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Interactive Media and Teaching Television Production Skills in a Northern Native Broadcast Context.

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ABSTRACT

This thesis examines the potential use of interactive technology in teaching the skills of television production and basic journalism as required by aboriginal broadcasters. It examines the past and current training methods used in training native broadcasters in northern Canada and suggests that a hypermedia approach utilizing videodisc, CD-ROM and telecommunication technologies, in an interactive context, could enhance existing training programs as well as provide an alternate strategy for teaching basic skills. It examines the issues surrounding the use of interactive technologies in terms of relevance and effectiveness in learning, and the appropriateness of computer-based learning systems in a northern native context. It also describes several sample instruction modules which would teach video lighting skills.

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LIST OF ABBREVIATIONS AND ACRONYMS

CAI	Computer Assisted Instruction
CAL	Computer Assisted Learning
CEIC	Canada Employment and Immigration Commission
CBC North	Canadian Broadcasting Corporation Northern Services
CRTC	Canadian Radio Television and Telecommunications Commission
DIAND	Department of Indian Affairs and Northern Development
GNWT	Government of the Northwest Territories
IAV	Interactive Video
IBC	Inuit Broadcasting Corporation
NCP	Native Communications Program
NNBAP	Northern Native Broadcast Access Program
TNI	Taqramiut Nipingat Inc.
TVO	TV Ontario

INTRODUCTION

The Role of Broadcast Training

Broadcast Training in the Canadian North plays two important roles. On an immediate level, broadcast training has enabled the northern native communication organizations to develop the infra-structure necessary for program production and distribution.

> "Training has contributed substantially to each society's human resources and organizational development. It has enabled native broadcasting organizations to become established and function at a relatively sophisticated level within the Canadian broadcasting system. It has enabled them to meet the demands of a daily broadcast schedule and to grapple with the complexities of programming and distribution and broadcasting policy. Training has helped many employers provide socially and culturally rewarding career alternatives in regions where unemployment is chronic (Stiles,1988).

On a more intrinsic level, journalism and television production training are an essential component of native broadcasting, which in turn is one of the principal structures for native empowerment and traditional cultural and social value re-enforcement (Valaskakis, 1984).

The Problematic of Media Instruction in the Canadian North

Because of its vast size, small population, remoteness, climate and restrictive transportation and communication infra-structure, delivering a specialized training program in the Canadian Arctic poses major challenges to the educator or training organization.

In the past, one of the simplest and most cost effective solutions to these challenges was to bring the student or trainee to southern Canada where programs, facilities and institutions already existed. This strategy often resulted in socio-cultural adaptation problems for the Northerners relocated to the south. Current practise for the most part is to provide on site training/education.

In terms of college and technical school training, institutions have only recently been established in the north. In the areas of interest to this thesis- communication, journalism and television instruction- Arctic College had only begun to offer these subjects in 1988. It offered one and two year courses at its campuses in Inuvik and Iqaluit. Unfortunately, this program was suspended in early 1990. The only other schools currently offering journalism courses specifically oriented to native students are the Grant McEwan Community College and the Saskatchewan Federated Indian College. A native journalism program at the University of Western Ontario was suspended in May, 1990.

Many institutions and organizations which have specific training needs have been forced by circumstance to develop their own training programs, which are generally delivered at the location of the people to be trained. This has been the approach taken by most of the native communications societies.

This approach, while specifically geared to the needs of the organization can be very expensive to deliver, especially if the trainees are small in number. For example, the Inuit Broadcasting Corporation is planning a two year training program in Igloolik in the Northwest Territories beginning in late 1990. It will train six persons to be either technical producers or program producers at a cost of $246,000 per year (IBC, 1990).

Finding the appropriate instructors is often very difficult. Rarely are the required skills available in the north, so southern based instructors are generally used. These instructors often have no cross-cultural or northern experience and usually require several weeks to several months of adaptation to the community before they become truly effective. Because of the cultural isolation, it is often difficult to keep qualified personnel once they have completed their initial contract.

The cost of transportation and housing for the southern-based instructors is also extremely high. In some communities, housing is simply not available at any price.

North/South Cultural Considerations

Northern Canada has long been dominated economically, socially and culturally, by southern institutions and values. This relationship has had a devastating effect on the traditional values, culture and self-esteem of its native peoples (Irwin, 1988). The introduction of mass communication systems further reinforced the cultural and social values of a dominant southern society and increased the already massive stress placed on northern native people (Valaskakis,1984, Coldevin and Wilson,1983). These pressures from the south have caused enormous social upheaval to the native peoples living in the Arctic. Educational and mass media systems have institutionalized the historical process of cultural replacement experienced by northern natives (Norton 1981, Coldevin, 1979).

Until recently, the original inhabitants of the north have had little access to, or control over, the social, educational and communication infra- structures to which they are subjected. The educational system is seen by many as one of the major institutions of southern cultural patterning. It does this through a heavy reliance on southern curriculum, teachers and resource expertise (Darnell, 1989).

Computer-based learning (CBL) systems have some potential to redirect this north/south educational paradigm northward, since it permits learning to take place where it is needed, that is in the home communities. CBL content can be readily structured for a northern context making it more relevant to the specific needs of Northerners. The use of a self-directed learning system with less reliance on classroom, lecture-style teaching would be more complementary to native values and traditional methods of learning (Heffron, 1984).

Any effective method which could help native broadcasters to meet their training requirements while minimizing southern dependence would be of great use in the north. This thesis will explore the use of hypermedia-based learning systems as one such method.

Thesis Organization

In the first chapter, The Evolution of Northern Native Broadcasting and Training, I will set the context for my thesis, providing background information which will support my contention that interactive technologies can play a valuable role in the media training required by native communication societies. I will provide overviews of broadcasting and training developments in the north to illustrate the evolution of northern native broadcasting systems and their corresponding training strategies. I will show that there is a definite need for native journalists and production staff by the native broadcasters that is not being fully met by existing training structures or methods.

In the second chapter, The Evolution and Design of Interactive Media Systems, I will present a brief history of computer-based learning systems with a view to setting the developmental context for videodiscs, interactive video, hypertext and hypermedia. I will also describe the technology which falls within the hypermedia envelope. I will also discuss the design components which must be considered when developing a hypermedia system. These include the instructional design, development strategy, authoring concerns, the expertise required, cost factors, and development design details.

The third Chapter, Questions and Issues Surrounding Interactive Media, I will set the framework for the andragogical aspects of my thesis. I will give a brief synopsis of the dominant learning theories which are relevant to computer-mediated learning with interactive video (IAV) and other hypermedia technologies. This will also include an overview of hypertext, the underlying approach used in hypermedia applications. I will look at the issues involved with IAV and hypermedia. Are they effective? Is any media better than the rest? I will look at the appropriateness of using computers in a northern cross-cultural context and I will discuss the distance education aspects of my thesis.

The fourth chapter, Curriculum Development and Demonstration Module, will evaluate the television production skills which I believe can be taught by a hypermedia-structured computer-based learning system. The selection of skills is based on a needs assessment conducted by the Inuit Broadcasting Corporation in 1989. From this assessment, I have drafted a set of employee skill requirements which in turn suggested a course breakdown into specific training modules. Since designing a curriculum for these skills is not within the mandate of this thesis, I have selected several areas for demonstration which illustrate the potential of hypermedia. I will describe the design and operation of these modules on basic lighting technique and calculating an electrical load. Both use the hypertext authoring system "HyperCard" to generate a hypermedia environment. I will also describe the potential of several other interesting courseware possibilities. I will conclude this chapter with a budget breakdown of the anticipated costs for developing a hypermedia based training curriculum.

In the final chapter I will link up the various issues discussed previously. I will review the arguments which suggest that a hypermedia methodology would be an effective teaching strategy in a northern cross-cultural context. I will discuss the distance education aspects as related to my thesis of hypermediated training, the cost associated with developing such a training methodology, I will review the media training options available to northern communications societies, and suggest how a hypermedia approach could be a useful addition to the present training infrastructure. Finally, I will suggest areas for further research.

CHAPTER 1

THE EVOLUTION OF NORTHERN NATIVE BROADCASTING AND TRAINING

The Origins of Northern Broadcasting

It will be useful from the outset to trace the evolution of northern communications and northern native communications specifically. At the same time it will be helpful to include in this chronology the critical events relating to native and non-native broadcast training.

Broadcasting was originally introduced into the north to ease the isolation of transient southern military personnel, mine workers and government employees stationed there. Formal broadcasting services began with the establishment of the CBC Northern Service in 1958. Prior to this, there were only 3 radio stations in the north: at Inuvik, Whitehorse and Yellowknife. These belonged to the Department of Defense and the Department of Transport, but were turned over to CBC North once it was established. Service outside these communities was limited to shortwave broadcasts from the south (Cousins, 1990).

Television service in the north only began in 1967 with the CBC's Frontier Coverage Package. This service, which continued into the early seventies, broadcast pre-recorded southern programming in 21 northern locations.

As early as 1961, the federal Department of Indian Affairs began supporting the development of small community radio stations in the north. These stations, generally operated by volunteers, offered their audiences a mixture of native language programming including phone-in shows, local announcements, radio bingo and music. Currently there are over 250 radio stations operating in the north, most of which are owned by native communications societies or local community groups. CBC provides community access to 22 of its radio transmitters (CRTC, 1985a).

In the late 60's, High Frequency (HF) radios became increasingly available. Although first used by missionaries, police and government officials, these light-weight, two way radios were quickly utilized within native communities as a convenient means of local and regional communication. The HF radios were not always reliable since they were susceptible to various kinds of interference, but they did allow a semi-reliable, inexpensive and locally controlled means of communication.

Between 1971 and 1974 the Department of Communications sponsored the Arctic Pilot project which tested the feasibility of using HF radio to form communication networks between communities. Baker Lake in the NWT was linked to four neighbouring Inuit communities, while Sioux Lookout in Northwestern Ontario was linked to 16 Cree and Ojibway communities. These experiments, which placed the design, operation and control of a communication network in the hands of native people, were important milestones in the development of aboriginal communications.

The launching of of the Anik A-1 satellite in November 1972 introduced the era of live television broadcasting into the north. By early 1973, CBC was delivering its complete southern television service to the north, though not all communities were able to receive it. Many native communities refused to accept the new service, fearing the effects which southern English television might have on their traditional lifestyle, culture and language.

In 1974 the Federal Government through the CBC implemented the Accelerated Coverage Plan, a $ 50 million dollar program to bring CBC radio and TV signals to all communities in the country with a population of 500 or more. The Northwest Territories and several provincial governments instituted similar programs for smaller communities. Most communities now have access to CBC radio and TV delivered by satellite or terrestrial means (Canada, 1983b).

In December 1973, the Department of the Secretary of State created the Native Communication Program. This program was designed to provide support funding to the many emerging native communications organizations.

Native organizations were quick to to see the potential of satellite technology for their specific communication needs. In 1976, the Hermes Satellite was launched and used for communication experiments by both Canadian and American groups. Taqramiut Nipingat Inc, (TNI) an Inuit communications organization in northern Quebec, operated the Naalakvik I project. It used the satellite to link a dozen Inuit communities in northern Quebec in a interactive radio network. An experiment by Wawatay, a native communications society based at Sioux Lookout in Northwestern Ontario, demonstrated the practicality of distributing radio programming to 3 communities.

Another experiment, Project Ironstar, initiated by the Alberta Native Communication Society, established a three-community video tele-conference link using the Hermes Satellite. It was this experiment that served as a model for the Anik B experiments which followed in 1978-80.

Partly in response to opposition by Native groups to the introduction of television services without Inuktitut language programming, the Department of Communications and the Department of Indian Affairs and Northern Development (DIAND) included two Inuit groups on their experimental Anik B satellite project. In 1978 the Inuit Tapirisat of Canada

(ITC) and TNI began experimenting using interactive television to link distant communities via the Anik B satellite. These experiments, the Inukshuk Project in the Eastern and Central NWT and Naalakavik II in Northern Quebec, clearly demonstrated the ability of Inuit to produce and distribute Inuktitut language television programs and showed that the native audience wanted to watch these programs (Valaskakis and Robbins, 1980).

DIAND continued to fund both Anik B projects once the actual experimental period had ended in mid 1980. That same year, at CRTC hearings in Baker Lake, ITC suggested an Inuit controlled broadcasting network be established using the CBC's existing satellite distribution system
(Roth, 1983).

In 1981, IBC was granted a network licence from the CRTC to distribute Inuktitut language television programming via CBC Northern Service. The staff and production centers established during the Inukshuk Project formed the nucleus of the Inuit Broadcasting Corporation (IBC). TNI's television production centers and staff were also incorporated into its already existing organization.

At the same time as it licensed IBC, the CRTC also licensed the Council of Yukon Indians and the Dene Nation to begin communication services to their respective communities.

In 1981 the CRTC licensed the Canadian Satellite Communications Company (Cancom) to deliver Canadian and American TV and radio to the remote and underserved communities in the Canadian North.

In 1982, IBC officially began operations. It used satellite facilities in Iqaluit, Northwest Territories, to uplink TV programs, including those produced by TNI in Northern Québec, to the Anik satellite where they were inserted into the CBC signal for delivery to communities in the central and eastern NWT, Northern Québec and Labrador.

By 1983, the Inuit population in northern Canada had access to native language TV programming produced by IBC and TNI and several hours a day of Inuktitut radio broadcasts produced by the CBC. The 170,000 Indian and Métis population of northern Canada however, had little or no access to radio or TV in their own language. Native organizations were becoming increasingly vocal in their efforts to gain access to the dominant communication chains of radio and TV.

This problem of inequitable access and lack of service was recognized by the CRTC back in 1979 when it established the Committee on Extension of Services to Northern and Remote Communities. Known as the "Therrien Report", for its chairman, Real Therrien, was released in 1980 (Therrien, 1980). It championed the need for native language programming to counteract the increasing barrage of southern programming. Its recommendations supported the concept of northern native broadcasting and gave suggestions concerning funding, consultation and the roles of the CBC, the private sector and various levels of government (CRTC, 1985b).

In 1982, the Department of Communications began a series of consultations with 18 native groups and communication societies with the aim of developing a policy toward northern native communication needs. A joint discussion paper from DIAND, Secretary of State and the Department of Communications was presented to the Federal Cabinet. Subsequently, in March 1983, the Cabinet announced the Northern Broadcast Policy. In April 1983, the government announced the Northern Native Broadcast Access Program

(NNBAP) as a means to implement the recommendations of the Northern Broadcast Policy (Canada,1983a).

In 1983, the Okalakatiget Society, an Inuit group based in Nain, Labrador, began a training program for TV producers and technicians. It began broadcasting one half hour a week of TV programming via the IBC network in 1984. This complimented its existing radio network.

The Northern Native Broadcast Access Program was given a four year mandate and a 40 million dollar fund to assist native communications societies in producing and distributing radio and TV programs relevant to the needs of their peoples. However, it did not allocate any funds to train people to produce these programs. The Native Communications Program did provide for training but with rare exceptions, its funding was for print and radio-based communications groups located primarily in the south (Rudden, 1990).

Prior to the establishment of the NNBAP, native communications programs were funded through the Department of Indian and Northern Affairs or the Secretary of State, through its Native Communication Program. Once the NNBAP was set up, all funding was transferred to the Secretary of State, which directed NNBAP funding to the 13 northern groups and NCP funding to native groups in the rest of the country, although this included some of the NNBAP groups as well.

A production goal of 5 hours a week of television and 20 hours a week of radio was set for the native communications groups, based on European experience, which indicated this to be the minimum amount of broadcasting required to maintain language and culture at a stable level (Alcock and O'Brien, 1980).

In July 1989, Television Northern Canada (TVNC) was formally established by the Federal government to solve the distribution problems of some of the native broadcasters and answer the growing communication needs. It will provide a dedicated satellite channel for the Inuit broadcasting corporation, the Inuvialuit Communications Society, CBC North and the governments of the Northwest Territories and the Yukon.

Canada's Native Communications Societies are currently in the midst of a funding crisis following the drastic budget cuts, in April 1990, from their principal funding source, the Federal Department of the Secretary of State. This resulted in a 16% reduction of their principle funding program, the Northern Native Broadcast Access Program, and the outright cancellation of their secondary source of funds, the Native Communications Program.

The Origins of Northern Broadcast and Journalism Training.

As mentioned earlier, public broadcasting came to the north with the establishment of CBC North in 1958. Initially there was little consideration of training native residents for employment by CBC, since all programming was in English and was directed primarily at the white audience. It was only in the mid 60's, when CBC North began broadcasting Inuktitut language programming from its Inuvik and Iqaluit (then Frobisher Bay) stations, that any effort was made to train native broadcasters in an organized fashion (Cousins, 1990).

The community radio stations which sprang up across the north were the first to depend on local natives to staff and operate them. CBC provided sporadic training for staff at community stations which accessed CBC transmitters, and some training was also provided by equipment suppliers and installers. However, most community radio training was on an ad hoc, learn-by-doing basis (Rudden, 1990).

Training was a component of the 1976 Hermes project. In both the experiments conducted by TNI and Wawatay, local people were trained to co-ordinate and produce programming for the duration of the projects.

In 1976, Nunatsiamuit, a non-profit Inuit communications group, was formed to produce dramatic and other types of films for Inuit audiences. Nunatsiamuit was largely funded through the Native Communications Program (NCP). Part of its mandate was to train Inuit in film and later, video production. The Cape Dorset experiment was relatively short lived while Nunatsiamuit continued to produce television programs until it was merged with IBC in 1985.

In 1978, as part of the preparatory phase of the Inukshuk and Naalakavik II projects, programs were established to train Inuit to produce film and video programs, and co-ordinate and animate the eventual satellite link-ups.

These training programs were the first concerted effort to train large numbers of native people to produce television programming, although the National Film Board had conducted animation workshops in Cape Dorset and Frobisher Bay between 1972-75 (Rudden, 1990).

Throughout the period from 1978 to 1983, the Department of Indian and Northern Affairs and the Canada Employment and Immigration Commission (CEIC) funded training for the development of Inuit television services in the NWT and northern Québec. The NCP also provided funding for training at TNI (Rudden, 1990).

In 1969, the GNWT had established an Adult Vocational Training Center at Fort Smith to train heavy equipment operators. This center was subsequently renamed Thebacha College in 1981 and expanded to teach office and administrative skills. In 1984 Arctic College was established to consolidate various post-secondary and adult education programs in the NWT.

In October 1984, the CBC had its budget cut by $150 million. This reduced its national training budget to a bare minimum. The Northern Services training budget was then determined by whatever was surplus from other budget areas. It averaged approximately $17,000 annually (Cousins, 1990).

In 1985 the CBC North training fund was enlarged and given a budget of $160,000 as well as a full time training director. Almost all training by CBC was done in-house, using an on-the-job, apprenticeship method. Special courses were offered from time to time at specific locations in the north, and CBC North staff occasionally participated in professional development training courses given by the network in the south (Creery, 1990).

In the 1985-86 budget year, CEIC funding of northern broadcast training dropped by 40% following the implementation of the Canada Job Strategy Program. CBC and IBC began lobbying the Territorial Minister of Education for a journalism program at Arctic College (Rudden, 1990).

In March 1987, the NWT Minister of Education approved the start up of journalism courses at campuses in Iqaluit and Inuvik. CEIC committed $156,000 to the program to pay for 15 students via direct purchase funding. Direct purchase funding is the only CEIC program which allows 100% of the costs of a training program to be paid for by CEIC. The training must, however, be provided by a recognized educational or training organization.

When the federal government renewed the NNBAP and NCP program in May of 1987, it was at 1986-7 levels. No mention was made of the funding shortage for northern native broadcast training (Canada,1986).

In October, 1987, the doors opened on a journalism program at the Inuvik (Aurora) campus of Arctic College. Fourteen students were admitted. Three months later the journalism course begins at the Iqaluit (Nunatta) campus. It was already six months late due to funding problems.

In June 1988, seven students graduated from first year at the Aurora campus of Arctic College. Five returned for a second year. In December, five graduate from first year at Nunatta campus. In June 1989, five students graduated from the two year journalism program at Aurora Campus in Inuvik. However, the Board of Governors of Arctic College recommended no new program at either campus in 1989-90.

In December 1989, four students graduated from the two year program at the Iqaluit Campus. These were the first and the last to graduate from this program at Iqaluit. Four months later in April 1990, the Secretary of State cut NNBAP funding by 16% and cancelled the Native Communications Program (NCP) completely.

Currently the Arctic College Journalism program is under review. The College will not admit any new students into the Journalism program until its fate is decided by the Arctic College Board of Governors. During its two year life span it graduated eleven students in the one year certificate program and nine students in the second year diploma program. Of the nine diploma students, six had found media-related jobs within two weeks of graduating (Stiles,1989).

These budget cuts have forced the native broadcasters to make drastic cuts in personnel, facilities and services, including their training programs. Now more than ever, alternative methods of training must be explored to maximize the effectiveness of the already underfunded training programs.

The Training Needs of Northern Broadcasters

Native Broadcasting groups operating in Northern Canada have a constant need to train new staff and to upgrade the skills of existing personnel. As of 1987, there were about 300 media jobs in the northern native broadcasting sector funded by the NNBAP. This does not include the native staff at CBC northern services or non native print media. Stiles (1987) estimated a conservative staff turnover rate of 22% per annum which would indicate a need for approximately 75 replacement personnel every year.

Since the establishment of aboriginal broadcasting groups in the late 70's and early 80's, training has always been a top priority. Initially that training was directed at establishing the basic infra-structure necessary to begin broadcasting, including the training of production and management staff in the basic skills and techniques necessary to produce radio and television programs.

As the groups became established, their training needs shifted to include entry level training for new staff, and wide ranging professional development training for production, management, administration and technical staff. Aside from these specific job-oriented requirements, there was also a need for improvement in basic educational levels. The Stiles (1987) training report found that almost all of the 13 NNBAP groups had to do some form of academic upgrading to improve the reading and writing skills of their staff.

