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**University of Alberta**

**Providing Support to Instructors  
Incorporating Web-based Technology into Their Teaching**

**by**

**Lynn Feist**



**A thesis submitted to the Faculty of Graduate Studies and Research  
in partial fulfillment of the requirement for the degree of  
Master of Education**

**in**

**Adult and Higher Education**

**Department of Educational Policy Studies**

**Fall, 2001**



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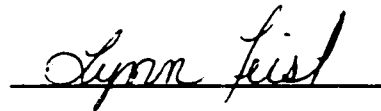
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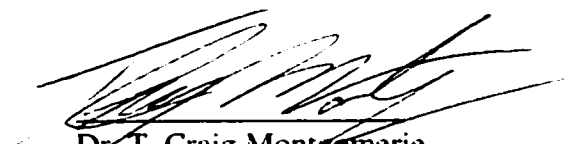
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## **Abstract**

**The purpose of this study was to examine the support instructors desire and need in order to be able to effectively incorporate Web-based technology into their teaching.**

**Using a case study approach, interviews were conducted to provide in-depth information about the experiences and opinions of instructors at a college in Alberta. Instructors were grouped into three groups depending on the length of time they had used Web-based technology in their teaching.**

**The findings indicated that different groups of instructors needed different types of support, such as infrastructure and professional development, at different levels. Recommendations from the findings included creating an institutional strategic plan for incorporating Web-based technology, offering faculty professional development that follows the principles of adult learning theory, and providing mechanisms to identify barriers that may prevent instructors from using Web-based technology in their teaching.**

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## Chapter One: Introduction

Web-based instructional technology is receiving increasing attention in both distance and face-to-face education. Institutions are being pressured to offer on-line courses and examine the educational applications of new technology. This pressure comes from a variety of sources including administrators who want their institution to be viewed as innovative and responsive to changing technologies, students who request flexible learning activities, and businesses that want to hire graduates having the knowledge and technical skills required to work effectively in their fields (Bates, 2000; Daniel, 2000; Galbreath, 1999; Reid, 1999; Rossner & Stockley, 1997).

Teaching using Web-based technology requires new skills and the adoption of new roles (Berge, 1997; Daniel, 2000). In addition to learning how to use new hardware and software, instructors must learn how the technology fits within their teaching situations. For example, if Web-based technology is used to deliver content, how will an instructor's role as lecturer change? Although teaching with technology creates new opportunities, it also creates new challenges or problems. A major problem is actually integrating new technology into the curriculum (Maddux, Cummings & Torres-Rivera, 1999). Often faculty are viewed as being resistant to technology, however, in most cases instructors are not given adequate support to integrate Web-based technology into their teaching (Cole, 2000; Maddux et al., 1999). Despite professional development days, in-services, workshops, and access to technology experts, instructors tend to proceed on their own, with minimal support. Cole (2000) suggested that this may be due, in part, to the fact that much of the training for faculty focuses on how to use the hardware and software but does not emphasize how to integrate the technology into the curriculum.

Geohegan (1994) stated that a major problem with many support systems is that they were designed by and for early adopters; innovators who like to try new products and processes. He questioned whether the same kinds of support mechanisms, encouragement, and facilities are helpful to the majority of faculty. Green (1999) wrote that assisting faculty to integrate technology into instruction is the “single most important informational technology (IT) challenge confronting American Colleges and universities over the next 2 to 3 years” (p. 1).

### **Purpose**

The purpose of this research was to examine ways to provide support to instructors so that they will be better able to use the technology and make decisions regarding technology integration that are beneficial for them and their students. Specifically, the research question posed for this study was, “what support do instructors need in order to be able to effectively incorporate Web-based technology into their teaching?”

### **Sub-statements**

From the main research question, four more specific sub-questions were developed.

1. What sorts of computers and Internet access do instructors have?
2. How do instructors currently use Web-based technology in their teaching?
3. What type of support do instructors identify as most important or useful as they try to incorporate Web-based technology into their teaching?
4. What barriers do instructors face when incorporating Web-based technology into their teaching?

