

## Communication Channels and the Adoption of Web-based Courses by University Professors

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### **Abstract**

*This qualitative study examines the structure and importance of communication channels in the adoption of Web-based courses by university professors. This study provides insight into the importance of informal communication among peers, the changing nature of communication networks, factors that impede communication, the role of change agents in facilitating communication channels, and the changing concept of “proximity” which is being developed in the context of increased use of information and communication technology. By offering insight into the communication channels of these adopters, valuable information is gained into possible strategies for encouraging adoption of Web-based courses.*

### **Introduction**

Many scholarly writers have documented how information and communication technology is causing dramatic changes in society. These changes, they claim, have not been confined to just technical areas but more importantly impact the very structures of institutions in our society. Many believe that network technology has the potential to trigger systemic reform in education (Bates, 2000; Christensen, Anthony, & Roth, 2004; Drucker, 1999; Pittinsky, 2003; Tiffin & Rajasingham, 2003). Supporting this belief are several sources which have documented the growth in the number of online courses and have predicted that this growth will continue (Government of Canada, 2001; LaGrange & Foulkes, 2004; National Postsecondary Education Cooperative, 2004).

The National Center for Educational Statistics, a branch of the U.S. Department of Education, has studied trends in distance education at post-secondary institutions and found that distance education is becoming more common and the availability of networked technology has played a role in this increase (Lewis, Levin, & Greene, 1999; Tabs, 2003; U.S. Department of Education, 2004). It was found that institutions were planning to adopt or increase their use of Internet-based technologies. They concluded that distance education, and in particular asynchronous Internet-based technologies, would become more common. In Canada, the Advisory Committee for Online Learning reported that between March 1999 and May 2000, 57% of Canada’s 134 colleges and universities offered online courses (Government of Canada, 2001). Altogether, institutions offered almost 3,000 courses, ranging from 1 to 340 online courses for each institution. The report concludes that Canada is “among the world leaders in online learning” (p. 30).

In an environment of fast-paced, dramatic change, the ability of individuals and organizations to adjust is very important. Despite the indications of future growth there are some indications that universities and professors are slow to adopt the use of new technology (Bills et al., 2006; Christensen, Anthony, & Roth, 2004; Drucker, 1999; Noam, 1995; Prensky, 2006). Authors such as MacDonald, Stodel, Thompson, et al. (2005) point to the contradiction that exists between the predictions about dramatic change being driven by technology and the reality of slow acceptance

of new technology. While many academics see the potential of online learning, many universities and individual professors are slow to adopt the use of information and communication technology in education. These comments emphasize the importance of research that provides insight into factors influencing the rate of adoption of online courses.

This paper examines the communication channels professors use to gather information about the use of Web-based courses before adopting the use of the new medium for teaching. Through examining these communication channels, insight will be gained which will be useful for those encouraging adoption of Web-based courses. The primary question guiding this qualitative research is: What are the communication channels used by professors to gather more information about Web-based courses?

### *Theoretical framework*

Rogers (2003) identifies communication channels, or the means by which messages get from one individual to another, as being very important in the diffusion of new ideas. His theory of diffusion, which is used as a theoretical framework for this study, identifies five variables which determine the rate of adoption of an innovation: 1) perceived attributes of innovations, 2) type of innovation-decision, 3) communication channels, 4) nature of the social system, and 5) extent of change agents' promotion efforts. Both mass media channels and interpersonal channels have characteristics which make them useful during the process of adoption. While the mass media play a role in creating awareness, the interpersonal networks are more important in influencing the decision to adopt an innovation. Rogers recognizes that diffusion is a social process and that communication is more effective when the individuals are similar in many respects. While people within a group are usually able to talk freely with each other there is also a need for communication outside the group to bring in new ideas. Rogers makes the point that the experience of "near-peers", those who have used the innovation in circumstances similar to their own are very important for potential adopters.

With this in mind, he provides a framework for analyzing communication networks. He classified networks into two kinds "interlocking" where people talk to each other, and "radial" where a group of individuals all communicate with one central individual but not with each other. Also emphasized is the importance of "weak ties" people you know but do not have an extremely strong and continuous relationship with who are sources of new ideas and information. Rogers generalizes that individuals tend to be linked to others who are close to them in physical distance (p. 341) and similar to them in terms of social characteristics.