When surveyed about their difficulty in finding skilled and experienced staff, 69% (9 of 13) replied that they had great difficulty in recruiting staff, while the remaining 31% (4 of 13) had some difficulty locating trained personnel. When asked if they were able to recruit staff from universities, colleges other media or the local labour pool, only one group (NCI) reported that it was able, to a large extent, to find the skilled people required. Two groups reported no luck at all, while the the majority (9 of 13 or 69%) reported difficulty in finding college or university trained staff. All groups reported that new recruits still required further training before being fully integrated into their organizations (Stiles, 1988).

> "On average it takes native trainees at least one year to develop basic radio journalism and operation skills, and at least two years to develop the basic competencies required for television production, provided the training is intensive and of high quality. Since very few trainees are high school graduates and even fewer have previous broadcasting experience, the societies spend considerable time during the first years of training developing the trainees' basic skills in reading writing and work habits. The [Societies] insist that one or two years of entry level training does not produce a professional broadcaster. Most of these graduates function only at a rudimentary level and require ongoing training" (Stiles, 1988).

It is obvious that aboriginal broadcasters do not have a readily available labour pool of well educated native broadcaster/journalists and technicians. As previously mentioned, only Grant McEwen Community College and the Saskatchewan Federated Indian College currently offer journalism programs oriented to native people.

Funding for Northern Broadcast Training

Various government policies and initiatives which created and continue to fund the aboriginal broadcasting systems gave little thought to the ongoing training needs of these organizations. Initially they believed that all training could be accomplished through funding from the Canadian Employment and Immigration Commission. This worked relatively well until 1984 when the existing CEIC training programs were replaced by the Canada Job Strategy (Stiles,1988). The three programs which the native groups had been using were replaced by at least six other programs whose requirements were not easily met. In many cases the requirements for accessing Canada Job Strategies funds did not coincide with the needs of the native groups. Where once the majority funding source (79% in the 1983-4 budget year), CEIC funding for training has steadily decreased (36% in 1986-87) so that now, the majority of training funds come directly out of operating budgets. This money, which was intended for program production, is spent on training, in violation of program guidelines (Stiles, 1988).

The Journalism program at Arctic college was established after discussions between the native broadcasters, CBC, the GNWT and Arctic College. It was seen as an ongoing, permanent training program which could provide entry level employees for these organizations and at the same time perhaps reduce the burden of internal training programs, which in the case of native broadcasters, were paid out of operational or production funds.

The decision by Arctic College not to admit more students to its journalism program has, in effect, cancelled the program. Shutting down the program results in the short term loss of experienced staff, facilities and goodwill. In the long term, it effectively results in a backward step for northern broadcasters who will have to continue to train all their own staff, primarily out of operational funds.

The recent reduction in funding to the native communications organizations and the loss of Arctic College as a northern-based, core training institution have demonstrated the need for new approaches and methods to meet the training requirements of the northern broadcasters and maximize the funds they spend on training. In the succeeding chapters I will show how an interactive media training strategy could be an effective approach to broadcast instruction in the north.

CHAPTER 2

THE EVOLUTION AND DESIGN OF INTERACTIVE MEDIA SYSTEMS

The Development of Computerized Learning Systems

The computer has long been hailed as a revolutionary instructional device by educators (Papert,1980), but initially, because of their size and cost, computers for educational uses were restricted to schools, institutions and organizations which could afford the large, mainframe-based computer systems.

By the early 70's, several state of the art Computer Assisted Learning (CAL) systems had been created within university environments. These systems, the PLATO system from Control Data Corporation, the IBM 1500 system and a PDP-10 system developed at Stanford, incorporated multimedia terminals which allowed the student to access text, graphics and visuals, and limited sound. These systems were operated by a mainframe computer which limited the number of terminals able to use the system. They also required complex programming or authoring to support a CAL program (Brahan,1984). These mainframe systems, however, supported many innovative projects which were, unfortunately, overshadowed by the introduction of the micro-computer in the mid-70's. It was ironic that the early PC's had neither the software nor the sophisticated programming language to compete with the CAL projects done on the mainframes It would take many years until the PC could match the capabilities of the older mainframe computers . In fact, many of the CAL experimenters believed that the introduction of the micro computer set back the development of CAL by five years (Brahan, 1984).

The Personal Computer

The introduction by Apple Corporation of an affordable personal computer system in the mid-70's, made CAL an affordable option for widespread educational use. Although, as Brahan points out, it was many years before the PC 's had the software and technical capacities (memory and storage) to match the mainframe computing systems, they never-the-less became integrated into the repertoire of educational strategies. CBL strategies initially centered on behavioristically oriented programs, often modeled on programmed learning strategies. By the late 70's, the CAL paradigm had begun to shift in a more cognitive direction. This coincided with major software developments which increased the capabilities and potential of the CAL systems.

Hypertext

Although Ted Nelson coined the term "hypertext", the concept was first mentioned in 1945 by Vannavar Bush, who conceived of a system called Memex (Bush, 1945). His hypothetical system centered around a machine which would use photocells to link a large library of microfilmed documents. The users could quickly access any document in the library mechanically. Bush felt that Memex would help in managing the growing bank of human knowledge by locating relevant information quickly and efficiently. Bush also believed that human minds operated by omni- directional association and that his Memex system was a more natural, efficient way of accessing and storing information (Bush, 1945, Tsai,1988).

Bush's concept was further defined by Ted Nelson and Douglas Engelhart. Nelson coined the term "hypertext" and expanded the concept. Engelhart, who headed Stanford University's Augmented Human Intellect Research Center, developed the concepts of the computer "mouse" and "window". He also spearheaded the development of a computer software which integrated multi-person text editing, electronic filing and on-line conferencing which evolved into one of the first hypertext systems called "AUGMENT" (Tsai, 1988).

Nelson's idea of hypertext was elaborated in his Project Xanadu. He suggested a system which would allow the user to locate information by searching for ideas rather than specific words or strings. The user could navigate through the information in any order or method that was appropriate to the user. One could access and retrieve just about all available knowledge, on line and in real time. The system would also automatically add more knowledge to itself as it became available.

Hypertext has been described as "nonsequential writing" (Jonassen,1986), "a computer based medium for thinking and communication" (Conklin, 1987), and "a database which models link node networks" (Tsai, 1988). This last description is particularly revealing of the nature of hypertext.

Tsai describes the basic unit of information in a hypertext system as analogous to a node. Nodes are connected to other nodes by links. When displayed, each node corresponds to a separate window of information on a monitor screen. Links appear as highlighted text or Icons. When a link is activated a corresponding new node appears on the screen (Tsai, 1988).

Tsai's hypertext model is directly analogous to the cognitive science concept of semantic networks. The nodes represent concepts and the links represent the relationship between concepts. Concepts can be indexed by their semantic content and their relations to other concepts. Because of this resemblance to the semantic network, hypertext may convey knowledge instead of just information (Tsai, 1988). This overrides a concern of many researchers about the ability of CAL systems to teach knowledge-based content (Hannafin and Peck, 1988).

HyperCard

Although most still operated on large computer systems, one hypertext system, introduced in August 1987, stood out from the rest. It was called HyperCard. Developed by Bill Atkinson, it was advertised by Apple as being

> "...a personal tool kit for managing information. Because now with Hypercard, you can use your Macintosh computer to collect, explore and organize information just as you do in your mind, by association. And a lot of people; teachers, professors industry specialists, the eager and the innovative, will now have a medium for sharing their knowledge, their findings, their particular thread of thought" (Morariu, 1988).

HyperCard is a hypertext system based on the metaphor of a notecard. Individual cards are collected together to form stacks of cards, or just "stacks". Using a system of easily installed buttons which serve as links to other cards, the user can easily go to any other card instantly. Each card, can contain text or graphic information and can be linked to almost any format of information, be it print, sound, image, or telephone. The user can create his or her own stacks or use ones created by someone else. They can add information to a card or act on it.

Hypercard embodies most of the hypertext concepts envisaged by Bush and Nelson. It also fits within the realm of hypermedia since it can be connected to and control videodisc and CD-ROM players and assorted other digital devices.

By the end of 1988 , Apple reported that over one million copies of Hypercard were on the market with another 10,000 copies appearing each month. This clearly makes Hypercard the most widely available and accessible hypertext/hypermedia authoring system in the world (Langthorne, 1988).

Electronic Storage of Information

In order for a computer based system to realize the possibilities of hypermedia, it must be able to access and retrieve large amounts of information or data in a very short period of time. Traditionally, computer information has been stored on floppy or hard disks. Floppy disks, however, have limited storage capacity. Although hard disks have recently begun to approach the capacity required for hypermedia information storage, they do not have the reproducibility that a hypermedia information/data resource must have if it is to be widely distributed. The solution to this storage requirement is found in two peripheral devices, the videodisc (also known as a laserdisc) and the CD ROM disc.

The Videodisc

The development of the videodisc by Philips and MCA in the early 70's greatly increased the visual and sound capabilities of a computer. The 12" discs are capable of storing large amounts of visual and audio information and provide almost immediate access to that knowledge base through a variety of means. Videodiscs use a laser to record and play back information via billions of microscopic pits on very thin, plastic coated, aluminum discs. One of its advantages over videotape is that the playback head can be moved to any point on the disc almost instantaneously, reducing the time spent waiting for an image to appear or sound to be heard.

The CD ROM Disc

The newest technology to enter the hypermedia shell is the CD ROM (Compact Disc, Read Only Memory). Developed in 1985, they are similar to musical compact discs. However, instead of storing digitized music, they store digitized data which can be accessed by a computer. Each 51/2 inch disc can store 600 megabytes of information, which can be in the form of digitized sound, text, graphics or data.

Currently there are over 600 CD -ROM's available commercially. Most are reference sources, such as encyclopedias, dictionaries, directories and computer programs (Hawkins, 1990). CD- ROM's are useful in a hypermedia context since they can act as vast storage systems for instructional resources. A single disc can store the equivalent of 1000 floppy discs. They are rapidly turning into a major publication system (Barron and Baumbach, 1990).

The Interactive Videodisc

The videodisc is the essential component in interactive video systems. It is also essential to most hypermedia systems. Interactive video was one of the first hypermedia technologies to become widely developed. It brings together the pictorial qualities of still photography, motion picture film and video, the text, graphic, programming and controlling features of the computer and the immense information storage capacity of the videodisc to provide a valuable new resource for training and educational purposes.

"An interactive videodisc system is not merely a merging of video and computer mediums, it is an entirely new medium with characteristics quite unlike each of the composites " (DeBloois,1982).

One of the main values of an interactive videodisc system is its ability to act as an extremely flexible visual data base which can be accessed in a variety of ways. An interactive disc can be set up as a pre-programmed, task-specific program, or it can be set up as a resource bank, which the trainer/educator/user can access or program for specific content or curriculum goals or any combination of the two.

Interactive Video and Hypermedia

Interactive Video and Hypermedia: Which is Which?

In discussing the relationship between interactive video and hypermedia, I would suggest that the distinction between the two has to do with the number of information/concept nodes within a given system and the flexibility of the system in accessing them. Hypermedia systems have a greater number of node and link structures accessible to the user. This is largely due to the larger data storage and accessibility capability of peripheral devices such as hard discs and CD ROM players and the authoring strategies inherent in a hypermedia system. By such reasoning, interactive video would be seen as a sub-set of hypermedia.

Levels of Videodisc Interactivity

There are three generally accepted levels of videodisc interactivity (Kearsley and Frost, 1985). The first level has the least amount of interactivity. It consists of a videodisc player and a monitor which can only be manually operated by the user.

Level two systems consist of a videodisc player with a small built in computer and a TV monitor. In this type of system, a controlling program is recorded directly on the videodisc. The microprocessor in the player is able to read the program from the disk and perform simple branching operations based on input from the user.

Level three systems consist of a separate computer, a videodisc player and a monitor. This is the most common interactive system. It also has the most capabilities within the three levels.

There is also a fourth level suggested by some authors that uses two or more videodisc players and features advanced capabilities (Romiszowski,1986).

Interactive Videotape

Interactive video systems were first developed using videotape based systems. These early systems were generally effective though they had several inherent flaws. The video tape tended to stretch after extended use and the access time to retrieve information could be quite long (from several seconds to several minutes). During this waiting period learners could become distracted and therefore less involved in the learning process (Dalton, 1986). Other difficulties with tape based IAV are its inability to provide a stable still image in pause mode and the relative short life of the videotape itself. These shortcomings have been overcome with videodisc technology which provides almost instant access to material wherever it is located on the disc, unlimited still mode time and durable long lasting discs.

Videodisc formats

As with most new technologies, several standards exist. Two early systems, the CED and the VHD discs have disappeared, leaving the optically reflected laser system as the dominant standard. Laservision is the brand name associated with this technology. It is available in two formats , the CAV version and the CLV version.

The CLV or constant linear velocity disc has a playing time of up to one hour per side, but cannot really show a still frame image. This was the format used to release movies when Laserdiscs were introduced to the consumer market. The dominant IAV disc, the CAV or constant angular velocity disc, operates on a different principle and is able to hold a still frame indefinitely. The CAV disc has a capacity of 54,000 individually accessible frames which translates into a half hour of continuous audio/video, or longer if used in the interactive mode.

Interactive Media System Costs

A typical Hypermedia system consists of a laserdisc and CD ROM player, a computer (which implements the instructional program, tells the disc players where to go, generates text and graphics and monitors performance), and a television monitor which displays the laserdisc images and the superimposed computer text and graphics. A computer software package co-ordinates content and controls the hardware. Some systems use 2 monitors, one for the video images and a second for the computer sourced information. The cost of a complete system is approximately $ 6-8,000. The videodiscs and CD ROM discs can cost anywhere from $30 to $750, depending on the number of copies produced.

The costs of developing and producing an interactive videodisc, however, are much more expensive, anywhere from several thousand to half a million dollars. As much as 75% of this cost is attributable to manpower costs for project research and design and software programming. The design and implementation of a hypermedia project is extremely labour intensive.

The cost to develop the journalism and broadcast training curriculum envisaged by this thesis would be approximately $332,000. A detailed design and development budget breakdown is included in appendices C.

The Expertise Required for Interactive Media Design and Production

The production of a interactive media product, whether it is videodisc or CD ROM based, is a labour intensive process requiring the expertise of a variety of professionals. The design and production phases of an interactive media program are similar to the organizational structure of a large film project.

Personnel required would include:

- A Producer, who becomes the overall manager, responsible for the project from fund raising through completion.
- A Project Manager who looks after the day to day functioning and co-ordination of the project.

- An Instructional Designer who develops the instruction strategy in accordance with the program objectives. If not a content specialist, then he or she would work in close co-operation with an Information Programmer who is a subject matter expert.
- A Computer Programer is also necessary to integrate the program content into an authoring system which can then control the actual computer and peripheral devices such as a videodisc or CD ROM player.
- A Scriptwriter may also be employed to optimize any narration or voice overs which may be required.
- A Production Assistant and Project Secretary would also be used on large projects.
- A video or film production crew consisting of a director and technical crew would also be required to produce specific video and audio material.

Like any large project the more comprehensive the pre-production and design planning, the more efficient the production and post-production process.

Although the personnel and cost factors discussed above are generally acknowledged as necessary to the production of a interactive video disc, there are other, less expensive, alternatives. Recent videodiscs produced at Concordia University are examples of effective videodiscs produced on a shoestring budget (Tovar, 1989, Domaradzki, 1990).

Interactive Video in Industry

Individual or small group skill training and visual databasing (operation and maintenance applications) are among the prime functions of IAV among industrial users. Industrial users take advantage of IAV's massive visual database and individual skill training potential.

Industry training is generally done in small or individual groups where the high cost of disc production and playback equipment can be cost effective and easily justified. Because of the small number of persons being trained, time allocation to the equipment is flexible and frequent. The period of instruction is also likely to be more intense. In these situations, it becomes more cost effective to use IAV than human resource personnel.

Interactive Video in Education

The education system, however, operates on a different set of strategies. Typically the instruction group size is much larger; a class may have 20-30 students. The learning periods for specific courses tend to be grouped in short (30-60 min) periods spread out over a year or even several years. Because of the cost of IAV equipment, the educational system cannot afford to have enough machines for each student, therefore individual access to IAV is limited. IAV is often seen as a very expensive resource technology because of its low cost effectiveness. As a result, IAV tends to be used as a resource which teachers can use for their own specific purposes rather than as an individual learning/teaching machine.

Strategies and Design Considerations for Videodisc and Hypermedia

Strategies of Videodisc/Hypermedia Development

When considering a videodisc or hypermedia project , one of the first decisions to be made must be which development strategy to follow. There are 4 approaches applicable to interactive video (Bork,1987). These approaches, I believe, would also apply to hypermedia projects.

A common method is to use existing video material which is relevant and applicable to the subject matter and transfer it to video disc. This "re-purposed material" can then be made interactive with an appropriate computer and authoring system (Bork, 1987, Sherwood, Kinzer et al, 1987, Kent and Stoddard, 1990).

Repurposing can also be used to take existing CAL material and add slides, video or audio to it to increase its effectiveness. This approach will only work if the authoring software can support external devices such as a videodisc player (Bork, 1987).

A third approach would be to use a commercially available, generic videodisc of appropriate content and tailor the course requirements and interactive capabilities to its content (Bork, 1987).

The final and most effective strategy however is to develop all material, courseware, video, audio and graphics as a unit. Although this is also the most expensive approach, it results in the most appropriate courseware designed to meet specific needs. (Bork, 1987)

Instructional Design Models

There are many different approaches to the development and design of a hypermedia document whether it is hypertext, interactive video or various combinations of media. Whichever approach is chosen, certain factors and requirements are common to all designs (Bonner, 1988).

- an instructional goal based on specific needs or requirements,
- an understanding or profile of the user/learner,
- an instructional strategy and courseware design to achieve the goal,
- an operational strategy which includes time available for training, logistics, production and budgeting,
- evaluation methods to determine the efficiency of the design strategy and the effectiveness of instruction,
- media selection.

The Systems Approach

One of the most common approaches used in conventional courseware designs and many CBL systems is based on the systems approach. At its most basic level, a systems approach is one that (1) defines a problem, (2) collects data, (3) analyzes the data and (4) constructs a solution (Conklin, 1987). As applied to educational design, the systems approach is an "overall" method which breaks down a task, objective or problem into its component sub-elements in an organized, disciplined manner. Each sub-element can be designed, fitted, checked and operated so as to achieve the overall objective efficiently (Romiszowski, 1986). A systems approach also frequently uses a team approach to design, in which individuals with specific design, content or production expertise perform their specialized skills on sub-tasks of the whole.

A typical systems approach as suggested by Dick and Carey (1978) breaks the instruction into 9 steps:

- Identifying an instructional goal
- Conducting an instructional analysis
- Identify entry behaviors and characteristic
- Write performance objectives
- Develop criterion referenced tests
- Developing an instructional strategy
- Developing and selecting instruction
- Designing and conducting a formative evaluation
- Revising instruction

A summative evaluation, while not part of the design process, is however the final evaluation of the effectiveness of the design/learning process. A systematic design structure is illustrated in figure 1.

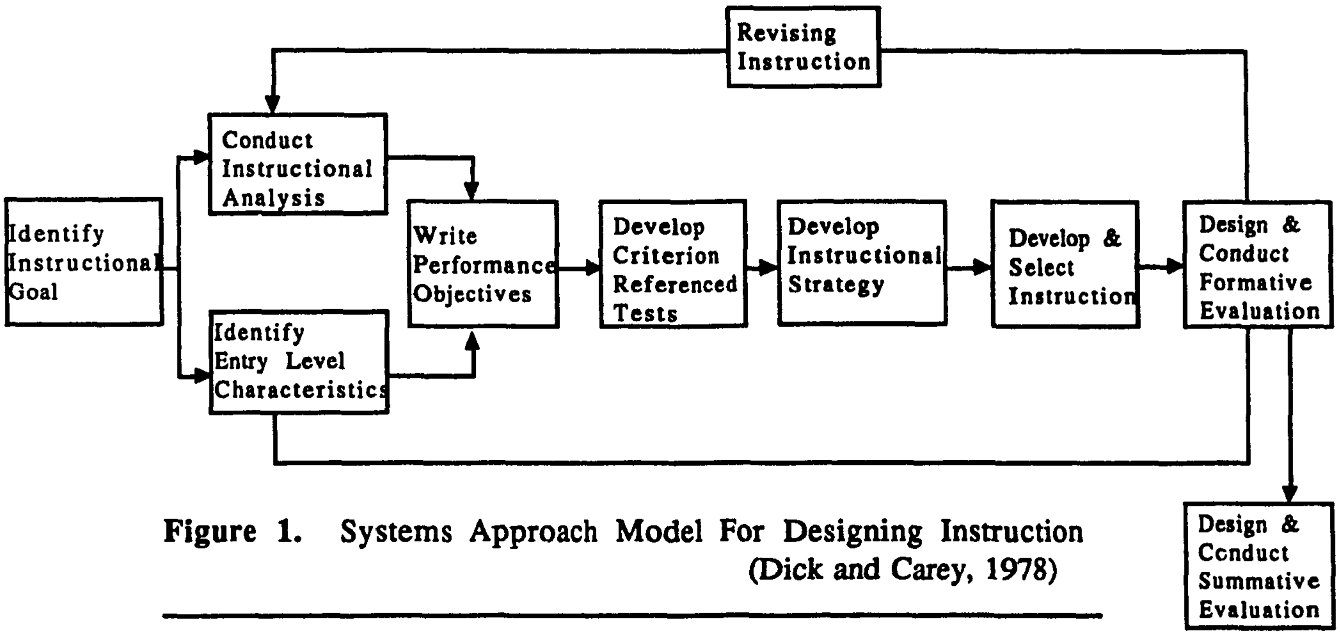


Figure 1. Systems Approach Model For Designing Instruction (Dick and Carey, 1978)

A variation of this method is used by the US Navy for the design and development of their interactive videodiscs (Cantor, 1989). Here the process is broken down into 4 phases: (1) analysis and alternatives, (2) system design, (3) system development and (4) system test, evaluation and implementation. These 4 phases encompass all the steps outlined by Dick and Carey(1978).

