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Teaching with Video Programs: From Closed Use to Open Use

Donna Sharon

Abstract: This paper explores the connection between the nature of the television/video media and the practice of using them in teaching. Much of the current use (and non-use) of television/video is based in a conventional view of these media, a view which focusses on the mental passivity associated with the experience of viewing. While recognizing this phenomenon, this research begins instead with a focus on the sensory and personal connections that also accompany viewing.

Based on an analysis of actual classroom use of video programs, this paper presents four categories of teaching practice: "closed use", "one-way use", "partial use" and "open use". These categories indicate the extent to which teaching practices do and could recognize television/video as a medium of sensory, personal involvement. The final sections consider the implications of this analysis for classroom teaching, for producing video and support materials and for developing good use of newer technologies to support teaching and learning.

Resume: Cet article s'arrete sur les liens entre les medias de television et video et leur utilisation dans 1'enseignement. L'utilisation actuelle (ou la non-utilisation) de la television et du video est basee sur une vision conventionnelle de ces medias. une vision qui met 1'accent sur la passivite intellectuelle associee au visionnement de material. Tout en reconnaissant ce phenomene, cette recherche s'interesse d'abord aux liens sensoriels et personnels qui accompagnent le visionnement.

Base sur 1'analyse de 1'utilisation de programme video dans la salle de classe, cet article presente quatre categories de pratique d'enseignement: utilisation fermee, utilisation laterale, utilisation partielle, utilisation ouverte. Ces categories indiquent jusqu'a quel point la pratique d'enseignement reconnait ces medias comme un medium d'experiences sensorielles et personnelles. Finalement, les implications de cette analyse sont presentees quant a leurs impacts sur 1'enseignement, sur la production de video et de material de support ainsi que sur le developpement d'une bonne utilisation des technologies nouvelles comme support a 1'enseignement et a 1'apprentissage.

Introduction

In contrast to the view of television as a medium of mental passivity (Krugman, 1971; Mandler, 1978; Kubey & Czikszentmihalyi, 1990) this paper focusses on the personal, sensory nature of television and video. (McLuhan, 1964; Wartella, 1987; Mcllwraith, 1994; de Kerckhove, 1990, 1995).

Unlike earlier studies of school television/video use, this research explored the use of video programs as it occurred naturally in classroom settings. The research method is modelled on an interpretive rather than an

experimental process (VanManen, 1990), designed to develop a new understanding of how television/video viewing does and can contribute to learning.

The analysis looks at how teachers can and do take the personal response that television and video evoke into account in their teaching practice. Four broad categories are suggested: "closed use", "one-way use", "partial use" and "open use". Consideration is given to the ways video programs could be produced, presented to teachers and used in classrooms when this aspect of the media is kept in mind. Finally, this paper raises questions to consider when exploring the pedagogical implications of newer technologies.[1]

The conventional view of television/video use in schools

During the 1950s and 1960s, television was still a new medium and little had been written about its use in education. Some educators felt threatened by the perceived ability of this new technology to replace the teacher; others were impressed by the attention that television demanded and were eager to explore how it could be used in education. Many different methods and approaches were suggested. At this time, television was still perceived as a new educational tool (perhaps comparable to CD-ROM and multimedia today) whose potential was as yet unknown.

Smith (1961) described several ways that instructional television could raise the quality of teaching. Writing before the spread of Krugman's concern with the low level of mental activity, Smith saw television as a means to "arouse students' interest and attention" which teachers can then direct to the subject matter under consideration (p. 18-19). This approach was based on the view of teacher as deliverer of instruction; it presented television as a way to hook or entice students into the curriculum being taught.

Wilkinson's *Educational Media and You* (1971) also included directions for using classroom television. He began by pointing out that, like the classroom teacher, the television teacher can use his/her voice and gestures to convey personal feeling and involvement with the subject matter. However, he was quick to add that television can not replace the teacher because the television teacher does not receive feedback from students and is therefore limited in its ability to communicate effectively. It took several years to confirm that a televised lecture could not replace a live teacher (Cambre, 1987, pp. 5-6).

Wilkinson also argued that 'immediacy and personal magnetism' were the special facets of television. He wrote: "Immediacy has been the strongest argument for the use of television. Proponents of educational television claim that watchers of television feel the illusion that what they are seeing is happening 'now' "even though they are aware that the program may be on tape or on film" (p. 121). He also proposed that light and sound waves bring a

'telepathy' that is almost as effective as the communications presented by a live teacher. Like McLuhan, Wilkinson attributes the personal response television evokes to the 'light and sound waves' of both television and film. To both McLuhan and Wilkinson, the unique value of television was seen to reside in the personal senses and feeling it evokes.

Despite his understanding of the sensory nature of television viewing, the specific pedagogical guidelines that Wilkinson proposed suggested an emphasis on the information being delivered and the mental activities of learning (p. 122). Like Smith, Wilkinson assumed that television is a tool to help teachers deliver curriculum and that the personal involvement television elicits is useful only as a first step: to entice the interest of students.

In the 1970s, educators became increasingly concerned with television as a passive experience that minimized - perhaps even curtailed - mental activity. The leading research on the value of video in teaching conducted by Salomon (1979b) drew attention to the general perception of television viewing even in a school situation as requiring less active thinking than did other media, particularly print. Since television was perceived to be mentally less demanding than comparable print material, learners were reported to invest less mental effort in television/video and to generate fewer inferences from it. To compensate for this lack of mental effort, Salomon found that making explicit task demands increased the amount of effort students invested and the amount of inferential learning they achieved.

Based on this research, instructions to teachers in the 1980s focussed on compensating for the mental passivity of television (Cunningham, Anderson & Leithwood, 1985). The most widely-adopted strategy suggested that teachers precede their use of video with a question or direction that draws students' attention to particular information or concerns. Providing such a focus for viewing was suggested in order to enlist students' mental processing while watching by giving them a mental task. In order to introduce opportunities for mental activity, teachers were encouraged to show long program in chunks and ask questions at each break point to ensure that students were paying attention to the information or ideas delivered by the program. Cunningham, Anderson & Leithwood (1985) also recommended asking post-viewing questions and providing related activities to "reinforce content, practice skills, or encourage questioning and critical thinking" (p. 15). These strategies focussed on overcoming the "couch potato" image of video viewing.

Rethinking the Conventional Approach: From "Closed Use" to "Open Use"

Typically, teachers have been encouraged to use the personal response that video elicits as an attention getting base from which they can deliver

instruction, set up an activity and cover the curriculum. The pedagogical perspective underlying this approach views teaching as a process of delivering curriculum (teacher-centred). Both general guidelines and particular teachers' guides that accompany specific programs are often based on such an approach.

This paper suggests that the sensory arousal which accompanies television viewing can be seen as a kind of personal experience, made up of the perceptions and feelings stored by viewers and available for later reflection (Gendlin, 1978). The pedagogical perspective underlying this approach to using television/video focusses on the student as an active, involved learner and sees the teacher as a facilitator who supports, encourages and guides students in their learning. From this perspective, television/video is seen as a medium that invites students to express their personal response, which provides a foundation for reflection, critical thought, and awareness of the learning process.

Types of Classroom Use

Based on the classroom observations presented below, I describe classroom use of video as ranging from "closed use" at one extreme, where there is no recognition by the teacher of the personal response that viewing evokes in students, to "open use" at the other extreme, where teachers recognize and build on the sensory response that students experience. At the closed end, the teacher's focus is strictly on providing curriculum and directing response; as teachers become open to students' personal response, their attention shifts to using video in recognizing and involving students' personal participation and making room for students to direct their own learning.

As described below, four different approaches to using video were seen in the classroom research. While one teacher was not at all open ("closed use"), two teachers directed their students' attention to the personal elements presented in the video ("one-way use"), two teachers provided indirect recognition of students' feelings ("partial use"), and one teacher invited and built on students' personal response to the program ("open use").

The following table summarizes the classification of the programs seen in classroom use and presented in this research.

Table 1
Pedagogical Styles When Using Video Programs in the Classroom

Type of Use	*How Used in Teaching*	*Example(s): by Program Titles*
"Closed Use"	Avoided consideration of feelings.	*You Can Say No*
"One-Way Use"	Drew students' attention to the feelings and processes presented in the programs.	*Adolph Hitler Up Close*
"Partial Use"	Asked students to incorporate their opinions in answering questions and presenting their views.	*The Great Gold Mine Strike*
"Open Use"	Asked students to express their response to the program as a basis for assessing the message and its implications.	*The Lorax*

Teachers' openness to students' personal response when using video is consistent with teachers' use of student-centred elements in their teaching, as described in *Archetypal Forms in Teaching: A Continuum* by William Reinsmith (1972) and in Teaching for Understanding by Cohen, Milbrey, McLaughlin & Talbert (1993). The "closed use" of video programs is consistent with Reinsmith's most teacher-centred forms of teaching, namely teacher as disseminator/transmitter and teacher as lecturer/dramatist. The "one-way use" of video might be linked to Reinsmith's category of teacher as inducer/persuader, who draws students attention to the feeling element of the video to help convey their point. The "partial use" of video can be linked to the teacher as inquirer/catalyst who calls on students' opinions in an effort to steer them toward a particular train of thought. The "open use" of video programs is consistent with Reinsmith's student-centred teacher. The teacher as facilitator/guide is continually aware of students' experience, draws students out, confirms the value of students' life experience and is responsive to students' initiative.

Similarly, in the pedagogy called Teaching for Understanding (Cohen, et al., 1993) teachers no longer see themselves as the transmitters of knowledge and engineers of behaviour; instead they become involved with students in

constructing knowledge. Teachers who decide to move to this approach undertake substantial new learning in order to rethink both what is taught and how it is taught. This approach is based in a knowledge of the learner which the teacher uses to guide conceptual change in the learner. "Teachers must be able to consider subject matter through the eyes of the learners; they must be able to interpret the learners' comments, questions and activities through the lens of a particular subject" (p. 2). Classrooms using this approach are characterized by generally cooperative relations and ongoing communication among students, by recurring support for trying out new ideas and by a close and active relationship between students and teacher (p. 2-3). The "open" style of video use is very consistent with this pedagogical approach.

Classroom Research: Research Method

Large numbers of studies on instructional television and media were done in the 1960s, '70s and '80s. Early research struggled unsuccessfully to show that one medium was generally superior to another. While concluding that children can and do learn from television, the research literature offered little information or understanding about when and how to use which programs (Cambre, 1987; Bryant, Alexander & Brown, 1983).

In their review of the literature, Clark & Salomon (1977) indicated that little of value could be gained from the research. See also: (Clark, 1983; Clark & Salomon, 1986). They attributed the failure of this research to its highly analytic and detached approach, and concluded that the research did not represent the classroom world of education (p. 106).

Initially, this study was designed to explore what could be learned by observing actual use of video programs in Grade 7 and 8 classrooms and asking teachers to describe their plans. After reviewing the literature on using video in school teaching, I had accepted Clark's view (1983) that instructional design and the novelty of new media, rather than the nature of educational media, play a predominant role in the use of teaching materials and resources. Despite this predisposition, my pilot research in classrooms led me to focus instead on the nature of the television/video media and its impact in the classroom.

In doing the actual research, I attended 13 Grade 7 and 8 classes during the 1992-3 school year. I watched 13 programs in use, observing classroom activity, noting (and often audiotaping) what was said, and how students and the teacher behaved. I selected six of the thirteen programs to report in detail.

In the six chosen settings, the programs consistently drew students' attention and involvement. This involvement could be seen in such elements as their constant eye contact with the screen, their body language, and the decrease in the usual level of social contact among students. Four of the 6 programs were designed with classroom use in mind, while two were produced for broadcast television or home viewing.

In the classrooms I visited, I watched for events and listened for words that indicated how teachers were using video programs, what the programs offered, and what happened in the class when they were shown. I watched three elements of classroom communication and all the interrelationships at once - the teacher, the video, the students. I talked to teachers before and after classes, sometimes taping the conversations, and then transcribed tapes or filled out notes made during these conversations.

While including all three elements in my observations and consideration, I was especially interested in what the teacher did and didn't do before, during and after the video program. I began to note where teachers focussed on increasing mental activity to counter the assumed passivity associated with video and where teachers made room to recognize the nature of the video medium in evoking personal response.

In the analysis, consideration is given to the process presented in the program, as well as the content, an approach that McLuhan (1964) suggests is particularly appropriate to the personal involvement of television viewing. While consideration of both content and process is part of all teaching and learning, the relative attention given to each component varies: it appears that a relative emphasis on content is associated with an avoidance of personal response in the classroom, while an emphasis on process increases as room is made to include personal response.

Classroom Research: Six Examples

1. "Closed Use": You Can Say No

What I call "closed use" can be seen in the way a teacher, I call Pam, used the program, *You Can Say No.* This program was designed to encourage students to consider their potential use of harmful substances such as alcohol and non-prescription drugs. The program included four generally well-acted dramatic scenes where students could see young people like themselves handling intense situations. It was designed to provide a lot of information in an appealing manner, to show some examples of situations where young people are enticed or encouraged to consume alcohol or drugs or to behave irresponsibly, and to model ways young people can handle pressure and choose to say no. Pam, the teacher I observed using the program, gave the students a handout with questions on the information covered in the video.

The students were very interested in watching the program. There was steady participation in answering the questions asked on the handout given them. For many students, the program evoked personal experiences and feelings. This could be seen and heard from the regular talking back and forth among small groups of students and from the personal stories and concerns expressed by three of the students.

Pam stopped the video three times during shifts in the program. In the discussions, she focussed on the information provided in the program, supporting the assumption that students who know more of the consequences will make better decisions. The questions on her handout asked for information - how many years does it take for an adolescent to become addicted to a drug? Name two health problems that may be associated with drinking? How does cocaine affect your body? Many of the students questions during the discussions asked for the meanings of some of the terms used, such as sober, joint, etc.

The second skit showed one girl refusing to drive home with a girlfriend who had been drinking, deciding to call her father instead. This was followed by some factual material. While considering the question,"What are some problems related to impaired driving?", several students became involved in a lively exchange about alcohol strengths and blood levels. One student asked "why do they make alcohol if it's just going to hurt people?" Several students respond all at once with positive ideas about alcohol use - it's for celebrations, its for New Years Eve, its okay if you don't drink more than 3 beers, etc. - and the talk ended when another student added - "there's a person down the street from me and he was drinking and he killed himself and his girlfriend."

Pam did not comment on these personal views - either the possibility that moderate use could be harmless or that the personal impact of alcohol abuse can be devastating. Instead she continued, "Let's see, oh another comment that was made was that there is almost the same number of passengers killed as drivers, so you as a passenger getting into a car with someone who has been drinking, you're risking your own life there as well, so you have to be very very stern, if you see someone who has been drinking, don't get into the car, you can say no, find some other way to get home."

Following the fourth skit, while students were answering the question, What are two facts about cocaine?, one student responds that it releases dopamine in the brain. Another student asks what dopamine is and Pam explains that "dopamine is already a substance in your brain, that's what causes a rush or a high and then you come down. You can be addicted to cocaine the first time you try it."

Pam then asks a student, Janet, for a second point and Janet says "Well I was going to ask you before if some people, if they have mental disorders. Is that the same effect as some drugs, because like, some people have, like, he had this thing like where he'd - feel happy and hyper and then, really happy and hyper, and then all of a sudden he'd get really depressed." Pam replies,"That would probably just be some sort of a neurotransmitter or dopamaine which is in his body naturally, shutting on and off." Janet adds, "He's not on any drugs," and Pam continues, "yeah, that's what I mean naturally, that's within his brain, but I'm not really too sure about that." Janet then continues, "It was really serious, he died like [Pam says 'shh, girls, listen'], he died just recently

because, he'd, um, what happened was when he gets really really excited..." [girls not listening and Janet fades out, discussion peters out]. Pam points out to the students "that was very rude of you," then moves on to say, "meanwhile back to the ranch. Okay I want to hear some more facts."

In this situation the students did not listen to Janet's concerns and while Pam noted they were behaving rudely, she didn't ask Janet to finish her story or address Janet's concerns and emotional expressions about the person who died. Again, Pam kept very strictly to conveying the dangers of alcohol and drugs, without allowing consideration of students' experiences or feelings.

In the questions and answers after the viewing, Pam maintained focus on the information provided. At every opportunity she moved away from students' personal experiences and feelings and she did not offer her own. No room was provided for students to imagine themselves or remember themselves in similar situations. Students concerns were not invited into the whole class discussion or were ignored and discouraged. Pam was happy to use the appeal of the video to get students' attention but was not aware of or sensitive to the personal feelings that the video medium evokes.

By focussing on the phenomenological potential and process bias of the medium of video, a teacher could take a different approach. This might include stopping during, or at the end of, each dramatic sequence to ask students what they saw happening, whether they've ever been in a similar situation, or whether they thought the scene was realistic. Students could be asked about tough decisions they have made in the past and how they made them. By asking open-ended questions about personal feelings and experiences, students would have the opportunity to consider and share the personal meanings evoked by the program. A teacher could then move from there to encourage a reflective consideration of how students' personal experiences and feelings fit with their own beliefs and values and how they would affect decisions and behaviour. The information covered in the program could be provided in print form with time for questions at the end.

Pam's use of *You Can Say No* did not reflect any recognition of video as a medium that involves students in a personal way. She paid no attention to the feelings students expressed and made no effort to involve these responses in the teaching/learning process. I call this a closed approach to using the medium. Pam was closed to the opportunities provided by the video program to discuss students' personal feelings and opinions, or to consider how feelings and information are related in learning and decision making processes.

Rather, Pam was using video to deliver content. While this works on a cognitive level, the meta-message that may be conveyed to students is that personal response is not an important part of learning.

2. "One-way Use": Adolph Hitler Up Close

While I named the use of *You Can Say No* "closed use", I call the teacher Gail's practice of showing *Adolph Hitler Up Close* "one-way use". This two-hour program is a high quality documentary of a vary emotional subject, co-produced by British and American companies combined extensive historical footage with recent interviews and narration by an American film and television star.

Gail showed the program as part of a Grade 8 English course on the theme of Identity. She told the class that she was showing this program in order to develop students' respect for human life and their tolerance of differences, while building on their knowledge of WWII. Gail also told students that she was showing this program as an opportunity for them to develop listening, viewing, and note taking skills.

Gail showed the program in roughly fifteen-minute daily segments over a two-week period. She stopped the program every 3 or 4 minutes to review the notes students were making of the sequence of events.

After the first or second class, students learned the expected pattern of viewing and note taking. But many students had difficulty shifting from viewing to note taking and picking out the points Gail was looking for. Gail encouraged them to work at it with such comments as:

> okay when you write, you don't have to write sentences, you have to use your arrows and equal signs and all kinds of things like that, and little codes like H for Hitler, or whatever other codes you um devise for yourself... . Now don't get caught up in watching, remember we still have to listen, we hear not with our hearts, right, [later] We're going to see another video strictly for visuals, for the emotional part and you won't have to take any notes. I can only tell you that the last two classes it has been getting much easier for them to take notes, much easier as the time goes. You have to learn it. You have to do a real training of your mind, okay?

Over the first few days, Gail and the students seemed to accommodate to each other. Gail wanted students to get the points and give them to her when she stopped. At first students had difficulty separating themselves from the program to separate out and write down the main points. To help them, Gail started to call out, "Get that Down" for each point, to direct students attention to the main points. With this direction, students were able to note the points being made and give them back to her at the breaks. Despite the constant interruptions, many students adjusted and were able both to hook into the program while it was on and step back to record notes while it was stopped,as students comments below illustrate.

But the practice of shifting back and forth between watching and note-taking demanded ongoing attention. On the second last day, Gail again commented on this process:

> you need to remember that your brain has to be active and listening. You're getting much better at what you are doing. Put your hand up if you yourself feel there's an improvement in your own ability to get things down. Good! That's what I care about; that you're making progress in doing some very difficult tasks.

While conducting this activity, Gail repeatedly drew students' attention to the process featured in the program connecting Hitler's charismatic power and the course of events. She also drew their attention to their own mental processes in moving back and forth from video to print.