### **Definition of Terms**

The above research problem and sub-statements contains terms that are defined as follows:

1. **Support** refers to administrative, technical, or professional development support that affects instructor use of technology. Administrative support includes funding, release time, recognition, and equipment (software and hardware). Technical support includes services provided by technical experts (computer services and instructional development departments), and the library system. Professional development refers to any learning situation an instructor participates in, such as workshops, peer mentoring, or self-study.
2. **Instructors**, for this research, refers to postsecondary instructors working in a two year college setting.
3. **Web-based technology** means using computers and the Internet to deliver educational materials. In particular it involves applications accessed by the user through a Web browser such as Netscape Communicator or Internet Explorer. These could consist of Web pages developed by an instructor, computer conferencing, external Web sites, electronic journals, and on-line quizzes. The term on-line is frequently used in the literature, and extends to Internet applications that are not accessed through a Web browser. For example, the use of computer programs such as Lotus Notes or First Class requires students to install specialized software on their own computers. Students would access course materials over the Internet, without using a Web browser. Web-based technology could be used to supplement existing face-to-face or

distance courses. Web-based technology could also be used to deliver a completely on-line course.

### **Researcher Beliefs**

I have many assumptions about the adoption of Web-based technology that could affect data collection, analysis, and synthesis of findings in this study. Exploring these assumptions and beliefs is an important first step in mitigating their effects on the outcomes of the research. Firstly, I believe that administrative issues would have the most influence as to whether or not an instructor would attempt to use the technology. For example, instructors must have the time and equipment to incorporate Web-based technology before any other support mechanisms can really be helpful. I also believe that instructors may be more willing to approach family members or friends than technical experts for support. This may be related to their comfort level with the technology, understanding the jargon of technical experts, or knowing what questions to ask.

I also assume that instructors face many barriers to incorporating Web-based technology, including time, recognition, technical support, and knowing how to incorporate Web-based educational material into their courses. Even if these barriers are removed, I believe that some instructors are just not interested in the technology. These instructors will need to see the benefits to themselves and their students, as well as sufficient support structures in place, before they will attempt incorporating Web-based technology into their teaching. Some instructors may still choose not to use technology based on their course content, students, and beliefs about education. These instructors may however, require knowledge about Web-based technology to defend their decision.



Another assumption I hold is that instructors will not use the technology unless they are confident it will be successful in a teaching situation. Finally, I believe that workshops may not be the best way to increase instructor knowledge and skills. Different instructors may prefer different methods for learning.

Further information on my beliefs can be found in Appendix A, which describes the process I went through in learning how to use computer technology. Specific steps taken to reduce the effects of my beliefs and biases are detailed in the method section of this document.

### **Significance**

As previously stated, Green (1999) wrote that assisting faculty to integrate technology into instruction is a major challenge facing educational institutions. To assist technology integration, there must be a thorough examination of all the factors that affect instructor use Web-based technology in teaching. The literature provides examples of support systems, identification of barriers, and lists of administrative conditions that facilitate technology integration. Unfortunately, there are very few studies that examine all of these elements together and then compare results to a wide variety of literature topics. As a result, administrators do not know how to proceed and wonder why there isn't more innovative use of technology within their institution. For example, there may be a plan to make computers available to faculty, yet there may be no professional development that helps them integrate technology into their curriculum in ways that benefit them and their students.

This research relates to diffusion of innovation and adult learning theory as well as educational technology literature. My intention was to obtain in-depth information

from the case-study analysis that contributes to the current literature and identifies the many factors that, in practice, affect the adoption of Web-based technology by instructors.

### **Organization of the Thesis**

This thesis is organized into six chapters. Chapter Two provides an overview of the literature in relation to the support needed by instructors to incorporate Web-based technology into their teaching. Chapter Three describes the context, respondents, and the research method used to collect, analyze, and synthesize the data. Chapter Four presents the findings and Chapter Five discusses the findings in relation to the literature. Conclusions, recommendations, and personal reflections are provided in Chapter Six.

## **Chapter Two: Literature Review**

Many factors affect the support wanted and needed by instructors to incorporate Web-based technology into their teaching. The purpose of this chapter is to explore these factors as described in the literature and provide a context for my research question. Topics included in this literature review are (a) Web-based technology, (b) diffusion of innovation, (c) adult learning theory, and (d) providing instructor support. Although much of the literature provides information related to innovations or educational technology in general, the findings and recommendations made in this literature are transferable to Web-based technology.