In phase 1, analysis and alternatives, the task or training requirements are analyzed and possible solutions and methodologies are considered. The task requirements are also analyzed to verify that IAV is an appropriate medium.

In the system design phase, the layout and design of a system which meets the training requirement needs is developed. This phase includes summarizing training needs, developing appropriate instructional strategies and methodologies, evaluating hardware and courseware characteristics and formalizing the system development plan and the long range (life cycle) development plan.

In the system development phase the training materials are actually produced. This phase covers the pre-production, production and post production aspects of the courseware materials.

The fourth phase consists of debugging and formatively evaluating the training package before deployment. Once it meets its design objectives, it is released for implementation.

Both these methodologies reflect the instructional design approaches which emphasize (1) breaking down complex tasks into elementary motor operations and "learning hierarchies" and (2) breaking down ambiguous instructional objectives such as understanding or appreciating into observable and unambiguous behaviors that represent motor operations (Dede and Swigger, 1988).

Developing an instructional design for hypertext and hypermedia systems is more problematic than traditional CBL methodologies, which have evolved from many years of empirical research. As Jonassen says;
" hypertext is theory rich and research poor". Little empirical research exists about interacting with hypertext (Jonassen,1988).

A search of the ERIC database for citations which include Hypermedia or Hypertext reveals that, whereas there were only 15 such articles in 1986 and 1987, there were 51 in 1988 and 60 in 1989.

In a hypertext model, learning objectives are not always stated through stimulus /response associations but more often as mental processes and knowledge structures that are developed and the navigational pathways that are explored by the learner.

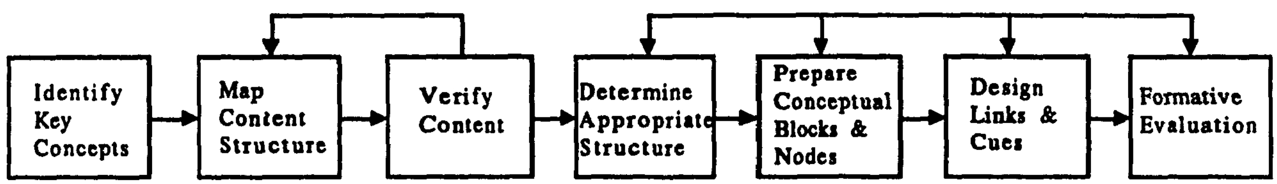


Figure 2. Jonassen's Model for Hypertext Instructional Design

Jonassen (1986) suggests (as shown in Figure 2) a procedure for the instructional design of hypertext systems consisting of the following steps:

- Identify all the key concepts involved, through some form of content analysis, or free associating of key concepts.
- Map the structure of the content to determine the relationships between concepts.
- Verify the content structure by using a subject matter expert.
- Determine the type of hypertext structure. (open/structured/hierarchical) appropriate to the learning situation
- Prepare the conceptual blocks by writing appropriate text , graphic, audio and video for each node/frame/card in a concept block.
- Provide links and cues to other concepts within the hypertext document.
- Debug the system through formative evaluation practises before implementing the hypertext document.

Morariu (1988) suggests a conceptual model for a hypertext instructional design somewhat more detailed than Jonassen's. Her model, shown in Figure 3, has seven component levels which encompass most of the variables likely to occur in a hypermedia environment.

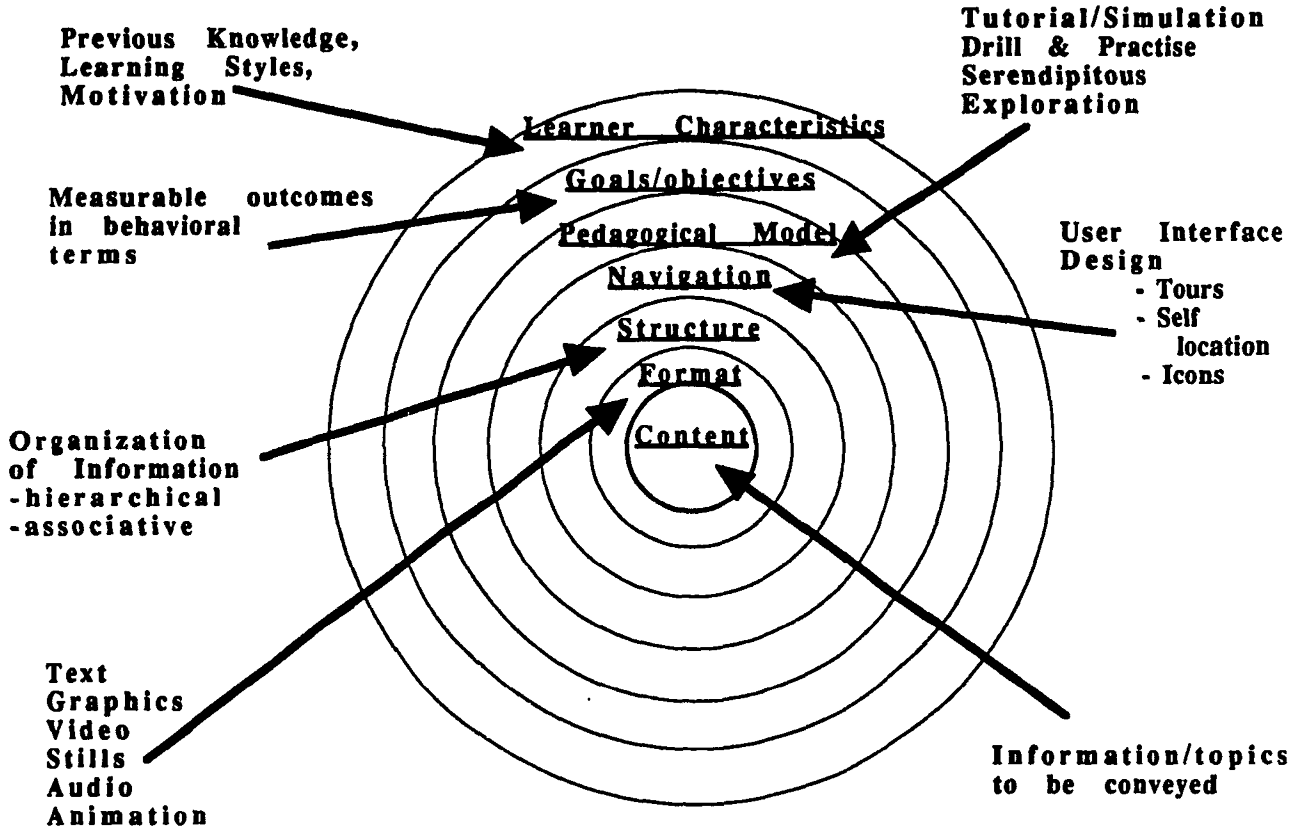


Figure 3. Morariu's Model for Designing Instructional Hypermedia

In Morariu's instructional design model the key operational components are:

1) Learner Characteristics; collect and analyze basic learner profile information, including: previous knowledge, learning style and motivation.

2) Goals/Objectives; stated in behavioristic terms, result in a breakdown of the context and measurable outcome for the entire instructional environment.

3) Pedagogical Model; method used to teach the content, such as drill and practise, tutorial, simulations, serendipitous exploration, etc.

4) Navigation; the user interface that determines how the user moves through and is able to determine his or her location within the system.

5) Structure; the overall organization of the hypertext document, such as hierarchical with topics and sub topics or unstructured with browsing capability.

6) Format; the type of media, text, graphics, animation, audio, stills, motion video required.

7) Content; the actual information to be conveyed.

Design Considerations for Instructional Materials for Computer-Based Learning

With a strong reference to Gagné's Conditions of learning, Bååth (1983) suggests that all instructional materials should have the following attributes;

1) Arouse attention and motivate through the use of (a) structural factors such as layout, use of · lour, typography, and graphics, etc., and (b) functional factors which appeal to student needs, re-enforce the subject, define standards, provide feedback and evaluation.

2) Present objectives of the instruction in simple to understand terms using relevant examples. Use sub-objectives to simplify the organization of material.

3) Link up with previous knowledge and interests through summaries, tests of previous knowledge. Link material to past lessons and everyday interests. Make suggestions on study techniques/options.

4) Present the material to be learned with intellectual clarity, logically ordered, adapted to students' vocabulary and reading habits. Material should be encouragingly presented in a personal style, with a sense of cultural relevance, illustrated by examples.

5) Guide and structure the material to reinforce comprehensibility via layout, commentary, and instructions. Present similarities and contrasts with previously learned material, summaries and explanations within the body of the text.

6) Activate and involve the learner via exercises, assignments, tests, practical applications. Make reference to useful supplemental material, involve the student in constructing material, give positive criticism and time standards for completion.

7) Provide feedback as quickly as possible. Answer and explain solutions to all exercises. Provide summaries and directions for model solutions.

8) Promote transferability of material by using a variety of examples to illustrate principles, point out parallels or dissimilarities and refer forward/backward in material. Suggest how the example can be applied.

9) Facilitate retention by helping students understand material by encouraging revisions and sensible study technique. Make the student use previous acquired knowledge, use summaries, self test questions, and special sections going over the material from another perspective.

Although the preceding attributes pertain to all forms of instruction, specific criteria for CAL, IAV and hypertext have been made by many authors. Table 1 illustrates many of these points.

Table 1

Design Considerations for CAL, IAV, and Hypermedia

(Adapted from Hannafin and Peck, 1988, Davis,1984 and Braden,1986)	CAL	IAV	Hyper-media
1) Develop Instruction in accordance with processes of learning	•	•	•
2) Base on known effective instructional precedent	•	•	•
3) Review relevant research literature before starting	•	•	•
4) Individualize instruction	•	•	•
5) Maximize interactivity	•	•	•
6) Use feedback effectively	•	•	•
7) Guarantee success	•	•	
8) Assure congruence among objectives, instruction & assessment	•	•	•
9) Allow an appropriate amount of learner control	•		
10) Provide the maximum amount of user control		•	•
11) Account for, monitor and evaluate affective considerations	•	•	•
12) Evaluate based on objectives, attitudes, and programming	•	•	•
13) Design screens carefully	•	•	•
14) Use additional media as appropriate	•		•
15) Make the structure of the disc obvious		•	•
16) Provide an easily accessed review option		•	•
17) Allow the user to answer questions in their own vocabulary	•	•	•
18) Provide a help option which could be accessed at any time	•	•	•
19) Provide an exit option which could be accessed at any time	•	•	•
20) Allow user to stop/re-start/review program		•	•
21) Allow learner to leave the program or branch to another segment	•	•	•
22) Show only one primary concept per visual display	•	•	•
23) Maintain visual continuity between text and visual imagery	•	•	•
24) Make sure you use compatible colour combinations	•	•	•
25) Use the appropriate font size and restrict the # of lines of text	•	•	•
26) Have a system of showing text and visual emphasis	•	•	•
27) Be consistent in placement of program control information	•	•	•

Other factors which must also be considered early in the design phase of a hypermedia program include which mode of instruction will work best for each instructional segment, what type of input device will be used to enter the user's response, what type of response is required and what level of navigational freedom will the user have. Some of the variables for these factors are shown in Figure 4.

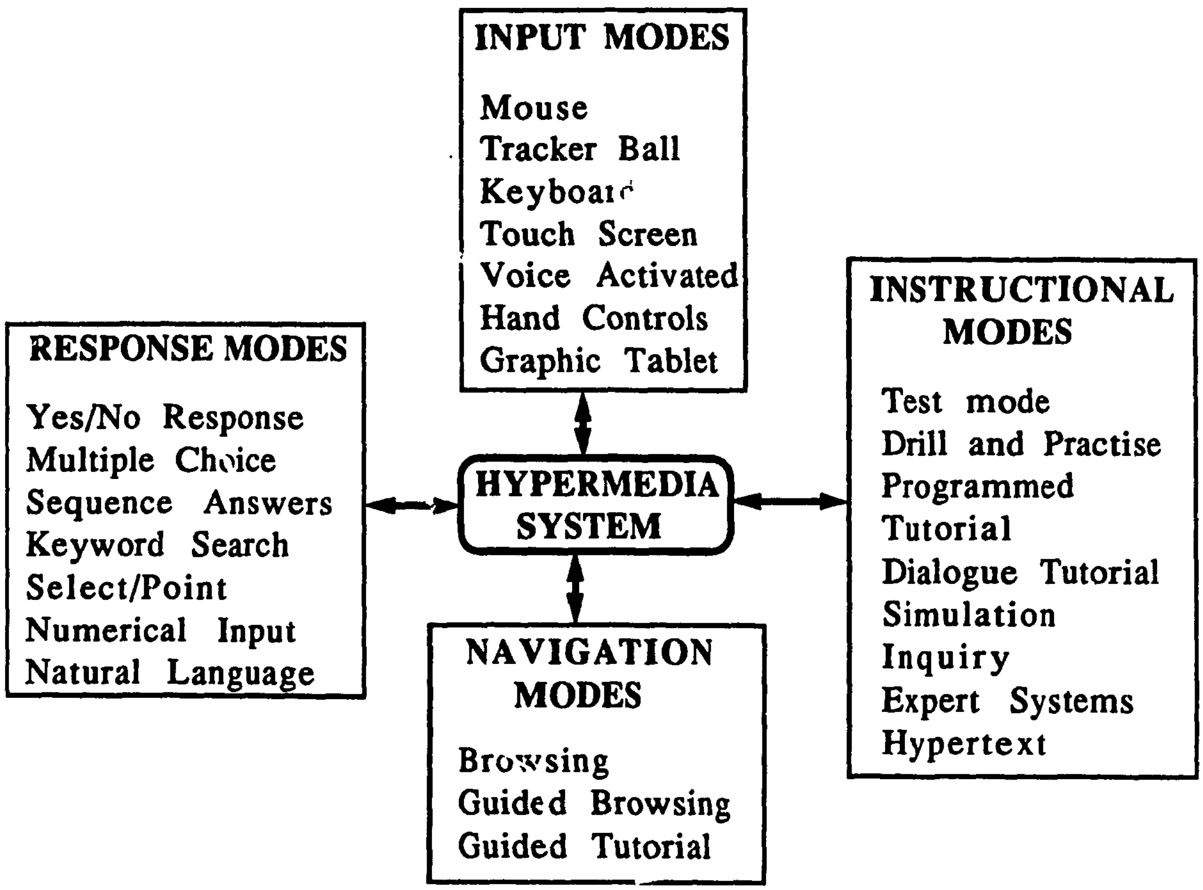


Figure 4. Design Variables for a Hypermedia System
(Based on Bork, 1987, Barden, 1989, and Romiscowski,1986)

Authoring Considerations.

Authoring refers to the process of creating programs or courseware that is to be run on a computer. The computer software which actually directs the instructional content is called an authoring system or more precisely an authoring language. It is this software that tells the computer and any peripheral device that may be plugged into it (such as a videodisc or CD ROM player) what to do at any specific time in response to user response or commands or according to a pre-programmed routine.

There are three methods for authoring CBL courseware: (1) computer programming languages, (2) CBL authoring languages and (3) CBL authoring systems.

In a commercially available programming language, such as Fortran, C or BASIC, programs are written in machine code, the most basic programming language. These highly complex programming languages are used because they assure the fastest operating times and can be custom designed for any specific project. However, they require the talents of a computer programmer to translate a design concept into reality.

Authoring languages are programming languages developed specifically for CBL situations. They include commands for presenting text, judging responses, presenting feedback, maintaining student records, etc. However, these programs still have to be written in a program language format which may not be easily learned by an instructional designer.

Fortunately, there is an alternative in the form of commercially available authoring systems. These user friendly programs are designed to simplify the steps required to program CBL content. They are generally easy to learn and operate so that virtually anyone can use them. Their drawback is that they tend to be generic products which were designed for general application, so may not have all the features required by a specific project. They are also slower than a machine code program since they have to translate from the user friendly commands to the machine code level on which the computer operates.

HyperCard is an authoring system. There are currently many different authoring languages and systems on the market for either IBM, Macintosh or other types of computers.

Interaction Strategies

Interaction is seen as one of the key elements of a learning strategy and should be integrated into an effective instructional design.

Allen(1986) suggests that there are two strategies of interactivity. The first adheres to the generative model of learning which seeks to provide the learner with more control over their own learning process. Interactive video and other interactive technologies permit greater individualization, motivation and responsiveness to learning needs.

The second strategy emphasizes the use of interactivity to control mathemagenic activities, those learner activities that influence learning such as listing lesson events or answering embedded criterion questions (Allen, 1986).

Interaction in a learning context serves confirmation, pacing, inquiry, navigation, and elaboration functions. Damarin (in Jonassen, 1988) proposed six levels of courseware to maximize interactivity: watching, finding, doing, using, constructing and creating. Traditionally most instructional strategies only operate within the first three levels. of watching, finding and doing.

Hannafin (1989) describes this traditional view of interaction as an objective, quantitative entity, designed to promote competence. He suggests that to maximize interaction and develop the aspects of using, constructing and creating, we must have a richer understanding of the psychological requirements associated with instructional tasks and responses. To Hannafin, it is no longer adequate to simply describe interaction in terms of input technology or the physical characteristics of the responses made. He suggests increasing the interactivity and hence generative (student initiated) performance of interactive media by using;

- Fault free questions which encourage elaborated, complex responses such as in a compare & contrast question. Fault free questions are not evaluated quantitatively.
- Queries which allow the user to ask questions.
- Real time responses which create a "live environment", especially useful in simulations.
- Electronic notetaking which encourages elaboration and cognitive retention.
- Predicting and hypothesizing which help to organize internal "schema".
- Hypertext which uses semantically organized navigational possibilities to link concepts.
- Co-operative dialogue which encourages working with other students and helps to stimulate and elaborate content.

CHAPTER 3

QUESTIONS AND ISSUES SURROUNDING INTERACTIVE MEDIA

Clarification of Terms

Before proceeding I would like to clarify some of the terms which will be frequently used in this chapter. Figure 5 situates the principle terms.

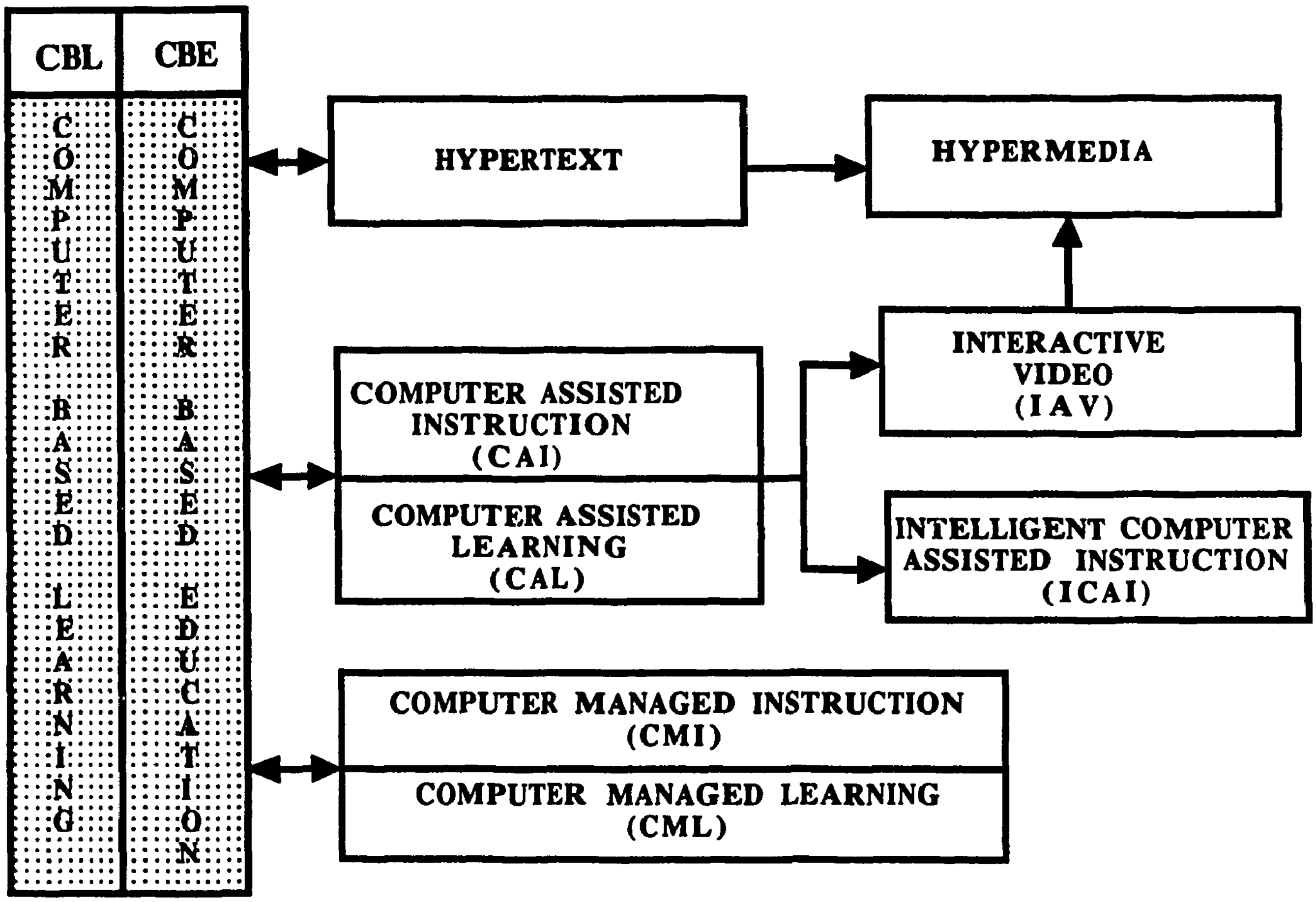


Figure 5 Common Computer Referenced Acronyms Used In Education

Educational strategies which use computers are generally described as either Computer Based Learning (CBL) or Computer Based Education (CBE). I will use the more common CBL designation.