Gail drew students' attention to many of the feelings shown in the program. She encouraged students to repeat what they had seen and heard, and she provided two opportunities for students to relate particular experiences shown in the video to their own experiences in real life.

When asked about the value of the video itself, students said they understood more because they saw Hitler speaking, because they had seen real footage of the concentration camps and atrocities, and because they heard people who knew Hitler talking about him:

> like, if we were reading it out of a book it wouldn't attract your emotions... . They showed how the genocide [was]. You could feel the pain they were feeling and when we talk to the survivor we can feel something of what she was feeling.

> when you see them take the valuables out of their mouths and put them in their pockets... the expressions on people's faces.

> well some of the parts of the movie were sad, they just... and the way he acted towards people and how he could do those things.

> because it showed everything in front of you... people being shoved into graves and like... shot in the head, buried alive... [it showed] what Hitler was really like, how people suffered.

> because its about war and its fun [different feeling than others].

Most students seemed to be strongly engrossed and touched by the program. They were asked to learn to take notes, repeat what was shown, and to make connections with the learning they had been doing in the larger unit on WWII and the holocaust. The program kept their attention and most of them seemed to work at the tasks they were set. However, only one opportunity was given for students to express their own feelings about the international forms of abuse and discrimination they were seeing. After their visit to the holocaust

centre, students wrote personal reflection papers on what they felt about the experience and handed these in to their teacher. No organized class time was spent, either with the class as a whole, or in groups, with or without the teacher present, discussing the students' feelings about Hitler and the holocaust.

I call this example "one-way use" because it encouraged students to describe the feeling shown and to note the processes involved, but didn't provide them an opportunity to express their personal responses to what they were seeing and doing. Students were asked to identify the emotional elements presented in the program, but were not invited to express their feelings or to respond to what they were shown. The meta-message students receive may be that their personal feelings are not an important part of teaching and learning.

Teachers who adopt a facilitator role could pay greater attention to the students' response to what they were seeing. This program might be shown in response to student interest in how Hitler came to power and maintained it. Students would be asked to express and consider what the program meant to them personally and as a group, and to look at the questions the program raised for them to get ideas for further research.

3. "Partial Use": CBC News in Review: The Giant Mine - The Price of Gold

In the next example, *Adolph Hitler Up Close,* students were asked to identify the personal links presented in the video, but were not asked to express their own responses. In using this program, CBC News in Review: *The Giant Mine - The Price of Gold*, the teacher, Sandra, adopts what I call a "partial use" of video

The story Sandra chose from the March 1993 video is called *Giant Mine Strike: The Price of Gold.* Sandra saw it as helpful because it ties into the Grade 8 history lesson on the Yukon gold rush. On a more personal level, it talks about strikes, and the strike process, which connects with the labour unrest in the local community and "all that stuff that's happening to all those kids in their houses."

Sandra told me how she planned to lead the class.

> I've modified the work sheet, um we're going to take a few minutes at the beginning, we're going to talk about these [terms] to make sure we've got the language straightened out first of all, and they [the students] will probably have it quite right.... I'm going to put them in small groups and have them discussing one of these three issues, um, or we may just do it as a whole group, we'll just see how much time we have.
>
> ... I'm going to read... a little bit of information [from the introduction] that they'll need, that'll help them sort these things out... . The other thing I'm going to do is I'm going to talk to them about the fact that this is news footage that was broadcast on the TV

> news and that some of these people are angry and frustrated and using strong language. So in other words, I'm warning them that they're going to hear a word that they use a lot on their own anyway and say that its nothing you haven't said.

In talking with me, Sandra didn't mention or discuss the opening paragraph she included on the handout which reads:

> Cool Heads
>
> Clearly a great deal has gone wrong during this labour dispute. While attempting to assess the factors that led to the failure to resolve management and union differences, the tendency might be to focus only on the tragic events, the violence, and the sensational aspects. As much as possible, a careful and objective understanding of the situation is warranted.

At the beginning of the 10-12 minute item, CBC announcer Knowlton Nash explains what strikes are, that some strikes get out of hand, and that this is one of them. The story of the lockout and use of replacement workers is presented in a series of interviews with a reporter, a labour rep, the company president, a university expert, a striker who went back, and a picket captain. While their words tell what they think, their voices and bodies tell how they are feeling.

Then the reporter and mine officials announce that there has been an explosion in which nine men died, indicating that it seems the explosion was not an accident. Two days later, officials announce that the deaths were homicide. Two women are shown reacting with outrage and denial. The union says the announcement does not translate into the conclusion that strikers did it. The item shows the hostility to strikers and a counsellor helping students cope. Footage of the day of mourning is very emotional, showing the church service, One of the widows crying, and an RCMP friend of a miner at the funeral. This is clearly the most emotional part of the program. The mine reopens a few days after once safety is felt to be restored. Comments made indicate a move to decertify strikers, the possibility of a commission of inquiry, the company's refusal to bargain, delays in the investigation, and RCMP frustration. Other comments point out that some people may be withholding information and that the widows of the miners are particularly upset by not knowing what really happened.

At the end of the segment, Sandra stopped the tape and begins describing how the story presents us with "three sets of people who are locking heads. So you have a company and you have their point of view, and there's the union and it has its point of view, and there are people who are part of the union who now have sort of broken away from the union and are trying to go back quickly because they don't agree with the union's tactics. That's the third group, and I

think there's a fourth group, the mine workers and they have a job to do no matter how they feel about being involved." She draws students' attention to three questions at the bottom of the handout and assigns them to three small groups for discussion. "Now read the question out loud first so eveybody's aware of what the question is... try and put yourself on both sides of the question."

Sandra walked around to each group and after a few minutes (class almost over) asked students for their answers.

> Group 1 Question: Hiring nonunion replacement workers has been widely used ... should companies... be legally allowed to hire replacement workers?
> Students' answer: "We think its okay, there is another side to that question and they had it."
>
> Group 2 Question: Should management and staff be allowed to fill in?
> Students answer: "We think that isn't really fair, if you wouldn't want other workers to do your job when you are laid off."
>
> Group 3 Question: Should police... be used to escort replacement workers across picket lines?
> Students' answer: "We think that they should because their job is to protect."

Because the time was limited, short answers were given quickly with no time for exchange of views. Sandra asks students for their opinion about the rules that should be adopted for governing other labour disputes, and for a justification for their views. The questions are controversial ones, where people's answers reflect their values about what principles should be invoked. By asking for students' opinions, Sandra is using the personal element of the video program and is indicating that personal values are a legitimate element to be included in the discussion.

The questions that were raised for discussion were concerned with the people's rights on all sides of the labour dispute. The questions seemed to be designed to encourage students to look at a situation from several perspectives. However the situation was actually quite complex and each perspective was presented very briefly. Students were asked to give their opinions on several important issues raised in the story with little time to exchange views.

This program did a good job of presenting the story of the Giant Mine Strike. The most memorable moments occurred when seeing and hearing the key participants and the strong feelings evoked both by the murders and by the strike. However, in the classroom viewing, the central events of the deaths and the investigation of the deaths were pushed into the background. No

opportunity was given for the students to express their reactions to the deaths, grief of the families, and the discomfort of not knowing who was responsible.

Rather than minimizing attention to the strong feelings involved, a greater understanding might be possible by recognizing the sensational elements of the situation and how the different parties involved felt. This recognition can then serve as a base for considering the varying experiences and perspectives, the underlying legal principles and the alternatives that could be pursued to address everyone's needs.

This program could have also have provided an opportunity to make connections linking students' personal values with the students' responses to the program. While Sandra made efforts to include students' personal responses to the subject matter at hand and to invite students to develop personal opinions about the labour dispute process, no time was given to expressing their own responses to the program or to making connections between their personal responses and the formulation of opinions about managing labour disputes.

4. "Open Use ": The Lorax

This example presented what I call an open use of video, where the teacher invited students to respond to the program from their own experience and recognized this response as a central part of learning. The Lorax is a lavishly produced animated program designed mainly to entertain young children with lively singing and dancing, but the underlying story drew attention to the fictional Onceler's selfish mismanagement of the forest, despite the Lorax's pleas for the plants and animals that were being destroyed. In showing the program as part of a unit on forest management, Linda was able to draw students' attention to the story and ignore the entertainment elements.

Linda began this class by reviewing their recent visit to the nearby forest and the native and invasive trees and plants they had seen. Many of the students participated in answering her questions. Linda then told the students that they would be seeing *The Lorax* twice. The first time, Linda asked students to relax and enjoy the program and told them that the second time they would get a handout of questions to answer. In both cases, Linda showed the program without breaks.

Before the first showing Linda told the students to close up their books, and that she wanted them to just sit back and enjoy the video. She asked them to move to a place where they could see well, on a stool or on the floor if they wanted, and she turned off the lights.

The Lorax is based on the Dr. Seuss book of that name. The video was done as an animated musical, targeted to a younger audience. It moved back and forth easily between the text that advanced the story and the musical production numbers. Actor Eddie Albert read the lines while the animated

characters sang and danced as well as acted out their parts. During the showings, students were very attentive to the video, although there was some fidgeting during the longer musical numbers.

At the end of the video, Linda began by noting that she had wanted to tell the students before it started that this story was written by Dr. Seuss, and that as you get older you start to appreciate how good his writing is. She then asked a very open ended question, "What was it about? We spent about half an hour watching a video, what was it about? "

After a couple of brief answers, saying that the program was about saving the trees, saving forest life, the air and water, Linda asked, "was it about anything else? Megan?" Megan zeroed in on the heart of the video, namely that the program was about the greed of one person who wanted to be rich and the harm that came from short term planning. Another student talked about how the Lorax tried to speak up for the creatures, like the Swammy Swans and the Humming Fish of the forest, who were ignored by the selfish Onceler.

Linda then added her own observation. "One thing that really stood out for me this time, you never see the Onceler's face, what do you think that means?" A student adds that we never saw the faces of the Onceler's relatives either. And another suggested that means that everyone has greed, it could be anyone. One student suggested it was incidental and Linda asked the students what they thought, and to vote, showing the student who suggested this that others disagreed.

Linda suggested there are two aspects to the story, the forest side and the Onceler's side. She asked for some of the names the Onceler called the Lorax, names such as Nature Boy, that Onceler used in a belittling tone of voice. She then asked if there were any other ideas about what this was all about. "Do you think the Onceler had a conscience?" Students recalled the Onceler musing near the end that if he didn't do this, someone else would. But at the end, the Onceler gave the seed to the boy and said, "maybe if you can grow this seed, the humming fish and the swammy swans will come back."

To relate the story to strategies for forest management, Linda then asked the students what they thought the Onceler would do differently if he could get the forest growing again.

Three days after the first showing, Linda showed the program again. Before the second showing, Linda gave students a handout with 10 questions asking students to consider what was going on, why, where responsibilities fell, what other possibilities they could imagine, and how they would feel if it were up to them. Students were asked to do this work alone, or among themselves, and hand in their answers at a later class.

After this second showing of the video, Linda gave me the opportunity to talk with the students for a couple of minutes. I asked "I'm wondering what you can tell me about how this program was helpful to you in your course on forest management. What is added to what you've been learning?"

> Student 1: "Well, its making us realize what's happening to our forests. Because the demand for things that come from the forest is getting greater, so, the trees, like the truffula trees are getting used up so the forest is disintegrating."
>
> Student 2: "Well you can sort of see that it is a chain, if you cut down the truffula trees then there's no more."

In the discussion after the program I was impressed with the way Linda brought out students' personal responses and understandings of the situation in the story, and then flowed seamlessly to a consideration of forest management. Discussion following the first showing focussed on how students felt about the story. Their initial answers showed their concern about the damage done to the animals and the environment. Linda probed for more answers. The next student talked about the greed and wish for lots of money that led to the destruction of the forest. Another student focussed on how the Lorax tried to protect the animals against the Onceler.

Linda then offered a personal observation about the lack of faces on the Onceler and the Onceler's relatives, inviting students' views of why that was done. A student suggested that this was done to indicate that any of us could be the greedy one, a very astute comment I thought. This discussion then led to the beginning of consideration of what kinds of forest management would be needed to prevent this kind of destruction. This consideration served as the background to the list of questions students were given before their second uninterrupted viewing.

Students' responses to my question after the showing indicated that seeing *The Lorax* helped them see the inter-connectedness involved in forest ecology and the variety of perspectives needed in forest management. This they felt was the unique value of the video program. As McLuhan might have predicted, the video was also used successfully to present process. The feelings and personal responses students offered were incorporated as a fundamental part of their consideration of the larger process of forest destruction for commercial profit; and from there, of planning about forest management. This approach was open to the personal response to video and to the use of video to draw students' attention to process. To encourage this involvement, Linda first showed the program uninterrupted, and showed it again with questions drawing students' attention to particular aspects of the process.

Implications forTteachers

Both general guidelines and teachers' guides for specific programs assume teachers are using television/video programs to help them deliver the curriculum, with little or no reference to the video viewing experience and the personal response that the programs evoke (Wilkinson, 1971; Russell, 1992;

Tiene, 1993; Tiene & Whitmore, 1995). "School television [is] now promoted not as a replacement, but as an extension of the teacher, not as enrichment, but as an important complement to the classroom curriculum" (Cambre, 1987, p. 7).

This study suggests a different approach which, like the "open use" approach Linda used with The Lorax, involves acknowledging and supporting expression of the personal response to video programs. It suggests using these expressions to build understanding and generate questions. Examining and comparing personal responses could help students become aware of their own processes for constructing meaning and understanding, and of their own learning processes.

Strategies for "open use" can be summarized as follows:

Selection	Use video when interested in encouraging personal involvement as part of an area of learning. Look for well-produced programs which offer a story or personal perspective.
Action Research	Explore ways to use the understanding of the nature of video presented in this paper. Observe their own and their students' personal response and consider how these responses can contribute to learning. Involve other teachers and share observations.
Encourage students' to express personal response	Use open-ended questions and modeling expression of personal responses. Explore other strategies. Group activity using video materials is described by A. Convery in his classroom research (Convery, 1990).
Act as a facilitator	Encourage a wide variety of response and encourage students to identify their own questions and interests and build their own connections. Include all views and recognize their expression. Encourage pursuit of individual or group interests.
Encourage students to become aware of their own learning	Recognize students' personal response as a valuable element of their learning, encourage their awareness of this process.

Implications for Selecting and Producing Educational Video and Support Materials

In visiting classrooms using video and selecting examples for this thesis, it was easy to see the impact of the design and production quality of the video. Several instructional programs conveyed a feeling of being poor television, a kind of talking book rather than a real video. It appeared to me that the medium lends itself best to programs that present a story or subject for its own sake, rather than in an attempt to deliver instruction. The educational value resides in the decision to produce or show the program.

Most teachers' guides are based on the assumption that it is the teachers' job to move students from the passive viewing experience into mental activity related to the story or content of the program. In very few cases do the guides provide room for or encourage expression of personal responses, or experiences related to the video, before moving to the mental elements covered.

In developing or selecting teachers' guides to accompany video programs, this research suggests an emphasis on ways to encourage expression of students' response to the program, and using the response expressed in shaping subsequent consideration or activities. As with the strategies offered to teachers', producers of teachers guides could suggest open-ended questions designed to elicit students' personal responses and indicate ways teachers can pick up on students' response in shaping subsequent discussion and activity. They could present ways of dividing students into groups and suggest suitable questions or tasks that provide room to incorporate students' responses. They could suggest ways the teacher can express their own personal response and thereby model the acceptability of such expression. Examples of ways to acknowledge and build on students' response can be provided as well.

Producing such teachers' guides could be based on experiences with the kinds of responses students might express and the possible directions such responses suggest. Given the great variability possible among students, such experience could offer indications of the range of responses that might be expected and some of the directions suggested by these particular responses.

Conclusion

Today's schools typically provide computers and CD-ROM resources and are likely introducing computer communications capabilities to bring educational technology to students and teachers. Some students can produce videos as well as view them, often working in small groups. A few schools are introducing multimedia resources and the capacity to produce them.

Both video and computers are often presented to teachers as ways to help them deliver the curriculum better or faster. The research and analysis

presented here indicate that the growing use of technology in schools makes most sense when combined with a learner-centred pedagogy.

Today's teachers spend less time delivering group instruction. They increasingly see themselves as facilitators who coach and support students as they learn and develop skills. This change reflects a shift in the underlying view of the knowledge acquisition process - a shift that moves from a focus on knowledge as something that can be transmitted to students, to a focus on knowledge as the internal construction that occurs in each individual. Use of technology is one of the strategies teachers can use to support a learner-centred approach to the teaching-learning process (Peck and Dorricott, 1994; Hannafm and Freeman, 1995).

On the whole, interactive and communications technologies, video, and multimedia offer engaging experiences for students. This research indicates that video - and possibly newer media - provide an opportunity to do more than deliver information or curriculum. Educators can become more aware of the personal response involved in using media and can develop ways to include this response in the teaching and learning process.

This paper also indicates the potential benefits of taking a close look at teachers' and students' experience in order to explore the relationships that connect the nature of each medium, the experience of its use and its pedagogical value. Such research would best be carried out in regular classrooms, by or with classroom teachers.

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Footnotes

This study is reported in detail in my Doctor of Education thesis (1994), Ontario Institute for Studies in Education, which was supervised by Ron Silvers, Department of Sociology in Education. Ted Magder, Dean of the Mass Communications Programme, York University has provided advice and assistance in the preparation of this article.

All names of teachers and students mentioned in this discussion have been changed in the interest of anonymity.

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"Sam's Cafe": A Case Study of Computer Conferencing as a Medium for Collective Journal Writing

Elizabeth Yeoman

Abstract: The author uses the example of a computer conference in which she was a participant-observer to examine the potential of computer conferencing as a dialogic form of journal writing. It is argued that computer conferencing can play a key role in the development of a teaching practice that emphasizes mutual support, exploration and sharing but, at the same time, encourages high standards of scholarship and analytical thinking.

The initial goals of "Sam's Cafe,"the conference under discussion , were to experiment with computer conferencing as a form of cooperative learning, and to become more familiar with the technical and theoretical language of poststructuralism. The conference was remarkably successful in achieving these original goals. As it progressed, it also became a support network for most of the participants. Reasons for the success of this particular conference, both as a learning tool and as a support network, are examined.

Resume: L'auteure utilise 1'exemple d'une conference multimedia a laquelle elle faisait de 1'observation participante pour examiner le potentiel de la conference multimedia comme outils de tenu/redaction de journal. On propose ici que la conference multimedia peut jouer un role cle dans le developpement de la pratique de'enseignement en mettant 1'accent sur le support mutuel, 1'exploration et le partage des buts tout en encourageant un haul niveau academique et de pensee analytique.

Les buts initiaux de la conference nommee 'Sam's Cafe' etaient d'utiliser la conference multimedia comme forme d'apprentissage cooperatif et de se familiariser avec le langage technique et theorique du neo-structuralism. La conference multimedia a bien respondu a ces buts tout en devenant un reseau de support pour le plupart des participants. Les raisons pour le succes de cette conference sont examinees tant au niveau d'outils d'apprentissage qu'au niveau du reseau de support.

Introduction

This article uses the example of 'Sam's Cafe' to explore the potential of a collective electronic journal for students as an alternative to individual journal writing. The author was a participant-observer in 'Sam's Cafe', a computer conference set up through "Participate"[1] to explore issues raised in a graduate course in education. Members used this conference extensively, both, as originally intended, as an informal, interactive pedagogical tool and also as a support network. Research on collaborative learning (Schniedewind, 1985; Vygotsky, 1978; Wells, 1987), on journal writing in education (Mattel

& Peteret, 1988; Roderick, 1986), and on computer conferencing (Riel & Levin, 1990; Saiedian, 1992) points to the potential benefits of such an approach. However, some researchers (Dicks, 1992; Rojo, 1991) have found limitations to the uses of computer conferencing despite this potential. Others (McConnell, 1988; Morrison, 1992; Perry & Greber, 1990) suggest a need for further study of the group dynamics of computer conferencing. This article proposes some ways of overcoming the limitations cited by other writers. As well, it argues that computer conferencing can offer the educational benefits of journal writing, while at the same time promoting ongoing dialogue and debate among students and instructors. A description and analysis of 'Sam's Cafe' are used here to illustrate the use of this strategy in teaching and learning.