### *Literature Review*

Very little research has been carried out on the third variable in Rogers (2003) model, the communication channels. Many who claim there is a gap between the potential for information technology in education and the current situation, point to the important role which professional development can play as a communication channel. Various methods of professional development have been used to introduce technology into university level teaching. Abbey (1997) outlines the early efforts of a small south western university to increase faculty integration of technology into teaching. The plan involved the attraction and training of early adopters who would then, by demonstrating successful use, help convince other mid-to-late adopting professors of the usefulness of technology. Concentrating on a small group of teachers, who show more interest in using technology, seems to have many advantages over a strategy to encourage immediate adoption over the whole system. Early adopters may provide valuable insights which can help guide further implementation. Moore (1995) and Rogers both recognize the critical role that early adopters play as

advocates and demonstrators of innovations within their peer group. Moore uses several examples to demonstrate that attempts to move directly to wide scale adoption, without the support of a group of early adopters, is almost always doomed to failure. This is especially true in cases where the innovation involves dramatic change from past practice.

Research has been conducted related to how the presence of information and communications technology is changing communication patterns within organizations, including scholarly communities. Genoni, Merrick, and Willson (2005) examine the use of the Internet to activate latent ties in scholarly communities. Based on the results of a survey of professors at an Australian university, it was determined that the Internet had played a significant role in activating ties that might not have otherwise been made. This research builds on findings that have been made by earlier researchers into communication networks, such as Granovetter (1973) who demonstrated that weak ties can have strong effects on the diffusion of new ideas. Constant, Sproull, and Kiesler (1996) examined how people use e-mail to seek technical advice from “strangers” or those they had “weak ties” with. They found that people, when contacted, provided useful advice and information, despite not knowing the person making the request.

Caroline Haythornthwaite is another researcher who has completed a great deal of research related to the impact of the Internet on communication in academic environments. Haythornthwaite (2002) examines how new media affects the communication patterns between people with various kinds of relationships. In a more recent study, Haythornthwaite (2005) focuses more specifically on the impact of Internet connectivity in academic environments. It was found that those with strong ties were more likely to integrate a new media as one of the multiple ways they communicate. The results related to weak ties were somewhat less clear. While those with weak ties were less likely to try new media to communicate, they were likely to use e-mail if it were commonly used within their group as an easy-to-use opportunistic means of communication. Likewise, e-mail made it easier to communicate and activate latent ties. Another study by Nentwich (2005) provides further insight into how the use of information and communication technology is causing a complex process of change, which is occurring in communication between scholars. This work shows that not only are professors communicating directly with others about their work, but they are also using electronic platforms such as e-journals and e-conferences to present their work to a wider audience and initiate interactions.

The evidence from one of the earliest studies of the use of technology in education, the Apple Classrooms of Tomorrow (ACOT) project and from some university initiatives, indicate the field of education is similar to others in terms of adoption of innovations. People are more likely to adopt if they can discuss an innovation with people who use it in situations similar to their own (David, 1996; Yocam, 1996). Studies of the importance of communication networks have shown factors such as geographic isolation or lack of interaction with others are a negative impact on innovativeness. Communication networks can be developed through conferences, social events, contact through work arrangements, or any other situation which encourages peer contact and the sharing of information. Several questions in the interview guide (Appendix A) are directly related to gathering more information about how communication networks could impact on professors’ rate of adoption of Web-based courses.

#### Method

This is a qualitative study involving semi-structured interviews with 32 professors at one university. By examining in-depth what is happening with professors at various stages of adoption, the researcher was able to gain insight into the structure and importance of communication channels through which professors get information about Web-based courses. Qualitative research tends to

favor a strategy which is relatively open and unstructured, rather than a rigid and predetermined frame of reference. This flexible research structure provides opportunities for the researcher to discover unexpected issues which may be of importance to the study. This is an important aspect, given the newness of this area of study and the continuing evolution of the technology. The interview guide (appendix A) has been developed based on the theoretical framework used and a review of the literature on this topic. While questions were asked about other variables in the Rogers (2003) model, this paper focuses on findings related to communication channels. The initial questions asked to start the discussion on this topic were: How did you first learn about Web-based courses? Where did you go to get more information? Do you share information with other professors about Web-based courses? Did you attend any kind of information or professional development session on Web-based courses? The openness of semi-structured interviews allowed for an in-depth examination of the situation being experienced by university professors at Memorial University of Newfoundland. McCracken (1988) suggests:

The long interview is one of the most powerful methods in the qualitative armoury. For certain descriptive and analytic purposes, no instrument of inquiry is more revealing. The method can take us into the mental world of the individual, to glimpse the categories and logic by which he or she sees the world. It can also take us into the life world of the individual, to see the content and pattern of daily experience. The long interview gives us the opportunity to step into the mind of another person, to see and experience the world as they do themselves (p.9).