Under this CBL umbrella are several further distinctions in computer usage. The first, Computer Managed Learning (CML) or Computer Managed Instruction (CMI), are both generally used for administrative and tracking purposes in monitoring a students progress though the school system. Although certain aspects of this function are relevant to our thesis, we will generally not consider this aspect of CBL.

The most prevalent terms used within the domain of CBL are Computer Assisted Learning (CAL) or Computer Assisted Instruction (CAI). These terms can be used interchangeably, although CAI is more frequently used in the United States and is more associated with the programmed learning-behaviorist traditions while CAL, favoured in Canada and Britain tends to more humanist, cognitive approaches (Romiszowski 1986).

In Canada and Britain, CAI is often thought of as the precursor to CAL. A CAI strategy involves a computer program acting as a (very limited) personal tutor to a single student delivering prompt and drill exercises derived from the programmed learning machines/programmed instruction model (Bostock and Seifert,1986).

Typically, the instructional strategy follows the content by questions. The answers are evaluated by the computer, based on predetermined specifications. The computer then provides feedback about the correctness of the answer and determines whether to allow the student to progress to new material, or by using branching strategies, to review new information on the current topic.

In general the CAL strategy favours a more student centered activity that is not prompted by the computer but involves the student using the computer as a resource. A CAL approach is generally more student centered and follows the Piagetian tradition of learning by doing (Bostock and Seifert,1986). Romiszowski (1986) favours another role for CAL, as an emancipatory approach to ease the drudgery of writing and analysis, a tool to access database applications, and simulations.

When appropriate, I will use the term CAL. Where such acronyms are mentioned by other authors, I will leave them as they are written.

Hypertext is a term first coined by Ted Nelson in 1965, although it took 20 years to enter the language (Nelson,1965). Hypertext is a non-linear or dynamic text based system which allows its users to easily access and add to an almost infinite knowledge base (Jonassen, 1988). One of its unique characteristics is its ability to conceptually link ideas, files or concepts within its knowledge base. It is of particular relevance today in connection with hypermedia, which extends hypertext's capacities to include sound, graphics and video information.

Interactive Video (IAV) combines the video and sound resources of a videodisc with the graphic, text, controlling and programming capabilities of the computer. In an interactive video, the user's actions and choices determine the program flow or content. Interactive Video can be a stand alone learning strategy or it can fall within the definition of a hypertext/hypermedia strategy.

Interactive Media are media in which the user determines content and duration of a learning or viewing situation, resulting in individualized program material.

Is There a Learning Theory For Interactive Media?

Most learning theory for interactive media is derivative from the theories developed for the strategies of Computer based learning, (CAI/CAL) which in turn have evolved from the behahaviorist and humanist branches of educational psychology. Another branch centered around hypertext has evolved from cognitive research.

The initial, prevailing methodology as applied to technological instruction followed the behaviorist paradigm. However, shifting trends in research and the development of more sophisticated software and peripheral systems has shifted the focus of CBL towards a position more heavily influenced by cognitive psychology and the humanist tradition. In this section I will attempt to situate the leading theories with respect to the evolution of computer mediated instruction.

Behavioristic Methodology

The behaviorist methodologies were based on the early work of the training psychologists such as Skinner, Thorndike, Hull, Gutherie, Tolman and later expanded and further developed by Melton, Lumsdaine, Hawkridge, Glasser, Briggs and Gagné (Schramm,1977).

The work of Mager, Bloom and Gagné was very influential in defining the process of education and how we learn. Mager stressed the importance of stating instructional objectives in terms of observable behavioral objectives. Bloom and colleagues like Englehart,Furst Hill and Krathwohl organized taxonomies of cognitive, affective and motor objectives (Romiszowski,1986).

Gagné's 1965 book, "The Conditions of Learning", was a major work which linked learning theory and the technology of instruction by providing a framework for instructional design. He described a taxonomy of types of learning in which each type of learning was characterized by a specific set of conditions which characterized that learning (Gagné, 1965). He organized these types of learning into a hierarchy of 8 categories which ranged from signal and stimulus response learning to the more complex strategies of chaining, verbal association, discrimination, concept and rule learning and problem solving (Gagné 1965).

These 8 categories were included within the broader category of Intellectual skills when Gagné expanded his learning categories to include intellectual skills, cognitive strategies, verbal information, motor skills and attitudes.

A Systematic Approach to Instructional design

The work of Gagné and Briggs and others laid the foundation for the systematic approach towards instructional design. This systems approach is characterized by identifying the instructional goal, conducting an instructional analysis to identify the subordinate skills required to achieve the goal, identifying learner entry behaviors and characteristics, developing performance objectives, developing the actual instruction strategy and developing criterion referenced tests and formative and summative evaluation procedures (Dede and Swigger,1988).

Programmed Learning

The behaviorist methodology of programmable response conditioning was the genesis for the programmed learning methodology. Skinner's ideas about instrumental conditioning were realized through a teaching machine concept which featured a detailed programmed text of instructions which he felt would be suitable for programming/teaching students in a systematic, controlled manner in much the same way as he taught rats in his laboratory experiments.

This approach to education came to be known as programmed instruction. It is characterized by the detailed structuring of learner objectives and teaching materials. The learning is broken down into small steps which are learned in a sequential progression. The student could proceed through an exercise at his or her own pace. Programmed learning also makes extensive use of pre- and post-testing and curriculum revision to optimize the learning success rate. Programmed instruction typically followed either a linear or a branching strategy. The linear approach had every student follow the same presentation order for the material while the branching option acted as a detour, directing the student to a particular question based on his or her response.

This programmed approach has strongly influenced the development of instructional design particularly in regards to the earlier Computer Assisted Instruction (CAI) courseware development. This approach involves a computer program acting as a very limited personal tutor to a single student. The content would include prompt and drill exercises, derived from a programmed instruction model, which presented the content followed by questions. The computer program evaluated the answers and presented its mediation or feedback which either allowed the student to progress to the next content area or review the material via a branching strategy which presented new information about the subject of the wrong answer once the correct response was seen, the student was allowed to move on.

The Cognitive View

As we move away from behaviorist models on the learning theory continuum we move into the realm of the cognitive psychology. The cognitive psychologists look at how we absorb information from the world, how that information is represented and stored as knowledge and how that knowledge influences our perceptions and behavior.

Cognitive psychology is largely concerned with problem solving and complex cognitive skills as opposed to memorizing or straight forward procedural tasks. Problem solving is "...behavior directed towards achieving a goal" (Anderson, 1985).

Instead of learning a response, the emphasis is on learning information. Learning is viewed as an active process where experience contributes to the development of meaning and understanding (Wildman and Burton, 1981). The cornerstone work in this area was done by Jean Piaget.

The "active structural networks " proposed by Quillan (1968) is the most widely accepted model used to describe how we represent knowledge. (These networks are composed of nodes and ordered, labeled relationships connecting them (links) (Norman, Gentner & Stevens,1976). The nodes can be thought of as token instances of concepts while the links describe the type of interaction between the nodes.

What the learner already knows provides the basis for integrating new knowledge. Learning is then a matter of acquiring new structures by constructing new nodes and interrelating them to each other and existing nodes (Norman 1976).

"Most conceptions of knowledge are based on semantic networks used by individuals to describe concepts and the relationship between them and to interpret and explain new stimula to the environment" (Jonassen, 1986).

This node and link network is often represented spatially as webs of concepts/information. Multiple nodes help in the integration of new concepts by linking a new concept to a previously established or more relevant part of the web. In this way new concepts are intertwined within the web at nodes that are related to it.

This model of web learning was conceptualized by Reigeluth as the elaboration theory of instruction. According to this theory, we begin the learning process with a coarse web of information, outlining the topic to be discussed and then giving a general overview. This is followed by a detailed overview and finally the detailed substructures (Reigeluth 1979).

Gagné and Dick (1983) have summarized three concepts of cognitive psychology relevant to instructional design as (1) metacognition, (2) schemata and (3) stages of skill acquisition.

Metacognitive skills are the "cognitive strategies of learning and remembering " and " ...knowledge of one's own cognition" (Gagné and Dick, 1983). They are the techniques used to monitor oneself while solving problems and the strategies one uses to learn (Bonner, 1988). These involve monitoring strategies for checking self performance (such as re-reading directions, keeping notes about steps taken to solution) and learning strategies (how you go about learning- outlining what is read, rehearsing numbers).

"Schemata" is a term used to refer to how knowledge is represented in memory. Schemata are knowledge structures with both declarative and procedural components. As we learn, we alter our existing schemata integrating new information into previously formed sc'ıemata. These schemata influence recall of previously learned information and allow the learner to make inferences which fill in the gaps of verbal information.

It is important for the learner to be able to evaluate and modify his or her schematic network (Bonner, 1988). The schemata view of learning parallels and compliments Quillan's node and link mode and Reigeluth's web model. These learning theories also complement Nelson's concept of hypertext.

<u>The Humanist Tradition</u>

The Humanists view learning as a holistic process. Learning is only a part of each person's personal growth and development. Individual education then becomes a process of defining areas of importance.and relevance to each individual's needs. Gardiner (1980) describes this process as inside-out learning as opposed to more behaviorally-based learning systems which direct the information content, flow and learning style of the student in an outside-in direction.

Individual personal development and human relationships are important to counteract the increasing alienation experienced within society. Practitioners of the humanist approach generally believe that there is no one approach that will satisfy the needs of all. Rather a variety of approaches may be necessary to suit the needs of each individual.

Hypertext and Learning

The active structural network model of knowledge acquisition and the humanist expectations of learning clearly come together in the hypertext paradigm. Jonassen argues that systems based on semantic network models of knowledge representation can serve as models for a hypertext electronic tutorial system. The accessing and linking characteristics of hypertext and its ability to represent knowledge structures make it complementary to web teaching methods (Jonassen ,1986).

The generative learning hypothesis suggests that when interacting with information (text, illustration, language), learners activate prior knowledge structures to interpret the new stimuli. This new stimuli has meaning only insofar as the learner can find prior knowledge to explain it. This ability to retrieve prior knowledge from memory and relate it to the current stimuli are important cognitive processes involved in learning (Jonassen ,1986). What we will learn is based on what we already know and as each individual knowledge base is uniquely different, then how we learn will be be unique to each individual. Hypertext allows the user to individualize the learning process, interacting with new information in a way meaningful to them.

As Jonassen says;

> "Because knowledge acquisition is such an idiosyncratic process, it stands to reason that learners should have control over the content as well as the process of learning "(Jonassen, 1986).

This issue of control over content and processes of learning will be discussed in a subsequent section of this chapter.

<u>Hypermedia</u>

Hypermedia extends the hypertext definition of nonlinear text to include the capabilities of audio, graphics, video, stills and animation and other forms of information transfer (Marchionini, 1988).

Marchionini suggests that there are three main characteristics of hypermedia systems:

1) They contain huge amounts of information from a variety of sources which can be accessed quickly and easily. Materials can be accessed explicitly and implicitly.
2) Hypermedia create an enabling rather than directive environment, offering a high level of user control.
3) They offer the potential to alter the roles of teachers and learners and the crucial interactions between them. The flexibility of hypermedia allows the creation of unique information tours or documents which can be shared among users,

allowing a richer and more challenging experience for learners as well as teachers (Marchionini, 1988).

Learner Control

Who Controls Learning?

Some of the qualities which make hypermedia (including interactive video) so attractive, such as their potential for prescribing the learning methodology for the user, are also cause for much debate. The notion that learners should control their own education, study what they feel is appropriate to their own needs, at their own pace, under circumstances of their own choosing, constitutes a more humanistic view of learning.

The debate over learner control extends from the domain of traditional CBL approaches to the more recent hypertext and hypermedia approaches. The notion of hypertext only became technologically practical on a widespread level in the mid -80's thus entering the debate in mid-stream. One of hypertext's major operational tenets is to give learners control of their learning environment. But before addressing the issue of learner control in hypertext, let's examine it within the framework of the more traditional CBL systems.

Learner Control in Traditional Computer-Based Learning Situations

Laurillard (1984) argues that many of the existing strategies for IAV have been derived from adding video to Computer Assisted Instruction strategies and come from the programmed learning tradition. This type of design often tends to lock the learner into a specific branching sequence depending on the correctness of an answer.

Many IAV designs control both the order in which information is presented and the learning strategy to be followed (ie. the number of presentation and practise sessions, practise questions, remedial loops and the timing of testing). This type of design, which assumes the program designer or teacher can design a more efficient learning task than one in which learning control are left to the student, can be effective in certain types of situations. (Balson et al, 1985).

A study on medical intravenous injection techniques done for the US army found, that a structured, strictly controlled use of IAV yielded better or equal results than those which gave learners unrestricted access to the IAV. Those who had more interactive control tended to spend more time moving about on the disc without significantly greater learned skills. They found that the soldier could learn the specific task just as quickly without unrestricted access to the disc content, making the interactive control unnecessary in this situation (Balson et al,1985).

Although it has many benefits such as working at the students' pace and permitting endless repetitions, many researchers such as Bostock and Seifert (1986) believe that this CAI methodology lacks sensitivity to the students' wants and needs, particularly in the case of adult learners. They argue that it is limited in its ability to vary the teaching style qualitatively or according to individual difficulties experienced by the student.

In reference to the use of CAI in an adult education context, Bostock and Seifert contend that;

> "CAI is seen as counter to the spirit of adult education with its emphasis on consent and participation (Bostock and Seifert, 1986).

Laurillard (1984) believes that learner control of content sequence is a better means of taking full advantage of the capabilities of IAV. The greater the amount of information available through a videodisc or other medium, the greater will be the number of ways that it can be put together. Structuring the learning route through an interactive disc necessarily defines the possible uses of it and in turn reduces its potential use. Laurillard believes that the learner should have control of learning strategy, not the programmer.

Another point she raises as a design consideration is the alternation of receptive (viewing) and active (participating) modes of learning. This she maintains is what makes IAV such an attractive teaching/learning strategy. Laurillard concludes:

> " Students can make full use of most aspects of control, and moreover make use of it in such a variety of ways that it becomes clear that program control must seriously constrain the individual preferences of students."

Inevitably the issue of learner control is a reflection of the ongoing debate over the role of computers in instruction. Seymour Papert, the developer of the LOGO computer language, argues that the computer is a tool to think with and that the main issue is whether the computer should control the student or the student control the computer (Romiezowski, 1986).

Higgins (1983) likens the role of the computer in education to that of an obedient slave (pedagogue) which dedicates itself to providing a conducive learning environment for the learner. He contrasts this with a more behaviorist view of the computer which places it in a master 's (magister) role, where the computer (program) acts as a knowledge dispensing tutor, directing the learner through the material to be learned (Underwood, 1989).

Learner Control and Hypertext

What we will learn is based on what we already know and as each individual knowledge base is uniquely different, then how we learn will be be unique to each individual. Hypertext allows the user to individualize the learning process, interacting with new information in a way meaningful to them. As Jonassen (1986) says:

> "Because knowledge acquisition is such an idiosyncratic process, it stands to reason that learners should have control over the content as well as the process of learning."

Individual differences pervade the reading/learning process Hypertext's inherent characteristics help to accommodate these differences.

Learner control may improve the efficiency and effectiveness of learning because individual difference can be accommodated, but it can also have negative effect on learning since learner control without guidance may be less effective as some studies have shown (Jonassen, 1986).

Snow (1980) states that the premise of learner control is based on two untenable assumptions:

> "...(a) that learners know what is best for them at any given time in the instructional sequence and (b) that they are capable of acting appropriately on this knowledge."

His analysis of research concludes that:

> " One can perhaps give control to all of the learners some of the time, and to some of the learners all of the time. But one should probably not give control to all of the learners all of the time. The problem is to determine which learners to give what kind of control when."

Studies have shown the students often prefer the method of instruction the least conducive to their learning (Clark 1982). High ability learners tend to prefer more directed structured instruction but benefit more from non-directive, self-structured approaches. Low ability learners often prefer these non-directive self-structured approaches on the belief that they can maintain a low profile and minimize the visibility of failure. However, they experience maximum learning in directed, structured learning activities.

Jonassen maintains that while the case for learner control has not been empirically supported, learner control should not be dismissed as inappropriate in the context of hypertext and hypermedia. He maintains that learner control should be thought of in a context that considers personal knowledge construction. The point according to Jonassen is this:

> "Although allowing learners to control the sequence or events of instruction, such as in hypertext, may not produce higher achievement, the learner is still in control of his or her learning process. Each learner will ultimately make sense out of stimulating whatever mental strategy is most productive. Certainly learners can acquire new strategies that will make them even more productive. Although learners may or may not control the events of instruction, they certainly exert some control over the process of learning. Which is more important?" (Jonassen, 1986).

The high level of learner control inherent in hypertext, often results in user distraction, when a user wanders about the hypertext document without a clear sense of purpose. The increased decision making of hypertext may also be more stressful to some users. The rich learning environment could become a "hyperchaos" (Marchionini,1988).

As we have seen, learners may not always know the best sequence to achieve their learning goal. Tsai (1988) suggests that a default learning path be incorporated into hypertext documents for those who require it although there is no proof that they will take it when offered.

A hypertext system, by its very nature, infers a greater level of responsibility and initiative on the part of users, but also requires new strategies and approaches to learning in a non-linear environment.

The issues of hypertext extend beyond user control. Hypermedia will affect basic teaching patterns in schools and the instructional decisions of teachers. Students will have to learn new skills to filter information and develop methods of learning in self-directed ways (Marchionini, 1988).

Issues Arising From Hypertext and Hypermedia

New Strategies Are Required To Deal With Hypertext

Traditionally, education has been heavily dependent on the linear patterns of the written word. Marchinioni (1988) argues that the new methods of writing, transferring and reading information will have far reaching effects within the realm of education. If significant amounts of reading /information input come from electronic, nonlinear sources, then new strategies and skills will be required to adequately deal with them.

Hypertext And User Disorientation

Although hypermedia systems offer the potential for an rich educational environment, they also present problems with respect to user disorientation. As users navigate through the nodes and links of hypertext, they can easily get lost in hyperspace. Users can experience disorientation from the enormous amount of information available to them and the potentially complicated structures designed to access it. They can easily forget where they are and how they got there. Hypertext documents lack the physical feedback associated with print materials so making these locational associations is more difficult within its electronic context. To circumvent this problem, effective browsing and navigational aids are a required component of any hypertext system (Conklin, 1987, Marchionini, 1988).

Hypertext and Cognitive Overhead/Overload

Another problem facing hypertext users is becoming accustomed to the extra effort and concentration required to maintain several tasks (nodes) or navigational trails simultaneously. Cognitive resources can become overloaded when many links or nodes are active without a contextual framework. In hypertext, the user is also forced to make many decisions which, in a print based text, the author would have made. This cognitive overhead can be stressful to some learner unaccustomed to the hypertext environment (Conklin, 1987).

Hypermedia as an Environment for Teaching

Adapting the hypermedia model for the real world of the classroom presents another set of concerns according to Marchionini (1988) Managing learning in an electronic environment will be more complex than in a traditional setting. Teachers may spend valuable time attending to electronic system problems rather than content problems. Hypermedia may shift class emphasis from fact learning to synthesis and evaluation, forcing teachers to re-evaluate their roles in the classroom.

The authoring strategies for creating effective hyperdocuments are not as simple as the software manufacturers suggest, making it potentially more difficult to introduce the possibilities of hypermedia into the classroom.

Creating appropriate assignments and activities will have to be rethought. Traditional theory suggests that we create objectives for students and plan assignments that help accomplish them, but it is difficult to develop objectives that require higher order thinking because they are often applied to complex or subjective problems. It is difficult to write objectives for interactive exercises since all possible outcomes cannot be predicted or accounted for. The kinds of tasks that hypermedia documents do best may not, in fact, lend themselves to conventional instructional design(Bonner 1988). Self directed learning requires the added responsibility and self- discipline of staying oriented and attentive to goals.

Because of hypermedia's many unique characteristics, evaluating and assessing its effectiveness poses many challenges. While traditional instruction design and evaluation is based on meeting instructional objectives, the criteria for success in a hypermedia document relate to processes and interactions. New strategies are required that address such quantitative aspects as, time spent where, number of nodes connected, number of key paths discovered and such qualitative aspects as the appropriateness of paths and the satisfaction of experience.

Morariu (1988) stresses the need for further research to develop ways of charting a learners' path through the hypermedia information and to determine effective tools for measuring learning.

Hyperphobia

As economic and social structures become more and more dependent on computers and electronic technology, we can expect many problems, in terms of expectations, confusion, etc.

> "Hypermedia will certainly exacerbate the classic tension between empowering learners with great freedom to direct their own learning and assuring society that all students will learn a common body of skills concepts

and principles" (Marchionini, 1988).

The Effectiveness of Media Instruction

Multimedia Instruction

This issue is best addressed by separating instruction into its two operant approaches, that of interaction and multimedia usage. In regards to the latter, the use of multimedia to enhance the presentation of teaching and the efficiency of learning is certainly not a new concept. Almost all teaching uses multimedia to a certain extent (Schramm, 1977).

Since earliest time, face to face instruction has been supplemented by drawings and illustration whether hand printed manuscripts, slates, blackboard or scratchings on a wall. These early, simply fashioned media constitute what might be considered the first generation of multimedia The invention of movable type and its revolutionary impact on the availability of books was the last dominant event in this era which continued until the late 19 th century.

The last century and a half has seen the development and implementation of a host of new technologies in a second generation of multimedia which might be termed the opto-electric period. This would include photography, radio, film, audio tape, film strips, slides, television and videotape.

The third generation was heralded by the advent of the personal computer and its associated hardware of near instant access and mass information storage. The personal computer, videodiscs, CD-ROM and other digital devices are the media of this digital or hypermedia period.