### **Web-Based Technology**

Khan (1997) defined Web-based instruction (WBI) as a “hypermedia-based instructional program which utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported” (p. 6). A Web-based learning environment allows students to access a variety of informational resources such as Web sites, databases, on-line journals, and libraries (Bates, 2000; Khan, 1997). It also allows students to communicate and collaborate with classmates and instructors who may be at different locations from one another (Bates, 2000; Jonassen, Davidson, Collins, Campbell, & Haag, 1995; Khan, 1997). Colleges are presently using Web-based technology to provide learning opportunities and services to students through e-mail, Web pages, electronic journals, bulletin boards, on-line course catalogs, library resources, and on-line student application forms (Green, 1997, 1999; Khan, 1997).

When describing Web-based instruction, Khan (1997) distinguished between the technological tool and how it could be used in an educational setting. For example, a Web-based conferencing tool can be used to facilitate communication among class participants. A goal of such communication is to create an environment that provides for social interaction that in turn leads to the construction of knowledge (Jonassen et al., 1995).

Two main benefits of Web-based instruction emerged from the various bodies of literature. The first benefit is access to information that in turn provides the basis for learning (Duchastel, 1996-1997). Students who do not have access to information available on the Web are limited to resources provided by their instructors, bookstores, or libraries within their community (Relan & Gillani, 1997). When course materials are presented on the Web, there is the opportunity to provide links within the content and to external resources. Students have an element of control over the order in which the information is viewed and what external resources are utilized (Duchastel, 1996-1997; Khan, 1997). Students also have the flexibility to view information at a convenient time and place (Bates, 2000). When students work in an information rich environment, the instructor must support and guide them to ensure they are successful (Duchastel, 1996-1997; Khan, 1997). For example, the instructor may provide specific goals for students to pursue as they gather information from a variety of sources.

The second benefit of Web-based instruction is that it provides an opportunity for increased communication among students, peers, and instructors. This is especially beneficial in large lecture or distance learning situations (Berge, 1995; Khan, 1997). The premise is that students can communicate and thus work together to solve problems,

discuss interpretations, and negotiate meaning. Knowledge construction occurs when students explore issues, take positions, are exposed to alternative points of view, and then reflect on and re-evaluate their positions (Hiltz & Benbunan-Fich, 1997; Jonassen et al., 1995).

Incorporating new technology in a way that is appropriate for a Web-based environment requires instructors to learn new skills and assume new roles (Berge, 1995; Duchastel, 1996-1997; Hiltz & Benbunan-Fich, 1997). The instructor, as lecturer, is no longer the main source of information. Instead the instructor becomes a facilitator and a discussion leader. The instructor guides students to a variety of information sources and designs learning activities, questions, and feedback that allows students to develop problem solving, decision making, and critical thinking skills (Bates, 2000; Berge, 1995; Hiltz & Benbunan-Fich, 1997; Kearsley, 1997).

Despite the benefits cited in the literature, many instructors are reluctant to adopt Web-based technology in their teaching. The following section on diffusion of innovation theory will provide background information as to why Web-based technology is adopted by different instructors at different rates.

### Diffusion of Innovation

Diffusion of Innovation theory provides a way to examine how and why innovations are adopted by groups of people. Rogers (1995) defined diffusion as “both the planned and the spontaneous spread of new ideas” (p. 7) and innovation as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (p. 11). Rogers explained that an individual’s perception of the characteristics of an

innovation affects the rate of adoption. He described the following five qualities as important characteristics of innovation:

1. The relative advantage of an innovation may be judged in terms of economic factors, social prestige, convenience, or satisfaction.
2. Compatibility is the extent an innovation is consistent with past experiences and values, and the needs of the adopter.
3. Complexity refers to how difficult it is to understand or use an innovation. If it requires the development of new knowledge and skills, the innovation may be assessed as too complex.
4. Triability refers to whether an innovation can be tried or experimented with. Examples include sample or “demo” products.
5. Observability is the degree the results of an innovation are visible to others.

According to Rogers, innovations that are perceived as having “greater relative advantage, compatibility, triability, observability, and less complexity will be adopted more rapidly than other innovations” (p. 16).