There are several advantages of using a semi-structured interview rather than a completely free flowing conversation. First, the use of an interview guideline provides consistency from one interview to the next, thereby facilitating comparison of data (Merriam & Simpson, 1995). Second, the use of questions assures that important topics, possibly overlooked by the interviewee, will be introduced.

Each interview was recorded and transcribed by the researcher for analysis. During the transcription, initial categories and comparisons were developed as recommended by Maxwell (1996). The preliminary research questions and related literature provided guidelines for data analysis, however, flexibility was maintained in order to accommodate any unexpected findings as suggested by Marshall and Rossman (1999). Further categories were developed by close examination of the transcripts to identify patterns and themes. Bogdan and Biklen (1992) suggest a strategy for developing coding categories;

You search through your data for regularities and patterns as well as for topics your data cover, and you write down words and phrases to represent these topics and patterns. These words and phrases are coding categories. They are a means of sorting the descriptive data you have collected so that the material bearing on a given topic can be physically separated from other data (p.166).

As the coding of the data continued, categories continued to be refined and the final coding categories were used as headings in the findings section of this paper. During the process of interviewing, transcribing, and refining the data, analytical memos were written to help facilitate the analysis as suggested in both Maxwell (1996) and Glesne and Peshkin (1992). As the data analysis progressed, the researcher explored implications of the data.

A request was made in writing to all professors at Memorial University of Newfoundland

(MUN) who have taught or are currently teaching Web-based courses to participate in this study. Memorial is the only university in the Canadian province of Newfoundland and Labrador and is the largest university in Atlantic Canada. The university has 17,000 students and employs 950 full-time faculty as well as 850 sessional instructors (Memorial University, 2007). The impetus of a sparse population of 515,991 (Newfoundland and Labrador Statistics Agency, 2007) spread along 17,000 Kilometres of coastline, which is faced with variable and often harsh climatic conditions may have led to the university to become a leader in the development of distance education. At the time of data collection, the university's office of Distance Education and Learning Technology (DELT) offered more than 250 distance courses to more than 13,000 students each year. Distance programs were offered in areas such as business, education, health, maritime studies, social work, and technology. Courses were offered in 22 different disciplines over 8 faculties and 150 courses were delivered in whole or in part via the Internet. DELT offers many support services related to the offering of online courses at the university (DELT, 2007). For the purposes of this study, Web-based courses are defined as courses where the primary means of delivery is through applications such as Web pages, e-mail, or electronic discussion forums.

#### Findings

Rogers (2003) identifies communication channels as being very important in the diffusion of new ideas (p.18). The findings of this study provide insight into how professors first heard about Web-based courses and gained more information about them. The findings emphasize the significance of informal communication networks and the fact that the communication networks may be changing since the earlier offerings of Web-based courses at the university. The findings also support some of the patterns of communication network identified in Rogers' work.

#### *Talked informally with other professors*

Many professors conversed with colleagues within their faculty or at the university about Web-based courses. Some said they had an idea of what to expect since someone they knew had taught a Web-based course. This kind of information was usually gathered informally through conversations with other faculty members in their area of specialization. Some talked to professors in other faculties who had a great deal of experience teaching online. One professor noted he went looking for specific information on how much more time a Web-based course would take and his best source was another professor with that kind of experience. The professor he contacted cautioned him to expect a steady stream of e-mails. He also explained how the Web-based format would impact his preparation and evaluation time. Some professors made the decision to teach a Web-based course and then went to look for information from others who were already involved in teaching this way. In many cases, the people at DELT were able to provide contact information for professors with whom they should converse. One professor explained that he talks to other professors to see what they are experiencing as well as to get technical and practical advice. These findings support the assertion in Rogers (2003) that before adopting an innovation, people like to discuss it with others, similar to themselves, who have already adopted the innovation.