The value of journal writing as a pedagogical tool has been well documented. It often allows students to discuss course related issues in more creative and exploratory ways than would formal essay writing or traditional class discussions (Martel & Peteret, 1988; Roderick, 1986; Spack & Sadow, 1983; Surbeck, 1994). Martel & Peteret (1988), for example, describe its advantages in the following terms:

> [A student] expressed in her journal how she found it so difficult to speak out in class. She was uncertain of her ability to think, to form thoughts and to express them. Those who were dominating the class were also those we (traditionally and unfortunately) had identified as the strong bright students. We have found journal writing an important activity for encouraging participation and confidence in students. Journal writing is another form of interaction, if we request to read student journals (p. 93).

While journal writing as a teaching strategy has indeed made an important contribution to pedagogy, its popularity has sometimes led to a "bandwagon" effect. Over the past few years, based on the author's observations in the Education faculty where she teaches, journals had become increasingly popular course assignments. However, students began to be overburdened with such assignments, and found themselves doing reflective writing on similar topics for several different courses. In reaction, instructors now seem to have moved away from using journals, to the extent that some students in the faculty recently stated that they had no chance to do informal reflective writing in any of their courses, and that they would like to have done so.

Computer conferencing can provide a forum for this kind of informal writing and foster collaborative learning at the same time. Several advantages of this approach are as follows:

1. In a given programme, all instructors interested in using journal writing, or in a particular topic, could be involved in the same conference along

with students. They would thus avoid both the above noted "bandwagon" effect and the problem of isolation, where one instructor responds individually to many students.

2. It would enable students and instructors to get to know each other in a different way. As well, like other forms of journal writing, it would sometimes allow students who are not comfortable with speaking out in a large group, or expressing themselves in traditional academic ways to shine (Morrison, 1992).
3. Unlike individual journal writing, it would allow many people to share thoughts and ideas, thus potentially stimulating further exploration and reflection than might otherwise occur. As the same time, it still permits the sending of private messages to one or a number of individuals, should this be desirable.
4. Like individual journal writing, it would foster a more extensive, yet informal and exploratory, expression of ideas than do most classroom exchanges.
5. Computer conferencing is part of an ongoing, rapidly developing and lateral or divergent, rather than linear dialogue. Since entries can be made and responded to at any time, it is a dialogue that is not limited by time, space, chronological order, physical appearance or other factors that may limit face to face conversation and/or traditional journal and letter writing (Schaefermeyer and Sewell, 1988; Updegrove, 1991).

Some instructors may be concerned with how to evaluate this kind of course assignment. Students can be given a mark for the quantity and quality of their individual contributions to a conference. Alternatively, a basic level of participation - for example, a minimum of three substantial entries - could be a course requirement without being allocated a specific mark. A third possibility would be to make participation optional, as an after class study or discussion group might be. In the author's experience, if a computer conference is relevant and interesting, students will participate anyway, and the knowledge that their comments will not be marked may foster a different kind of dialogue than would a marked assignment.

'Sam's Cafe' illustrates these points and also suggests some new directions for the use of computer conferencing in teaching. The remainder of this article comprises a qualitative first person narrative, in which the author attempts both to reflect on a rewarding personal experience, and to offer an example and analysis of a useful strategy for collaborative teaching and learning.

In addition to her own experience and the transcripts of 'Sam's Cafe', the author draws on the text of a second conference, 'Reflections', to enhance her personal narrative. 'Reflections' was set up by one of the participants of

'Sam's Cafe' as a forum for discussion of the nature of computer conferencing and its potential as a pedagogical tool.

The next section describes the organization and implementation of'Sam's Cafe'. This is followed by an analysis of the data from the conference, and recommendations for the use of computer conferencing in education.

Description of 'Sam's Cafe'

As students in a graduate course on poststructuralist theory and its implications for education, some of us decided to experiment with computer conferencing to discuss difficult concepts and terminology. We began very informally by sending each other electronic mail messages but soon our instructor suggested setting up a "Parti" conference. This conference, called 'Sam's Cafe', was introduced by a written description of a fictitious cafe where an argument about theories of language and culture takes place. Although others joined later, initially six students, Bonny, Helen, Alastair, Steve, Danny and I, along with Roger, our instructor, chose to participate in this ongoing discussion. We hoped that this new form of cooperative learning would be fun and motivating as well as useful. It did indeed help us work through the ideas we needed to deal with, to feel more at ease with the often difficult vocabulary of poststructuralism, and to develop confidence in ourselves as doctoral candidates. In so doing, we also discovered that the use of this technology could become an important means of support and a way of alleviating the inevitable sense of isolation associated with writing a thesis. Although most members used the conference in this way later on, when we all knew each other better, from the outset it was a particularly important aspect for the three women involved. Helen and I were both single mothers, trying to earn a living, raise children and do advanced degrees. Helen had often said she felt she had no right to be in graduate school at all, that she had "snuck in". Bonny lived at some distance from the campus and was frequently at home alone with two small children. All three of us often felt cut off from the life of the university, unable to participate in as many formal or informal activities as we would have liked and frustrated by our lack of time to do the work expected of us.

Morgan (1986) describes this kind of situation in terms that are amusing but all too true when she writes of the need to provide

> empathic support through the "cognitive dark nights of the intellect" (such nights made even darker by the twins getting chicken pox the week before assignments are due…) (p. 40).

One cannot often call friends, colleagues or instructors at midnight on dark nights of the intellect, either for empathic support or to discuss ideas for an article. However, that was often when we most needed to do the former, and had the only free time to do the latter. In 'Sam's Cafe' we had a support

network that was constantly available to us, a dialogue where there was always an opening, where we knew there would soon be a response. It is ironic that the very technology that is, in many ways, the source of isolation and alienation should also provide solace and support but this seemed to be the case.

The initial goal of the conference, however, was to help each other come to a clearer understanding of a body of theoretical work and to discuss its implications for teaching practice. One of the factors that enabled us to do this successfully was the creation of a fictitious situation, a cafe on a cold winter night, and various personae who took part in the discussion. We sometimes spoke/wrote in the voices of these personae - the cook, patrons of the cafe, a fly on the wall, a spider - and sometimes in our own voices, but still in terms of this imaginary situation. At first, we used the scenario and personae extensively, as a way of overcoming shyness and inhibitions related to exploring new and complex ideas with people we did not yet know well. Thus, an early note to the conference went as follows:

> As you may recall, the initial reason why I suggested working together on 'Sam's Cafe' was that I was getting lonely at the terminal talking to myself. There was a pretty arid discussion going on... So here is part of a discussion on the literary canon. I ask the literatus to explain his position: 'First of all I would like to raise the issue of the literary canon. To make clear to our audience here where the differences between our two views lie, perhaps you could give us your views on how exactly this has developed. Why are certain books considered 'literature' and others not?'...
>
> The literatus leaned forward, placing a fraying sweater elbow in a small pool of gravy. 'So you would deny the greatness of thought in Shakespeare, the splendor of poetry in Wordsworth?'...
>
> Alastair

This was followed by entries like the following examples, playing on the humour of the storyline, but also asking serious course-related questions. The initial discussion (and a focus of the course) was about how great literature is defined, and the implications of this for curriculum planning and teaching. Another early goal was to master the use of poststructuralist terminology, for example the notions of discourse, counter-discourse, subjectivity and intertextuality. Thus, in asking and responding to questions, we also tried to use this terminology as much as possible, probably more than we would have in other kinds of conversations. In effect, some of the exchanges involved practising a new language, as one might participate in simulated dialogues when learning French or Cantonese.

> I wondered wildly what to say next, clutching desperately at the jumbled straws of counter discourse that remained from those courses I had taken... I felt that the reputation of feminist poststructuralism was at stake as the assembled literati leered at me condescendingly and the cook disappeared back into the kitchen to dish up more fries. Sam balanced a beer on his stomach and smiled broadly.

> 'First of all', I said, 'you have to understand the concept of ideological hegemony...'

Elizabeth

> Thank God you're here, Elizabeth! In all the smoke and intellectual smog I didn't see you. You know, in some ways I wonder if there's any use talking to someone like Sam. After all, we know which side his bread is buttered on, don't we? I mean, we all get a paycheck from somewhere and that somewhere has a big influence on what we believe about the world and the way it's ordered... Isn't that what hegemony is all about?...

> What do you say we order some herbal tea and whole wheat biscuits? Do you think they have that here?

Helen

Bonny, who has appeared rather preoccupied for some time, positions herself for her maiden speech:

> Sam, I am trying to pull together what people have been saying and the best way I can respond to the discourse is by looking at your arguments in defense of the *Merchant of Venice* and *Huckleberry Finn* quite closely...

Bonny

As time went on we grew more comfortable with each other and with the ideas we were examining, more and more entries were simply straightforward discussion of course material, without recourse to the cafe scenario. Typical notes at this stage began: "Danny, I don't know how to respond to your mighty-multi comments re monotheism/polytheism...", or "Alastair, in reference to the reduction of inter-sexual power relations in computer discourse, a quick thought... ". Along with the theoretical discussion, we also

fell more and more into simply speaking from our own lived reality so that the dialogue sometimes looked more like the following examples:

> I must apologize for not responding to the debates in Sam's but I am very much in the "real" world of catching up on some childcare that I have neglected for the past few weeks...
>
> Bonny

and

> ... Sorry for so many typing mistakes... I'm using my son's computer and modem at the moment. I will, yes I WILL buy one this month and this keyboard is driving me nuts!
>
> Roger

Perhaps this more personal and less elaborate tone was due to the fact that we were growing more at ease both with each other and with the theoretical content of the conference. In addition, as we became more comfortable with some of the difficult academic material, we began to use the computer conference for other purposes. This often meant using it as a support network. Over a two year period, we continued to use 'Sam's Cafe' for a discussion of ideas and theory, but also came to use it for socializing, talking about daycare, computer chit chat and other everyday concerns of "the real world". On a more serious note, by the end of the conference four of us had used 'Sam's Cafe' to tell the news of the deaths of parents or loved ones. This, perhaps more than anything else, seems to illustrate the degree of trust and support that had been built as the dialogue developed.

Analysis

In "Reflections" we began to analyse the learning process that had taken place in 'Sam's Cafe'. Some of the points made by members of the conference as to why it was successful in meeting their expectations are as follows: a) the creation of personae in a fictitious situation and the use of humour and caricature seemed to help alleviate initial inhibitions, promote an exploratory and critical dialogue, and allow for more egalitarian relationships; b) a clearly outlined, yet fundamentally dialogic and open-ended task structure was important for keeping people focused while at the same time giving them enough latitude to ask questions and develop new ideas; c) the availability of conferencing at odd moments and late hours as well as its flexibility and lateral, rather than linear nature, permits people who might otherwise be isolated to participate in an ongoing intellectual dialogue;[2] d) the sense of obligation or commitment participants developed towards the other members

of the conference seems to have begun with their initial pleasurable engagement with the storyline and collaborative exploration of ideas; e) the oddly intimate nature of conferencing, compared in "Reflections" to the art of letter writing and even, more specifically, to the writing of love letters (!) seems to have been another factor in the success of 'Sam's Cafe'. Some of these points have been made by other writers, some appear to be new ideas.

Dicks (1992) emphasizes the importance of a common task and shared interests, suggesting that, without these, "[cjommunicating by computer can produce very boring exchanges, reflecting a lack of direction and resolution" (p. 34). Riel & Levin (1990) also point to the importance of a "shared goal or task with a specific outcome" (p. 163). Rojo (1991) suggests that there are two main types of computer communication, instrumental (task-oriented) and social (networking and mutual support). Certainly, 'Sam's Cafe' exemplified both types of communication. The open-ended nature of the task and the creative and humourous use of storyline and role play seemed to contribute greatly to the fulfillment of both instrumental and social needs for the participants.

Rojo (1991) further suggests that, although there was a certain sense of warmth and community in "El Cafe", the conference she examines, "some of the issues commonly conditioning inhibitions in face-to-face encounters are also playing a role in Parti encounters" (Rojo, 1991, p. 113). Students participating in "El Cafe" had expressed concerns that they might look "stupid", "presumptuous", and "racist" (p.113). Because of these concerns, they did not take risks or share ideas as freely as they might have wished to. The creation of the storyline and personae in 'Sam's Cafe' and the ability to switch roles at will enabled its participants to take such risks in ways that challenged and deepened their understanding of the concepts they were exploring, thus facilitating both social and instrumental uses of the conference. For example, Alastair, tired of speaking in the conservative voice of "Sam" announced "I don't want to be the literatus anymore. Can I be a fly on the wall or an old drunk in the corner?", and then concluded his next entry with "I am only a fly on the wall and this is off the top of my head. Please treat these remarks with caution at the very least." At that point, Helen brought Sam's voice back into the dialogue, responding to Alastair/the fly with

> Hey, look what the literatus is doing! He's muttering to himself over there in the corner. Wait, I think I can hear what he's saying - something about - yes, I've got it. 'What is the world coming to? There's no respect anymore for history, morality, common sense, decency. It all just proves my point. All this liberalization of education just contributes to destroying the fabric of society... If we upheld the study of the canon in schools people would have a sense that... there is a meaning to life...'

Thus the concerns expressed by Rojo as to risk-taking were, to a considerable extent, eliminated through the possibility of speaking in voices other than the participant's own - voices including those of insects who warned that their remarks should be treated with caution, and "literati" who were known to be philosophically opposed to the dominant view within the conference. At the same time, these voices challenged those who *held* the dominant view to rethink and justify their position.

While the elaboration of the storyline and characters in the examples given here may appear to be entertaining but superficial, this kind of dialogue was, in fact, far from trivial. In an article in *College English*, Cooper & Selfe (1990) argue that "the irreverence of the entries is not only a mark of the egalitarian nature of computer conferences but is also central to their success" (p. 857). The fact that the conference was not taken too seriously paradoxically allowed us to make more in-depth explorations of ideas than we might have in a more formal setting. We could hide our insecurities behind comic roles to ask difficult questions, to try out terminology we were unsure of, or to outline our understanding of theoretical points with no fear of being laughed at, precisely because laughter was integral to the conference. Questions would be answered and understandings clarified through interaction with others interested in the same topics. Our instructor, having created the forum, continued to play a key role by periodically interjecting in his own voice or as one of the personae, "What do you mean?" or even, on at least one occasion, "You're wrong!!". Thus, although there was a great deal of exploration, the conference was not without direction.

As the conference developed, its informality and irreverence also allowed us to bring up issues from our own lives and use them to enhance our understanding of the relationship between theory and practice in ways that would not have been possible in most traditional classrooms, partly because of time constraints and partly because of the more academic and impersonal nature of most classroom interaction. Thus, for example, Helen responded to a question I had raised about whether certain themes in literature could be considered universal by drawing on her own experience as a mother:

> I mean, isn't it possible that our universal themes, like motherhood and love, themselves reflect cultural and ideological values? For example, we're both mothers, but for me this has always been problematic...

Alastair then returned to the more theoretical course content with:

> A fly on the wall comments: 'Your comments about love and motherhood, Helen, raise a very pertinent issue... If I recall, you started on that theme by talking about universals... Bakhtin would have stressed the dialectic of the reproducible meaning and the

> irreproducible theme. Foucault would have preferred to discuss the discourse of motherhood and love to show how subject positions are constituted within them...'
>
> Alastair

Another way the conference enabled us to develop ideas further than we might have in other forums was that it was not dependent on time or space. We could read back over previous entries and enter a note whenever something struck us as important or interesting. Again, the entertainment value of the conference is probably relevant here in that we might not have spent as much time going back over it if we had not enjoyed the storyline so much. Thus, for example, on December 3, Alastair responded to questions of intertextuality Bonny and I had raised several days earlier, even though many other notes on various topics had been entered in the meantime. Bonny also suggested another advantage to the achronological nature of 'Sam's Cafe': "I guess one of the nicest things about 'Sam's Cafe' is that I can write to all of you without thinking that I'm encroaching on your time..." This would be a particularly important aspect for less confident or more modest students who might not speak out so freely in class.

Shared goals, seen as crucial by Riel and Levin (1990, p. 163), seem to have been central to the success of 'Sam's Cafe' at both the instrumental and social levels. However, a specified outcome, also viewed as necessary by these writers, does not appear to have been important. Indeed, attempting to bring the conference to a resolution might have been detrimental to the processes of higher level thinking in 'Sam's Cafe'. The question was raised in 'Reflections' as to whether there was a conflict between the task structure of the conference and the inherent flexibility of Parti and the open-endedness of the discussion. Some participants thought that the flexibility might lead to incoherence or to an inability to complete the task or produce a definitive end product (a concern of both Riel and Levin (1990), and Dicks (1992)). There was acknowledgment of the importance of the shared task, but uncertainty as to just how structured and finite the task should be. For example, Roger wrote:

> Bonny... your comments about the time bound, linear nature of face-to-face conversation vs. conferencing are quite interesting and relate to my concerns after reading 'Sam's Cafe' if everyone felt they had an opportunity to pull together the issues that had been discussed... because there was no summary product and collective text that one could point to and say... see there... we've worked it through... I was unsure what the result of the discussion was... yet all of you... seem to have felt that the conferencing did function to pull

> it all together even though there was no point-at-able integrative test...
>
> Roger

While coherence and some shared goals or values are obviously essential to dialogue, an end product may not be. Rather, some computer conferences could be seen as a form of brainstorming where participants could come to a better understanding of theories and concepts as well as develop and explore new ideas. An open-ended task, then, might be most appropriate for this kind of dialogue. At the same time, however, there should be enough structure and leadership to give direction to the discussion, thus avoiding the on-line chaos described by Dicks (1992, p. 34). 'Sam's Cafe' provided an open-ended yet focused task where there was a specific problem to be worked through (the mastery of poststructuralist terms and concepts) and leadership on the part of the instructor, but where the creation of various characters and "voices" as well as the element of humour and lightheartedness allowed for the free play of ideas. The Russian linguist Mikhail Bakhtin, in his discussion of the role reversals typical of carnival time when males often dress up as females, blacks as whites and so on, suggested that at such times "seriousness and folly enter into an open dialogue, which changes both sides, as real dialogue does" (Morson, 1986, p. 13). Both the creation of the personae and the humourous situation of 'Sam's Cafe' exemplify the Bakhtinian idea of carnival. The temporary suspension of normal roles and the irreverance referred to by Cooper and Selfe (1990) permitted "a special type of communication" (Morson, 1986, p. 106) where participants could take intellectual risks not possible in a more direct kind of communication. As Bonny put it

> I felt that the persona was important to the beginning of the assignment because I was feeling a little vulnerable and liked the idea of hiding behind a dramatic character. It also gave me the opportunity to use "unacademic" language at a time when I was still uncomfortable with my grasp of the concepts of poststructuralism.

In 'Sam's Cafe' most participants did not seem to feel the kind of pressure there would be in a course or formal paper - or, according to Rojo (1991), in some computer conferences - to have the "right" answer. Bonny was the only participant who expressed this kind of concern. She stated

> I try to make sure I have a substantial period of uninterrupted time ahead of me before I prepare to participate in the conference. In fact I am very reluctant to say anything unless I think it is a fairly coherent, substantial contribution. I think this must have something to do with writing styles/personality types...

All the other participants seemed to agree that they liked its fluid experimental quality, and felt quite free to play with ideas and speak off the top of their heads. Roger, for example, wrote, "I like the indeterminacy of it all... the sense that one doesn't have to work out a complete response before entering a note." Helen added, "I also really like computer conferencing because it is a conversation to be picked up at any odd moment.... [TJhere is so much I want to think about and respond to... I take comfort in the fact that I can print out and chew over stuff later... the words are not blown away on the winds of verbal discourse." At the same time, for someone like Bonny, the fact that the conference was achronological meant that she could take as much time as she needed to prepare her entries.

Although Bonny was the only one to have expressed reservations about participating informally, we all occasionally reverted back to the scenerio and personae when we felt unsure or insecure. Roger, for example, long after we had dropped the regular use of personae, began a note with "It was a cold, dreary, drizzly night... and Sam's seemed just the place to dispell the terror..." He then went on to discuss his doubts about how things were going in another course he was teaching. Most of us resurrected various personae when we began, several months into the conference, to discuss a new topic raised in another course several members were taking.