Moore (1991, 1995) approached diffusion of innovation from a marketing perspective. He explained that a model provided a tool describing why customers would buy new products at different rates. Rogers (1995) and Moore described the following five adopter groups:

1. Innovators are the technology enthusiasts. This group must have the latest technology. They are often known as “techies” and like to fiddle with the latest innovation, even if it does not work as expected. They are committed to a new technology because they believe that, sooner or later, it will improve their lives.

Innovators actively seek information about a new innovation. They must be able to cope with a high degree of uncertainty and must be willing to accept a set-back when a new idea is unsuccessful. Innovators form support groups with other innovators.

2. Early adopters are considered visionaries. They evaluate an innovation and adopt it if they feel they can achieve a dramatic advantage over the old way of doing something. This group has influence over later adopter groups as they examine an innovation and provide a subjective evaluation. They often bring in real money, either to purchase the product or as venture capital.

3. The early majority are the pragmatists. This group is deliberate and cautious and doesn't like innovations purely because they are new. There must be proof of a benefit and strong references from people they trust. This group has high expectations of a new innovation and expect a support infrastructure to be in place.

4. The late majority are conservatives. They are skeptical, very demanding, and price sensitive. This group often has fewer resources to support the transition to using a new innovation. They want an innovation to work in a reliable manner, although they don't care how it works. The late majority have very high expectations.

5. Laggards are skeptical and traditional. They are not only cautious, but they actively resist a new innovation. They often adopt an innovation only when they have no other choice and, therefore, require significant support.

Moore (1991, 1995) presented important differences between the early adopters and the early majority. These differences create a gap between the two groups of users. If an innovation is not successful in bridging, or crossing the gap, it will fall into the chasm and therefore will not be adopted by the early majority.

How does this theory relate to the question of what support instructors want and need to incorporate Web-based technology into their teaching? Different groups of instructors have adopted Web-based technology at different rates. Furthermore, at this time there seems to be little adoption of Web-based technology by the early majority. Geoghegan (1994) stated that this failure to “bridge the gap” between early adopter and early majority is due to the failure to recognize the differences between these two groups. The differences are presented in Table 1.

**Table 1**

**Differences Between Early Adopters and the Early Majority**

<b>Early Adopter</b>	<b>Early Majority</b>
<b>Visionaries</b>	<b>Pragmatists</b>
<b>Project oriented</b>	<b>Process oriented</b>
<b>Risk Takers</b>	<b>Cautious</b>
<b>Willing to experiment</b>	<b>Want proven applications</b>
<b>Generally self-sufficient</b>	<b>Expect significant support</b>
<b>Cross disciplinary ties</b>	<b>Network within own discipline area</b>

Geoghegan (1994) suggested that support mechanisms at educational institutions have been created by the early adopters for use by early adopters. This in turn has created an alliance between faculty innovators, campus computing support, and technology vendors. Emphasis has been placed on the technology instead of teaching



with the technology and thus has alienated the early majority. This alienation is increased because of the highly visible, highly funded projects of the early adopters.

Instructors require support to use Web-based technology and support to teach with the technology. This support is frequently provided through faculty professional development opportunities. Adult learning theory provides principles and models that can help ensure the learning needs of both the early adopters and the early majority are met.

### Adult Learning Theory

As mentioned previously, instructors must learn new skills and adopt new roles when incorporating Web-based technology into their teaching (Berge, 1997). Instructors are adult learners in professional development situations and as college instructors they teach adult learners (Burge & Roberts, 1998; Gallant, 2000; Johnston, 1999). I believe that adult learning theory provides the foundation upon which faculty professional development opportunities should be based. Examples of professional development in relation to Web-based technology will be presented in a later section of this chapter.

Topics included in this section are assumptions and principles of adult learning, self-efficacy, and learning styles. The first topic provides basic assumptions and principles that should be used to guide any adult teaching-learning situation. Self-efficacy theory acknowledges the fact that people have a need to feel competent in a given learning situation (Bandura, 1997). If they don't believe they will succeed, they are unlikely to participate in a learning situation. Finally, theory on learning styles recognizes that different people are responsive to different learning environments, materials, and activities (Kolb, 1994).