There were also some interesting findings in terms of physical proximity and communication networks. One professor (Prof. 007) explained how sharing an office with another professor, who also taught a Web-based course, allowed for the informal sharing of information. For example, when she was starting to experiment with using real time chat in her course, she had many discussions with the person sharing the office who was already using this feature in his course. She explained her colleague tried posting questions or discussion topics for the chat session, rather than leaving it wide open and found that it worked better. She is intending to try that in her course, as well. This

professor noted the group of people she can draw on in her faculty is expanding.

Well, it is really good to have someone to talk to. Two of us are the only ones who teach Web courses, but we have two other people who have Web components to their course; and actually three or four of us are all developing Web-pages and other Web components, even for our on-campus courses now. So, the experience with the Web course has been really good for us in that way (Prof. 007).

Another important point she made was that the DELT training sessions were an excellent opportunity to meet people in other faculties. Professor 007 tried to attend any kind of instructional session offered by DELT and has met people in other faculties who teach Web-based courses. This has enabled her to hear about some of the differences between Web-based courses in other faculties.

Despite the clear indication that professors were communicating with those around them about Web-based courses, it was also evident that many professors were also contacting other sources of information. The nature of the innovation and the fact that courses were observable at a distance seem to be contributing factors to the use of somewhat distant resources. Professor 023, who recently started teaching at the university, explained he had asked other professors some questions about workload, teaching strategy and evaluation before agreeing to teach a Web-based course. He also contacted professors at the university where he did his Ph.D. The discussion he had with them was more of a debate about the use of the Web as a means of instruction, rather than practical or technical matters. Also, since teaching his first course over the Web, he is now working with another professor to co-design and eventually co-teach another Web-based course.

Professor 034, who started to teach Web-based courses after many in her faculty were already doing so, explained that she sought out information from various sources. She talked with professors in her faculty, professors in other faculties, and also people at other universities. She contacted people at the university where she did her graduate work and also contacted a professor at a university in the United States who taught a course similar to the one she would be teaching. One point, which emphasized the nature of the innovation and its observability from a distance, was the fact that she had made contact and was able to view some courses being taught at two other universities using a limited password. Other sources of information included reading articles in academic journals and talking to the course designers at DELT. She says her main preparation was talking with other people. Professor 034 suggests it would be helpful if there were more in-services and discussions at the university on the use of Web-based courses. While praising DELT for doing a pretty good job bringing in a number of speakers, she did not feel people were always well prepared to teach Web-based courses. She explained there is some interchange among professors, but usually it was related to a specific problem rather than a more general discussion. Sometimes she approaches people who are near her and interrupts their work to seek the information needed. Another professor (Prof. 043) explained he drew on the general office staff near his work area to get technical help. He said, "I knew where my resources were in terms of people who could help me out and I did not hesitate to tap their doors." This professor explained he had also promoted discussion within the faculty about the impacts of technology by expressing his views and by organizing debates on the issue.

### *In the early days*

Professor 018, who was among the first to teach Web-based courses, noted there were not many people to talk to or rely on in the early days. Also, there were no formal avenues set up to

encourage discussion among the few professors who were teaching over the Web at the time. One of the first professors to teach Web-based courses at MUN noted communication networks are becoming more formal in recent years. He says there was a lot of information sharing among professors going on in the early years of Web-based courses. Professor 018 contends that such informal networks have now been supplanted by the things that are being done by DELT. Initially when there were only a few professors involved, people would do things on their own, like holding workshops and seminars. He says DELT has assumed the role of instigator for Web development. While he still chats and discusses things with some good friends or talks about articles they have read, he is less inclined to become too involved with helping people put courses online.

So we talk about things like that, just minor things. If anyone comes to me with anything that is major, if anyone comes to me with anything like I am going to formulate a course, could you help me with it, I will actually tell them why don't you talk to the people at DELT (Prof. 011).

Some professors noted when they started there were not many professors with online experience to talk to. This appears to have been typical of some faculties, even recently.

#### *Useful communication*

A number of professors had an opportunity to talk with some of the earlier professors to teach Web-based courses. The people they talked to and the courses involved were not necessarily in their subject area. However, the conversation exposed them to how a Web-based course worked. Notwithstanding the different subject areas, similarities existed, like the way students access the course and how professors communicate with students. Professor 015 mentioned there was some informal discussion in her faculty. Professors would give each other advice about how to approach such aspects as the discussion forum; they would also compare techniques and offer tips. If there were any major difficulties, they would contact DELT and ask for assistance. She praised DELT's capabilities saying, "they are the experts, if you have a question about how to do something, they are the ones to go to." This professor also noted that in the early stages of offering Web-based courses, there was a liaison person located in the department to carry out trouble shooting and act as a link with DELT. She thought this person had been really helpful, given that they had so many problems the first time around. Professor 015 thought in fact that the person in the position was really being missed and ought to be re-instated. The importance of this support type of position was also upheld by others in the faculty who were among the first to teach Web-based courses.