Perhaps because of the humourous and exploratory nature of the conference, and the possibility of playing more than one role within it, no one person ever seemed to dominate the dialogue, either in terms of monopolising, or of having the "right" answer. These same factors enabled us to practice the terminology, push each other to clarification through constant questioning, and synthesise our ideas as we interwove the personal, the practical and the theoretical in 'Sam's Cafe'. Bakhtin speaks of "the word as a tool for pedagogy" (Morson, 1986, p. 33). Perhaps computer conferencing should indeed be seen as a tool rather than as a task to be finished.

Another factor in the success of'Sam's Cafe' was its surprising intimacy. In 'Reflections', Roger pointed out that letter writing, like computer conferencing is "ironically often more intimate than face-to-face conversation". Bonny took this idea further in her comment that in a love letter:

> Firstly because the author is, by definition removed from the person he/she loves, the writer cannot rely on body language, gestures, eye contact, etc. to convey love/desire. The intimacy therefore needs to be explicated and elaborated upon. Hence, love letters are often more "verbose" than a face-to-face expression of love. Secondly, expressions of desire are used in so many contexts and so many ways that such expressions have a variety of different meanings. A writer has to elaborate on such expressions to convey accurately the mood/tone intended. Thirdly, again because the writer of such a letter

> is by definition removed from the addressee, the writer could well be experiencing feelings of loneliness, loss that might generate uncharacteristic expressions of intimacy. One of the issues that I have in the back of my mind is the oft-made assertion that women are better correspondents than men and that women are more "able" to express intimacy than men.

It seems that distance may have forced us to use words more carefully, more expressively and more intimately. This is not to imply that it is of the essence of computer conferencing to do this, but that the potential for this kind of intimacy is there, as was shown by our experience. However, while distance and technology may have colluded to force us into finding new ways of being intimate, it was the flexibility and availability of conferencing that allowed us to do so. The fact that we could gain access to 'Sam's Cafe' at any time made it possible to speak "straight from the heart" and/or "off the top of the head". It also meant that we could respond to whichever entries struck most deeply rather than only to the latest one, as would usually be the case in face-to-face dialogue. And, perhaps most importantly, we were able to "listen" in a new way, going back over entries, taking time for reflection, and then responding. This kind of flexibility in conjunction with a more intimate use of words seemed to enable us to respond more often and in different ways than we might have otherwise.

Conclusion

The example of 'Sam's Cafe' is based on the somewhat serendipitous experience of a small group of people. However, it serves to illustrate a creative approach to the use of computer conferencing in an educational setting. As well, it shows how, despite the rapid changes in educational technology in the past decade, the teacher still plays a key role in facilitating communication and understanding. Students need informal ways to reflect on their experiences and newly acquired knowledge. Teachers can provide a forum and direction for this kind of reflection through using computer conferencing as a form of collaborative journal writing. Factors contributing to the likelihood that this strategy will be effective include some already well documented in the literature and exemplified in 'Sam's Cafe', and others initially discussed in this article. Factors documented elsewhere include the importance of a common task and shared interests (Dicks, 1992; Riel & Levin, 1990), a genuine need for the conference in the sense that it is the most convenient way for participants to communicate (Riel & Levin, 1990), and the advantages of the non-linear, non-chronological nature of conferencing (Updegrove, 1991). New ideas suggested by the present article and worth further investigation are reiterated in the following paragraphs.

Morrison (1992) writes that "computer conferencing] enables students to reach higher levels of thinking, but only //they are properly prepared to do so" (p. 47). 'Sam's Cafe' demonstrates some ways this can be done. Beyond basic technological preparation, there is a need to find ways of fostering dialogue and creativity within a conference if computer conferencing is to reach its potential as a pedagogical tool. The experience of 'Sam's Cafe' suggests that open-ended rather than finite task structures would be most appropriate for promoting higher levels of thinking, just as they would be within a traditional classroom discussion. The instructor's invention of a humorous storyline in 'Sam's Cafe', and the possibility for participants to switch roles and speak in various voices within the conference allowed for much more exploration and risk-taking - essential to higher level thinking - to take place than might otherwise have been the case with a group of students who did not know each other well and were working with difficult theoretical material. The storyline also allowed us to practice using the language of poststructuralism in a simulated situation before using it in more formal circumstances. Participants appear to have been much less inhibited and concerned about "making a mistake" than has sometimes been the case in computer conferences. It has already been noted that membership in the conference was voluntary and the participants highly motivated. However, the high degree of motivation was due, at least in part, to the way the conference was set up and to the skill of the instructor in initiating, monitoring and extending the discussion.

Participants showed a strong sense of commitment, both to the academic project and to each other, within 'Sam's Cafe'. This may have been, to some extent, simply due to group dynamics and "chemistry". However, it may also have been facilitated by the removal of inhibitions in the earlier stages of the conference, and by the shared pleasure derived from the entertainment value of the conference. As well, the fact that some of the participants were living in somewhat isolated circumstances and could communicate through the conference at any time meant that they came to depend on each other and to look forward to hearing from each other. Bonny suggested that, as with a love letter, participants were forced to develop their thoughts more fully than they might have in face to face conversations. This probably indicates another important factor in the promotion of higher levels of thinking. Helen's statement that, lacking time to reflect on things immediately, she loved the permanence of the dialogue within the conference and the idea that its written words would not be "blown away on the wind", also comes into play here. Ideas both were extensively developed and could be gone back to and reflected on later.

In the context of feminist pedagogy, but in words broadly relevant to all those who are interested simply in good teaching, Schniedewind (1987) writes of teaching

> democratically and with feeling. Such teaching rejects what Paulo Freire (1971) calls the banking system that assumes that one person with greater power and wisdom has the knowledge to dispense to others. Feminist education implies that we enter into a dialogue with our students, meeting them as human beings, and learning with them in community (p. 179).

Computer conferencing, of the kind described in this article, is democratic in nature, making a dialogue of equal voices more feasible than it might be in more traditional academic settings. If it can also become the kind of support network it was found to be in 'Sam's Cafe' - humourous, imaginative and sustaining - then it is certainly also "with feeling".

We have seen conferencing compared with letter writing. Its informality, immediacy and flexibility also make it an effective vehicle for the collaborative writing of student journals. Both journals and letters, like conferencing, are forms that can be taken up and put down again, that will bear frequent interruption and that, while often intimate and personal, can also deal quite adequately with the theoretical, as demonstrated in 'Sam's Cafe'. Conferencing, at its best, can serve as "an opening to the stories of the students and of various theories in a clarifying and edifying process. A listening, communicating, translating process in which story informs theory, theory informs story and story informs story" (Mattel & Peteret, 1988, p. 94).

There are important implications here for teachers and students who wish to take a more personal and interactive approach to learning, and for those interested in computer conferencing. The example of 'Sam's Cafe' points to ways of using computer conferencing as an extension and an expansion (not a replacement) of other forms of dialogue, and as an effective pedagogical strategy.

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Footnotes

[1] Participate, also known as "parti", is a VAX based computer conferencing system with facilities for e-mail, real time messaging, asynchronic conferencing and the setting up of branches and sub conferences.

[2] It must be pointed out, though, that a major concern in discussing the possibilities of conferencing from home is a financial one. Many students who could benefit from conferencing would not be able to afford home computers. While this article deals with the possibilities rather than the limitations of computer conferencing, educators must be aware that if these possibilities are to be realised, computers must somehow be made available to people who are isolated because of distance, domestic responsibilities, disabilities and so on.

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Bringing the Personal to the Practical: Collaborative Instructional Design as Conversation

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Abstract: During 1988-1989 the Faculty of Education at the University of Alberta, and the Instructional Processes group from Edmonton Public Schools undertook a collaborative project to design and produce a Level II interactive videodisc on questioning strategies in the classroom. This paper tells a little of the story of that design process, suggesting an alternative way of characterizing the collaborative instructional design process as a sustained conversation. Conversation, which explores and uses the experiential bases of the designers as the source of knowledge for design practice, is explored as instructional design method, instructional plan, and the content of the resulting videodisc. Implications for instructional design practice are suggested.

Resume: Au cours des annees 1988 et 1989, la Faculte d'Education de 1'University of Alberta et le groupe Instructional Processes des Ecoles Publiques d'Edmonton se sont engages conjointement dans un projet de conceptualisation et de production d'un vioeodisque sur les strategies de questionnement dans la salle de classe. Get article raconte 1'histoire entourant le processus de conceptualisation du videodisque. La conversation, 1'exploration et Putilisation de 1'experience des concepteurs comme source de savoir est discutee comme methode de la conceptualisation, planification d'instruction et contenu du videodisque. Des implications pour la pratique de conceptualisation d'outils d'instruction sont suggerees.

Bringing The Personal To The Practical: Collaborative Instructional Designs As Conversation

> *Noddings... drew attention to the ways we situate ourselves in relation to the persons with whom we work, to the ways in which we practice in a collaborative way, and to the ways all participants model, in their practices, a valuing and confirmation of each other. What Hogan and Noddings highlighted is the necessity of time, relationship, space, and voice in establishing the collaborative relationship, a relationship in which both researchers and practitioners have voice.*
>
> Connelly & Clandinin, 1990, p. 4.

Through 1988 and 1989 the Faculty of Education at the University of Alberta, and the Instructional Processes group of Edmonton Public Schools undertook a collaborative project to design and produce a Level II interactive videodisc on questioning strategies in the classroom titled, "Do I Ask Effective Questions?" (The QDisc). This project was described in 1991 (Campbell-Bonar & Grisdale), and again from a more ethnographic perspective in 1993 (Campbell-Bonar & Olson). This latter frame, in a real sense, paralleled both my developing understanding of the roots of my own instructional design praxis and a growing frustration with what I perceived to be constraints in systematic instructional design practice. The two "imperatives" came together for me as I became more comfortable with the narrative and autobiographical research I was encountering during my doctoral studies. Finally, I began to merge my backgrounds in curriculum development, teaching, and instructional design by revisiting the design process for the QDisc in a series of narrative research conversations in the spring of 1993 (Portions of these conversations are included, and the speakers identified, in this paper). On one level, the resulting study is the story of an instructional design project. But on another level, it is a story of how four teachers became intimately connected to each other through a collaborative process, a process that binds them together socially in a collaborative relationship, giving everyone a space and a voice. This paper retells a little of that story, and attempts to extend the ideas contained in the culture-building paper (1993), by suggesting an alternative way of characterizing the collaborative instructional design process as a sustained conversation

The telling of stories is a purposeful way of connecting to the intimate lives of their authors. These lives, revealed through socially-intimate conversations, contain the stories of asking questions in the classroom. These questioning stories became the content and the plan of the videodisc, the *sharing* of them the way that the plan emerged.

The story of the collaborative instructional design process is likewise nested with the instructional story told by the QDisc. The instructional story is itself reflexive of the stories of the QDisc-makers who are makers of questions, askers of questions, and tellers of stories about the rhythms of questions in classrooms. And finally, the telling of the stories of the QDisc-makers is at the same time the story of maintaining the ties of this teaching family through distance and time and experience.

This story tells of the conception and unfolding of a collaborative project to design an interactive videodisc for preservice and inservice teachers, with unexpected consequences for its collaborators - enduring relations that in their living continue to be transformational. Developing and sharing these connections in constant, collaborative conversation helped the instructional plan to be narrated, the instructional design process to be defined.

The Members of the QDisc Family

At the time of the study, Al was a senior professor in the Faculty of Education, a man who resisted collaboration by institutional mandate, but who naturally sought out and thrived in collaborative groups. An early reader of Michael Apple, a University Discipline Officer who felt strongly about involving students in the governance of their community, Al is a deeply thoughtful man who consistently acts in a caring, moral way in a professional context (the academy) that, in his experience, often demanded allegiance to dualistic structures of thinking and acting. Al came to the QDisc project typically full of curiosity about the rational instructional design process, remembering this as a time when "we were really on the bubble" (Al, 1993, May 20).

Roy came to the project status-poor, a graduate student on sabbatical leave from teaching. Of us all, Roy was most competent in creative and formal group processes, yet most comfortable working with the technical aspects of television production. After the project Roy resumed his teaching life in administrative leadership, but now focuses on curriculum development, because teachers "need someone to support them" (Roy, 1993, May 20).

Louise is a senior administrator who, more and more, seeks opportunities to work collaboratively with teachers, administrators, community members, and colleagues in teacher education. At the time of the QDisc project she was a consultant in a professional development program based on Joyce and Shower's (1988) peer-coaching model. Consistently curious (Jamieson, 1993) like Al, Louise saw her professional commitment to the collaborative process as a continuing personal commitment to everyone in it. She seeks different frames with which to understand this time, examining the process as a consultant, as a teacher, and as an administrator.

This paper is mostly *my* story of instructional design - understanding how I act as a designer in projects that were institutionally mandated (I'm talking about collaborative teams involving teacher educators, teachers, administrators, designers, and production teams), and that framed my working life for ten years. In examining my life and its enduring connections to the lives of those with whom I plan, I propose to authorize tools of instructional design that are denied in theoretical models of rational design. These tools are the tools of personal connection; that is, language, humour; social context. As in a family, we built patterns of language, of discourse, that defined us and kept us intimately connected through time and distance. This spoken language, the Conversation, was the content and process of design, and the means through which we shared what we each knew, collaboratively constructing new meanings of questioning.

Understanding My Own Praxis

The times I liked teaching best were when I *was planning* to teach. Both teaching assignments in my public school teaching career involved resource problem-solving, identification or creation of unusual materials and events, and the planning and implementation of new curriculum and activities.

I was transformed by having the experience of collaborative curriculum planning in the implementation years of Edmonton Public School Board's Extended French pilot program, an intensive second language program for which existing curriculum needed to be substantially adapted. Intimate conversation, negotiation, and creative problem-solving were personal and working styles that presaged my entry into the instructional design field.

My formal introduction to this field was a result of entering a Master's program in Curriculum and Instruction in Secondary Education at the University of Alberta in 1978, for which Dr. Douglas Parker was my supervisor. Newly excited by the possibilities of using microcomputers in the French classroom, he encouraged me to investigate this new technology in my own program and to explore other media-based approaches to teaching a second language. At one point, he demonstrated an early interactive videodisc: A personal epiphany! I immediately enrolled in television and instructional design courses and began working with him and David Mappin, Director of the Instructional Technology Centre, to field-test the Faculty's first videodisc, "The Golden Touch of Midas".

As a team member on SIMCLASS II, later to be called "Classroom Discipline: A Simulation Approach", my design contributions were very closely based on my personal experiences in the classroom. The disc contains four scenarios, each based on an actual problem in classroom management. After the opening video sequence which sets the problem the student, in the role of the classroom teacher, is confronted with a series of choices for action, each of which has a related sequence of choices. The scenario unfolds until all the possibilities are revealed and an evaluative summary of the student's choices is provided. My job, initially, was to take the skeleton scenarios and first menu choices identified by a large team of content experts (faculty and graduate students) and extend each "thread" to a resolution. Each menu choice on that disc was based on a personal action. I had made all of those mistakes and had all of those successes. I told how event would fold into event on the videodisc, and the plan was given authority by flowcharts, script pages, videotapes, and computer code.

During subsequent projects involving teams of faculty members and teachers, I learned more about design by doing it, at the same time studying the prevailing theories and models in the field. No one approach seemed to reflect what I was coming to believe was an essential element in the process - the

personal practical knowledge of the instructional designer. Nor did any describe the process of design as I was experiencing it. Since I was supposed to be the expert, I resolved this personal dilemma by referring retrospectively to the theory or model which best seemed to fit the finished design.

As I worried about the problem of professional expertise, I took a course from Richard Butt at the University of Lethbridge and, at the same time, began working with Jean Clandinin at the University of Alberta. I realized that a melding of the work on teachers' autobiographies with that on teachers' personal practical knowledge gave me a key to understanding my own planning practices - growing up as the daughter of a teacher, my own schooling experiences in that context, the daunting task of creating new resources during my teaching years, the videodisc development with Douglas Parker and David Mappin - all contributed to my genesis as an instructional designer. Since all my design projects took place in the social context of a collaborative team, I became committed to a praxis that involved the sharing and blending of personal stories about teaching and about life, in context-bound, "constant collaborative conversation" (Streibel, 1991, p. 128).

The sharing of teaching stories, the creation of the content knowledge for the instructional plan, was a transformative social activity (Wexler, 1982). Britzman (1991) asserts that voice permits participation in the social world. The conversation in instructional design is a social activity with cognitive aspects in that the discursive process involves the "social negotiation necessary for the production and interpretation of knowledge" (Britzman, 1991, p. 38, italics added); and it is transformative because "life review and the act of telling one's story (are) active components in the process of transformation" (Benmayor, 1991, p. 164).

An Alternative Process of Instructional Design

In this study, then, I propose an alternative instructional design praxis grounded in the tenets of narrative discourse; that is, that the process of *collaborative* instructional design:

is a process of negotiating meaning through the telling of stories;
uses socially negotiated meaning as content;
is a social activity;
is transformative for all involved in the construction of the instructional story;
permits me to construct it as a feminist model, in that the process legitimates participants as the subjects of their own lives;
and results in the enduring relational obligations of the family, that is, the moral obligations of care and responsibility for the others.

Negotiating Meaning Through the Telling of Stories

In this research study, I characterized the conversation-based instructional design process as a metaphor which describes both the process of constructing instructional meaning, that is, the way that we designed; and the content of the story of questioning, the story of the design of the videodisc "Do I Ask Effective Questions?". Conversation was the interactive social activity in which we engaged, privately and reflexively, with our own life stories; and publicly with each other's tellings of their lives. This was a reflexive process in that design conversations were internalized conversations made public and accessible (Bruffee, 1984). I include in this public telling the conversations with teacher/exemplars and with others in the institutions. Conversation revealed the teacher lore (Schubert, 1991), or "beliefs, values and images that guide teachers' lives" (p. 207), that were at the heart of how each of us understood being in the classroom as question-askers. After Dewey, this conversation *is* the making of curriculum, or in this model the design of instruction. In the collaborative probing of the meaning of our stories we were able to draw upon the collective knowledge that "gives meaning and direction" (Schubert, 1991, p. 210) to the experience of questioning in the classroom.

Traditional, technical models of instructional design may also use language as a tool with which to probe the knowledge of assumed experts. From a feminist perspective, however, language can be an instrument of power used on informants (here, subject matter specialists) to extract what they know. The resulting "data" can then exist in forms completely independent of the personal meaning with which these individuals would have imbued them, for example, in anonymous notes to be used later. This is almost a violent image to me, suggesting strong language in explanation: The process of decontextualization suggests obliterating the personhood of the knower, recasting personal practical knowledge without reference to the personal. On the other hand, conversation is a mutual, reciprocal process authorizing a "breadth of subject matter and variety of voices compatible with it" (Florio-Ruane, 1991, p. 239) and, instead of imposing order, welcomes the twists and turns of meaning and understanding that define its equity of form and content.

In addition, conversation is the research process by which we came to understand the phenomenon of the QDisc project. During the design phase, we came together to share stories of our reflexive knowing-about the process and the experienced transformations in our lives and our work. The conversation was without boundaries - humorous, resistant to institutional accountability; ultimately transformative - and we again came away with new understandings about the QDisc project and a mutually constructed, plurivocal story of the making of curriculum.

Using Socially Negotiated Meaning as Content

How do many stories, many voices, many meanings, become the story of questions in the classroom, the story of the QDisc? The process of constant, collaborative conversation is a process of negotiation, of reflection-in-action (Schon, 1987), which engages the design team members in a dialogue with the phenomena of their lives. This is a process of finding the spaces where shared ownership of meaning can be claimed, where conversation requires each of us to clarify and authenticate for ourselves and for each other our "motives, authentic experiences, and common meanings" (Aoki, 1991, p. 73).