All these media devices have enhanced the transmission of knowledge, but as Schramm points out, research suggests that there are no significant differences in the effectiveness of any one media over another when the content is designed with a particular media in mind. Studies by Chu and Schramm(1968) found no significant difference in educational effectiveness when comparing print, radio, TV and film.

In another study, they analyzed 421 studies which compared the effectiveness of using television to teach a given topic versus a standard classroom approach. 308 of the studies noted no difference between the two methods of instruction , 63 found television taught best while 50 found that classroom instruction was superior (Chu and Schramm,1967).

Trenaman (1967) also compared media and found that the three media of radio, print and TV could communicate a wide variety of material with roughly equivalent efficiency.

As Schramm points out in "Big Media, Little Media", increased learning efficiency begins to occur when combining different media. He notes that research has repeatedly shown that the addition of one or more supplementary or complementary channels of instruction makes a positive difference to learning. However, there is no evidence to suggest that a super media exists, one media that is the most efficient under all circumstances
(Schramm 1977).

The third wave technologies have one major advantage over their forerunners in their ability to interact with their users. They are able to immediately respond to the actions and needs of those using them. This interactivity can play a important role in maintaining an active learning environment. Many researchers have found active learning to be a vital component in maintaining learner interest (Bååth,1983, Laurillard, 1984).

Computer Assisted Instruction and programmed instruction have demonstrated that students can learn efficiently from either method (Romiszowski 1986).

The Effectiveness of Interactive Video

As we have seen, combining media can enhance the learning process. But can interactive video work more effectively than a standard multimedia approach? A review of interactive video studies suggests that interactive video can be more effective than traditional methods of instruction in many areas, although the criteria for effectiveness vary widely between studies.

Several research studies have found that the variety of of visual and auditory learning stimuli present in interactive video can dramatically improve learning (Clark,1984). It can also aid in improving short term recall and retention (Schaffer and Hannafin, 1986).

A study by the Medical Information Technology Research group of the US Army found that in teaching the proper procedures for medical injections, IAV was found to provide a faster training time (by 30%), higher post-test success (7-8%), lower student stress and greater subjective student satisfaction when compared to the traditional instructor based situation (Balson et al,1985).

In his analysis of interactive video effectiveness, Bosco (1986) found that of 29 studies evaluated, a majority reported that IAV was more effective in obtaining the learning objective than the comparison or control groups.

However, Bosco noted that the typical evaluation focused on the question, "Is IAV more effective than traditional instruction?" Effectiveness was generally assessed by achievement, performance and attitude measurement. He was unable to discern any categorical answer to the question, "Is IAV more effective than traditional methods of instruction?". Interactive video did seem to result in positive findings with respect to user attitude and training time, but he felt the benefits of faster training time needed to be considered along with achievement outcome, which split at around 50% in favor of IAV. Sometimes it was more effective than the comparison instruction, other times it was just as effective. He cites the widely diverse nature of the projects studied and the differing methods of defining what was effective as reasons for his inability to give a specific answer as to whether IAV systems are better than more traditional methods.

The conclusion he draws is that IAV is best thought of as a wide variety of approaches rather than one approach. The only shared aspects of IAV projects is the hardware they have in common. The ultimate consequences of interactive video will depend on the specific design and content of each program.

Native Learning

The impact of southern values, culture, media, and economic priorities on the lives of Canada's northern native population have been enormously disruptive. The patterns of cultural replacement have been well documented and will not be discussed in great depth.

However, the impact of these rapid changes occurring in the north have many ramifications which are relevant to this thesis.

Tom Wilson (1981) found that southern originated TV and a predominantly English language education system have contributed to a cultural schizophrenia for Inuit who are caught between the traditional values of their parents and the southern values dominant throughout the north. This contributes to a sense of hopelessness, low self-esteem and a perceived lack of control in their lives. This is most evident among young Inuit who are at the front lines of cultural change (Wilson, 1981). These factors are also major influences in determining success or failure within a school system.

Most research on native learning strategies has been conducted on children. Applying these findings to older and adult native persons may not be the most methodologically sound procedure, however it is made necessary by the lack of data for older learners.

Native Learning Styles

Many researchers see the cause of poor performance by native people in the normal school environment as a mismatch between learning styles and instructional method (Havinghurst, 1970, Kleinfeld,1970). Kleinfeld suggests that Inuit children possess unusual perceptual strengths which are seldom activated within an existing educational environments. Havinghurst suggested that the teaching methods employed with native students were not always effective because of their distinct needs and perceptual abilities.

In speculating on the results of early research, McCatin and Schill (1971) wrote

> "If performance on tests is any indication, it appears that that the American Indian child has a greater facility in learning when visual methods of instruction are used and performs less well when tasks are saturated with verbal content".

Other studies, most using the Illinois Test of Psycholinguistic Abilities (ITPA), have had similar results (Lombardi, 1970, Downey, 1977). A study done in Labrador in the mid-70's found that Inuit children scored stronger than non-native children in visual reception, visual sequential memory, visual memory and visual closure, and weaker in audio associations, verbal expression, grammatic closure and auditory closure (Taylor and Skanes, 1975).

Research on children from Baffin Island in the NWT also indicated that the Inuit subjects surpassed the comparison group on all measures of visual discrimination ability and spatial skills (Berry,1966). Berry attributed these acutely developed visual skills to environmental and cultural activities such as hunting, where locating game was often a matter of survival and travelling on the land, where recognizing terrain features is vital in determining location and position. In Kleinfeld's study, she also found that Inuit children were able to outperform urban white children in recalling complex visual patterns (Kleinfeld, 1970).

Kaufback asserts that child rearing practises are also a factor in developing these abilities. Constant mention is made in research about the fact that native children learn by observing and imitating the actions of their elders, parents and older siblings. Cazdon and John (1968) characterized this style of learning as "learning through looking."

Much of native non-formal learning that takes place is non-verbal in nature. Sound is often used to draw attention to observable aspects of a situation (Krober, 1970).

In a typical white middle class family, questioning is often the dominant interactive strategy to solicit and exchange information (Lassoa, 1977). Scollon and Scollon (1979) found that question asking was not a verbal strategy employed by natives in their day to day speech habits. They found that children considered question asking to be an activity reserved for schools, not for home.

Such differences in learning styles between native and non-native may very well handicap native students attending traditional schools which cater to the auditory learner.

Kleinfeld (1976) also noted that successful teachers were sensitive to native ways and made subtle use of praise and indirect criticism. They were personally interested in their students but not intrusive. These teachers also demanded a high quality of academic work. The "warm demanders" were good facilitators for learning. Kaufback (1984) equates the "warm demander" qualities of a teacher with to the potentially "user friendly" ways of the computer.

The observation learning style of native children while potentially a negative factor in the overly linguistic environment of the traditional school, is a learning style complementary to some forms of computer mediated learning systems (Kaufback, 1984).

Computers and Native Education

Computers can be effective in the learning process for many reasons. They actively involve the individual in the learning process. Students proceed at their own pace though material. Learning is reinforced immediately. Teachers are freed up for more personal interaction within the classroom, including more time for individual remedial learning situations (Chambers and Sprecher, 1980).

Heffron (1984) suggests the use of the computer as a "tutor" could build on the values of independence, humour, time awareness and private practise which are common among native students. MacLean (1981) suggests that the computer can serve a useful role as a facilitating tool under the control of the user.

> " A computer is a device for doing something that the user wishes to do; the user is in control and accomplishes something he or she wishes to accomplish" (McLean, 1981).

Such operations as word processing and simulations are particularly useful in education. The word/text processor is a spatial mechanical mode of representing knowledge which is adapted for the visual strengths of a native child (Heffron, 1984).

Simulations or the artificial recreating of a real life situations or problems can also be very strong learning tools in part because of their concrete representation of a situation. Simulations can teach problem solving, decision making and judgmental skills which are not easily taught by other means. In a work-related context, simulations provide an opportunity for realistic practise, quicker skill acquisition and a direct transfer of learning to job performance (Kearsley and Frost, 1985).

Heffron also suggests using the computer in another role as a "tutee", whereby a person programs, manipulates and creates their own learning environment. The use of languages like LOGO enables students to understand the process of learning by developing their heuristic strategies within a visually interactive mode (Heffron, 1984).

Using the computer as tutee can:

> " ...shift the focus of education in the classroom from end product to process, from acquiring facts to manipulating and understanding them" (Taylor,1980).

Computers and Culture

If computers are being introduced by the dominant white culture won't they just continue to instill southern white content, values and practise?
The introduction of television has had a powerful and negative impact on the lives of native people (Wilson, 1981, Coldevin, 1979). Could computers have that same effect?

To be effective, any introduction of computer technology must be made with the participation of the intended audience. A study by Hart, Kidd and Nahanni (1975) focusing on computer usage by the Dogrib people of Inuvik, cited the failure of the project to elicit native participation because there had been no native involvement in the preparation, testing and evaluation stages of the project.

Heffron argues that computer software must be culturally relevant, reflecting the external aspects of the culture as well as the values and beliefs of the people. The program designers must be aware of the cultural background of their audience (Heffron, 1984).

Northern Adult Computer Usage.

Most of the literature on CAL and native learning deals with school age students. However, one recent CAL study conducted in the Keewatin district of the Northwest Territories dealt with using CAL in an adult education context (Fahy, 1989). This program was designed primarily to use a CAL based program for adult basic education and high school upgrading. A secondary goal was to provide training in business, financial and telecommunications software applications.

Fahy found that the computer was helpful in attracting and maintaining a larger segment of the target population. The computer conferred an enhanced image on a program which had previously been considered a low status offering. Although test results showed no difference from a non CAL comparison group, the course instructors found an improvement in skill acquisition including reading, writing and speaking and a greater awareness and realism about their goals. The principal finding of the study was that CAL and computer technology should clearly be a part of a new model of adult education in the North (Fahy, 1989).

Students at all levels testified that learning and the learning experience was enjoyable, swift and rewarding. CAL provides a new image for adult education in the communities, increasing the perceived prestige of the adult education program. It provided greater student motivation, attracting a wider range of potential learners. Motivation was maintained by a wide range of course offerings and skill training packages. It resulted in greater student persistence with fewer dropouts than in a non CAL context.. The role of the adult educator became more as guide and motivators and less as dispensers of information.

The CAL program also placed more responsibility on the students themselves to use their time on the compute effectively, to seek help as needed and to use non computer based resource materials to supplement their CAL programs. A minority of students, however, resented this approach and preferred an instructor dependent program.

Distance Education Implications

Aspects of Distance Education

Distance education has been defined by Holmberg (1989) as:

> " the various forms of study at all levels which are not under the continuous, immediate supervision of tutors present with their students in lecture rooms or on the same premises but which nevertheless benefit from the planning, guidance and teaching of a supporting organization (Holmberg,1989).

Clearly, many aspects of this thesis fall within the definition of distance education offered by Holmberg. First and foremost is the notion that many aspects of journalism and television production need not be taught by an on-site instructor. These are the skills, and information that I propose can be taught and learned equally if not more effectively by computer-mediated means.

A second aspect involves the use of a distantly located tutor or instructor connected to the student by various telecommunication devices on a regular, structured basis. Connection could be by phone, fax machine, or modem or any combination thereof. The student and tutor would be able to interact electronically at many levels. They could discuss and clarify concepts and/or problems with the hypermedia instructions. The student would be able to send questions, exercises or problems electronically and receive prompt response. They could in fact work on the same document at the same time at opposite ends of a modem connection.

Traditional Distance Education.

Traditional correspondence-based Distance Education systems, although proven effective over many years of their existence still suffer many disadvantages over on-site instruction. They are generally tied to an occasionally unreliable delivery system, such as the post office. This mail link necessitates a lengthy delay in student/instructor response and feedback. The student is typically studying in an isolated location with limited access to libraries and resource materials. Traditional distance education materials by their very nature of being massed produced for large numbers of students are not able to be individualized to each students background and abilities. Distance education course also encounter difficulty in providing psychomotor objectives (Kaufman, 1984).

Distance Education and Technology

Sharples (1980) suggests that any new technology to be utilized for distance education should increase interaction between student and tutor. Whatever the medium used, it must suit the message. The new technology must not duplicate information. It must use a direct route for communication. It must also improve the quality of information production and finally the new technology must be user friendly.

Kaufman maintains that the future of CAL in Distance Ed is tied to the developments in high quality courseware that can be used on home computers and access to affordable low cost telephone or cable networks for voice and data transmission. He also cites the recent innovations in computerized communications such as electronic mail and computerized conferencing as being a major boost to the role of computers in Distance

Education. These innovations allow one to one and one to many communications between people using computers and communication lines. This electronic communication is also ideal for accessing and searching and retrieving information from distant databases and instructional support/resource services.

This access to distant electronic databases and services, while available, has been made unnecessary in some situations since that same information might be available on-site on CD-ROM discs.

The gradual merging of telematic and distance education is leading to the development of computer-based distance education systems. A 1988 experiment called the Global Classroom Project demonstrated the potential of this approach. It was a series of 5 personal computer based tele-teaching demonstrations between seven American Universities and Beijing Normal University in China (Gao, Li, and Li, 1989). The audience at every site watched a common visual display on their computer monitor. Any input at any site could be seen at every other site. The system carried all data and voice by modem on a single phone line.

Northern Telecommunications Experience

Numerous examples also exist of current electronic or CAL networks in the Canadian north which use the existing telecommunications infra-structure.

The Kativik School Board in northern Québec has been using the Envoy 2000 computer network's bulletin board service to allow students in classrooms in different communities, many hundreds of miles apart, to exchange information with electronic pen-pals (Royal, 1990).

Another project by the Kativik School Board and McGill University's Faculty of Education is designed to train northern teachers to deal with the introduction of computers into the classroom. This project uses the fax machine and modem to keep on top of the teacher's questions, comments and assignments (Burpe, 1990).

A distance education project in the Baffin region of the NWT is using courses distributed on videotape to five communities. Students fax course assignments to their instructor who is in a sixth community. One advantage cited to this approach is that it allows students missing parts of the course to easily catch up without have to repeat the whole course (Ross,1990).

Northern Arctic Cooperatives has been using a slow scan television system to appraise carvings. A co-op in the Northwest Territories can put a carving in front of a video camera and send a video picture over ordinary phone lines to an appraiser or interested buyer in the south (NewsNorth, 1989).

These examples show that existing telecommunications infra-structures can support a wide variety of information transfers as would be required by a hypermedia system.

New Technology

Other options are also available , though somewhat more expensive. The use of a VSAT satellite channel can provide a large capacity data channel between any number of remote locations. An experiment by TV Ontario (TVO,1988) in 1988 demonstrated the feasibility of this approach. However, TVO decided that the high cost of equipment and satellite time was a strong factor in not pursuing this option for educational use at this time.

A more useful approach in the long run will be the further development of digital compression techniques in modem transmission. These techniques compress the amount of data by a factor of many thousands. This compressed data can then be sent over a normal phone line. The information is decompressed at the other end of the line. This type of technique will speed the quantity of information which can be sent over the existing telephone network.

The McBride Report

The 1980 UNESCO Commission for the Study of Communications Problems, also known as the" McBride Report", felt that distance education as an approach would not be effective in teaching communications skills since, they believed, these are skills that are best taught locally for a variety of reasons.

> "The considerable experience of experts from both developed and developing countries has held to the conclusion that basic training (in broadcasting and communications) should be conducted locally, in familiar surroundings with training methodology suited to local conditions, cultural traditions and development strategies" (UNESCO, 1980).

While I concur with their preference for locally based training, I don't believe this rules out using certain aspects of distance education to enhance local training, especially in light of more recently available and/or accessible computers, peripherals, communication networks and courseware developments.

CHAPTER 4

CURRICULUM EVOLUTION AND DEMONSTRATION MODULE

The Employee Skills Required by Northern Native Broadcasters

The employee performance goals I have used for this section of the thesis are adapted from a needs assessment done by the Inuit Broadcasting Corporation (Rudden , 1989). These goals represent the skills required by a broadcaster to meet the current needs of a typical native communication society.

There are approximately 300 skill areas for journalists and production employees of a native communications society (see appendix A for a complete list). The skill areas for a journalist would be different from those of a field producer or a technical producer although there would be some necessary overlapping of skills. The skill areas are shown in table 2.

Table 2 Employee Skill Areas

1	**Story Development**	
1.1	Writing and research	14 skills
1.2	**Interviewing**	
1.2.1	Organizing an interview	4 skills
1.2.2	Directing and controlling the interview	7 skills
1.2.3	General interview skills	15 skills
1.3	**Writing**	
1.3.1	Script formats	8 skills
1.3.2	Writing styles	12 skills
1.4	**Presentation and Hosting**	
1.4.1	On-camera skills	16 skills
1.5	**Producing**	
1.5.1	Pre-Production	9 skills
1.5.2	Production	3 skills
1.5.3	Post-production	8 skills
1.5.4	Field production	6 skills
2	**Administration/Station systems**	
2.1	Administration procedures	12 skills
3	**Technical skills**	
3.1	Typing/computer	4 skills
3.2	Studio camera	10 skills
3.3	Camera operations	10 skills
3.4	Studio VCR	7 skills
3.5	VTR operations	8 skills
3.6	Location camera operation	10 skills
3.7	Camera techniques	8 skills
3.8	Location VTR	9 skills
3.9	Audio	24 skills
3.10	Lighting	12 skills
3.11	Switching	7 skills
3.12	Studio directing	10 skills
3.13	Editing	15 skills
3.14	Graphics	8 skills
3.15	Set design	3 skills
3.16	Studio systems	5 skills
4	**Background knowledge**	
4.1	Language	4 skills
4.2	Inuit culture and traditions	1 subject area
4.3	Northern history	1 subject area
4.4	Economics	2 subject areas
4.5	Politics	5 subject areas
4.6	Environment	2 subject areas
4.7	Health and biology	5 subject areas
5	**Communications**	
5.1	The communications infra-structure	15 subject areas

An Evaluation of the Suitability of a Hypermedia Approach

The normal procedure in instructional design is to identify the instructional goal, conduct an instructional analysis of the skills required to achieve that goal and then select the media most appropriate to that goal. Schramm (1977), Gagné(1977) and Hannafin(1988) have all devised methods for evaluating the effectiveness or relevance of a particular medium. In this study I am approaching this from a different perspective, since the premise of my thesis is that some form of hypermedia will be used. The selection criteria now must be reversed and a method devised to evaluate an instructional goal to see if it can be effectively taught using the media chosen.

The 9 selection criteria were adapted from criteria developed by DeBloois (1982), Hannafin (1988) and Cantor (1989) for evaluating whether CAI or interactive video are appropriate methods of instruction.

1) Do reading & writing play an important role in achieving this goal?
2) Can this skill be learned alone?
3) Is the topic stable? (subject matter unlikely to change)
4) Are visuals (other than text) important in achieving this goal?
5) Is sound important in achieving this goal?
6) Does/could the skill/goal suggest a branching strategy?
7) Could aspects of this skill/goal be simulated?
8) Does this goal suggest a user controlled, hypertext strategy?
9) Does the goal require other than physical skills?

Expert Evaluation of Employee skill Objectives

An expert evaluation was conducted on the 297 skills to determine which of these skills were amenable to being taught by a computer based learning methodology. Three experts were engaged to evaluate the appropriateness of a CBL approach to each of the 297 employee skill objectives. According to Weston (1986) expert evaluations are necessary in order to save time at the beginning of the development of instructional course material.

Expert Characteristics

The three subject matter experts were Terry Rudden, Tom Axtel and the author. Terry Rudden was Training Director of the Inuit Broadcasting Corporation from 1981 until 1990. He developed the journalism/ technical producer training programs used at IBC and subsequently adopted and or adapted by many other native communications Societies. He has an extensive background in curriculum design and development for native communications training. Tom Axtell has served as training director for the Okalakatiget Society in Labrador and Wawatay Native Communications Society in Sioux Lookout, Ontario. He has B.A in communications and is completing an MA in Adult Education. The author, George Hargrave, is a freelance filmmaker who has worked as a television production trainer in the Northwest Territories, Labrador, Ontario and Quebec.

Instrument

A questionnaire was developed using a matrix format. Each skill area formed the rows and the nine (9) criteria the columns. Each cell was devised to contain one rating reference to one skill and one criterion. The nine criteria were considered equally important in order to decide upon the appropriateness of a specific skill. Each skill was assessed according to nine criteria of relevance suggested by DeBloois(1982), Hannafin (1988) and Cantor (1989).

The rating scale that was used consisted of either a 3= true, 2= sometimes true and 1=not true. (see appendix A)

Since the main purpose of this evaluation was to get expert advice on whether a specific skill could be learned as well as or more efficiently by using interactive media, a level of appropriateness was set at 80%, that is at least 7 of the 9 criteria had to be considered true. For each skill the maximum score was 27 (3 x 9) points, 21 points would indicate that the skill would be potentially appropriate to a CAL approach. A decision was made to compute the mean from the sum of the three expert ratings and use that score to determine whether the skill was appropriate or not. All three experts were either aware or were made aware of the nine evaluation criteria. Each evaluation took approximately 6 hours to perform.

Discussion of outcomes

Firstly, the outcome of this expert evaluation shows that the three experts divert in opinions about the appropriateness of a CAL methodology. Tom Axtell is more positive towards the use of Cal than either the author or Terry Rudden. Terry Rudden rates consistently lower than the other two. Since there are only three raters, no meaningful statistics can be generated. However, by use of a standard put to 80% consent over criteria/skill, an idea can be formed of which skills are appropriate to a CAL. The exact ratings of each expert can be found in appendix A. A summary of outcomes for each of the 5 employee skill objectives follows.

Category 1. Story development

In the writing and research tasks, consent was reached among the three raters that skills (1-14) which concerned research and writing related skills that could be taught by CAL methods. In the next category relating to interviewing skills and techniques and production processes (15-101), Terry Rudden felt that CAL did not lend itself to teaching these skills. However, the other two raters thought that skills (42-61) which dealt with program planning and coordination, could be developed into a CAL unit.