**Assumptions and principles of adult learning.** Andragogy is the term that was coined by European adult educators to label a theoretical model of adult education. Knowles (1980, 1990) defined andragogy as the art and science of helping adults learn, which contrasts with pedagogy, the art and science of teaching children. The andragogical model is based on assumptions about the adult learner. These assumptions include the following: (a) adults need to know why they need to learn something, (b) adults have a self-concept of being self-directing, (c) adults come to learning situations with a wide variety of experiences, (d) adults are ready to learn in relation to real-life situations, and (e) adults respond to internal motivators more than external. Knowles addressed the fact that these assumptions have several implications for practice by emphasizing that the andragogical model is a process model. The facilitator provides a climate conducive to learning that consists of mechanisms for mutual planning and diagnosing learner needs, formulating objectives and learning experiences to meet these needs, conducting learning experiences and then evaluating outcomes and re-diagnosing learning needs.

Vella (1994) expanded upon these implications and developed 12 principles for effective adult learning.

1. Needs assessment: participation of the learners in naming what is to be learned;
2. Safety in the environment and the process;
3. A sound relationship between teacher and learner for learning and development;
4. Careful attention to sequence of content and reinforcement;
5. Praxis: action with reflection or learning by doing;
6. Respect for learners as subjects of their own learning;
7. Cognitive, affective, and psychomotor aspects: ideas, feelings, actions
8. Immediacy of the learning;
9. Clear roles and role development;

- 10. Teamwork: using small groups;
- 11. Engagement of the learners in what they are learning;
- 12. Accountability: how do they know they know? (p. 3-4)

Brookfield (1986) also developed principles he thought were necessary for effective teaching:

- 1. Participation in learning is voluntary; adults engage in learning as a result of their own volition.
- 2. Effective practice is characterized by a respect among participants for each other's self-worth.
- 3. Facilitation is collaborative.
- 4. Praxis is placed at the heart of effective facilitation
- 5. Facilitation aims to foster in adults a spirit of critical reflection
- 6. The aim of facilitation is the nurturing of self-directed, empowered adults.

After examining the assumptions and process of the andragogical model as well as the principles developed by Vella (1994) and Brookfield (1986), some key points can be summarized about effective adult teaching and learning. Firstly, the adult learner should be involved in the planning of the learning. Learners should be involved in setting objectives through a needs assessment process. The learner must agree to learn and know why he or she should learn. This usually means that the learning must meet a need in a real-life situation and the new knowledge, skills, and attitudes must be used in the real-life situation soon after the learning situation.

Secondly, the learning environment and process must be safe. Trust and respect must exist between the facilitator and learner, and among the learners. Past experiences and a variety of opinions and knowledge must be welcome in the environment. The

relationship between the facilitator and learner should be one that allows the learner to be comfortable in a collaborative process, especially if this is a new role for the adult learner.

Third is the idea of praxis; action, reflection, and practise. The facilitator and learner must create learning activities that allow the learner to practise new ideas, skills, and attitudes and then reflect on them and how they will impact the learner's real-life situation.

Fourth is the need to evaluate the outcomes of the learning situation and then re-diagnose learner needs. There should also be an evaluation of the learning experience itself, which makes the facilitator accountable to the learner. Finally, any adult learning situation should promote the self-directiveness of the learner and create an environment that fosters life-long learning.

Brookfield (1986) described the role of facilitators as being a resource for learning. Facilitators don't have all the answers, rather they are in a helping relationship that is student-centered and focused on individual learning. Brookfield cautions that not all adult learners know enough about their own learning styles to be effective participants in their own education. For that reason he advocates that adult educators help students "learn-how-to-learn."

Self-efficacy. Instructors may not participate in professional development activities if they do not believe they will successfully learn a new skill or be able to incorporate it into their teaching. Bandura's (1995, 1997) Self-Efficacy Theory examines the belief in one's capabilities to accomplish desired goals. Self-efficacy is the judgment of one's capability and involves the assessment of cognitive, social, emotional, and

behavioral sub-skills. Bandura stated that “people avoid activities and environments they believe exceed their coping capabilities” (1995, p. 10). A person’s beliefs contribute to motivation, affective states, and action.

According to Bandura, efficacy beliefs are constructed from four primary sources of information. The first is mastery experience, which builds a person’s self-efficacy through his or her own successes. Mastery experience involves using the cognitive, behavioral, and self-regulatory tools for determining action for a variety of changing circumstances. Mastery experience is the most influential sources of efficacy information and therefore, the power of guided enactive mastery can be used to create and strengthen efficacy beliefs. It is important to ensure tasks are not easy or “ready-made” or they will not affect efficacy beliefs.

