers in this context declined over the course of the training program suggests a highly job-motivated group which could benefit from relatively sophisticated and in-depth content. The strong desire of many people, particularly the young, to learn skills useful for the job market has been reported before. However, the finding in this context needs to be replicated, given a potential difference in the motivation of francophone and anglophone volunteers. If this finding is validated, it has implications for both the level and content of at least some of the programs to be developed.

CONCLUSION AND LESSONS LEARNED

Team Assessment

In reviewing the completed project, the team made a number of observations:

1. It is essential that adequate time be available to undertake a complete users' needs analysis, covering:

   - motivation, desire to learn,
   - desire to learn on one's own,
   - expectation of course,
   - attitudes towards various forms of instruction,
   - for CAL, knowledge of typewriter keyboards,
   - for CAL, attitude towards computers and experience with their use,
   - flexibility with respect to time available for learning and preferred location of learning,
   - entry knowledge of subject matter of course.

   Relying only upon staff assessment of user needs weakened this project.

2. The philosophy, aims and content of the training program must be articulated, preferably in written form prior to developing supplementary training materials. The workshop format of the volunteer training program had not previously required the development of such documentation. Proper articulation facilitates analysis of the specific knowledge, skills and attitudes to be learned as well as identifying various stages of learning, review and reinforcement. The feasibility of teaching all or parts of the training course "at a distance" from the instructor can then be assessed as can the capabilities of different media such as CAL, textbooks, etc, to deliver such training given the needs of the learners and trainers.

3. The team must understand the intent and structure of prototype development. It is crucial that time be made available for learning the necessary procedures, becoming acquainted with the technology, etc, and planning to learn from the experience. The project should be designed in an experimental format, developing the smallest product possible which will yield the desired information. The different kinds of information being taught should be isolated from one another for testing and comparison. For example, one lesson focuses on skill development while another reinforces information learned from a different medium. Because insufficient time was available to introduce the team members in this project to the technology, the resulting product did not fully exploit the interactive capabilities of NATAL and the graphic strengths of TELIDON. The team also had difficulty assessing which elements of the multifaceted and abstract content of the training course were best suited to CAL. The final product intermixed the different skills and knowledge, impairing the quality of the evaluation and team's ability to learn from the experience.

4. Fast-tracking of production was necessary to meet the deadlines imposed by ETAP. In future projects, however, the team would wish to ensure that:

   - the process of product development permits the team to work in a cohesive fashion, so that shared planning and problem-solving integrate all elements of the module in reaching the instructional objectives. The simultaneous production of lessons in this project made it difficult to make the graphics an integral part of the overall instructional design.

   - all lessons are completed and evaluated in paper form prior to final graphic design and programming. The simultaneous development of the lessons in this project limited the team's ability to re-order or reorient the lessons as needed.

5. In addition to a project manager, content

specialist, educational technologist/script writer, programmer and graphic designer, the team should include an evaluator. Evaluation should be integrated throughout the development process. The Museum should also consider full-time employment of an educational technologist with particular expertise in CAL.

6. In summary, time proved to be the most severe constraint of the project. It is calculated that this project required about 200 hours of development time for each resulting hour of training.

Follow-on at the NMM

The development of the prototype has proved extremely valuable in the Museum's evaluation of the potential applications of instructional technology for the new building. Staff has gained exposure to the technology, an understanding of the process of developing CAL materials, an insight to the kind of expertise and team structure required and a healthy respect for the role of evaluation. With the research phase completed, the NMM is currently exploring means of continuing use of the module with the volunteer corps until the new facility and exhibitions open in 1988.

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