This negotiation, which is achieved in the public arena of conversation, does not result in a single interpretation of reality. That is not its intent. Rather, the multiplicity of meanings embodied in the telling of our stories is merged imaginatively into collaborative stories with many characters, many plots, many nests of meaning. The telling of stories did not result in the pulling apart, or isolation of strands of narrative meaning, but in the re-weaving of whole strands into a new product, the story, the instructional design of the videodisc.

What is central to a study of the making of the plan, then, are the problems of how conversation let the designers "produce and reproduce meanings and myths about education through their theories, practices, routines, discourses, contexts, and reflections on educational life" (Britzman, 1991, p. 15); and how these shared meanings and understandings of teaching life became the story of questioning on the videodisc. Collaborative conversation as instructional design process is thus inseparable from blended stories as content. Both clientele (teachers) and purpose (to understand the questioning process) for the instructional videodisc are intimately related to decisions about presentation, i.e. the instructional plan. Florio-Ruane (1991) makes this point in her discussion of the purposes and kinds of writing. The instructional videodisc is meant to be interactive, that is, it compels the learner to actively construct meaning from it. Therefore, the content and plan that is exophoric in nature "evokes in the (user) who shares its context images of his or her own experience that resonate with those drawn on by the author... Both (designer and user) participate in the creation of such a text's meaning" (p. 247).

Collaborative Instructional Design is a Social Activity

Various persons taking turns at talking - this is the "web of expressive social activity" (Borland, 1991, p. 63) that situates the designers at the center of a creative, dialectical process in which life experiences define the community of knowers. Elements of this knowledge community include the sharing of a multiplicity of meanings, values, imaginations, and histories. Sharing through oral personal narratives occurs naturally within conversation: This meeting in conversation is the "quintessential human act, the *social*

moment wherein and where we have authentic recognition of the other" (Brody & Witherell, 1991, p. 263). This social moment is recreated each time two or more of the design team members come together in conversation, because the community now shares a social history which I have come to think of as reflective of a family structure.

Collaborative Instructional Design is Transformative

The collaborative conversation is a process of authoring, but I go beyond the idea of authoring as the making of the plan, to the notion of authoring my own life through the making of the plan. It is in this sense that the conversation, the telling of who we are, the sharing and blending of meaning and values, is transformative for all the authors, the makers of the QDisc. Tappan and Mikel-Brown (1991) argue that this process is a moral activity because it "influences how we think, how we feel, and what we do" (p. 181). Further, reflective conversation as authorship is developmental, or transformative, in that it "not only expresses itself through narrative, it also develops through narrative... (and) such reflection also entails learning..." (p. 182). The telling of stories as instructional design praxis, or discourse as instructional design praxis, is a cognitive activity requiring reorganization, reassessment, and realignment of life experience (Brody, 1991), and in the sharing is both personally and publicly transformative.

Collaborative Instructional Design is a Feminist Construct

The instructional design process should be collaborative and socially constructed, based on conversation, negotiation, reflection, intuition, and embodied knowledge. Accepting that embodied knowing is the basis of praxis, I must make room in the instructional design process for the knowing expressed in the voices of all other design partners. Each design act is predicated on the personal/practical/professional knowledge of each design partner, and both the design process and the product will provide an account of our constant, blended, collaborative conversations. Authorizing the voices that tell these stories is a collaborative and ultimately, for me, a feminist practice.

Why a feminist practice? Because a socially negotiated process grounded in the intimate sharing of narratives legitimizes ways of knowing not imbricated in the canonical power structures of rational, technical, and finally paternalistic models of knowing and doing. After Bakhtin (1986), these models of authoritative discourse are the word of the father, invoked in systematic models of instructional design and valuing knowledge as an entity to be discovered and controlled. In contrast, a conversation makes room for multiple value systems and is plurivocal, and reflects the "Principles Behind Feminist Praxis" elucidated by Hollingsworth (1991), and by Belenky et al. (1986). In this view, the process values, rather than deprecates, emotions, intuitive leaps

and personal experiences as the basis of knowledge, and encourages continuous celebration of our discoveries, changes, and rearrangements of power through new narratives. Because conversation is so public and accessible, it masks the power question, "Whose account counts in this story?" because in its give and take it blends all accounts.

The Enduring Relational Obligations of the Family

"Making room" is characteristic of a feminist stance in which fidelity to others is an overarching concern (Noddings, 1986). The story of the making of the QDisc is fundamentally concerned with a community of story-tellers who practiced valuing and confirming the narratives of each other; building an enduring community of caring. Each conversation is a "return to community" (Benmayor, 1991, p. 166), a place where we are deeply engaged with each other's lives. This community became a haven where role definitions were fluid, where power structures were changed and rearranged through new narratives.

This process became a marker event for us all. In terms of our family history we count life events and construct new narratives from that time. Membership in a caring community means that we honour each other and our ways of knowing whether together or apart. The notion of family goes beyond community, however, in the depth of intimacy attained by entering into each others' lives and forging bonds that endure through time and space as we come together again to make a new story, the story of the making of the QDisc.

Conversation as Design

In conversation we make meaning out of stories, meaning that is enacted in a plan. This is the Conversation as Instructional Design. In this conversation, every story we tell is intentional: We share our images of teaching, and these images are given life by the teachers who ask questions. We share our teaching stories, and these stories become the content of the questions the teachers ask. We share our lives as parents, and our family lives are connected to our images of teaching. The instructional design evolves from talking about our shared classroom experiences, told as we engage in editing conversations, working with the videotaped images of our exemplar teachers asking questions in their classrooms. The rhythm of the conversation is the rhythm of teaching is the rhythm of the design. There is no clear distinction between the design activity and our lives.

In this excerpt, we talk about how the design conversation modelled the actual technology that would represent it: it was intuitive, dynamic, spontaneous, chaotic, and interactive, and it was very personal. Roy expresses the transformative nature of conversation:

> But there was also each and every person getting an education... maybe (that) added to the commitment and the ability for the design to continue. If, at one point, had this not happened, would the design have stopped? (Roy, 1993, March 18).

At first, the conversation does not seem to fit into the rhythms of school and academic life. Institutional accountability makes clear the expectation that a well-defined job is to be done in a plan-ful way that does not accommodate the personal rhythms and learnings (the coming-to-know-about) of collaboration. Of the four of us, Al and I felt most accountable to this view, and consequently most guilty about its defiance. I remember my vow to stick to the agenda (whatever that was) when I heard Al talk about his uneasiness with the slow pace of the process, although for Louise and Roy the conversation was a revered essential in their coaching and drama and teaching families.

The conversation, which was based on the shared language of teaching, emerged from our talk and from the talk contained on the videotaped classroom stories that unfolded as we watched. The stories in the QDisc were told in the classrooms as we watched, and we reconstructed those stories later, in the editing suite, into the instructional story of questioning. The stories of Question Framing, and Wait Time, and Taxonomies, and Questioning Disabilities - all were assembled from the Conversation about the teaching we saw unfold in front of us, frame by frame, from the day's master tapes, and the next day's videotaping was informed by the meaning shared, conversationally, in what we had seen. Thus, the teaching itself became the content of the conversation, which became the instructional plan called "Do I Ask Effective Questions?"

This seems to be an honest way to tell stories of teaching for others who will come to know about questioning. Conversation authorizes the decision to actively value the stories told in the asking of questions in the classroom, by legitimating them as design process. In this process we trust the teachers we are honouring at the same time as we honour each other's knowing-about teaching. Al describes the editing conversation as design process:

> I was just thinking that part of the consensus-making, part of the decision-making took place when we were up in that little place (the editing suite) and Roy was spinning the dials on the machine and picking out sequences. I mean, there was a sense that this is what we have, so whatever we make it's going to be made out of this. And so, that became an important part of the decision-making (Al, 1993, May 20).

This active process rejects a retreat into the artificiality of scripting:

> ... you armchair this stuff and you write out questions and classrooms are well-behaved and everything is just perfect... And you start

> getting into real classrooms and that's not the way they are... (Al, 1993, May 20).

Instead, it empowers conversation as a way of teaching that comes from the personal practical knowledge of the designers:

> But, at some level, that's part of being teachers again. And I think, to go back to consensus, that that's what we do every minute of our lives, in classrooms, and as coworkers... We didn't even have to say to each other, "We know that, that kids are going to answer that you didn't expect to have answer, or a teachable moment's going to come up and that'll take 11 minutes", you know, we knew those things and didn't have to talk about them (Al, 1993, May 20).

The conversation requires that we share images of teaching by telling stories of teaching. Here, one shared image is a common one of 'just getting one more little thing in' to the teaching conversation:

> One thing I really like pedagogically about Level II videodiscs, is with the teaching sequences, you return to it again and again and again. That really... gives the right impression about teaching... that there are a lot of things going on here, a lot of angles... (Katy, 1993, May 10).

Louise agrees, "Yeah, that it's complicated... That it's not sequential, and when you learn this, then it's learned? And you go on to the next thing? I really like that, that it's complex. Sophisticated..." (Louise, 1993. May 10).

And, finally, the conversation helps us to connect our lives to our images of Good Teaching, which are embodied on the videodisc as the content and the design.

Why Conversation?

Design partners in a collaborative process need to be aware that each is the sum of all past experiences, and that their embodied knowledge - about teaching, about relationships, about life - will cause them to interpret the design task and experience through personally and socially constructed symbols. Conversation is the public symbol system that allows this embodied knowledge to be surfaced and made available to the group, so that meaning may be negotiated and then captured in an instructional plan. As a symbol system, conversation corresponds to shared knowledge and provides the means with which we can connect on a deep level to each other's life experiences - our values, imaginations, and "ideological and axiological frameworks" (Chanfrault-Duchet, 1991, p. 81). The telling of stories, the oral narratives which provided the content and drove the process of the collaborative instructional design, were the meaning systems represented in

the constant conversations in which we engaged in workrooms, in restaurants, in classrooms, at lake cabins, on the telephone, while watching daily rushes in the television studio - over time and space and separation and nested lives. And as participants in each other's lives we became primary collaborators in each other's stories (Campbell, 1995),

Collaborative conversation as an instructional design method has been problematic for the theorists of the rational paradigms, unless they are able somehow to systematize the process or reduce it to the work of team-building that happens before the real work of design can begin. This is a view embraced in the androcentric worlds of industry and academia, although I suspect that there are more design anarchists like me than would be admitted at annual professional meetings. In fact, reviewers of my work have consistently confided their intuitive models while refusing to delineate a socially constructed process, except retrospectively4 submit that any instructional design process involving two or more team members *will* unfold in a conversational milieu, admitted to publicly by its participants or not; and that the making of an instructional plan will always require a constant internalized conversation with oneself, as well. So, what does the collaborative conversation look like, and how are its elements embodied in the curriculum/the design? For this I turned to the insights of feminist oral historians who, in their work with women with whom their lives became entwined, understand the process of telling lives as one of seeking deep moral connections with others.

The Purposes of Conversation

Conversation is collaborative, participatory, and inclusive: The purpose of conversation is to establish a community because community is the source of power and meaning (Tannen, 1990; Minster, 1991). We recognized the power of the community of the teaching family in providing us with collective memories and as a social structure that let us do the work of design. "Roy said something very interesting in one of these conversations... that we always set a place at the table" (Katy, 1993), and this setting of a place, this establishing of community through conversation was accomplished through the telling of a teaching story, putting out on the table our personal practical knowledge about teaching. The stories always contained collective memories, for example first-year teaching stories, that set the stage for the sympathetic, intentional talk about the process of teaching that, in retrospect, contain the meaning of the design. These stories are sympathetic and intentional just because they are told to cement relationships in the group - stories that are revealed as collective memories in the sharing.

The Forms ofConversation

If we accept that conversations are negotiations for closeness in the community (Tannen, 1990) then the forms that the conversations take must be both purposeful and personal. While the androcentric purposes of conversation may relate to power hierarchies (whose account counts most?), the conversation as negotiation has as its purpose the making of communal memories. Out of these memories come kernels of meaning that are collectively owned (Minister, 1991) and that lead efficiently to new stories of meaning in the community. Verbal markers, key phrases, questions, jokes, gestures, particular connotations such as "weasel words" and "technofear" - tools of the conversation - all are refrains that are regularized and are functional (Chanfrault-Duchet, 1991; Etter-Lewis, 1991). Thus, the telling of stories in the social milieu of conversation can still be authorized by guardians of institutional accountability. Both the forms and purpose of this conversation do differ substantially from the ritual talk of academic committees to which Al once referred, however, because it is meant to be non-competitive rapport-talk (Tannen, 1990). Typical of this conversation: Cooperative overlapping in which thoughts are linked with shared life experiences. Louise and I typically do this by simultaneous speech, by finishing a story started by another. We all do this by joining in to the self-deprecating joking about our shared personal and teaching dilemmas (Minister, 1991). Meaning is negotiated, communal memories are created by the sharing of humorous anecdotes and personal narratives, commonplace matters and mundane experiences (Minister, 1991). In conversation the stories can be told, and in the telling the curriculum is made.

A Few Implications for Instructional Design Practice

There is a strong tendency, I think, on the part of instructional designers based in corporate and industrial settings to resist a deeply personal authorization of their practice which actually supports the use of feelings and intuition - the "just knowing" that their praxis is right, that it embodies everything they know about design. I, on the other hand, resist just as strongly the pressure to rationalize and systematize my own practice by developing a 6-step process to "build a team culture", or "establish the conversation"; a process that can then be automatized by others in the same contexts. Knowing what I know now, I don't want to return to justifying my practice retrospectively. Perhaps the different contexts in which we work demand that we be alert in different ways to the demands of time, space, money, deadlines, distribution, implementation; competing professional lives: I call these the demands of institutional authority and accountability, and I suggest they lead to what Maxine Greene calls "the depredations of technique" (1978, p. 17).

I do believe though, that whatever our instructional design contexts, we must be attuned to the people with whom we are engaged in essentially a task of meaning-making. Given this, we must then value the rich knowledge bases, the personal practical knowledge that we bring initially to the design task, and keep probing the active reconstruction of meaning that is made as the instructional plan, or design, unfolds. What does this mean for design practice?

Certain *deliberate* practices enabled the Conversation to unfold in the project described in this paper. For example, as design team leader initially, I made a point of visiting each team member at his or her workplace several times, during which we talked about our lives - teaching histories, families, current work lives, future personal and professional goals - and sometimes those conversations had questioning as a topic , or included questions about what an instructional design project involved. Those conversations continued for four months before the team was *officially* brought together in the first design meeting. When we did meet in the Fall of 1988, the institutional authorities said we had begun our task. But we were far ahead of the task, because now we knew each other and shared a common understanding of questioning in the classroom. And, we knew how the design process was going to unfold because we had experienced and had articulated the culture of the classroom: we would go into classrooms and let teachers tell their own stories through their actions, and we would take those stories back on videotape and examine them for the plan. Because we decided, deliberately, to share design power (or knowing), we took turns with the process by rotating design tasks such as brainstorming, flowcharting, scripting, editing, and so on. We were able to proceed this way because we had a design space that was ours exclusively for a year— a room with a door that closed, away from phones, and equipped with coffee and food. We felt authorized to design together in social spaces like restaurants and our own homes, because conversation flows in the social milieu of a community, and that's what we had become. And even when the others had to go on to different things at the end of the academic year, as it happens while final editing and design decisions were still unmade, I was able to make decisions and bring the project to conclusion in full confidence that I had the trust of my team to tell the story that we had mutually constructed.

In Conclusion

The story of the making of the QDisc is the story of the tension between the authoritative discourse of instructional design and an internally persuasive discourse - the subversion of the practice of rational, lock-step instructional design processes (first you write objectives, then you create test items...). It is a story of the rejection of received and static knowledge and the celebration of alternative ways of knowing and "ever newer ways to mean" (Britzman, 1991, p. 21). It is a story of breaking the sanctioned rules, the sacred myths of the

discourse of technical rationality (Schon, 1983) and celebrating the ambiguity of words, the play of meanings in conversation. Collaborative conversation as instructional design praxis is the internally persuasive discourse that is socially negotiated and constructed through the telling and retelling, living and reliving of teaching stories (Connelly and Clandinin, 1990).

This is a story, the telling of which is a fundamental human activity and thus of instructional design practice. I tell it this way because "narrative might well be considered a solution to a problem of general human concern, namely, the problem of how to translate *knowing* into *telling"* (White, 1981, p. 1).

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Footnotes

Throughout this paper I use the word "praxis" to refer to my ID practice from within the frame of my personal practical knowledge, a term first coined by Connell & Clandinin, 1988.

I've been asked if a conversation-based process can deal adequately with the "conversational steps of an instructional design model, such as needs assessment, defining learner characteristics, etc." This is a paper written from outside the frame-work of those activities, and it in fact assumes that certain activities, like needs assessment, have already happened. I don't wish to imply that they should not happen just because they are technical steps (or are they, necessarily?) This story starts with the making of the instructional plan.

The word I have chosen to use here, reflexive, implies a kind of interactive "bouncing back", that is a sort of circle of reflectivity.

For example, one reviewer for "The Instructional Designer as Constructivist: An Anarchist's View" commented, "As I began to read the article, I immediately thought of my experienced as a designer and the times I was asked, 'What model do you use?' My very flip response was 'the intuitive model' and then quickly went on to describe how we use parts of various models in the order which fits the project, the faculty, the situation. So I can identify very closely with the writer of the article."

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The Effectiveness of Hypermedia Instructional Modules for Radiology Residents

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AbstractThis case study details the development and subsequent field testing of training materials for residents in radiology. Eight modules were produced in a hypermedia format at the Montreal General Hospital by teams comprising medical faculty, residents and educational technologists. The contents of the modules address clinical, anatomical and radiological themes. The nature and functionality of the modules, and the process involved in their development, are described. The results of a six-month field test utilizing a post-test only, quasi-experimental design are also presented. The evaluation addressed three types of learning: perceptual discrimination and interpretation, factual knowledge and inferential or diagnostic reasoning. Overall, the results indicated no significant differences between hypermedia and traditional instruction on any of the three categories of learning and only a slight difference among three levels of residency. Implications for future developments are discussed.

Resume: Cette etude de cas porte sur le developpement d'un hypermedia educatif par 1'Hopital General de Montreal pour les residents en radiologie, ainsi que sur les tests d'apprentissage administres sur le terrain suite a 1'implantation du logiciel. Les huit modules, qui abordent des themes cliniques, anatomiques et radiologiques, ont ete produits par une equipe composee de medecins, de residents et de specialistes en technologic educative. La nature des modules, leurs fonctions et les Stapes de leur developpement sont decrites. Les resultats des tests, effectues sur une periode de six mois selon un design quasi-experimental avec *post-test,* sont presentes. Trois types d'apprentissage sont mesures : discrimination et interpretation perceptuelle, connaissances factuelles et inferentielles et raisonnement diagnostique. Les resultats n'indiquent aucune difference significative entre 1'enseignement traditionnel et le format hypermedia quant au trois categories d'apprentissage. II existe, toutefois une legere difference parmi les niveaux de residents. Les implications pour de futurs d^veloppements sont analysees.

During the period September 1991 to August 1992, eight hypermedia computer-based tutorials for radiology education were developed at the Montreal General Hospital. The design, development, production and evaluation of the modules was carried out by a team comprising medical faculty from McGill University, residents from McGHFs network of teaching hospitals, and faculty and students from the Graduate Programs in Educational Technology at Concordia University and Universite de Montreal.

Postproduction evaluation of the modules was conducted during the period spanning September 1992 to April 1993.

In this case study we explain the rationale for utilizing a hypermedia approach in this domain and the expected benefits. The context, including the residency program in radiology and existing traditional teaching methods, is outlined. We provide a brief review of related development and evaluation projects in radiology education and comment concerning their relationship to our own work. The particular approach to development which was employed is described briefly, including aspects concerning organization, processes, tools and funding. Observations concerning the strengths and weaknesses of the approach are provided. The characteristics and functionality of the modules are also described. We then outline the evaluation scheme that was followed, including both preproduction and postproduction formative evaluation phases, and provide details of the postproduction evaluation which took the form of a field test. Procedures, tools and analyses associated with the field test are presented. Results are discussed and recommendations for future research and development are elaborated. Overall, findings were positive, with residents who learned with hypermedia generally performing as well as those who experienced traditional lecture and demonstration methods.