In another faculty, the growing number of professors teaching Web-based courses was also mentioned as a source of support. The strong commitment to Web-based courses in the faculty has meant that a very supportive environment has unfolded whereby professors are developing new teaching strategies and sharing them with each other. One professor explained:

"A lot of the faculty, because they have experience, will sit down with their colleagues and develop different ways...and they talk back and forth with each other about this, so it has been kind of a rich environment in that way" (Prof. 020).

#### *Lack of Communication*

It was significant that several professors were able to identify factors which limited the amount of communication they had in relation to Web-based courses. Business faculty professor 022, although aware that the faculty had offered an increasing number of Web-based courses, had not had much discussion with other professors before he started teaching the course. Before

commencing with online teaching, he met with the professor who designed the course and examined the material. He had taught the same course in class and was quite familiar with the content, but he wanted to review how the course would change when taught online. This particular professor was teaching the course because the professor who designed it did not have enough time to teach it. Other than these discussions with the professor who designed the course, he had very little interaction with other professors on this or any other matters. He attributed this lack of communication to two related factors. First, he teaches the course as a sessional. Second, he is not physically located in the work premises when he would more likely come in contact with other professors. He explains, "I don't have a great deal of interaction with people from the University." Professor 028 pointed out that due to the top-down imposition of Web-based courses in their faculty; there was not much discussion of the Web as a teaching medium before she started to develop the course she taught. Given the importance that other professors placed on the informal communication in their decision to adopt and in their development of the medium, lack of these type of communication networks are indeed serious hindrances to adoption.

*Helping other people*

Some professors pointed out that they had helped other professors with material for Web-based courses. Professor 002, for example, mentioned he often helped other professors put together Power Point presentations. Another professor (Prof. 004) observed that word of mouth about the quality of your course often results in people wanting to have a look at it. In fact, some professors who are new to teaching over the Web have been referred to this particular professor by DELT. Moreover, professors who were redesigning their courses heard about aspects of her work and wanted to have a look at it. Despite the fact that some professors were opened to looking at what others were doing and borrowed ideas, many professors are not. She describes professors as “a fiercely independent breed, who do not wish to emulate what their colleagues are doing.”

One of the earlier professors (Prof. 031) to teach Web-based courses at MUN said not only was there no one in his faculty or the university to talk to, but there were very few people anywhere teaching Web-based courses when he started. His work on the Web was, as far as he was aware, the first ever in his subject area. He published articles in academic journals about the work he was doing with Web-based courses. Shortly after his material was published in the major academic journal in his subject area, he began to receive a great number of inquiries from all over the world. Some wanted to use part of his course in their teaching, while others just wanted to look at what he was doing. Due to the number of inquiries, he decided to make one of the modules available to anyone who wanted to look at it. The professor explained there was also a lot of interest locally when the course was advertised, and even more when it received coverage in the local news media. Professors from other departments came to talk to him and he was asked to give presentations to various faculties and groups within the university. Professor 003 explained that he reviewed courses being taught by two other professors because he wanted to broaden his understanding of what others were doing. He found that these other professors were using techniques similar to his own, but he did not alter his approach much because he had strong ideas about how he want to teach his own course.

*Talked to people at DELT and Training*

As noted earlier, the data indicates that communication networks are becoming more formalized in recent years. This is evident in the number of professors who had a high level of dependence on DELT as they placed courses online. For many professors, their first information about Web-based courses came from DELT. Some of the professors were considering doing correspondence courses and DELT staff suggested that if they were going to teach the course or program by distance, then they should consider doing it over the Web. Professor 010 noted that there was not much discussion among other professors, but he did attend several seminars and workshops which were being organized by DELT. These forums drew on the experienced people who had been among the earliest to teach Web-based courses at the university. These early adopters were in a position to talk about some strategies for developing content and engaging students. Another professor (Prof. 019) indicated just how dependent he was on DELT for information about Web-based courses:

There was no one in the department who had done this before and I didn't speak to anyone in other departments about it. I didn't look at what other people were doing. I didn't read very much on the teaching theory or anything like that. I just went to the instructional designer who I was working with (Prof. 019).