The second form of influence is through vicarious experiences. Vicarious experiences occur when people see others succeed in a similar situation. Seeing others, similar to themselves, who have persevered and succeeded, despite obstacles, raises beliefs that they too have the necessary capabilities. Bandura (1986) also referred to this as observational learning. If learners are to retain observed activities, there must be a method of transferring the information into symbols as well as an opportunity to practice what they have seen.

The third influence in developing efficacy is through the use of social persuasion, and involves verbally persuading people that they have the capabilities necessary to master given activities. In addition to providing encouragement, successful efficacy builders actually provide the situations necessary to bring success. This form of

influence is stronger if the person expressing faith in one's capabilities is significant to the individual.

The final form of influence identified by Bandura is a person's physiological and emotional states. People judge their capabilities according to how they feel. If a person is feeling sick, tired, overwhelmed, or sad, self-efficacy may decrease. Thus, efficacy beliefs can be increased by enhancing physical well-being, reducing stress, and reducing negative emotions (or tension).

Learning styles. When professional development is provided to instructors, it must be recognized that different instructors have different preferred methods or styles of learning. Kolb's (1984) experiential learning model has four dimensions; concrete experience, abstract conceptualization, reflective observation, and active experimentation. The didactic nature of the model means that the learner moves in varying degrees from involvement and feeling (concrete experience) to thinking (abstract conceptualization) and from doing (active experimentation) to observing (reflective observation).

The following provides an explanation of the four dimensions as found in the literature (Border, 1998; Kolb, 1984; Learn Ontario, 2001). Those who are strong in concrete experience learn from specific experiences and make judgments based on feelings. These learners relate to people. Learners who are strong in abstract conceptualization rely on logical thinking and rational evaluation. These learners are often frustrated by unstructured "discovery learning" and are oriented towards things and symbols rather than people. Reflective observation indicates a tendency to carefully observe before making a judgment. These learners prefer learning situations such as

lectures where they can watch and listen. Finally, those learners who are strong in active experimentation learn by doing. They learn best when they can engage in learning activities such as projects or discussions.

The relationship among the four dimensions described above result in four different types of learners. The four types of learners are described in the literature as follows (Border, 1998; Kolb, 1984; Learn Ontario, 2001):

1. Accomodators are best at concrete experience and active experimentation. They adapt to change, prefer facts to theory, like to get things done, and tend to take on leadership roles. Accomodators learn by trial and error and “hands-on” learning.
2. Divergers are best at concrete experience and reflective observation. They are imaginative and are interested in people. Divergers learn by listening, absorbing, and discussing.
3. Convergers are strong in abstract conceptualization and active experimentation. They solve problems and apply ideas in practical ways. They prefer things to people. Convergers learn by hands-on experience.
4. Assimilators’ learning is dominated by abstract conceptualization and active experimentation. They create theories, models, plans, and define problems. They prefer concepts to people. Assimilators learn by thinking through ideas.

There is very little in the educational technology literature written about how instructors learn to use computer technology and how that learning related to different learning styles. However, the limited information available is important to consider when determining the type of professional development that should be created, and the strategies that should be used to meet varied learning styles.

Dreyfus and Dreyfus (1986) presented five stages of skill acquisition as one moves from being a novice to an expert. They stated that a novice learns to recognize objective facts through instruction. Rules are acquired to determine actions based upon the facts. The novice applies the learned rules to any situation, regardless of the context. As a person moves towards becoming an expert, intuition develops. Dreyfus and Dreyfus referred to intuition as the understanding that occurs when similarities to past experiences are seen. An expert knows what to do based on mature and practiced understanding in such a way that the expert may not even be aware of his or her skill level.

Adams (2000) described how teachers at a kindergarten to grade eight school were not having their professional needs met until the teachers' "technology intuition" was cultivated. Technology experts provided teachers with a set of tools for reading the computer screen. The process begins with the teacher determining what he or she wants the computer to do. The strategies for reading the computer screen empower the teacher to begin searching for the process to obtain the desired result.