Context

The project was carried out at the Montreal General Hospital under the direction of Patrice M. Bret, Chief of Radiology. The radiology program is a five year, highly selective specialization which follows accreditation as a general practitioner. There are only approximately two dozen residents at the five teaching hospitals in the Montreal area in this particular specialisation. The goal of the project was to develop and implement improved teaching methods in the radiology program.

Radiology candidates must develop knowledge and skills in four areas, namely: (a) perceptual discrimination and interpretation; (b) factual knowledge (e.g., incidence of different pathologies in different populations); (c) inferential or diagnostic reasoning, and; (d) patient and case management. All four forms of competence are developed and refined through supervised case loads. Traditionally, instruction for varieties one through three is also addressed through a lecture series and through "conferences". Conferences generally are one-hour sessions during which as many as five residents are required to diagnose individual cases before their peers and a staff radiologist who has prepared the cases.

This system of lectures and conferences and lectures is somewhat haphazard. Lectures, many of which are given by visiting staff, vary from year to year both in content and in quality of presentation. Conferences are important tools for learning, but only one or two residents are truly actively

participating at each session. Our observations of conference sessions revealed a low level of attention from some non-participants. Also, preparation time for both conferences and lectures is quite substantial and staff radiologists have less time at their disposal for these tasks than is desirable.

Given the foregoing analysis, it was our belief that technology could play a role in improving the quality of instruction while also, in the long run, freeing up faculty members' time for case supervision and case work.

Hypermedia For Radiology Training

Hypermedia has enormous potential as an instructional tool in the domain of radiology (Ackerman, 1992; Greenes, 1992; Jaffe & Lynch, 1992; Lesgold and Katz, 1992), especially with regard to the first three objectives listed above: development of perceptual and inferential skills and acquisition of factual knowledge. More explicitly, computer-based hypermedia offers the following possibilities:

design a highly interactive form of instruction that guarantees active learner participation;

present images (CTs, MRIs, Doppler images, X-rays) and highlight them in different ways to train residents in perceptual discrimination tasks and to test interactively their abilities in these tasks;

present cases and pose cases for solution;

utilise flexible instructional strategies including simulation and case-based learning and, more generally, both discovery and tutorial modes;

construct a seamless environment for study with interconnected on-line glossaries, bibliographies, abstracts and search functions;

provide facilities for annotating, saving, and printing images; generating bibliographies; saving and printing comments and notes, and;

exploit thematic connections among concepts and cases through the structural flexibility of hypermedia systems, a capability which Feltovich et al, (1989); Spiro et al, (1988); and Spiro et al, (1991) argue is especially important in ill-structured domains.

By exploiting these possibilities, the following benefits were expected to accrue from the project:

improved curricula in radiology;

standardization of the quality and content of core curricula;

improved learning through sound instructional design and the use of interactive learning strategies;

on-going improvement of instruction through formative evaluation (including evaluation based on on-line collection of data);

increased understanding of variables affecting learning in hypermedia in medical education;

dissemination of tools (a shell) and the transfer of development methodologies to radiology programs throughout Canada;
reduced instructional preparation time for faculty, and;
increased availability of explicit training to interns, with a growing repository of instructional and reference materials available through flexible scheduling.

Review Of Related Projects

Despite the apparent potential of hypermedia for the domain of radiology, there are relatively few projects which have been evaluated and reported. Those projects which have been reported are limited in scope and there are weaknesses apparent in the methodologies that were employed in their evaluation.

Among the studies which have been conducted we find the following: Moore, Kathol, Zollo and Albanese (1993) assessed the effectiveness of a videodisc film file compared with a conventional film file for teaching radiology to medical students. One hundred and thirty-four fourth-year medical students studied 116 cases selected from the American College of Radiology Learning File. Material comprised 58 skeletal cases and 58 chest cases. One-half the students studied the skeletal cases on film, the other half on videodisc. The conditions were then reversed for the chest cases. There was no significant difference in learning between the two conditions for either set of cases. However, students utilizing film reported their perception of a superior learning experience in terms of amount learned, convenience of use and ability to detect lesions. This is an interesting study insofar as it provides some justification for the use of lower resolution media for teaching purposes. However, the interactive and advanced navigational features afforded by the technology were not exploited in the design of this particular project.

D'Allesandro, Galvin, Erkonen, Albanese, Michaelsen, Huntley, McBurney and Easley (1993) compared the instructional effectiveness of a hypermedia textbook (HyperLung) concerning a lung disease with that of a lecture. HyperLung is a sophisticated hypermedia "pop-up" textbook comprising a table of contents, discrete chapters, indices, a dictionary, on-line testing and capabilities for text search and annotation. Forty-nine staff and residents in radiology were randomly assigned to receive instruction either through HyperLung or via a lecture. Both groups received the same content and each was tested before and after instruction. There was no significant difference in learning between the two groups.

The evaluation conducted by d'Allesandro *et al* is perhaps the one closest to the evaluation conducted at the Montreal General hospital which is reported in this article. However, the latter has a smaller, presumably more

homogeneous sample (residents only), and also provides longer exposure to the treatment condition.

Jaffe, Lynch and Smeulders (1989) developed a hypermedia program on echocardiography that was intended to be used as the primary instructional tool for achieving an intermediate level of clinical expertise. It consists of a user-controlled learning environment with random access to 54,000 images and 1,200 clinical items. This program has proved successful in providing a uniform basic curriculum in echocardiography. After five to ten hours of independent study with this resource, residents are said to "have achieved an intermediate level of expertise and need less tutoring from the attending physician" than previously (Jaffe *etal,* 1989, p. 479). An objective qualitative assessment of skill acquisition was reported to be in progress. However, the authors do not reveal how the improvements in skill and performance mentioned above were measured.

Wenzel and Gotfredsen (1987) studied retention of theoretical knowledge after computer-assisted instruction in intraoral radiography. No significant difference was found between treatment and control groups on immediate or delayed (three months, 18 months) post-test measures, though both groups showed significant differences on pretest versus immediate post-test measures. Instrumentation comprised 20-item multiple choice tests.

Starkshall, Riggs and Lowther (1986) report the development and informal assessment of a computer-aided instructional module for radiological physics. The program appears to be a prototype. Informal feedback collected from physicists, residents and technology students focused on educational value and user friendliness. The feedback reported was positive and supports the use of the technology in the curriculum.

Several features distinguish the work conducted at the Montreal General Hospital from the projects and evaluations documented above. In particular, our project involves several learning objectives, a variety of materials and themes presented through one standard interface, and a relatively long duration with some 20 hours of material delivered over a six month period and four and one-half hours of formal testing.

While there are weaknesses in the design of the evaluation and in the instrumentation, as discussed later in this article, overall the approach is more rigorous than the evaluations described above. Arguably, our evaluation provides more reliable and more detailed evidence of the applicability of hypermedia to instruction for radiology programs than do the other evaluations which have been reported in the literature. Important features of the evaluation plan include an analysis of the impact on learning by type of objective, residency level and instructional method, a field implementation, and a collaborative learning situation for the field implementation, which is described below.

The Tutorials

The modules developed during the project cover the following topics: (a) Cystic Tumours of the Pancreas, (b) Ectopic Pregnancy, (c) Physics of X-ray Filters, (d) Tumours of the Posterior Fossa in Children, (e) Anatomy of the Temporal Bone, (f) Diagnosis of Arthritis, (g) Arterial Stenosis and Occlusion Viewed Through Ultrasound, and (h) Echogenic Liver Nodules. Each module contains between two and four hours of content, divided into chapters. A standard interface and a standard set of functions were designed for use in conjunction with all the modules and these were incorporated in a shell programmed in Supercard on the Macintosh, which served as the basic authoring tool. A medical market scanner (an Omniscanner equipped with a back light) was used for digitizing directly radiological images. Sound (for Doppler) was digitized using MacRecorder. Standard illustration programs such as MacPaint and Adobe Photoshop were used for creating graphics. Macromedia's Director program was used for animations. The digital video standard was Quicklime.

The shell was developed by a staff radiologist and the interface was subjected first to expert review and then subsequently, with some content in place, to testing with the assistance of graduate students from Concordia and Universite de Montreal to determine usability. Three graduate students from Concordia were employed in the role of "end-users" during the usability testing which was carried out with a representative module. Two usability testing strategies were employed: task-based evaluation and an evaluation grid. In the task-based component of the exercise, students were required to obtain certain specific information from the module or to perform a particular task (e.g., paste an image to the scrapbook and print it). Data was collected through observation and on-line trace routines to identify problems with the tools and interface presented to the user. Using the evaluation grid, students evaluated the module along several dimensions using an instrument comprised of Likert-scale items measuring ease of use, quality of graphics and the degree of usefulness of specific features and options.

A staff radiologist and one senior resident were then assigned to develop the content and finally actually to produce each module. During production, the staff radiologist who developed the shell was available to provide technical support to the different development teams. Each module underwent periodic formative evaluation for content accuracy and for consistency in presentation style and graphics. Consistency within and among modules was verified at regularly scheduled group presentations of work in progress attended by staff developers and instructional technologists.

The core content of each module corresponds to a specific lecture scheduled during the 1992-1993 sessions. The staff radiologist assigned to develop each module was the same individual who would deliver the lecture.

Some modules cover all three aspects of radiology training referred to above. Some cover only two (leaving out diagnosis or perceptual training), while one module, the one concerning physics of X-rays, covers only factual or theoretical knowledge.

Modules incorporated digitized images (of computed-tomography images [CT], X-rays, magnetic resonance images [MRI] and ultrasound), animations, digitized sound (e.g., doppler effects), text, and graphics (medical illustrations). Figures 1 through 3 show typical screens from the Arterial Stenosis and Anatomy of the Temporal Bone modules, incorporating text, images and sound. Words in bold are hot-linked to both glossaries and references. Images are enhanced with animation and highlights illustrating the text. A standard menu bar provides access to navigational tools (chapters, pages, page-forward, page-back, end-of-section, beginning-of-section, quit and a trace of the navigational path), a context-sensitive help facility, and a set of utilities labelled "goodies".

Figure 1
Text and digitized image from the Arterial Stenosis module.

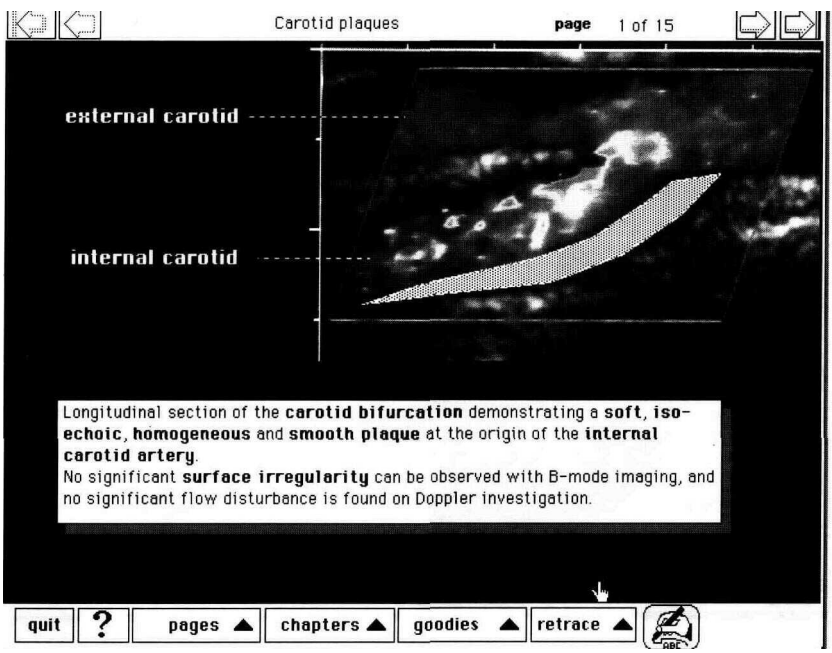


Figure 2
Screen exhibiting use of animation and digitized sound.

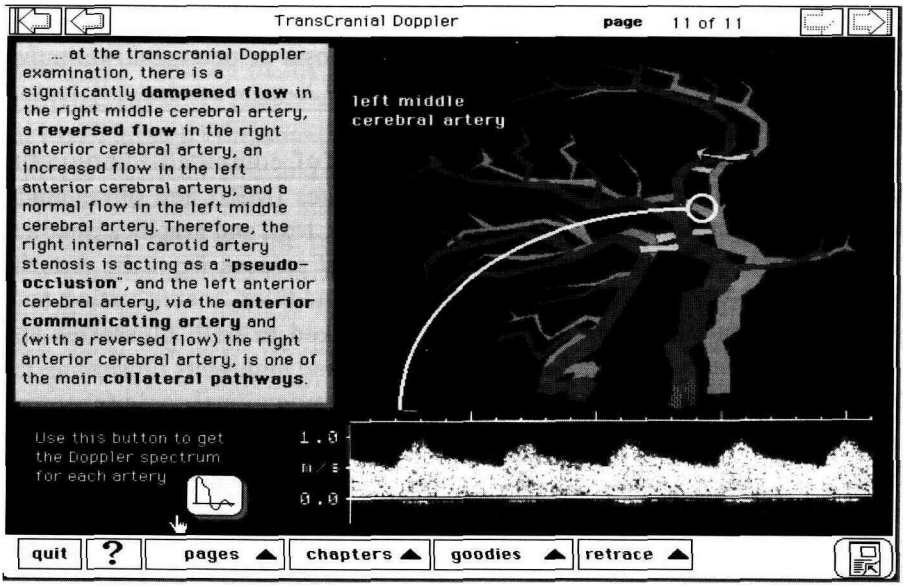
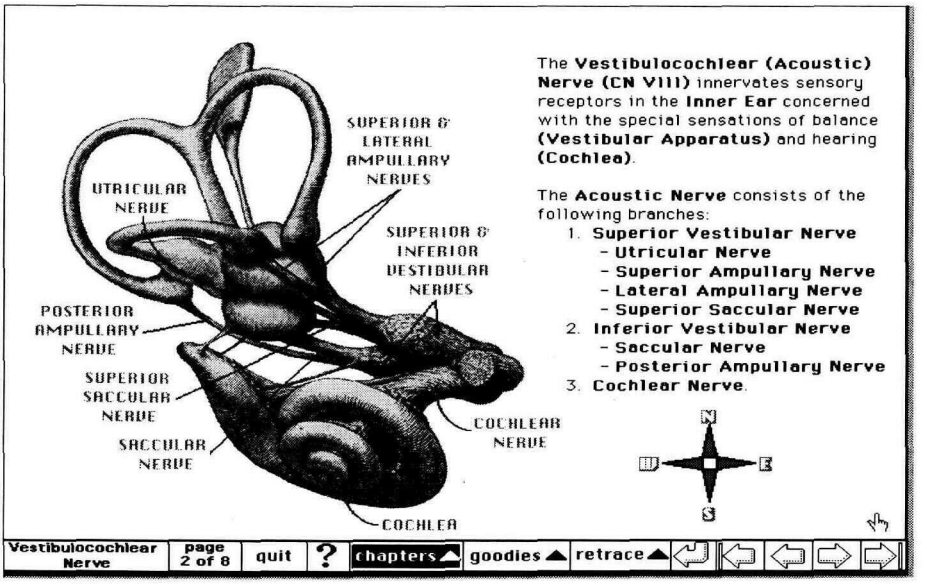


Figure 3
Typical use of medical illustration overlayed with "hot-spots".



Users can locate information and navigate via three alternative search functions. First, all modules incorporate key-word indexing and search. Two models were employed for key-word search facilities. Figure 4 illustrates a simple key-word search function, while Figure 5 shows a key-word search facility with cross-links to the glossary and bibliography. In the larger modules glossaries, indices and on-line bibliographies are cross-referenced and they are all available from a single screen displaying multiple windows (see Figure 6). All modules also include a second indexing device for navigation which is referred to as a "navigation board" (see Figure 7). The navigation board is accessible on any page from the "goodies" pop-up menu. It provides the user with a list of key words and pages related to the topic currently displayed. By clicking on a page or chapter appearing in the list presented in the navigation board the user may jump directly to that particular location in the module. Finally, some modules also incorporate full-text search as an alternative strategy for locating specific information.

Figure 4
Simple key-word search function.

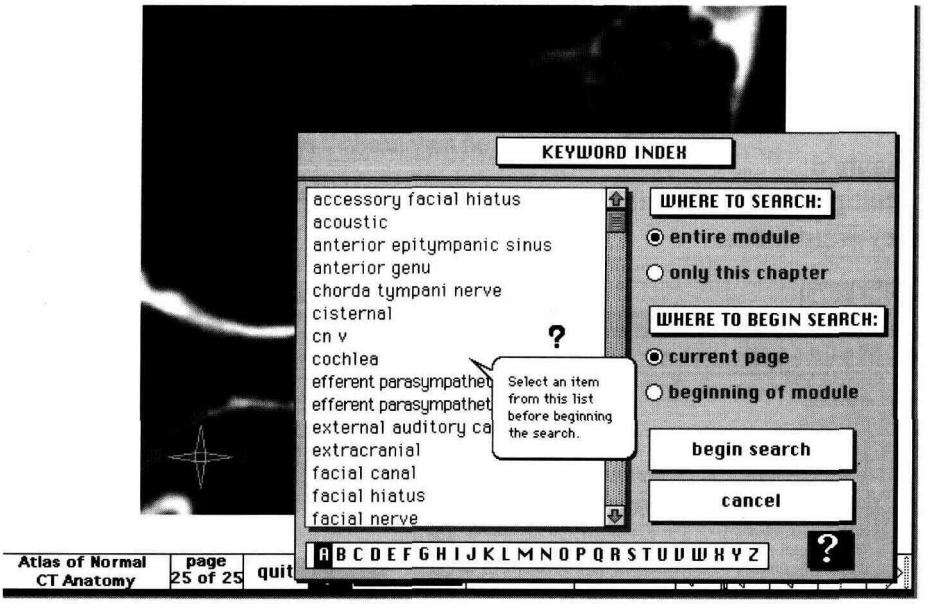


Figure 5
Key-word search facility with cross-links with glossary and bibliography.

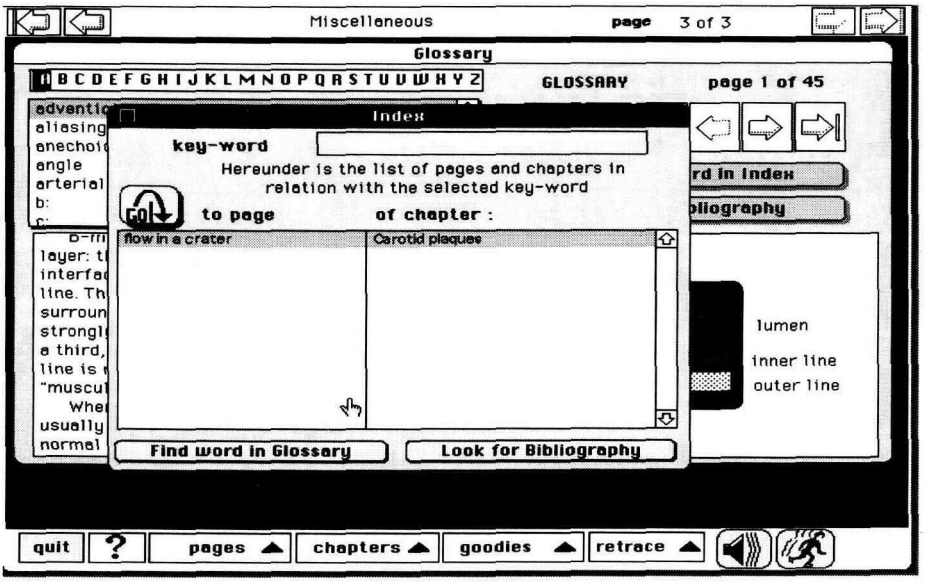


Figure 6
Multiple windows exhibiting connections among bibliography, glossary and key-word index.