Category 2. Administration and Station Systems

All skills are seen as appropriate by evaluator one (Tom Axtel) and two (Terry Rudden) and as "maybe's" by rater three (the author). Most of these skills related to procedural and organizational processes.

Category 3. Technical Skills

Here rater two believes that almost all these skills can easily (Mean =24) be used in a CAL methodology, while raters one and three are more cautious. This category also had the most skills with a physical activity component such as cleaning VCR heads, camera shooting techniques or the set up, tear down and packing away of lighting equipment

Category 4. Background Knowledge

This is the only category in which three evaluators agreed that most skill areas could be taught by CAL means. Most skill areas dealt with factual information with a high degree of inter-subject relationship. The questionable areas dealt with language interpretation and sight translation skill development.

Category 5. Communication Knowledge

Here again rater one and two judged these knowledge based areas as potentially suitable to a CAL approach while the third evaluator disagreed in most categories.

Discussion of the Results

As pointed out earlier, meaningful statistics cannot be generated with only 3 evaluators. Because of the subjective nature of the questionnaire, one can only infer from the outcome, but several points are clear.

All evaluators questioned the ability of a CAL approach to teach skills which were physical in nature (e.g., correct use of a tripod) or which required the participation of persons (interviewing techniques).

All evaluators felt that factual knowledge concerning northern history, economics, politics, the environment and health was amenable to CAL. In areas of more esoteric knowledge and concepts such as the role of advertising and propaganda, evaluator three adopted a more cautious attitude by responding in the "maybe" range.

The evaluators responses covered spectrum, with one being highly enthusiastic towards CAL usage on most skills, one seemingly dubious of many CAL uses and the third evaluator (the author) somewhere in between. All three evaluators have similar training backgrounds, with respect to knowing what needs to be taught and how to teach it by traditional methodology. None have had actual practical experience with a CAL based training program although all three are conversant with many of the methodologies involved. This lack of CAL expertise is understandable in the context of the relatively short period of northern native communications training and considering most trainers come from a broadcasting rather than an educational background.

The employee skill objectives were used as the basis for a topic analysis (Criswell, 1989) to determine concept grouping. This form of top-down instructional design is also called overview sequencing. Related concepts or procedures were grouped together into individual modules as shown in Table 3. A detailed listing of all topic groupings appears in appendices A.

Table 3 Basic Journalism and Production Training Modules

1) Story Development

1.1 Writing and Research
Story ideas
Story focus,
Research sources
Choosing usable clips
Basic writing skills

1.2 Interviewing
Organizing the interview
Directing and controlling the interview
Interview formats
Interview skills
Broadcast law
Editing concerns

1.3 Script Writing
Script formats
Writing styles
Writing techniques

1.4 Presentation and Hosting
On Camera skills./techniques
Off Camera skills/techniques Language skills

1.5 Producing
Pre-Production Management/Organizational Functions
Content organization
Scheduling/organizational skills
Budget production costs
Evaluation skills
Production Management/Organizational Functions
Post Production Management/Organizational Function

1.6 Field Production
Field Production coordination

2) Administration/Station Systems
Office & station procedures

3) Technical Skills

3.1 Typing/Computer Skills
Basic typing skills,
Computer operation for word processing,
Budgeting on a computer

3.2 Studio Camera
Basic electronic theory
Camera parts and functions:
Technical procedures/adjustments

3.3 Camera Operation
Camera procedures

3.4 Studio VTR
Studio VTR parts and functions;

3.5 VTR Operation
Operational procedures

3.6 Location Camera)operation
Operational procedures

3.7 Camera Techniques
Visual style options for program
Camera techniques
Framing and composition
Camera placement and movement
Shooting with a completed segment in mind

3.8 Location VTR
Field operation procedures

3.10 Audio
Sound related theory
Microphone operation
Sound equipment operation
Sound related procedures
Music & sound to enhance focus of a production

Table 3 (con't)

3.11 Lighting
Color temp. of natural,& artificial light
Role and placement of key, back, fill, set lights
Prepare and read a lighting plan for
Lighting procedures
Calculate electrical loads on circuit

3.12 Switching
Switching procedures/adjustments
Live switching functions
Character generator programming

3.13 Directing
Pre-production roles
Directing skills

3.14 Editing
Editing procedures
Editorial considerations
Editorial techniques

3.15 Graphics
Artistic considerations
Technical considerations
Simple video animation
Sub-titles

3.16 Set Design
Set design characteristics and procedures

3.17 Studio Systems
On-air procedures
Basic maintenance procedures

4) Background Knowledge
4.1 Language
Language skills
4.2 Inuit Culture
Traditions
History
Economics
Politics
Environment
Health and biology

5) Communications
Satellite and terrestrial distribution systems
Basic communication theory
The television industry
Advertising & Propaganda
Native broadcasting

The Proposed Curriculum

Using a Topic Analysis technique, the employee skill objectives were broken down into 44 instructional modules. These modules were further broken down into 10 video modules based on groupings suggested by the expert evaluation. Subjects which were rated as poor prospects for a hypermediated approach were not included in the video module content.

The 10 video modules, (shown in appendix B) once produced, would be transferred to videodiscs for curriculum implementation. The background knowledge areas would be converted to database information which would be transferred to CD ROM for use as on-line resources.

Demonstration Modules

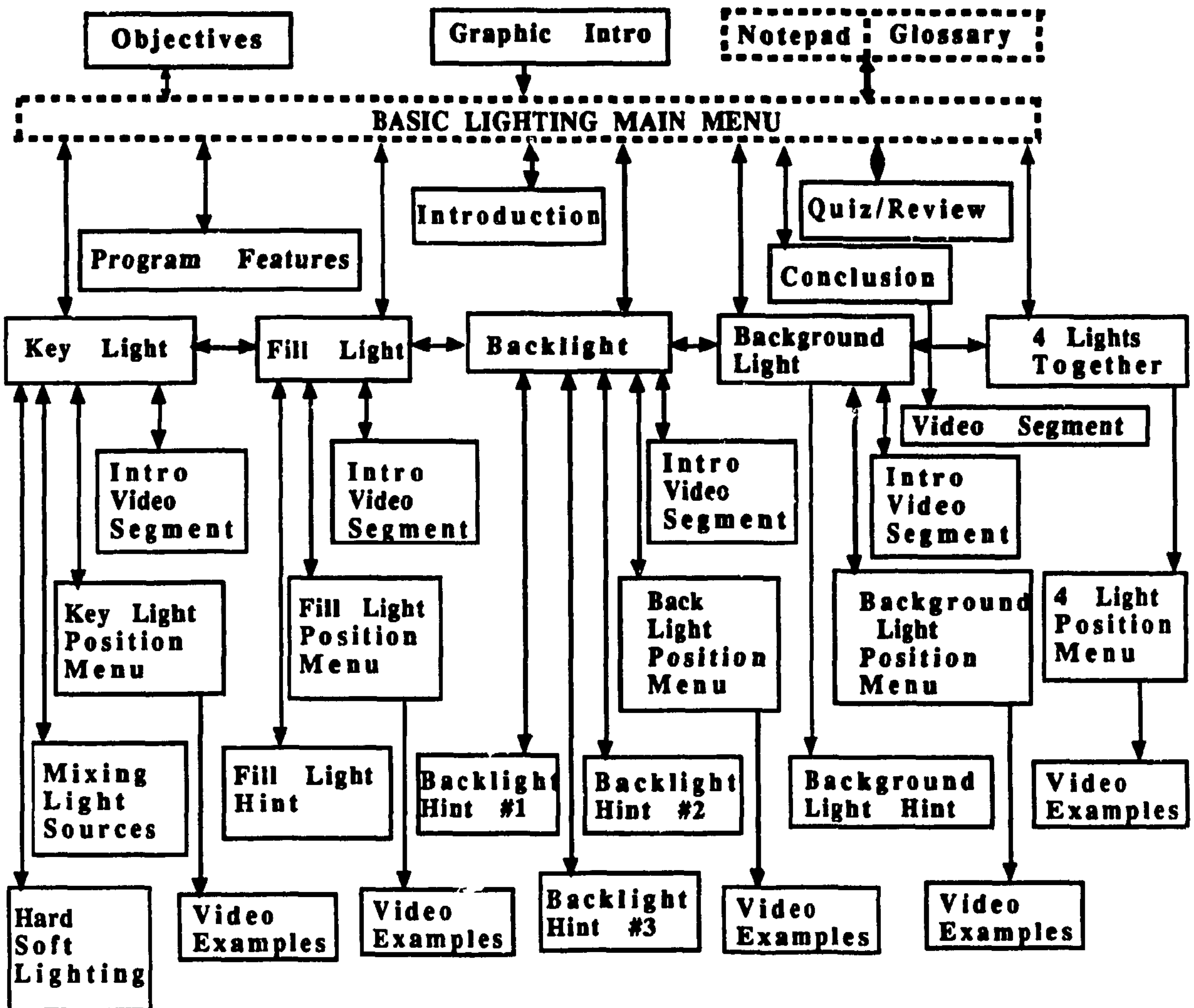
Sample Module-Basic Lighting

While it is not within the scope of this document to design an entire curriculum for these areas, I have selected two modules from the training modules outlined in the previous section to demonstrate the potential for a hypermedia approach. Of the five lighting modules suggested by the topic analysis, I have selected two for demonstration purposes: the role and placements of key, back, fill and background lights (Basic Lighting Techniques), and calculating the load on electrical circuits (Electrical Considerations for Lighting).

The choice of the sample module was in turn dictated by the availability of an appropriate videodisc which could be repurposed for this demonstration. The chosen disc was produced at Concordia University in 1987 as part of an interactive video class project (Domaradzki, 1990). Since it was produced for another purpose, I have adapted it as much as possible to operate within a hypermedia envelope.

Based on the skill objective areas outline in the needs analysis and the topic analysis, I have analyzed the component subskills required for the lighting module. I have not gone to the next stages of developing performance objectives and criterion referenced tests as advocated by Dick and Carey (1978) because of time constraints and because this is solely a demonstration module and is not intended for implementation at this time.

A hypermedia approach component flowchart for the basic three point lighting module is shown in Figure 6.



NOTE: Elements within dash boxes are accessible from any location

Figure 6. A Hypermedia Model for a Basic Lighting Module

Lighting Module Structure

The demonstration model follows a guided tutorial structure which restricts the concept linking to predetermined areas. It makes use of explanatory video sections, explanatory graphic information and a simulation which allows the user to see the result of turning on different lights. In some cases the user can select several variables such as the position of the light and its angle to the subject. (See figure 7 for a representation of the main selection menu). The module also contains hypertext features such as a glossary and an on-screen note-pad, both of which can be accessed from any location at any time. The glossary (see Figure 8) contains both visual and text references to the information discussed within any of the modules. The note-pad feature allows the user to keep on-going notes which can be later printed out for study and review. The note-pad function is also common to all modules.

Node Structure

The lighting module incorporates several types of node structures:

- Table of Contents nodes (TOC) or menu nodes which serve as indexes or sub-indexes (Main Menu)
- Resource nodes which contain a variety of information
- Concept nodes which contain a single concept of information
- Video nodes which are either single frames or a full motion sequence of video
- Work area node which is an electronic workspace for note taking. This node can be printed during or after a user session
- Non accessible Graphic nodes for visual display only

Figure 7. Lighting Module Main Menu Card

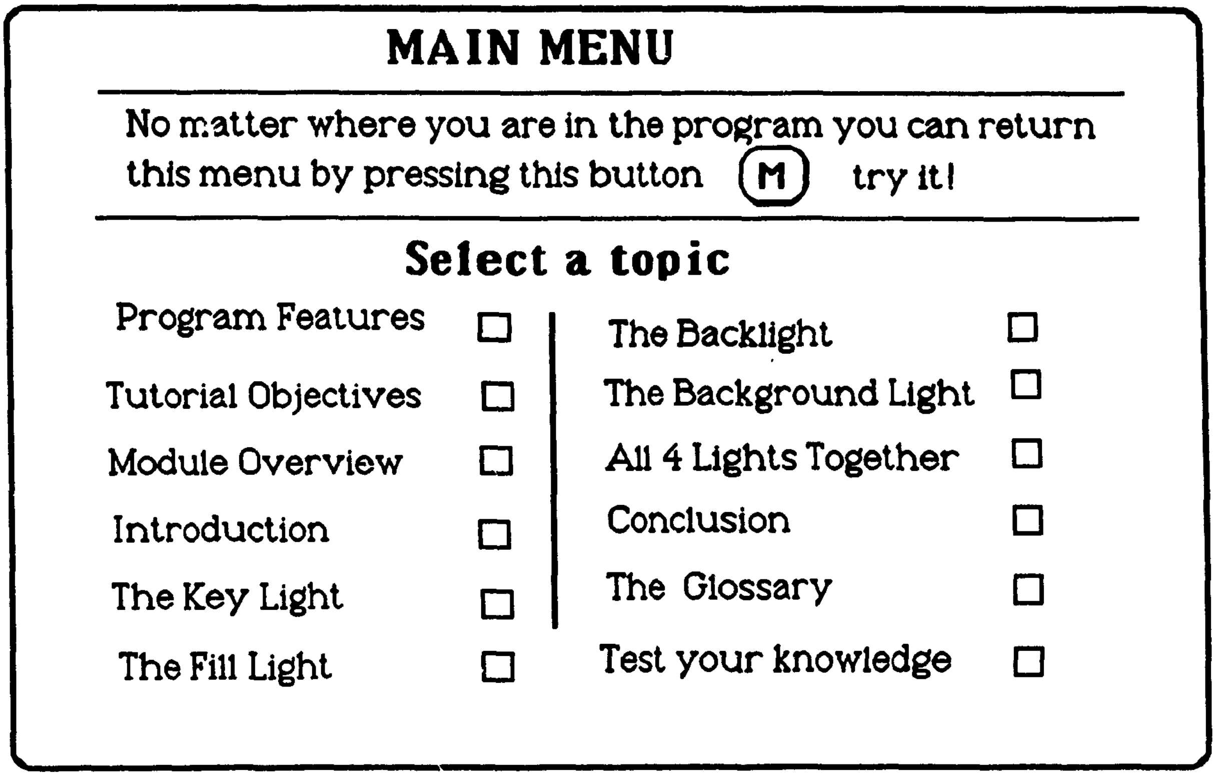
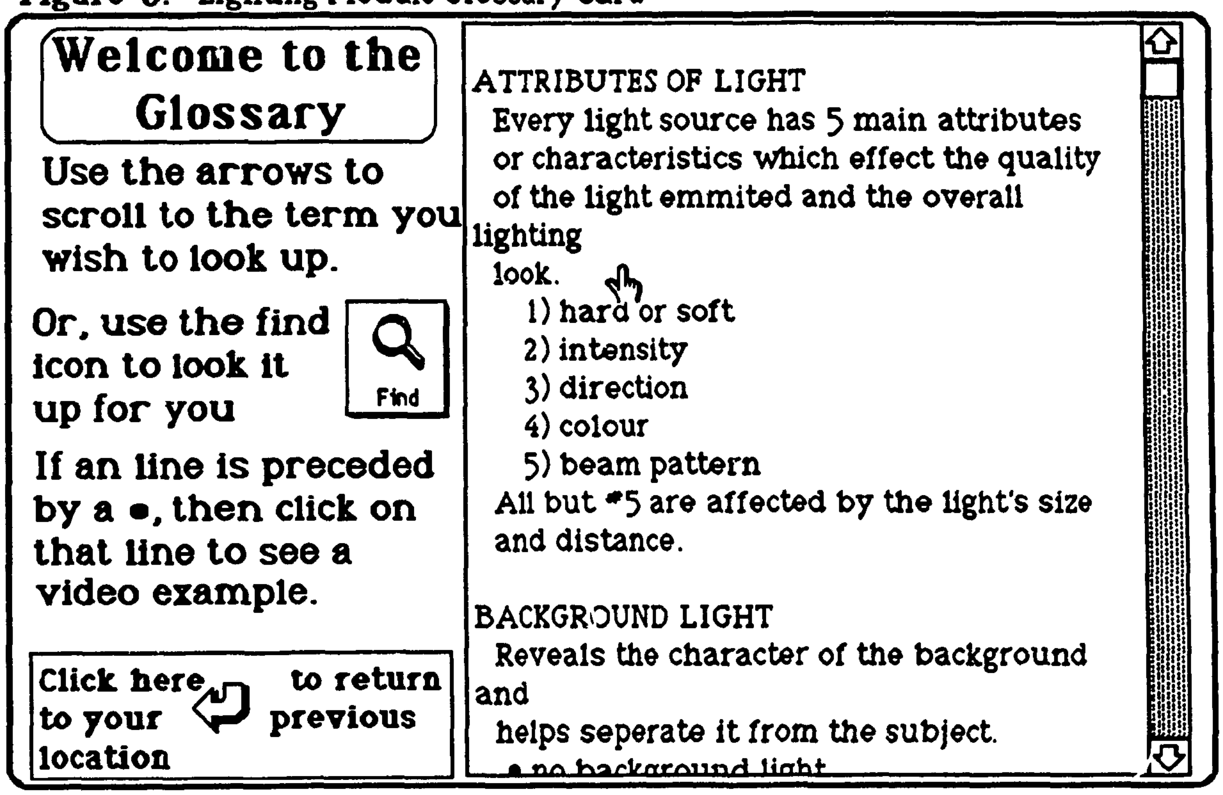


Figure 8. Lighting Module Glossary Card



Sample Module: Calculating Electrical Power Loads

The second demonstration module is largely a computer generated instructional unit, although it would use a video disc as part of its glossary or help functions.

Its objective is to enable the user to calculate the electrical load of a typical lighting situation and to select an appropriate electrical outlet to safely plug in each light. It also uses a simulation methodology to engage the user. It breaks the instructional task into its component sub-tasks and presents each as a frame of explanatory information. A game at the end of the module allows the user to assess their performance. (See Figure 9 for a representation of the game card) The user is asked to randomly assign a number of lights of randomly assigned wattage levels. The user must then plug the light into an appropriate socket which may or may not already have something plugged into it. This is also done on a random basis. The object is to plug all the lights into the sockets without blowing a fuse which is simulated by an explosion sound effect and a darkening of the screen. A sub routine keeps track of performance and provides feedback.

While this second example could be described as a typical CAL simulation rather than a hypermedia one, it was given to demonstrate the capabilities of the HyperCard authoring system for integrating graphics, text and sound in a relatively simple to design learning module.

I would like to suggest that these two demonstration modules offer only a glimmer of the potential of a hypermedia training system. Due to cost and time factors I am unable to present a more impressive demonstration. I would however like to briefly mention several other potential hypermedia modules for this series.

Figure 9. Lighting Module Overview Card

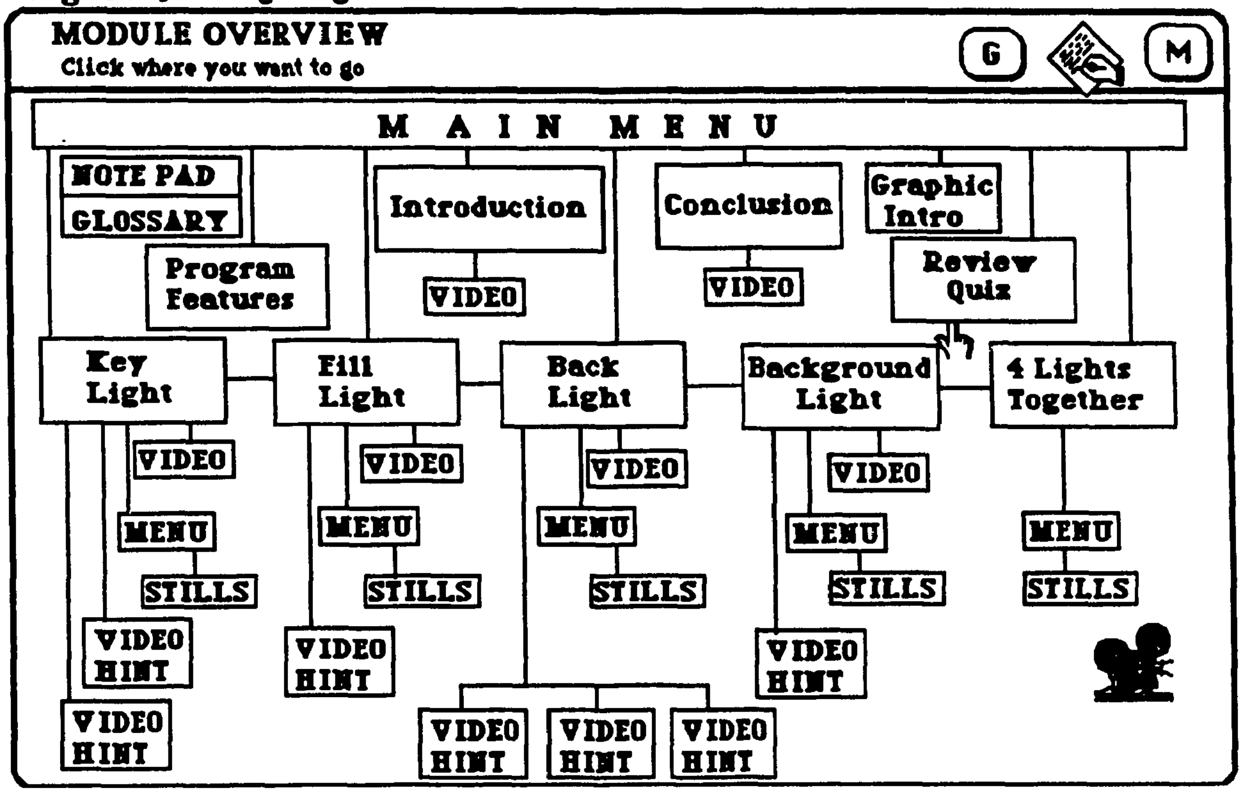
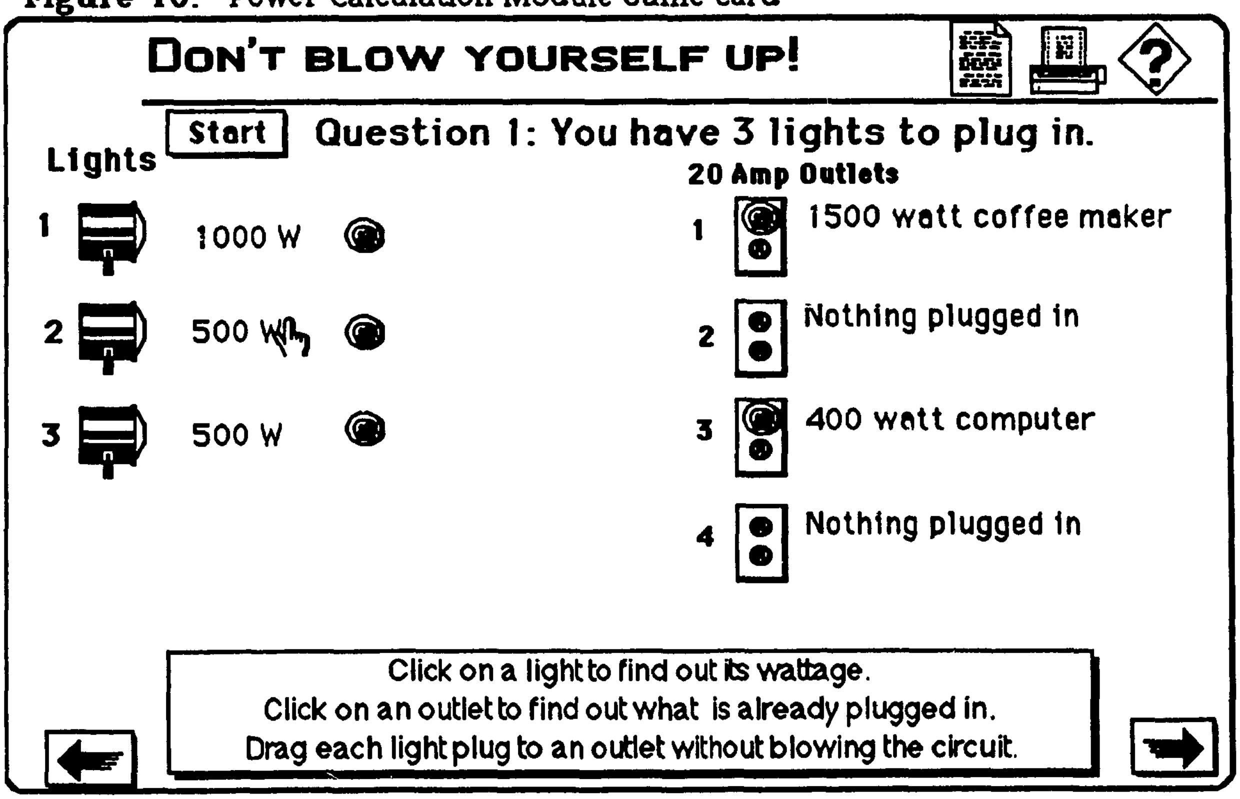