The level of dependence on DELT and the Web designers, as indicated by a significant

number of professors could have implications related to who takes responsibility for pushing forward innovations. Professor 028 admitted to being “totally unfamiliar” with Web-based courses before she actually taught the course. Not understanding the terminology being used to talk about some of the components of a Web-based course, she recognized how heavily dependent she was on a technical support person in the faculty and the Web designer from DELT. After teaching the course once, she realized it would take another round before she got truly comfortable with the format. Professor 029, who developed a course that involved a lot of graphic equations, says he got most of his direction from DELT because there were not many courses like his designed for the Web. Since professor 043 was located in the same building as DELT, he spent a considerable number of hours with the two Web designers involved in developing the course he taught. He estimates that for the first four weeks of the course, he spent at least an hour a week explaining trouble he was having and requesting assistance. Later in the term, he would not visit the Web designer’s office, but would phone and ask a couple of quick questions. He would often ask the course designers to change aspects he did not like, such as the way components were presented. Professor 043 also spent considerable time on his own, dealing with technical aspects and learning how to operate online. For example, in the early courses he taught before WebCT was introduced at the university, he had trouble printing assignments students would send to him. It had taken him a considerable amount of time and conversations with other people such as secretaries in the department to work things out.

#### *Personal interest and hands-on trials*

Another factor mentioned by one professor was that some faculty members have issues related to ownership and confidentiality and as such are reluctant to share information with others. People are initially hesitant about speaking about what they are doing, but in small group sessions they will begin to share information. One professor (Prof. 014), who became quite skilled at Web design, says initially she got most of her information from searching online. She had taken traditional correspondence courses and found them “boring,” so she started to look for other options. When this professor started to learn about Web-based courses, her enthusiasm grew. Another professor (Prof. 029) made the point that he was self taught when it came to obtaining the skills he needed to develop material for his course. He explained he developed an interest in electronic typesetting about 12 years ago and he had read every book that had come out on this topic. He has learned to do PDF files and add color, graphics, and other features to online documents. Several professors mentioned the hands-on nature of their learning in relation to the use of Web-based courses. Professor 015 said she had not read any articles or anything, she learned from a more hands-on trial, with feedback from students. Professor 010 noted it is rare to get an opportunity to discuss or think about the implications of teaching courses over the Web, because you are “involved in doing things rather than thinking about it.”

#### *Combination of factors*

Professor 033 had read some articles, but stressed she learned more from getting involved: “There were some articles that came around on Web-based learning, but in the end what I figured out was it had to be me. I had to work it out myself and determine what the problems were” (Prof. 033). While teaching, and after the course was finished, this particular professor became aware of a number of issues she would have to work on for the next offering. There were problems she could deal with up front, rather than wait for them to come up during the course. Several other professors had become interested in online teaching as a result of demonstrations or seminars held on campus. DELT had organized demonstrations of courses taught by early adopters and several professors mentioned that attending these had been important in encouraging them to convert their course to the

Web-based format. Professor 028 mentioned that attending the seminars and seeing the demonstrations offered by other professors raised many questions in her mind. She started to think about the market for her own course and some of the problems which might arise from moving online. For her, it was not just the technical issues of how to do it, but also one of questioning whether she should do it. She wondered what the implications were for her and her students. The training seminars had been attended by a number of the professors. Some of them attended when the courseware used by the university changed and they wanted to learn how to use new features, while others attended seminars to get the basics before starting to teach a Web-based course.