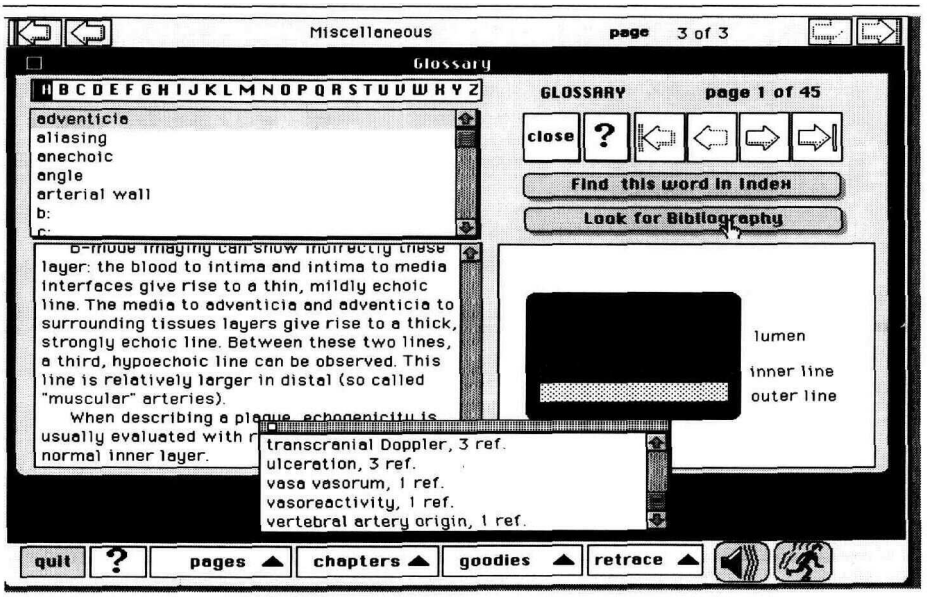
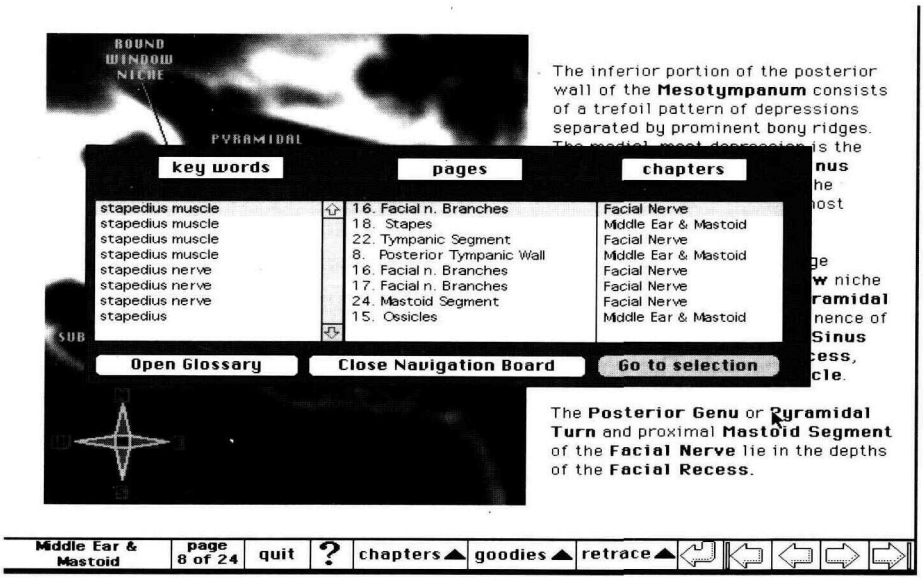
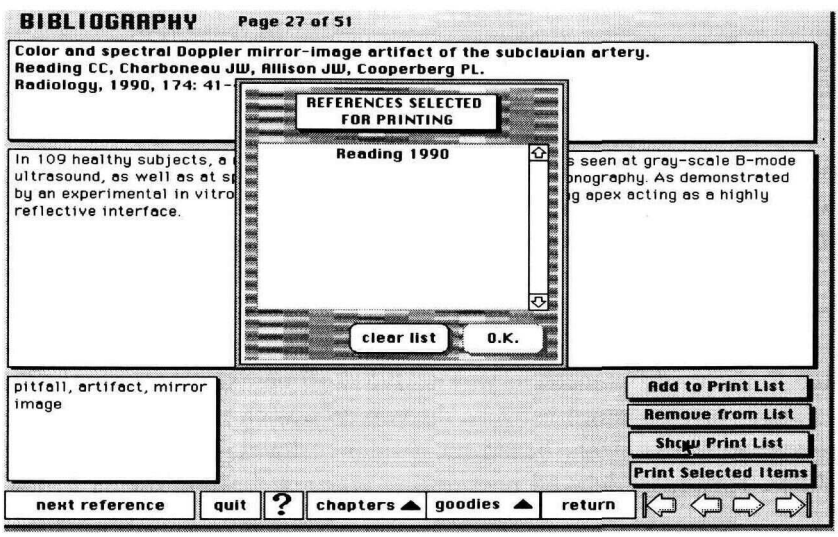


Figure 7
Navigation board.



Bibliographies include on-line abstracts and there are provisions for assembling and editing lists of references that can then be printed (see Figure 8)

Figure 8
Bibliography with on-line abstracts.



Other standard features include: a scrap-book where users can file images and text; a notebook, graphic tools and a text editor to annotate contents pasted to the scrap-book; print functions for scrap-book contents and notes; self-evaluation exercises; electronic bookmarks, and; dribble files with time stamps.

Although the modules are relatively sophisticated from a functional or technical standpoint, they were developed and produced largely by medical staff. Instructional technologists provided minimal production support while contributing to a greater extent to the design. Final production values were reasonably professional as judged by the instructional technologists involved.

The project was kept on schedule by the Chief of Staff of Radiology. This is a significant point in the organization of the project. It is estimated that over 6,000 person hours were spent in development and production phases over a three-year period. The cooperation and motivation of staff radiologists and residents, who are heavily burdened with cases and teaching responsibilities, could only be secured and maintained over time through the priority assigned to the project by the Chief of Staff.

In the following sections we report the study conducted to evaluate six of the eight modules and conclude with recommendations for future research and development activities.

Method

Subjects

Twenty-four radiology residents at McGill's five Montreal area teaching hospitals participated. There were 12 females and 12 males. The sample represents all residents available during the period of the study. Participation in the study was urged by the Chief of Staff of Radiology, and no resident declined to participate.

Design

A field test involving six of the eight modules was conducted over a six month period. A stratified random sampling divided the available group of residents (n=24) into two groups, with equal numbers of senior and junior residents in each. One group was assigned to the hypermedia condition, the other was to experience traditional lectures. No pretesting was employed; prior knowledge was treated as a random variable.

Originally the plan was to use a 2 x 2 x 3 x 5 x 8 mixed repeated measures design to assess differences in various types of learning (perceptual, factual, and diagnostic reasoning) between the two groups on immediate and delayed post-test administration, based on residency level, for each of the eight modules. However, delayed post-testing was not feasible owing to logistic

problems associated with assembling residents from the various teaching hospitals at the same time on so many occasions, and sample size and variable mortality experienced over the six post-tests did not permit a true repeated measures analysis of the data. Therefore, six independent t-tests were conducted to compare groups on post-test scores and six one-way ANOVAs were conducted to analyze differences based on residency level. Independent t-tests were employed to investigate which individual items differentiated the two treatment groups.

Instruments

Post-tests were designed to be as similar in format as possible. Each post-test comprised multiple choice and short answer items. One test (Arterial Stenosis and Occlusion Viewed Through Ultrasound) included photographic prints of ultrasound images with specific areas that were to be identified and outlined by residents. Each test was constructed by a lecturer with assistance from the instructional technologists. Tests were reviewed to ensure adequate sampling of the content, and to verify that content was contained in both lectures and hypermedia. The hypermedia modules contained additional content not intended to be presented in the lectures. This content was excluded from the post-tests.

Pilot testing of several of the post-tests was conducted with residents who were not included in the study in order to evaluate clarity and duration. Guidelines for format and length of the post-tests were created on the basis of the validation of the first post-test. There was not a sufficient number of residents available to allow for formal pilot testing of tests for all six modules.

Scoring of test results was carried out by the lecturer responsible for the content. Tests were identified only by a code number in order to ensure impartial evaluation. For non-objective test items (e.g., short answer diagnoses or precise identification of pathological features in images) with a range of possible scores, the lecturer provided an evaluation grid, and items were scored by both the lecturer and an instructional technologist. Inter-rater reliability for this scoring procedure was set at .90 and this level was achieved.

Procedure

On the six testing days, which occurred at one month intervals, all residents were assembled at the Montreal General Hospital in a meeting room. They were instructed to go either to the lecture hall or the hypermedia lab, according to their random assignment to conditions. The lectures were scheduled to last one-hour. The hypermedia sessions were concurrent with the lectures with the same duration. At the end of the one-hour presentation period, all subjects were reunited in the meeting room and the tests were administered during a 45 minute period.

Subjects were monitored by the instructional technologists during the administration of the tests. They were instructed to place the last four digits of their phone number on the cover sheet for identification purposes and to record their residency level (year one through five) on the back of the last page. The completed tests were returned to the invigilators, who recorded the completion time.

On the first testing day, the objectives of the study were explained to participants. In particular, they were informed that the results of the testing were not a formal component of their evaluation in the residency program, and that the primary objective was to evaluate the two instructional systems. Those not in the hypermedia condition were informed that access to the hypermedia materials would be provided to them after testing.

A survey revealed that no participant in the hypermedia condition had ever experienced computer-based instruction and also that there was little experience of application software other than clinical applications. Hence, in preparation for the hypermedia condition participants were provided with a twenty-minute training session. For this session, a self-instructional module was prepared using the same shell and interface as encountered in the medical education modules. During the training session the instructional technologists were present to provide additional support to the participants.

In the hypermedia condition, participants worked in groups of two or three at each workstation. They communicated freely during the sessions, within their groups. On-line traces recorded what content was accessed and the time spent in the module. During the hypermedia sessions participants were free to access any content, but they were informed which chapters corresponded to the lecture material and would therefore be directly relevant to the subsequent test.

The order of the modules was determined by the availability of the lecturers. There was no obvious relationship of dependency among the contents of the different modules.

Results

While eight modules were developed, only six were included in the study, owing to time constraints and availability of team members and subjects. The six were: (a) Cystic Tumors of the Pancreas, (b) Ectopic Pregnancy, (c) Physics of X-ray Filters, (d) Tumors of the Posterior Fossa in Children, (e) Anatomy of the Temporal Bone, and (f) Arterial Stenosis and Occlusion Viewed Through Ultrasound.

Descriptive statistics (sample sizes, group means, standard deviations, maximum scores on post-tests) for the six modules are presented for the two conditions in Table 1 . The SPSSx program *Frequencies* was employed to assess assumptions of univariate normality and to detect outliers. Tests for univariate normality were satisfactory.

Table 1
Descriptive Statistics for the Six Hypermedia Modules.

	Sample Size		Mean (SD)		
Hypermedia	Hypermedia Group	Traditional Teaching Group	Hypermedia Group	Traditional Teaching Group	Maximum Possible Score on the Posttest
1) Artereal Stenosis and Occlusion Viewed Through Ultrasound	10	14	31.60 (10.46)	32.29 (8.18)	64
2) Physics of X-Ray Filters	11	13	33.18 (8.68)	31.62 (7.08)	50
3) Ectopic Pregnancy	10	12	26.30 (4.64)	29.83 (3.76)	52
4) Cystic Tumors of the Pancreas	6	15	15.83 (3.82)	17.20 (2.51)	42
5) Anatomy of the Temporal Bone	8	13	14.25 (3.88)	15.08 (5.28)	30
6) Tumors of Posterior Fossa in Children	6	13	6.50 (1.23)	9.08 (1.32)	10

Of the six independent t-tests comparing post-test scores (see Table 2), only the one associated with Tumours of the Posterior Fossa was significant $t[17] = 4.04$, $p < .05$. However, irregularities regarding the length, format (short answer, only) and design of the post-test (redundant items), lead us to discount this result.

Table 2
Independent t-tests Comparing Groups on Post-test Scores.

Mean (SD)		T-Test	
Hypermedia Module	Hypermedia Group	Traditional Teaching Group	Value
1) Arterial Stenosis and Occlusion Viewed Through Ultrasound	31.60 (10.46)	32.29(8.18)	0.18
2) Physics of X-Ray Filters	33.18(8.68)	31.62(7.08)	0.49
3) Ectopic Pregnancy	26.30 (4.64)	29.83 (3.76)	1.97
4)Cystic Tumors of the Pancreas	15.83(3.82)	17.20(2.51)	0.97
5) Anatomy of the Temporal Bone	14.25 (3.88)	15.08(5.28)	0.38
6) Tumors of the Posterior Fossa in Children	6.50(1.23)	9.08(1.32)	4.04*
* $p < .05$			

Of the six one-way ANOVAs (see Table 3) conducted to investigate differences by level of residency only the one addressing Physics of X-ray Filters was significant $F(3,19) = 3.4$, $p<.05$. Subsequent post hoc analyses in the form of independent t-tests indicated the difference related to item five, a factual recall item which asked the resident to identify the material used for the node of an X-ray unit, the reasons why the material is used and at what kVp characteristic X-rays emerge. Junior residents outperformed seniors on this item.

Table 3
One-way ANOVAs Comparing Residency Level on Post-test Scores.

Hypermedia Module	F value
1) Arterial Stenosis and Occlusion Viewed Through Ultrasound	F(4,19)=2.54
2) Physics of X-Ray Filters	F(3, 19)=3.44*
3) Ectopic Pregnancy	F(3, 18)=0.34
4) Cystic Tumors of the Pancreas	F(4, 16)=1.56
5) Anatomy of the Temporal Bone	F(3, 12)=0.18
6) Tumors of the Posterior Fossa in Children	F(3, 13)=0.71

p<.05

Independent t-tests administered for items in each module to determine which individual items discriminated between the groups revealed seven additional significant items (see Table 4).

Table 4
Item analysis.

Hypermedia Module	Posttest Question Number	Mean Score of Hypermedia Group	Mean Score of Traditional Teaching Group	T-test Value
1) Arterial Stenosis and Occlusion Viewed Through Ultrasound	Ql	3.60	0.79	5.12*
	Q14	0.70	2.82	.361*
	Q15	0.20	4.43	4.05*
	Q16	0.70	1.25	0.20*
2) Physics of X-Ray Filters	Q5	4.00	3.07	2.21*
3) Ectopic Pregnancy	Q3	1.30	2.25	2.82*
	Q7	0.60	1.00	2.45*
	Q15	1.20	0.50	2.97*
* p < .05				

Discussion

Basically, we found no significant differences between instructional conditions or by residency level. As indicated above, only the module entitled Tumours of the Posterior Fossa revealed differences based on instructional condition and this result should be discounted because of problems associated with the length, format and design of the test. Only one module yielded significant differences based on levels of residency: Physics of X-rays. However, this module did not cover all three types of learning objectives. Furthermore, the single significant difference between residency levels should be interpreted in the context of multiple tests of significance drawn from essentially the same sample, with the concomitant increased likelihood of a spurious finding of a difference.

As acknowledged earlier, there was variable mortality so samples are not strictly identical across the tests and a repeated measures analysis was consequently contra-indicated. The mortality is not overly large, however, and we assume that the absences are random. Unfortunately, it is not possible to guarantee that there will be no mortality in an evaluation of this kind, given the many commitments of residents, unforseen hospital emergencies or illness among residents themselves. Variable mortality is the price that must often be paid to gain the external validity that comes with a field study conducted over an extended period of time.

The results do not appear generally to be due to a ceiling or floor effect. Most modules have mean scores between 50 and 65 percent of total possible scores, with reasonably large standard deviations (see Table 1). The lowest mean scores are found in Cystic Tumours of the Pancreas where they are about 40 percent which might be interpreted as a floor effect. This module did not have any items which discriminated between treatment conditions.

An important aspect of the design of the evaluation is duration. One would expect any initial positive or negative effect on performance due to the novelty of the treatment condition to dissipate over time. In fact, the actual results belie any such effect, since the only significant difference between treatment and control conditions did not occur until residents were tested with the fourth module, well into the field study, and since this finding has also been discounted.

Table 4 lists those post-test items for which the two treatment groups differed significantly. The items concerned fall into two categories: recall of factual information and visual discrimination tasks. Two factual items favoured the hypermedia treatment, while two favoured the control group. In the module concerning Arterial Stenosis and Occlusion, the control group outperformed the hypermedia group on three visual discrimination tasks. In the

Physics of X-ray Filters module, the hypermedia group outperformed the control group on a theoretical question.

While it is difficult to draw conclusions from these few results, it is interesting to note three things. First, the results for the three visual discrimination tasks are interesting. The hypermedia system provides more images than were presented during the lecture, and these images are highlighted and annotated in sophisticated ways. We therefore expected the hypermedia group to outperform the lecture group on this class of tasks. The results suggest that the impact on transfer of the difference in resolution between images displayed in the software and the regular film output should be investigated. In the visual discrimination tasks presented during testing, residents worked from copies of film. Film resolution is over 1000 dots-per-inch (dpi), while images incorporated in the modules are scanned down to 600 dpi and then displayed on a 72 dpi screen. This is a reduction in quality that may have a significant impact on feature identification and discrimination. The transfer issue is also interesting given that the technology is changing in the field and increasingly radiologists are being required to work from digital images displayed on a CT screen, rather than from film, regardless of how they received their training.

Secondly, the hypermedia module addressing the physics of X-ray filters made extensive use of dynamic visual displays (animations and Quicklime clips) to illustrate theoretical principles. The superior performance of the hypermedia group on a factual item addressing a theoretical issue is thus encouraging, insofar as it indicates the effectiveness of this strategy.

Thirdly, the general non-significance of the results provides a solid justification, from the standpoint of instructional effectiveness, for the use of the particular hypermedia format that was investigated. The long history of non-significant findings in instructional media or methods comparison studies would tend to support the prediction of a non-significant result in our field study. However, the amount of content available in the hypermedia condition is much greater than in the lecture, and on-line data indicates a considerable amount of material extraneous to the lectures was accessed by residents in the hypermedia condition. The lectures are highly structured and focused in comparison with the hypermedia material and they essentially teach to the tests that were employed. Thus, there was some reason to expect that there might be significant differences found in favour of the lecture condition.

The overall results of the evaluation are consistent with other studies which have investigated computer-based applications in radiology education. The methodology and sample are different than other reported studies. Other studies have included larger but less homogenous samples, different technologies (e.g., videodisc), lack details concerning instructional design

approach or granularity, are merely one shot post-test designs, or use different measures (or do not report measures).

Despite the limitations in our evaluation, as per the preceding discussion, the present field study provides strong evidence that technology-based instruction can be as effective as traditional lectures in delivering complex or refined subject matter to radiology residents.

Recommendations For Future Research And Development

With a no significant difference result, one can conduct a simple cost-effectiveness or cost-benefit analysis to decide whether the technological approach is worthwhile. While the initial effort to develop the eight modules was considerable, the benefits are obvious, as outlined above. The material is available on demand, while the content and quality of delivery is standardized. With the present shell it is a relatively easy matter to add new chapters or content to existing modules and, with the development and production expertise acquired within the radiology department during the course of the project, creation of new modules should be possible with less effort. Cost-effectiveness is enhanced by the circumstance materials can be shared with radiology programs across Canada. On the other hand, it must be acknowledged that the "freeware" approach limits the possibilities of developing and marketing the materials in a commercial form, to generate revenues for further work.

In assessing the strategy for funding this project, it should be remembered that a major goal was to develop a standard shell with a fixed interface which might achieve widespread use. One of the major problems associated with the growing body of published commercial software for medical education is that there is a great deal of variation in functionality and interface design. Standards and conventions yield efficiencies for both developers and end-users (learners). We reasoned that a robust design which could "satisfice" requirements for delivering content related to radiology education would be a useful contribution to software development in this area.

Funding for this project was minimal. Forty-thousand dollars was provided by the Canadian Radiological Association and the Sterling Winthrop pharmaceutical company. Despite this limited funding, over 20 hours worth of material was developed. The project demonstrated the feasibility of in-house development and production within a teaching hospital, with limited start-up capital. For the moment, until the market matures, development of usable products for smaller specialized market segments will continue to depend on the efforts of committed in-house developers.