Figure 10. Power Calculation Module Game Card



A Vision of Possibilities: Visual Syntax Modules

As we have seen, one of the advantages of a hypermedia system is that all informational concepts are stored as individual nodes which can be accessed by a simple linking structure. The visual syntax course I will discuss next would take advantage of this principle by using a common bank of curriculum modules (as suggested earlier) to form a course about a specific area in this case Visual Syntax. The instructor could draft the structural outline of the course and then insert specific modules as required, such as lighting, composition, camera locations, etc.

One of the difficulties often encountered in teaching film or video production techniques in the north is the difficulty students have in grasping the concept of film as a logical sequence of separate, individual shots which are linked into segments, which are linked with other segments to form a program. Just like the grammar and syntax of language are necessary for effective spoken communication, a visual vocabulary and syntax are required to effectively communicate a desired visual/audio goal to an audience.

The goal of this hypermedia course then, would be to help students develop this visual and audio syntax by:

- learning a visual vocabulary (basic shots, film and video terminology)
- learning camera movements and image manipulation
- developing the technical skills of video
- developing a basic understanding of image composition
- developing basic lighting skills
- learning where to put the camera (the implications of camera placement)
- learning basic editing (putting images together)

Each of these topics would be a independent module.

The program requirements of Northern native television organizations generally fall into the categories of public affairs/news programming, documentaries, children's programs, drama and sports. The skills learned in this curriculum would be readily transferable to the different format and program types used in the north and required by native broadcasters.

The skills taught in this module would be broken down into the following sections:

Visual Vocabulary. The module would begin by developing the concept of a visual vocabulary. The notion of the shot, types of shots in different settings, (long shots,medium shots, close ups), manipulation of shots, (pans, tilts, dollies, focus shifts, camera angle, etc.)will all be presented by demonstration, followed by an interactive section which would allow the student to choose appropriate examples in response to prompts reflecting specific design goals. A knowledge review/test situation would evaluate student progress and provide corrective feedback. This procedure would be common to all sections.

Technical Skills. This section would deal with useful technical skills such as proper exposure and focus, white and black balance of video cameras,.tripod use and hand held camera. A wide range of good and bad examples would illustrate various "what if" situations.

Composition. Although much of composition is subjective, there are some basic concepts which seem to be fairly universal. These include: the notion of the frame and balancing the visual information within it, dividing the frame into horizontal and vertical thirds to avoid excessive centering and head and eye space considerations. Exceptions to the rule would also be demonstrated and discussed. Still photos with computer generated overlays would allow a large variety of visual examples and trainee interaction.

Basic Lighting Techniques. This section would demonstrate the various types and effects of light in a variety of situations (e.g., the colour difference between sunlight at dawn and sunlight at noon). It would cover the various types of lighting equipment and would illustrate basic lighting approaches which might be used in typical situations. By using a branching technique, the user could turn on or off various lights within a scene to see the effect on mood, exposure, etc.

Selecting a Camera Location. This section would focus on selecting an appropriate spot to place the camera vis a vis the action to be taped. Sample locations might include a meeting situation, indoor interview, outdoor interview, or outdoor skill demonstration. Using a random walk technique the student could place the camera in any position in any of the 4 situations . They could also select a type of shot (LS, MLS, MS, MCU, CU) and the camera angle (low, eye level, high). The available shots could then be organized to fit specific scenarios appropriate to the design goals. Each situation would have typical problems which one might encounter on location, such as lighting, inappropriate background, sun position, obstructions, noise, etc.

Putting Images Together. This section would discuss the concept of editing together pictures which flow or merge to communicate an idea. The establishing shot, shot length, changing shot size and angle, the moving shot, editing to movement, shooting to facilitate editing, matching action and cutaways, etc. would each be demonstrated in a good/bad situation.

As an interactive exercise, a full range of video shots of simple activities such as catching a fish, making coffee, or going for a ski-doo ride would be available as raw material on a videodisc. Using the hypermedia work station, the student could then assemble an appropriate sequence of shots relevant to a specific goal. These shots could be put together in any order desired. The completed sequence or story would be recorded on the VCR, and played back as required. The computer program would recognize acceptable combinations of images and suggest corrections if inappropriate images were used.

CHAPTER 5

CONCLUSIONS

When I began this thesis it was on the assumption that interactive video was a potentially useful strategy to teach television production skills to northern natives. As I researched the concept of hypertext and its logical extensions into hypermedia, it became clear that there was a large overlap in learning theory, capabilities, possibilities and hardware with IAV. The possibilities which I saw in an IAV approach were encompassed and expanded with hypermedia. As a result, my conceptual and technological base shifted towards hypermedia, which at this point in time seems to offer the most educational potential. Part of the richness of hypermedia is that it supports a enormous variety of approaches including the basic strategies of CAL, the audio visual potentials of the videodisc and the conceptual linking strategies of hypertext, all within a single envelope.

Hypermedia and Native Learning

Native Learning Styles

The learning styles of native Indian and Inuit have been shown to be more visual oriented, based more on observation and less on interrogation when compared to their urbanized non-native counterparts (Kaufback, 1984).

Kaufback suggests that learning style differences can in part be attributed to family rearing practises and environmental conditioning (Kaufback, 1984). Browne (1990) attributes this difference in learning styles to right hemisphere dominance. Left dominant learners are able to deal effectively with the abstractness of language, developing wide vocabularies or formal meanings. For right dominated learners, meaning is more self centered, more concrete, tied to visual and tactile symbols. She maintains that the linear, sequential process of the left hemisphere dominates the curriculum and methodology of most schools often to the detriment of native students.

Computers and Native Learning

At their best, computers encourage an active, participatory learning which can be individualized to the needs of each student. Students can proceed at their own pace, learning is reinforced immediately (Bork, 1987). The role of the teacher is changed from information dispenser to information guide (Heffron, 1984).

The noncritical teaching approach, the self-paced learning, the visual capabilities and the perceived status of a computer environment are all factors which would also suggest that a CAL or hypermedia methodology would work well within a native context.

Many of the functional characteristics of the computer are consistent with native values and practise. We have already mentioned the visual aspects of CAL which build on native learning strengths. A CAL environment would also encourage the native strengths of independence, private practise and humour.

The Keewatin experiment (Fahy, 1989) has shown that a computerized environment was seen as a positive factor in attracting and maintaining student interest and attendance. Although students didn't learn more than a non-CAL control group in this experiment, motivation and attendance were higher in the CAL group. This is an important factor in communities with high unemployment and lots of young people with poor educational background.

Hypertext and Native Learning

Hypertext and hypermedia proponents argue that the structural operation of these systems is similar and complementary to many of the ways in which we learn. The node-link analogy of hypertext has its counterpart in the interrelated schemata of our semantic networks. We learn by adding to and rearranging our existing schemata or knowledge structures (Jonassen, 1988). Hypertext provides a structure for depicting and displaying knowledge structures as well as a means for transferring them into the learner's own knowledge base.

The strong visual connotations of hypermedia would suggest that it would be useful in a native context. Gardiner (1990) suggests that the visual aspects of hypermedia cater to the right hemisphere brain functions. If this is so then hypermedia could be even more useful to a native user than the more traditional CAL approaches advocated by Kaufback and Heffron. It should be pointed out that their endorsement of a CAL approach was made before hypertext and hypermedia approaches were widely discussed or practically available. As mentioned earlier, hypermedia can supports a variety of approaches from any form of CAL, to interactive video to the conceptual modeling strategies of hypertext.

The effective use of computerized learning strategies can be effective at redressing many of the biases of traditional instructional methodologies.

Distance Education as an Approach for Northern Training

This thesis envisages a training system composed of an instructor resource base and a network of hypermedia work stations located in communities throughout the north. Each work station would consist of a computer, videodisc and CD ROM players, a curriculum of self directed instructional modules and all required resources. These resources would include background research materials, data bases, visual examples and raw video or audio footage.

Training programs would be conducted on an ongoing basis with instructors initiating the training and then intermittently visiting each community for several weeks at a time to teach the things which need the physical presence of an instructor. Between visits the trainees would learn and practise by themselves using the work station curriculum and resources and using on site production equipment as required for assignments.

Contact with an instructor would be on a regular basis using a combination of phone, fax or modem depending on the circumstances. Exercises and programs would be transmitted electronically to the instructor resource center for comment, assistance, evaluation and feedback The electronic transmission would allow rapid feedback between user and instructor.

Hypermedia systems operate in an information (data) rich environment. The ability to communicate (send and receive data) with other systems is a key requirement in a hypermedia distance education context. These developments aside, it is clear that the existing telecommunications infra- structure is already supporting many of the communication requirements of a hypermedia system and, assuming a steady level of technical innovation, will be able to support all requirements in the near future.

The Cost of a Hypermedia Approach

It would cost approximately $332,000 (see budget in Appendix C) to develop and produce the training program envisaged by this thesis. This amount does not include the actual implementation and delivery costs. Delivering a traditional on site training program for 6 persons will likely cost about $246,000 (IBC, 1990).

It is difficult to do a cost comparison between the traditional training program and a hypermedia based program because of the large front end costs associated with a hypermedia approach. The start up costs for a traditional training program are minimal since the training curriculum development and instruction methodology costs have been largely absorbed over time by each communication organization.

The advantage of a hypermedia approach to training is that once its development costs have been absorbed, it is a relatively self-sustaining curriculum and methodology which can be easily adapted to a number of system configurations to meet the specific needs of each organization.

Training costs may be slightly lower due to more efficient use of training staff and trainee resettlement costs. One instructor could work with several groups of trainees in different communities. Instruction of smaller groups could be done at each production center on a regular basis rather than sending trainees to one location for an annual training program. With a hypermedia approach it would be theoretically possible to train a single individual in a cost efficient manner, something that traditional programs cannot do easily or cheaply.

Clearly, no single native communications organization has the resources at this time to implement the approach suggested by this thesis. The only logical alternative is to have the development costs covered by an external agency, organization or foundation and have the curriculum available to all native broadcasters to implement in a complementary fashion with existing training programs.

A Viable Curriculum.

This thesis has only scratched the surface of the potential of a hypermedia based training system. The few examples demonstrated are an inadequate representation of what hypermedia systems are capable of. The primary demonstration model on lighting was chosen because of the availability of a videodisc whose content was somewhat similar to that required for an actual module. The other examples are only potential components within eventual larger modules.

At the heart of this or any hypermedia system is useful information that can be easily accessed by the user. The ability of hypermedia to demonstrate, illustrate and simulate practically anything within the realm of the sight and sound spectrum can make it an enormously useful tool in teaching a content whose working context is words, sounds and pictures.

As shown by the development budget, designing and producing a hypermedia curriculum is an expensive process, but not out of line with the production costs of producing a traditional film or video project.

Possible Training Options

Educational Institution/Industry Mix

As previously mentioned, there does not currently exist a northern parallel to southern broadcast/journalism training since the demise /discontinuation of the Arctic College Journalism program. Even when it existed it did not fully meet the needs of the northern broadcasters and did not graduate professional journalists ready to step into existing jobs (Styles, 1989). Arctic College graduates still required some entry level training to integrate fully into their prospective organization.

The overall educational environment of an institution like Arctic College can provide many supplemental benefits to a student. An educational institution is often more conducive to learning because it provides a student access to supplementary reading, writing and language courses, resource personnel and services, a library and counselling services. These services can enhance and reinforce the learning experience (Stiles, 1990).

In the best possible situation, northern journalism training should occur in a mix of educational and industrial environments (Stiles, 1988). This work-study approach allows the educational institution to develop the foundation of research, writing, language and basic technical skills along with contextual knowledge of local, regional and national issues. The industry component of this training can refine and develop the basic skills acquired at school and focus on training directed at technical and operational skills required by the broadcaster or chosen by the student. This industrial component could be accomplished by short term apprenticeship periods. In this mix of educational and industrial training environments, the personal attention, possibility for growth and increase in self confidence are maximized.

Since the demise of the Arctic College journalism program, a northern institution based training program is not possible. In these circumstances, northern broadcasters have little choice but to maintain the status quo and continue training as they have, that is by diverting production and operational funding for training programs.

The option suggested by this thesis would be a modular hypermedia based training program which could be implemented in tandem with existing programs or as a stand alone training package.

Possible Hypermedia System Configurations

Possible combinations of the modular hypermedia training system suggested by this thesis could include:

- On site training for small groups where one instructor could work with several groups at different locations visiting each on an as- required or rotational basis
- Individualized on site/on the job training/orientation for individual employees with minimized instructor contact.
- Institutional or industry-based use as a self study/resource aid with minimum instructor contact.

Such a system would have several advantages. (1) It could enhance on the job training by providing the new employee with a more structured learning curriculum which could be accessed at times mutually convenient to the broadcasting organization and the employee's work schedules. (2) It would allow training at locations which otherwise would not justify a full time training program. (3) It could train small groups of one to four persons. (4) It would allow more efficient use of trainer/instructor time. One trainer could work with several groups in different locations on a rotating basis. (5) A work station could be used by existing staff for on-going professional development training.

Areas For Further Research

Hypertext and hypermedia are concepts which have only recently begun to be discussed and implemented. As a result there is very little empirical research regarding hypertext and hypermedia. This presents many intriguing research possibilities and questions.

This thesis contends that a hypermedia approach to learning would be an effective strategy for native people. While the research I have cited suggests that this is true, no empirical studies have been made to validate this argument. Further research is suggested in this area.

As suggested by many authors (Marchionini, 1988, Jonassen, 1988, Conklin, 1987), new learning strategies are required to maximize the learning potential of the hypermedia environment. Research is required to evaluate existing strategies and develop new ones based on the user characteristics of age, maturity, cognitive styles, attitudes towards learning and cultural background.

The issue of learner control has still not been resolved. The literature in conventional CAL studies suggests that maximum learner control works best with high ability, self-directed users. Further research is required to determine how users of different abilities learn within a hypermedia environment and assess what level and type of control works best for different users.

In terms of the physical structuring of a hypermedia document, further research is required to determine optimum access strategies for learning (open, structured, guided). Other technical considerations such as how best to overcome or minimize the disorientation and cognitive overload experienced by hypermedia users also suggest further research.

The unique characteristics of hypermedia pose many challenges in terms of assessing actual learning. Quantitative criterion referenced evaluation is not always possible because of the conceptual navigation inherent in hypertext. Further research is required to determine how best to evaluate cognitive retention performance if that is the best evaluation method

Heffron (1984) makes the point that program designers must be aware of the cultural background of their audience to make an education product which is culturally relevant to them. An educational or training package designed for native people should also reflect the external aspects of their culture such as language and self-image as well as the intrinsic values and beliefs of their society.

Accepted courseware design implies a planning, design and evaluation process that considers the intended users of a project, be it native or non-native. Given a professional standard, this should take the cultural context into account. However, more research is needed to see how electronic learning materials can be designed and adapted to meet the needs of native people.

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Appendix A

	ASSESSMENT CRITERIA				
1	Do reading & writing play an important role in achieving this goal?				
2	Can this skill be learned alone?				
3	Is the topic stable? (subject matter unlikely to change)				
4	Are visuals (other than text) important in achieving this goal?				
5	Is sound important in achieving this goal?				
6	Does/could the skill/goal suggest a branching strategy?				
	(ie. alternate info/review based on response,could be sound text or visual)				
7	Could aspects of this skill/goal be simulated?				
8	Does this goal suggest a user controlled, hypertext strategy? (multi-leveled information)				
9	Does the goal require other than physical skills?				
	true/yes = 3				
	sometimes true/maybe = 2				
	Never true/no = 1				
INSTRUCTIONAL GOALS FOR BASIC JOURNALISM/TELEVISION PRODUCTION					
	Each goal should begin with; The trainee will be able to....				
	Assessment criteria #				
1 STORY DEVELOPMENT		**Geo**	**Tom**	**Terry**	
1.1 Writing and Research					**Mean**
1	identify story ideas	25	25	23	24.3
2	demonstrate brainstorming techniques	21	25	20	22
3	evaluate story ideas	25	24	20	23
4	identify story focus,	22	25	20	22.3
5	identify research sources	23	25	22	23.3
6	conduct research	22	25	22	23
7	organize research to support focus	21	25	17	21
8	identify resources for program	22	25	22	23
9	select interview clips	22	26	24	24
10	locate other audio/ visual materials/resources	24	25	24	24.3
11	prepare final script based on clips	22	27	18	22.3
12	write precis of written and interview material	22	25	18	21.7
13	take accurate notes	25	25	24	24.7
14	define the term bias, hidden agenda, balanced view	24	24	19	22.3
1.2 INTERVIEWING					
1.2.1 Organizing the interview					
15	write clear focused questions based on the 5 W's	22	24	18	21.3
16	prepare follow-up questions	21	23	22	22
17	conduct pre interview	20	20	16	18.7
18	rewrite questions based on pre interview	18	23	16	19

1.2.2	**Directing and controlling the interview**				
19	develop appropriate relationship with interviewee	13	19	17	16.3
20	set the tone of the interview	14	20	16	16.7
21	clarify unclear or evasive answers	15	21	19	18.3
22	maintain focus	14	20	19	17.7
23	respond to unexpected response	14	21	20	18.3
24	control answer/interview length	15	22	18	18.3
25	verbalize appropriate wrap-up comments, closing remarks	15	17	16	16
1.2.3	**General skills**				
26	conduct a scripted interview	18	22	17	19
27	conduct an interview from notes	17	19	18	18
28	improvise an interview	15	18	17	16.7
29	define and conduct streeter interview	16	18	16	16.7
30	define and conduct multi-person interview,	16	18	16	16.7
31	define and conduct phoneout interview,	16	18	16	16.7
32	define and conduct standup interview,	16	18	16	16.7
33	define and conduct scrum interview	16	18	16	16.7
34	define and conduct double ender interview	16	19	16	17
35	correctly respond to cues from floor director	16	17	22	18.3
36	write cue sheet for director	17	18	18	17.7
37	demonstrate correct mic handling for interview situations	23	18	15	18.7
38	demonstrate telephone interview protocol	18	20	18	18.7
39	identify spec. concerns when interviewing elders,kids,etc..	23	23	16	20.7
40	identify aspects of broadcast law vis a vis interviews	21	23	20	21.3
41	identify editing concerns for interviews	23	23	21	22.3
1.3	**WRITING**				
1.3.1	**Script formats**				
42	write a program proposal	23	23	19	21.7
43	write a treatment	23	23	17	21
44	write a shooting script	23	24	18	21.7
45	write tape transcripts	23	25	21	23
46	write an edit script	23	25	19	22.3
47	write a studio cue sheet	22	25	18	21.7
48	write a program rundown	23	24	17	21.3
49	write program credits	24	24	16	21.3