#### *Attending conferences and reading journal articles*

Some of the earliest professors to launch Web-based courses at the university talked about the benefit of conferences and journals in alerting them to the possible use of Web-based courses. These comments indicated the importance of outside sources of new information in promoting innovation. In the early days of online teaching, these outside contacts promoted a valuable awareness. As Web-based courses increase in use, the outside contact may be just as instrumental in terms of encouraging continuing innovation and experimentation. Professor 017, who had a background in information and communication technology, explained how attending academic conferences were critical in advancing his involvement in Web-based courses. Through some contacts, he heard about new software from the University of British Columbia called WebCT and it was at the 1996 North American Web Conference in New Brunswick that he realized the significance of this new program. Up to that point, people were using Web pages to present material and posting notes, but there was no stable comprehensive piece of software being used. Professor 017 had been to the University of British Columbia to assess the software and then shortly after he also went to the 1996 NA Web Conference. This conference featured a great number of those involved in online teaching, yet the WebCT presentation was very different from what everyone else was doing. The courseware package created much interest and many people wanted to try out this new package. This professor became a Beta tester for an early version of WebCT. He had also been involved with sharing information with other professors around the world related to technical matters and best practices in teaching. In the early days of the Internet, newsgroups and list servers were an important means of exchanging information on Web-based courses and the use of technology, generally. There was some exchange of information and discussion about software and how to get resources, but the focus was not really on educational issues. One of the earliest professors (Prof. 031) to teach Web-based courses at the university could not remember where he first heard of the idea of Web-based courses. He did subscribe to a number of academic journals and suspects he was likely first exposed to the idea from one of those journals.

#### *Other factors*

There were also other communications from various sources which impacted professors' adoption of Web-based courses. Professors 004 for example, mentioned how the feedback the faculty received from the accreditation people influenced the amount of attention being paid to standards for Web-based courses. Two professors noted they were involved with a university senate committee on education technology which discussed the implications of Web-based courses. According to professor 040, some people have an interest in creating a mystique about the use of technology, which may discourage people from using Web-based courses. Several professors interviewed had academic backgrounds related to either educational technology or software development. Five professors mentioned that they had been involved in co-teaching of courses and

that this had helped ease their adoption of Web-based courses.

For professor 006, one of his first sources of information about Web-based courses was from former students of his, who had taken some of the first Web-based courses offered at MUN. He happened to meet the students by coincidence and they started discussing teaching techniques and design issues in Web-based courses. Another professor (Prof. 010) explained his main source of information was from a person the faculty hired who was just finishing his Ph.D. and was interested in Web-based teaching. He had some expertise in the area and was quite helpful because of his interest in pursuing it.

#### Conclusion

One of the understudied areas of adoption of Web-based courses is the communication networks used by adopting professors. This research provides some insight into the communication channels in the context of this innovation. It highlights many of the aspects of information exchange in the context of a university. It demonstrates the importance of informal conversations between professors. The comments from professors also indicate that the communication channels may have become more structured in recent years as more professors start to teach this way. The interview data demonstrates that some factors at universities, such as the hiring of sessionals, who were not physically located on campus and authoritative decisions to impose the teaching of Web-based courses, made it less likely that effective communication channels would develop. There was also evidence that the outside sources of information which Rogers (2003) refers to as heterophilic were important as sources of new ideas. The comments of the professors in this study illustrate the complexity of the communication networks involved in professors adoption of Web-based courses.

A number of professors talked about sharing information with other people in their department or faculty, in some cases people talked about the importance of proximity which is consistent with Rogers' (2003) theory. There is also some evidence that use of technology such as e-mail and Web-pages are changing the concept of proximity. A number of professors said they contacted people and reviewed material from other universities. The findings of this study suggests Rogers' concept of proximity might need to be revised because of the use of information and communication technology and how it changes conceptions of distance and space. While face-to-face is still important, other contacts such as staff at the university where professors had done graduate work were now more likely to be consulted as well.

The professors who started to teach Web-based courses during the early days provided some insight into how communications networks have changed over time. A number of these professors indicated that they had helped others by showing them what they had done. As Web-based courses become more common, the network seems to become more formalized. Administrators may want to think about possible strategies to maintain these informal networks, while also ensuring more formal supports exist. There was also some evidence that the early adopters and innovators were getting tired of the role of showing other people how to use the technology. The findings of this research suggests the Rogers' (2003) model which recognizes the importance of informal supports, still holds true for some, but people were starting to develop the attitude that DELT was where the experts were. Also, the idea of having support staff located right in the department or faculty seems to be important for some professors especially during the early days of adoption.

Another interesting point arising from this section was the lack of contact which some people, such as sessional professors, had with other people at MUN. As more sessional professors are contracted to teach Web-based courses, this lack of daytime presence on campus and lack of interaction with other professors may mean the benefits of informal communications networks are not full realized. University administration should consider this in relation to hiring practices or

consider what can be done to facilitate development of other communication networks to replace the traditional informal contact which this research indicates may be diminishing. A number of people talked about the importance of DELT as a source of help and training. Many talked about calling them by phone and the professors in the building where they were located said they had dropped in at the office quite often.