Future evaluations should utilize truly standardized post-test instruments that have been assessed for reliability. This was not strictly possible in our evaluation given the limited number of residents available within the McGill

teaching hospitals. A more representative sampling of the three types of learning objectives would also be desirable.

As mentioned previously, the study involved group utilization of hypermedia. No attempt was made to exploit this circumstance in the design of the modules and their functions, and groups were formed randomly and changed to some extent over time, based on absenteeism. Further studies might control for this variable, or investigate the impact of the variable on performance and attitudes.

The decision to utilize groups in the delivery of the hypermedia materials was based on three factors: (1) the nature of radiological activities during residency, which are typically group-based, (2) differences among participants regarding experience with computers, and (3) availability of appropriate computer resources (we didn't have 15 high-end Macintosh computers).

In a strict sense, the group dimension is clearly a confounding element in the field study (did residents learn from the hypermedia materials or from their interactions with peers?). But from an evaluation standpoint, the issue is not critical - unless one wishes to generalize to use of the materials on a strictly individual basis.

Finally, future developments of the applications should entertain the following recommendations:

The programs should exploit hypertext capabilities to a greater extent, incorporating more mini-cases (following Spiro et al, 1988; 1991).

Enhancements to program functionality should be based on a detailed analysis of realistic learning and clinical activities in radiology, following principles of cognitive apprenticeship and situated learning. Such an analysis would allow implementation of a cognitive apprenticeship strategy with variable levels of support for learning and performance (Collins, Brown & Newman, 1989) and would be in line with recent thinking about the need to accommodate situated aspects of complex problem-solving activities in ill-structured domains, including social and cultural dimensions (Clancey, 1993).

Further recommendations from formative evaluation of the interface, concerning aspects such as standardization of location of visual versus textual information, should be implemented.

The possibilities offered by multiple windows for promoting visual acuity based on multiple image comparison should be explored. The present software offers only limited comparison of images with two per screen, or with comparison images on successive screens or interchangeable within a window.

The issue of the impact of lower resolution grey-scale images on visual perception tasks and its impact on transfer to operational radiological conditions should be investigated.

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Book Reviews

Diane P. Janes, Editor

Canadian Internet Handbook (1995 Edition), by Jim Carroll and Rick Broadhead. Scarborough, On: Prentice-Hall Canada, Inc. ISBN 0-13-329350-5, 798 pp., $21.95 (CND)

Reviewed by Earl R. Misanchuk

The first thing you will notice about *The Canadian Internet Handbook* (1995 edition) is that it is daunting in size - nearly 800 pages. Given the recency of the Internet, you might be surprised that there is that much information to be had about the Canadian portion of the 'Net. In case you're worried about having to read so much, however, relax. Only the first 268 pages form the body of the book; the rest is devoted to 19 different appendices. Given that, you might expect that this book would provide a very comprehensive view of the Canadian Internet, and you'd be right.

Although updated and revised following the commercially-successful 1994 edition, some of the book is bound to be obsolete by the time you read this review. Despair not, however; the 1996 version is likely on your bookstore's shelves as you read this. The authors appear to be committed to making this book as dynamically update-able as a book can be, and provides e-mail addresses to which readers can write to fill in gaps in information, offer comments and suggestions, identify errors, etc.

Before launching into a chapter-by-chapter overview of the contents, a few general comments are in order. A lot of people are talking about the Internet these days, and not everyone is using a common language (and that language which is common is liable to be laced with acronyms). Person A describes how she found this marvelous listserver about a topic that fascinates her, which allows her to have intense e-mail discussions with others across the country or around the world who share her passion. Person B describes a session in which private "chat" conversations go on in real time. Person C speaks of downloading a research paper she needed for a class she's taking. And person D talks about looking through a list of 50,000 CD's and placing an order for several, simply by typing in his name, address, and Visa number. All of them, when asked, will say that they were doing this "on the Internet". Yet

each one (assuming they had only experienced the activities described) would likely not be able to figure out how the others' activities were possible.

This illustrates the basic confusion surrounding the topic of the Internet. What is it, and how does it work? The four individuals above would give four different answers, reminiscent of the fable of the blind men and the elephant. That's the reality of the Internet today. To make matters worse - much worse - it's changing and growing so rapidly that what we know about it today may be obsolete tomorrow. That's why a book like Carroll and Broadhead's is so valuable: It gives an up-to-the-minute snapshot of today's Internet, with a glimpse of its history, and a peek at some of the possibilities of the near future. Furthermore, it does so in terms that are easily understood by the lay reader. You don't need a foundation in computing or communications to understand this book. By and large, it uses clear, common language, with detailed yet simple explanations where warranted. At the same time, it contains a good deal of more-or-less esoteric information, that would be hard to locate were it not between these two covers.

Chapter One, *Information Highways and the Internet,* is a general introduction to the topic for anyone who, for one reason or another, has managed to escape the media barrage of hype about the Internet over the past couple of years. In keeping with the promise of the title, it provides a special focus on Canadian applications of the Internet. Its tone is much like the rest of the media's: upbeat and rah-rah. Reading it, you might come away convinced that the Internet is the greatest thing since sliced bread. The more cynical of you might, on the other hand, take it all with a grain of salt. Still, it provides the reader with a reason to read more of the book, which is really all that can be asked of an introductory chapter.

Using the Internet in Canada, the second chapter, consists of about a dozen and a half case studies of companies and organizations that use the Internet. The strong commercial slant of this chapter may not have a great deal of interest for educators, but makes interesting reading nevertheless for the variety of ways in which the Internet can be used. One of the case studies does, in fact, deal with distance education applications, although in a necessarily terse way.

Chapter Three, *The Internet in Canada,* starts with a historical review of the development of the Canadian portion of the 'Net, and offers an up-to-date progress report of activities to the present. Regional and national networks, commercial Internet access services (the so-called "on-ramps"), and free-nets are described. Newcomers to net-navigation will appreciate the description of how it has changed from its original, non-commercial, state to its current one, and how many of the policies and practices of net-use were born and have evolved in response.

Internet Fundamentals, the fourth chapter, begins to get down to the nitty-gritty of the 'Net scape. If TCP/IP is just a tongue-twister to you, and an

IP address is an unknown quantity, this chapter will clarify things. Clients, servers, domains and how the Internet actually works are described in easily-understood terms. After reading this chapter, you should be able to more than hold your own in cocktail-party conversation. You might even develop a reputation as a 'Net-guru, if you aren't careful.

Internet Electronic Mail, the next chapter, continues in that tradition, with a rich explanation of the topic. Once again, although a number of technical topics are covered, they are done in an understandable manner: even if you've never actually used it yourself, you are likely to come away from this chapter with a more comprehensive grasp of how e-mail really works than a lot of people who use it on a regular basis. Useful topics such as e-mail etiquette (including flaming and smileys), and locating e-mail addresses of others, are also covered.

Chapter Six, *Tools for Knowledge Networking,* concentrates on newsgroups (USENET) and mailing lists (listservs, mailservs, etc.). It explains how they are organized and how they work, from the perspective of both reading them and submitting material to them. Once again, there are practical tips on etiquette and expectations. Tips on how to decode the often-cryptic newsgroups names are included.

The seventh chapter is entitled *Remote Access Applications.* If you've wondered what Telnet, FTP and Archie are and how they work, this is the chapter you want. Sample sessions are included; you can mimic them to get started in remote access.

Tools for Knowledge and Information Retrieval, the eighth chapter, talks about a handful of useful information-retrieval tools: Gopher, Hytelnet, World Wide Web browsers, Finger, IRC and WAIS. This chapter should be read selectively, as not all tools described will be of interest or of use to all readers.

Chapter Nine, *Connecting to the Internet,* describes access points, be they institutional or corporate, or via the services of an Internet Service Provider (of which there is a sizable and growing number - the names, addresses, and phone numbers of which are included in an appendix). The mysteries of shell accounts, SLIP/PPP connections, e-mail only, and full network connections are illuminated and compared. A handy section in this chapter is Questions to Ask Your Internet Service Provider. If you are contemplating subscribing to Internet access, this chapter is must reading. It may save you from shelling out money and not getting the services you expected.

Why the Internet? is the question raised in Chapter Ten. It discusses trends and projections, hopes and fears and aspirations of business, governments, and educational institutions. Somewhat in the style of current media hype, this chapter nevertheless offers considerable food for thought, particularly for the educator.

The final chapter, *Putting the Internet into Perspective,* attempts to do just that, contrasting recent media coverage with the reality, and examining various recent undertakings on the Canadian scene. It ends with a call for participation in public discussion about a number of Internet issues.

The number of appendices is, as indicated earlier, quite large; nevertheless I think it worthwhile to list their titles so that you can infer the kind of information they provide. (For some, the appendices might well be the most valuable part of the book.)

A. Canadian Internet Timeline
B. History of the Development of CS*net 1986-1990
C. Directory of Canadian Internet Service Providers [i.e., who can you call in your area to obtain Internet access]
D. Directory of World Wide Web Servers in Canada
E. Directory of Gopher Servers and Campus-Wide Information Systems in Canada
F. Internet Forms
G. Directory of Canadian USENET Newsgroups
H. Directory of CSO and WHOIS Servers in Canada
I. Directory of IRC Servers in Canada
J. Directory of Archie Servers in Canada
K. Directory of Internet Service Bureaus in Canada
L. Directory of Canadian Internet Resources
M. Directory of Internet-Accessible Library Catalogues in Canada
N. Directory of Internet-Related Publications
O. Directory of Community Networking Organizations in Canada
P. Directory of Canadian Organizations with Registered Internet Domains
Q. Mailing List Software Commands
R. Where to find SLIP/PPP Application Clients on the Internet
S. More Canadian Internet Sources

Some of those appendices will be of general interest, but some of them contain information so esoteric as to be of interest to relatively few readers. This brings me to my major criticism of an otherwise fine book: There is too much information included in the appendices; this book tells me (and, I suspect, most readers) more than I wanted to know about the Internet. While it is gratifying to see so much Canadian-oriented material, the breadth of topics available is too great. A good deal of it is supplementary, and while it probably should be available somewhere, I'm not convinced that a book of this type is the best location for it.

Furthermore, a large number of the appendices will be out of date by the time each annual edition is printed (e.g., the lists of servers, and of

organizations) and their contents will be ever-increasing in number. By the turn of the century (assuming the publisher keeps providing annual updates - which it must do if it expects to generate sales) the already-large percentage of pages devoted to appendices will increase to a very high percentage. Some of that material perhaps could be made available on the Internet itself, perhaps on WWW pages, instead of in appendices to the book. The book could simply briefly describe the contents of those web pages, and provide theURL's to them. That would also make it easier to keep the information up-to-date. Then there's the matter of the trees saved...

All in all, this is a reference well worth having. The 'Net neophyte will find the explanation and examples easy to follow and understand, while the more experienced 'Net-nut will find value in the more detailed information in the appendices.

REVIEWER

Earl Misanchuk is Professor of Extension at the University of Saskatchewan, where he works primarily on the instructional design of distance education courses and on computer-based instructional and informational materials. He has published books and articles on the use of print materials for instruction and on interactive multimedia instruction. His most recent research efforts are in the area of computer screen design.

Computer Mediated Communication and the Online Classroom, edited by Zane L. Berge and Mauri P. Collins. Cresskill, New Jersey: Hampton Press, Inc. 1995. Volume 1 (ISBN: 1-881303-13-6, 230 pages), Volume II (ISBN: 1-881303=11-X, 209 pages) and Volume III (ISBN: 1-881303-13-6, 257 pages).

Reviewed by Cathy L. Bruce-Hayter

Computer Mediated Communication and the Online Classroom is a three-volume series which provides a wealth of information on the topic as well as directs the reader to numerous other sources for continued study. Each volume, comprised of 12, 11 and 14 chapters respectively offers a comprehensive look at its major issues inclusive of practical examples and strategies for implementation. Each chapter provides a list of references and each volume ends with a glossary. Of particular note is the fact that the authors and editors of this series completed these volumes, up to the hard copy, through electronic mail.

Volume I, entitled *Computer Mediated Communication and the Online Classroom: Overview and Perspectives,* presents a broad overview of the

themes related to computer mediated communication (CMC). Volume I defines CMC and explains how it can be used effectively in teaching and learning. The teacher as facilitator is stressed as well as the changing role of the student to a more active participant in learning. The value of CMC as an equalizer in education is recognized for the physically disabled, educationally disabled and those who are deaf or hearing impaired. CMC helps bring together students from remote areas and peoples of different cultural backgrounds contributing to their harmony and sense of belonging. Volume I provides a quick education on the topic and offers practical guidance on the appropriate use of CMC in the classroom.

Volume II, entitled *Computer Mediated Communication and the Online Classroom: Higher Education,* examines the various methods of CMC use and certain of its benefits and limitations. The volume commences with a basic instructional design model which outlines the necessary steps for successful implementation of education and training programmes from the determination of course goals to the determination of evaluation criteria and the many steps in between. Much of the volume is devoted to examples of the integration of CMC in university courses including writing, literature, psychology, political science, new teacher induction and medical education. Lessons learned and recommendations for similar CMC implementation are offered.

Volume III, entitled *Computer Mediated Communication and the On-line Classroom: Distance Learning* describes the effective implementation of CMC in a Distance Education environment. As in volumes I and II, the importance of sound instructional design is accentuated. Using CMC to improve and extend lifelong learning is emphasized. Although adult development is the chief concern of the book, examples are also provided on the use of CMC in home schooling and K-12 classrooms. Additionally, this volume provides a wealth of online techniques from moderating discussions to stimulating learning with electronic guest lecturers. The volume concludes with a chapter entitled "Online Resources for Distance Education". Here, you can find out about the myriad of online resources and how to use these resources such as discussion lists (addresses given) and e-mail, internet protocols, file transfers, electronic journals, and searching strategies and tools.

As a Masters of Education candidate who is currently studying the use of CMC, e-mail in particular, in graduate distance education, I have found this series to be invaluable. *Computer Mediated Communication and the Online Classroom* is a comprehensive reference and practical guide to the successful implementation of CMC in education and training. For the newcomer to CMC, it offers a quick refresher. I recommend this series to students and practitioners alike as a handy reference in their practical library.

REVIEWER

Cathy L. Bruce-Hayter is a Training Development Officer in the Canadian Forces (CF). Prior to commencing her Masters of Education degree at Memorial University, St. John's, Newfoundland (her home province) in 1994, Lieutenant Commander Bruce-Hayter was the Chief Instructor of the CF Training Development Centre at CFB Borden, Ontario. She is currently working on her thesis in the area of CMC in Distance Education and will return to active duty in the summer of 1996.

Kids, Computers & You, by Frank Edwards and Thomas H. Carpenter. Kingston, ON. Bungalo Books, 1995. ISBN 0-921285-38-8, 180 pages, $12.95 (CDN).

Reviewed by Gary Karlsen

To review a book with a cartoon on the cover, more cartoons embedded in journalistic prose, and a title and subtitle that are meant to catch the eye of the not-so-serious reader: would such a publication be worthy of review in a scholarly educational technology journal? The answer is in the affirmative. The authors have done their research, and most importantly, they have addressed a host of problems that plague educational technology researchers and teachers. This book will be a useful resource for educators whose job is to promote understandings and applications of media and technology to those who have little or no computer knowledge. The book's subtitle, *What Parents Can Do Now to Prepare Their Children for the Future,* is rather misleading, for while the authors claim to be writing for parents whose children are in the school system, their audience is much larger - it also includes teachers, educational administrators and school trustees, and teacher college faculty.

In their *brief Introduction* the authors raise many questions about computer use in schools and about the importance of computer literacy. The *Preface* expands on these questions and establishes a dual theme that runs throughout the book. The authors challenge society's blind faith in the positive role of computers, and they debunk a sort of myth that our education system has everything in hand with respect to computer education:

> Surprising, few schools in Canada seem to have a workable computer policy in place. Effective computer use in a classroom is more likely to be the result of an enterprising teacher than a master plan.

This book is divided into five chapters and a conclusion. Beginning with *Kids in the Classroom,* Edwards and Carpenter provide an historical view of

how computer use has developed in Canadian schools. They go on to outline important computer issues which range from philosophical and political machinations to gender equity and technology resource allocations. This chapter is a good primer for the person who is completely ignorant of the status of computers in the classroom.

In *Schools and the Information Highway* we are offered a clear explanation of the Internet and a credible presentation of the debates on electronic access to information in our schools. Included, is a discussion about Canadian content and public involvement in media and the use of the information highway; for example, the Rogers Cable - Specialty Channel revolt. In the section dealing with SchoolNet (the wiring of Canadian schools), the authors urge us to be supportive, challenging, and cautious all at once.

The *Teachers* chapter is one of teacher advocacy and a call for teacher empowerment. Conversely, the authors are critical of educational administrators and universities for their role in the creation of a variety of computer problems that are prevalent in our schools. In this chapter, practical suggestions are offered to teachers for instructional uses of computers, and to parents for involvement in the development of computer resources and related curriculum.

Administration is a chapter that describes for the non-educator, how local school boards work, and the leadership role of the principal as computer facilitator. The Ontario school system suffers a critical review with respect to educational computing policies, and the Carleton Board is held up as a model of successful technology implementation.

The closing chapter is called *The Home Front.* In this section of the book, parents are given suggestions ranging from how to become involved with school computer policies and curriculum development, to how to select a computer for the home. This chapter is rather thin. More could have been said about computers in the home, and about problems with and solutions to parents and children sharing the same computer.

Kids, Computers & You is a good primer for parents who lack knowledge about computers in general, about their status in Canadian schools, and even about how our school system works. The book is current, though it is pre-*Windows* 95. While any publication about computers is sure to be dated even a few minutes after it is released, the useful information provided in this book by Edwards and Carpenter will continue to be valuable for several years. And that usefulness will not be for the lay parent alone. The educational technologist would find the book a very quick read, but would also find some interesting references to media critics like Pappert and Roszat. References to the *Report ofthe Ontario Royal Commission on Learning* and citations of other reports and articles of professional associations about computers in the classroom will be useful leads for further investigation and analysis. Certainly,

the many questions raised in this non-academic publication are worthy of additional treatment.

REVIEWER

Gary Karlsen is Director, Western Canada, for Magic Lantern Communications and the president of AMTEC for the term, 1995-1996.

Information for Authors

CJEC welcomes papers on all aspects of educational technology and communication. Topics include, but are not limited to: media and computer applications in education, learning resource centers, communication and instructional theory, instructional design, simulation, gaming and other aspects of the use of technology in the learning process. These may take the form of reviews of literature, descriptions of approaches or procedures, descriptions of new applications, theoretical discussions and reports of research. Manuscripts may be submitted either in English or in French.

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Manuscripts may fall into one of two classes: General, dealing with a topic or issue at a general level (although reference to specific instances or examples may be included), and Profiles, dealing with or describing only a specific instance of an approach, technique, program, project, etc. A Profile may be thought of as a descriptive case study.

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Manuscripts should be printed in 8 1/2 x 11-inch ordinary white paper. All materials must be double-spaced, including quotations and references, include a title page on which appears the title of the manuscript, the full name of the author(s) along with position and institutional affiliation, mailing address, e-mail address, and telephone number of the contact author. An abstract of 75-150 words should be placed on a separate sheet following the title page. While the title should appear at the top of the first manuscript page, no reference to the author(s) should appear there or any other place in the manuscript. Elements of style, including headings, tables, figures and references should be prepared according to the Publication Manual of the American Psychological Association 4th Edition, 1994. Figures must be camera ready.

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Send four copies of the manuscript to the Editor along with a letter stating that the manuscript is original material that has not been published and is not currently being considered for publication elsewhere. If the manuscript contains copyright materials, the author should note this in the cover letter and indicate when letters of permission will be forwarded to the Editor. Manuscripts and editorial correspondence should be sent to: David A. Mappin, Canadian Journal of Educational Communication, Faculty of Education, 3-102 Education North, University of Alberta, Edmonton, Alberta, T6G 2G5. e-mail: David.Mappin@ualberta.ca.

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