Appendix A

1.3.2 Writing styles					
50	write dialogue	24	23	16	21
51	write continuity: intros, extros, bridges and series	24	24	18	22
52	write editorials and commentary	24	23	16	21
53	write reportage	24	24	17	21.7
54	write narration	24	24	18	22
55	script item based on print article and radio transcript	23	23	18	21.3
56	use drama and humour to strenghten focus	23	23	16	20.7
57	use quotes	24	22	18	21.3
58	write narration to given length	24	22	20	22
59	prepare a storyboard	24	24	17	21.7
60	select appropriate visuals to strengthen story	23	22	20	21.7
61	script a story without narration or dialogue	22	22	18	20.7
1.4 PRESENTATION AND HOSTING					
62	read intros, extros, bridges and copy on camera	17	21	17	18.3
63	chair panel discussion	15	18	16	16.3
64	demonstrate techniques for voice over narration	17	21	19	19
65	mark script for pauses, emphasis	26	25	22	24.3
66	correct vocab./grammar and pronunciation in Inuktitut	19	24	16	19.7
67	elocute/articulate on camera	16	21	16	17.7
68	ad lib on camera	16	20	15	17
69	read scripts to time	22	21	18	20.3
70	demonstrate on camera delivery styles	16	21	17	18
1.4 PRESENTATION AND HOSTING.					
71	sight translate selected passage of script	21	22	18	20.3
72	demonstrate on camera relaxation and breathing techniques	16	18	14	16
73	choose appropriate on camera dress and appearance	18	19	15	17.3
74	use television makeup	14	19	16	16.3
75	demonstrate basic acting skills	14	19	15	16
1.5 PRODUCING					
1.5.1 Preproduction					
76	identify objectives of program or segment	22	22	16	20
77	identify intended audience for program or segment	22	22	17	20.3
78	Identify and choose appropriate program format;	22	22	18	20.7
79	prepare production schedule	22	23	19	21.3
80	write a production budget	22	22	21	21.7
81	develop/rewrite the script	23	22	15	20
82	prepare implemention plan for production schedule	22	22	21	21.7
83	identify, recruit and hire talent	17	22	16	18.3
84	prepare release forms	22	22	18	20.7

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1.5.2	**Production**				
85	manage crew-coordination/supervision during a production	13	17	17	15.7
86	describe roles of all production personnel	20	20	18	19.3
87	demonstrate problem solving skills in a production setting	21	21	16	19.3
1.5.3	**PostProduction**				
88	screen, log and evaluate material	24	25	19	22.7
89	prepare editing script	24	25	18	22.3
90	identify editing procedures	22	24	20	22
91	organize program packaging	23	23	21	22.3
92	supervise the editor	20	24	20	21.3
93	identify production and technical standards	26	26	21	24.3
94	identify procedures for production follow-up	21	25	17	21
95	prepare promotional strategy for program	24	23	22	23
1.5.4	**Field production**				
96	prepare implemention plan for field shoot	19	20	17	18.7
97	find and collect stock shots for story/library	21	24	17	20.7
98	demonstrate procedures for safe transport of equipment	16	21	17	18
99	identify stories and program ideas while on location	25	21	16	20.7
100	make arrangements for facilities, transport and staff	21	23	15	19.7
101	demonstrate public relations. skills	17	19	17	17.7
2.1	**ADMINISTRATION/STATION SYSTEMS**				
102	use the vertical file system	22	25	20	22.3
103	use the tape library	23	25	19	22.3
104	use the tape numbering system	22	24	19	21.7
105	use the equipment sign out procedure	22	24	18	21.3
106	use facilities scheduling	22	24	19	21.7
107	use the station filing system for scripts	22	24	20	22
108	identify administration policy/sick leave,overtime,etc.	19	24	14	19
109	demonstrate and use time sheets	22	24	17	[illegible]
110	demonstrate familiarity w. constitution /bylaws of organization	20	24	16	20
111	use the library: indexing, cross referencing	23	24	19	22
112	book travel	22	24	17	21
113	demonstrate procedure for tape traffic (sked,shipping, copies etc):	23	24	19	22
3	**TECHNICAL SKILLS**				
3.1	**Typing/computer**				
114	Type 30 words/min with two fingers	19	21	20	20
115	demonstrate computer operation for word processing,	18	24	21	21
116	demonstrate graphics techniques for title generation,	21	25	22	22.7
117	demonstrate computer operation for budgeting	19	24	23	22

Appendix A

3.2 Studio Camera					
118	identify and demonstrate camera parts and functions:	21	25	21	22.3
119	explain basic electronic theory	24	26	21	23.7
120	explain basic optical theory,	23	26	20	23
121	demonstrate camera set-up	20	24	19	21
122	identify video cables & connections,	21	24	21	22
123	identify common power sources,	21	24	19	21.3
124	demonstrate intercom/tally procedures/protocols,	22	24	19	21.7
125	adjust CCU's as required	18	24	18	20
126	demonstrate knowledge of lens functions,	20	23	20	21
127	demonstrate technique for tripod/dolly movements/adjustments	16	22	15	17.7
3.3 Camera Operations					
128	set white & black balance,	19	24	20	21
129	select appropriate filters	19	24	21	21.3
130	select appropriate gain setting	19	25	20	21.3
131	adjust viewfinder	19	25	21	21.7
132	clean lens	16	24	15	18.3
133	demonstrate procedure for treatment of burns	17	25	17	19.7
134	demonstrate procedure for shipping, storage	18	24	18	20
135	phase and converge system	18	25	21	21.3
136	demonstrate operational terminology (directors cues, shot names),	25	26	22	24.3
137	identify safety procedures	20	26	18	21.3
3.4 Studio VTR					
138	identify and demonstrate VCR parts and functions	21	24	22	22.3
139	identify and demonstrate control functions (play,search, etc)	19	24	19	20.7
140	set audio levels	20	24	22	22
141	demonstrate studio cable routing and connections	20	24	22	22
142	demonstrate edit functions of studio VCR's	18	24	21	21
143	demonstrate procedure for VCR adjustment,skew, tracking,etc.	19	24	19	20.7
144	identify common power sources	20	23	18	20.3
3.5 VTR Operation					
145	connect VCR to camera	19	24	18	20.3
146	connect VCR to monitor	19	24	18	20.3
147	demonstrate knowledge of signal termination,	20	24	20	21.3
148	adjust monitor	19	25	19	21
149	demonstrate knowledge of waveform, levels,	22	25	21	22.7
150	demonstrate knowledge of color bars and sync, tone,	22	24	20	22
151	demonstrate knowledge of preroll, director's cue	23	24	18	21.7
152	demonstrate procedure for test recording	19	23	18	20

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3.6 Location camera operations					
153	connect camera to VCR	19	24	18	20.3
154	demonstrate knowledge of weather proofing	19	23	17	19.7
155	prepare camera for safe shipping	18	23	17	19.3
156	demonstrate procedure for defrosting	18	23	17	19.3
157	identify common power sources	19	24	18	20.3
158	set white & black balance	20	24	19	21
159	demonstrate use of tripod, monopods, braces	16	24	15	18.3
160	select appropriate filter	20	25	21	22
161	demonstrate procedures for camera safety	20	24	18	20.7
162	demonstrate problem solving skills in production setting	24	25	18	22.3
3.7 Camera Techniques					
163	identify visual style options for program	24	24	19	22.3
164	use camera either hand held or tripod mounted	18	21	13	17.3
165	demonstrate ability to zoom, focus, follow focus and DOF	17	20	14	17
166	break down a sequence into component shots	21	24	21	22
167	demonstrate appropriate framing and composition	19	22	18	19.7
168	demonstrate appropriate camera placement and movement	19	23	17	19.7
169	shoot from vehicles	17	18	13	16
170	shoot with a completed program in mind (editing)	23	23	20	22
3.8 Location VTR					
171	connect microphone to VTR	21	24	20	21.7
172	connect camera to VTR	19	24	18	20.3
173	select appropriate input switches	21	24	21	22
174	identify common power sources	19	24	18	20.3
175	set proper levels for test recording	21	25	21	22.3
176	demonstrate procedure for battery charging	19	24	17	20
177	demonstrate use of preroll	17	24	16	19
178	describe roles of personnel on 3 person shoot	21	22	22	21.7
179	clean heads	19	23	16	19.3
3.10 Audio					
180	explain basic princples of wave theory of sound	25	26	21	24
181	explain the theory of sound recording on tape	25	26	18	23
182	explain tape handling/characteristics	22	23	19	21.3
183	explain the principle of signal flow	25	25	22	24
184	dmonstrate the correct operation of a microphone	23	24	22	23
185	identify microphone types	24	24	24	24
186	select the appropriate mic for a given situation	24	25	22	23.7
187	demonstrate proper microphones placement	23	25	21	23
188	use windsocks, filters and blimps to reduce outside noise	22	23	19	21.3
189	select and operates station mic stands and booms	20	24	18	20.7
190	operate turntable, cassette recorder, reel to reel recorder	18	25	22	21.7
191	operate station mixers	19	26	21	22

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192	clean and handle records correctly	17	24	16	19
193	explain station audio routing system and patching	23	26	22	23.7
194	demonstrate correct operation of AGC in recording/editing	20	26	19	21.7
195	identify and demonstrate operation of equalization functions	20	26	21	22.3
196	demonstrate the principle and operation of a VU meter	20	26	19	21.7
197	explain the theory of impedence, vis a vis mic/line in/out	24	25	18	22.3
198	identify common audio connectors and cables	21	24	23	22.7
199	identify audio person's role on ENG shoots and in studio	21	23	22	22
200	set levels for a multisource mix, in studio and in post prod.	18	26	21	21.7
201	mix down two channel audio to channel 2	18	26	20	21.3
202	prepare and read audio cue sheets	22	25	17	21.3
203	use music and sound to enhance focus of production	23	25	19	22.3
3.11	Lighting				
204	explain color temp. of natural, fluor.,incand. light	22	25	20	22.3
205	identify and correctly place key, back, fill, set lights	22	25	21	22.7
206	select appropriate light for key, back, fill or set lights	21	24	19	21.3
207	use filters to soften shadows/create mood	21	24	20	21.7
208	unpack, set up, tear down and repack a portable light kit	16	20	14	16.7
209	operate light meter	18	25	17	20
210	change bulbs	16	21	15	17.3
211	demonstrate techniques for bouncing light	19	25	16	20
212	demonstrate safety procedures in studio and on location	20	25	16	20.3
213	calculate electrical loads on circuit	24	25	18	22.3
214	prepare lighting plans for a variety of locations	22	24	21	22.3
215	light graphics	21	25	18	21.3
3.12	Switching				
216	phase system	20	24	21	21.7
217	adjust monitors to correct hue, brightness and color	20	24	21	21.7
218	perform all switcher functions on director's cue.	17	21	21	19.7
219	program character generator	18	26	21	21.7
220	operate time base corrector	19	24	19	20.7
221	identify system routing of all cables/connections	22	24	19	21.7
222	demonstrate ability to trouble shoot system malfunctions	24	24	18	22
3.13	Studio Directing				
223	prepare shooting script, shot sheets	19	24	15	19.3
224	prepare schedule/studio assignment for studio tapings	19	22	18	19.7
225	demonstrate principles of framing and composition for studio	20	23	19	20.7
226	demonstrate pacing, rhythm, and variety in shot selection	21	23	17	20.3
227	use standard camera and studio directions	23	22	20	21.7
228	direct talent	17	20	16	17.7
229	demonstrate camera placements in interviews	22	24	19	21.7
230	supervise and direct crew	15	21	13	16.3
231	improvise when directing	15	20	13	16
232	describe crew roles in the studio	20	24	18	20.7

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3.14 Editing					
233	Log audio and video tape	22	25	21	22.7
234	prepare paper edit	23	25	16	21.3
235	prepare editing script	24	24	17	21.7
236	perform rough edit from script	23	25	22	23.3
237	perform insert and assembly edits	19	27	24	23.3
238	demonstrate appropriate use of control track, color bars and tone	19	26	23	22.7
239	demonstrate slate/count down procedure	21	25	21	22.3
240	cue, preview, and perform an edit	19	25	24	22.7
241	demonstrate techniques to maintain continuity: , style , content	23	25	22	23.3
242	demonstrate editorial techniques for pacing/mood/contrast/	23	25	20	22.7
243	demonstrate standard shot transitions(overlaps/fades/diss)	23	24	21	22.7
244	perform audio/video split edits	23	24	22	23
245	evaluate and catalogue material in field	22	25	15	20.7
246	mix multiple soundsources	18	24	19	20.3
247	edit to a given time	20	24	20	21.3
3.15 Graphics					
248	explain gray scale/colour basics	22	23	20	21.7
249	select appropriate tools and materials	19	23	20	20.7
250	design graphics for titles,credits,PSA's, station ID's, bridges	24	24	19	22.3
251	prepare graphics using slides, drawing, collage, etc.	23	23	18	21.3
252	demonstrate simple video animation on character generator	17	23	20	20
253	use character generator with live action and video tape	17	23	20	20
254	use time base correction and chroma key	17	23	18	19.3
255	prepare and insert subtitles with character generator	19	24	21	21.3
3.16 Set Design					
256	identify considerations when designing a program set	23	24	18	21.7
257	demonstrate use of cyc, flats,back projection, keyed backgrounds	17	25	18	20
258	choose appropriate set materials, props,furniture, flats	18	25	18	20.3
3.17 Studio Systems					
259	demonstrate on-air procedures	22	26	22	23.3
260	demonstrate basic maintenance	20	25	20	21.7
261	demonstrate shipping procedures	20	26	18	21.3
262	perform minor repairs in the field	20	26	18	21.3
263	demonstrate fault reporting procedure	23	26	20	23
4 BACKGROUND KNOWLEDGE					
4.1 Language					
264	demonstrate working knowledge of Inuktitut, written and spoken	22	25	20	22.3
265	demonstrate working knowledge of English, written and spoken	22	25	20	22.3
266	demonstrate bdcast quality interpretion/translation techniques	21	25	18	21.3
267	demonstrate bdcast quality sight translation techniques	20	25	17	20.7

Appendix A

4.2 Inuit culture					
4.2.1 Traditions					
268	demonstrate familiarity with cultural values, skills, myths, etc.	21	24	18	21
4.2.2 History					
269	demonstrate familarity with northern aboriginal history	19	24	18	20.3
4.2.3 Economics					
270	describe local and regional economic infra structures	20	23	21	21.3
271	describe mandate/structure of local /regional organizations	20	23	21	21.3
4.2.4 Politics					
272	describe the role of government and laws	24	25	21	23.3
273	describe the role of Canadian constitution	23	24	21	22.7
274	describe the role of institutions and agencies	23	24	21	22.7
275	describe the role of lands claims	23	24	21	22.7
276	describe the role of self government	23	24	21	22.7
4.2.5 Environment					
277	identify wildlife management issues	20	24	20	21.3
278	describe roles of protection agencies	21	24	20	21.7
4.2.6 Health and Biology					
279	idescribe traditonal healing methods	21	23	18	20.7
280	describe role of nutrition	21	24	20	21.7
281	identify symptoms of alcoholism	21	24	19	21.3
282	describe of immune systems and diseases	21	24	20	21.7
283	describe role of health care delivery system	21	24	20	21.7
5 COMMUNICATIONS					
284	identify methods of audio and visual transmission	25	24	23	24
285	describe role of satellite and terrestial distribution systems	25	24	21	23.3
286	describe sender/receiver communication model	26	24	19	23
287	define propaganda	26	24	17	22.3
288	discuss role of television Industry	26	24	20	23.3
289	discuss role of advertising	26	24	18	22.7
290	describeroie of U.S., Canadian, regional and local media	26	23	19	22.7
291	describe models of television systems(Ownership & regulation)	26	24	19	23
292	describe models of television (formats)	26	24	21	23.7
293	criticize television via criteria, standards, critical analysis	26	24	19	23
294	describe role of television in South and North	26	23	18	22.3
295	describe role/history of native broadcasting,,	26	23	16	21.7
296	describe role of NACS	23	23	16	20.7
297	describe role and impact of TVNC	23	23	16	20.7

APPENDIX B
VIDEO INSTRUCTIONAL MODULES

1) Story Development

1.1 Writing and Research

VIDEO MOD #1
Story ideas
Story focus,
Choosing usable clips

Research sources
Basic writing skills

1.2 Interviewing

VIDEO MOD #2
Organizing the interview
Directing and controlling the interview
Interview formats
Interview skills
Editing concerns

Broadcast law

1.3 Script Writing
Script formats
Writing styles
Writing techniques

1.4 Presentation and Hosting

VIDEO MOD #3
On Camera skills/techniques

Off Camera skills/techniquesLanguage skills

VIDEO MOD.#3
1.5 Producing
Pre-Prod. Man. Organ. Functions
Content organization
Scheduling/organizational skills
Budget production costs
Evaluation skills
Prod.Man.Organ Functions
Post Prod. Man./Organ FunctionS

1.6 Field Production
Field Production coordination

2) Administration/Station Systems
Office & station procedures

3) Technical Skills

3.1 Typing/Computer Skills
Basic typing skills,
Computer operation for word processing,
Budgeting on a computer

VIDEO MOD #4
3.2 Studio Camera
Basic electronic theory
Camera parts and functions:
Technical procedures/adjustments

3.3 Camera Operation
Camera procedures

3.4 Studio VTR
Studio VTR parts and functions;

3.5 VTR Operation
Operational procedures

3.6 Location Camera)peration
Operational procedures

VIDEO MOD #5
3.7 Camera Techniques Visual style options for program
Camera techniques
Framing and composition
Camera placement and movement
Shooting with a completed segment in mind

3.8 Location VTR
Field operation procedures

VIDEO MOD #6
3.10 Audio
Sound related theory
Microphone operation
Sound equipment operation
Sound related procedures
Music & sound to enhance focus of a production

VIDEO MOD #7

3.11 Lighting
- Color temp. of nat.,& artificial light
- Role and placement of key, back, fill, set lights
- Prepare and read a lighting plan
- Lighting procedures
- Calculate electrical loads on circuit

3.12 Switching
Character generator programming

VIDEO MOD #8
- Switching procedures/adjustments
- Live switching functions

3.13 Directing
- Pre-production roles
- Directing skills

VIDEO MOD # 9

3.14 Editing
- Editing procedures
- Editorial considerations
- Editorial techniques

VIDEO MOD #10

3.15 Graphics
- Artistic considerations
- Technical considerations
- Simple video animation
- Sub-titles

3.16 Set Design
- Set design procedures

3.17 Studio Systems
- On-air procedures
- Basic maintenanc proceduresе

4) Background Knowledge

4.1 Language
- Language skills

RESOURCE MOD #1

4.2 Inuit Culture
- Traditions
- History
- Economics
- Politics
- Environment
- Health and biology

RESOURCE MOD# 2

5) Communications
- Satellite and terrestrial distribution systems
- Basic communication theory
- The television industry
- Advertising & Propaganda
- Native broadcasting

APPENDIX C

Hypermedia Training Program Development Costs

For the design, development, production and evaluation of a training program consisting of 44 training modules, 10 video modules (on 3 videodiscs) and 1 CD ROM disc

Materials Cost		Quantity	Rate	TOTAL
Prototype computer work station		1 @		$10,000
Videotape,for producing sements, (10 hrs)		30 tapes @	$40	$1,200
1" videotape for Laser master		2 tapes @	$200	$400
Videodisc Mastering copy		3 masters @	$1,800	$5,400
Videodisc copies		12 copies @	$20	$240
CD ROM Master disc		1 master @	$1,000	$1,000
CD ROM copies		4 copies @	100	$400
Authoring package licence				$500
	Sub total			**$19,140**
PRE-PRODUCTION				
Project Manager/Producer		60 days @	$350	$21,000
Instructional designer/writer		90 days @	$350	$31,500
Subject matter consultants		10 days @	$300	$3,000
Information programer		30 days @	$350	$10,500
Production Assistant		60 days @	$150	$9,000
Segment Director		10 days @	$300	$3,000
Office expenses		60 days @	$50	$3,000
Telephone/postage		3 months @	$1,500	$4,500
	Sub total			**$85,500**
PRODUCTION				
Project Manager/Producer		20 days @	$350	$7,000
Instructional designer		5 days @	$350	$1,750
Information programer		5 days @	$350	$1,750
Production Assistant		20 days @	$150	$3,000
Director		20 days @	$300	$6,000
Cameraman		20 days @	$300	$6,000
soundman		20 days @	$300	$6,000
Actors/on camera hosts				$5,000
Equipment rental		20 days @	$700	$14,000
Lodging (5 people)		20 days @	$300	$6,000
Travel (5 people)				$10,000
Per Diems(5 people)		100 days	$50	$5,000
Office expenses		20 days @	$50	$1,000
Telephone/postage etc		1 month @	$1,500	$1,500
Freight				$1,000
	Sub total			**$75,000**

POST PRODUCTION			
Project Manager/Producer	60 days @	$350	$21,000
Instructional designer	15 days @	$350	$5,250
Information programer	60 days @	$350	$21,000
Production Assistant	40 days @	$150	$6,000
Director	40 days @	$350	$14,000
Editor(picture and sound)	40 days @	$300	$12,000
Rental,(off-line) 20 days @ 250/dy	40 days @	$150	$6,000
Rental,(on line) 2 day/8 hrs @ 500/hr	16 hrs @	$500	$8,000
Voice-over narrators	2 days @	$450	$900
Music			$3,000
Sound mixer	2 days @	$250	$500
Audio Mix	40 hours @	$100	$4,000
Translations	20 days @	$250	$5,000
Office expenses	40 days @	$50	$2,000
Telephone/postage	2 months	$1,500	$3,000
Sub total			$111,650
System Test/Evaluation			
Project Manager/Producer	10 days @	$350	$3,500
Instructional designer	10 days @	$350	$3,500
Program evaluator	10 days @	$350	$3,500
Travel			$3,000
Travel/lodging/per diems	10 days @	$200	$2,000
Sub total			$10,500
			$301,790
10% Contingency			$30,179
TOTAL			$331,969

BUDGET SUMMARY	
Material Costs	**$19,140**
Pre Production	**$85,500**
Production	**$75,000**
Post Production	**$111,650**
Systen Test and Evaluation	**$10,500**
Sub Total	**$301,790**
10% Contingency	**$30,179**
TOTAL	**$331,969**