The demonstrations organized by DELT were useful and this practice is also supported by Rogers (2003). The findings of this research support the idea that professors are more likely to adopt the use of an innovation when they have seen it used by someone in circumstances similar to their own. Some people said they had learned some of the technical skills through hands-on trials. More research might prove to be useful in determining if this is a characteristic of professors or if it is more about the way people learn technical skills.

It was mostly the innovators or early adopters who said they were interested in conferences and academic journals. Incentives to encourage attendance at those kinds of events seem important in the early stages and also for continuing experimentation and innovation. The fact that several professors noted that co-teaching had allowed them to get skills from other professors indicates that this might be a process that administration might want to encourage. Being involved in university communities is a way of sharing information, but people who talked with those outside this normal group of associates were also important. For example, discussions with students or new professors entering the university were important sources of information, new skills and insight in relation to the use of information and communication technology.

Several professors mentioned the importance of people who could be classified as opinion leaders in pushing forward the use of Web-based courses. In some cases those were people in administrative positions at the university. In some cases there were certain people who were seen as the experts in this field who were pushing forward innovations in this area.

In terms of the adoption and use of Web-based courses, the concept of critical mass is useful in understanding how after a certain number of professors are teaching Web-based courses things happen that make them more sustainable. For example, the pool of students who are familiar with the format has increased and the possibility of peer support for professors is enhanced because of the increased number of colleagues who have taught this way. Also, the economies of scale make it more likely that services such as a help desk and course-design support will be available. Although the connection is not as clear as in the case of interactive innovations in communication technologies, such as the telephone or e-mail, each new user does in a way bring some benefit to all those teaching Web-based courses. Professors who were among the first to teach Web-based courses pointed out that they were on their own to a large degree in the early days, while professors who recently started teaching Web-based courses noted that they have good support and several colleagues they can talk to if they need help.

This research is in many ways an initial foray into an unexplored aspect of professors' adoption of Web-based courses. By exploring the lived experiences of these early adopters, insight is gained into possible strategies which could be used to increase the rate of adoption. The initial analysis indicates that while many of the generalizations of Rogers (2003) are accurate in this circumstance, there are also intricacies and nuances which exist in relation to this particular innovation in the context of universities.

## Appendix A

### Interview guide

#### **Type of innovation - decision**

How did you come to teach a course over the Web?

What things motivated or discouraged you as you started to use Web-courses?

When you were making the decision to use Web-based courses were you pressured in any way to do so? By administration? Other professors? Or was it your decision alone?

#### **Communications channels**

How did you first learn about Web-based courses? Where did you go to get more information?

Do you share information with other professors about Web-based courses?

Did you attend any kind of information or professional development session on Web-based courses?

#### **Nature of the social system**

Is there anything about the situation at MUN that helps or hinders Professors in adopting the use of Web-based courses? Is innovation encouraged at MUN? How? Is there any pressure from administration, students or others to offer Web-courses?

Are there any organizational changes happening at the university as a result of the use of Web-based Courses?

#### **Extent of change agents= promotion efforts**

Has anyone been encouraging you to use Web-based courses?

Did anyone help you obtain the new knowledge and skills you require to offer Web-based courses? Did you receive formal training or was it through informal learning?

What could be done to encourage professors to use Web-based courses?

#### **Perceived attributes of innovations**

Thinking about the traditional role of the university professor: How has your work changed in relation to course preparation/design, course delivery and evaluation. What are some of the strengths and weakness of Web-based course as a medium for teaching?

Has your perception of the use of Web-based courses changed? If so, how?

Has the use of Web-courses changed your terms of employment in any way? Do you feel you have less control over your work? How do you see your role in relation to course designers?

Has the introduction of Web-based courses left you doing things which require less skills? Different skills? Are the skills you used as a professor in the past now becoming irrelevant?

Are you co-operating with other professors to develop course material in any way because of Web-based courses? Is there more use of material developed by publishing companies? Do you see commercialization becoming more of a problem when Web-based courses are used?

Did you do any experimentation with information technology before moving to a full Web-based course?

How do you think students feel about the use of Web-based courses?

### **Conclusion**

Are there any other problems or opportunities you see developing for professors as a result of the introduction of Web-based courses at universities?

Is there anything that I have not asked that will help me understand how the introduction of Web-based courses are affecting your work?

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