Adams provided the following example strategies:

1. Spending a moment looking at the screen, scanning for icons on the toolbar and desk-top, reading descriptive labels on cursor-ver pop-ups, trying toggle switches and always remembering the undo command.
2. Looking across drop-down menus for words synonymous to what you want the computer to do.
3. Checking out right click functions (or click and hold on a Mac).
4. Checking in the software help function, an underutilized treasure trove of tutorials and tips. (p. 116)

The need to develop technology intuition is similar to inquisitivism, an approach to learn and use new information technologies presented by Harapniuk (1998).

Harapniuk explained that many adult learners are paralyzed with fear when first learning



how to use the computer. He suggested that this fear of breaking the computer, crashing the system, or losing their data could be removed by demonstrating mistakes, crashes, and back-up procedures. He further advocated letting the learner know that technology can be frustrating and it may not work as wanted. After fear is removed, a key concept of inquisitivism is to encourage adults to “click on buttons” to see what happens. Harapniuk compared this to the approach children take, where they simply enjoy the pleasure of inquisitiveness. To ensure this learning method is valuable for adult learners, inquisitivism should be applied to real-work assignments. This inquisitivism approach would match the hands on or experiential learning style described by Kolb.

As discussed previously, Adult Learning Theory provides a basis for designing professional development activities for instructors who must learn new skills to implement technology into their teaching. The next section of this chapter examines the specific support that instructors require to incorporate technology into their teaching as presented in the literature. Faculty professional development, as one component of instructor support, should be part of an institution’s overall infrastructure.

### **Providing Instructor Support**

According to the literature, the main type of support required by faculty when incorporating technology-based teaching is appropriate institutional infrastructure (Bates, 2000; Ely, 1999). Infrastructure can include things such as hardware, software, planning mechanisms, policies, and priorities. Another requirement for successful technology implementation is the knowledge and skills needed by instructors to successfully use the technology (Ely, 1999). Successful faculty professional development should be integrated into the overall infrastructure of an institution (Bates, 2000; Ely, 1999; Frayer,

1999). This section of the chapter focuses on infrastructure, professional development, and barriers. Barriers was included in this section because they frequently relate back to infrastructure and professional development issues. Removing the barriers that prevent instructors from using Web-based technology is an important part of providing instructor support.

Infrastructure. Institutional infrastructure is created and supported through strong leadership (Bates, 2000). Senior management provides the inspiration and the support needed for technology integrations by:

1. Defining a vision for teaching and learning and defining how technology fits into that vision.
2. Demonstrating support and endorsement of technology through technology integration or strategic plans.
3. Allocating resources such as equipment, funding, and support staff.
4. Providing rewards, incentives, and time for faculty to effectively integrate technology into teaching (Bates, 2000; Ely, 1999).

Sharing a vision for teaching and learning allows individuals working within the institution to identify and work towards common goals. The use of technology should be one aspect of teaching and learning and should therefore fit into the larger vision (Bates, 2000). For example, the vision of an institution might identify potential students whereas the use of technology might provide innovative ways of reaching those students.

The actual decisions about how technology use will be implemented should be reached through strategic planning activities (Bates, 2000). A strategic plan ensures all

administrative, academic, and support departments agree on how and if technology will be used in teaching (Bates, 2000).

Resources are the tools needed to ensure technology integration works. These tools include equipment, staff, and funding (Bates, 2000; Ely, 1999). An example of allocating resources appropriate to the vision for teaching and learning is described as follows. If an institution decides that graduates should have word processing skills, there should be mechanisms in place to teach these skills. Required resources would include instructors, computer laboratories with appropriate software, and technical support staff. Without the allocations of resources, it is unlikely that graduates would obtain the skills described in the vision.

Faculty must be compensated for the time and effort it takes to learn and integrate Web-based technology into their teaching. Rewards and incentives can be intrinsic, such as satisfaction of a job well done, or extrinsic, such as money, promotion, tenure, or awards for innovative excellence (Ely, 1999; Frayer, 1999).

A supportive college infrastructure is a requirement to promote the use of educational technology. It is necessary for administration to work with instructors to decide how the technology should be used within a given institution. For example, technology may be used to supplement existing courses, provide skills to students, or to replace traditional delivery methods. Once the use of technology has been decided upon, a strategic plan must be developed that addresses issues of support, faculty workload, incentives, compensation, and professional development (Bates, 2000). Institutional support must be visible and communicated through all levels and departments (Frayer, 1999; Reid, 1999).

**Faculty Professional Development.** Professional development is an essential component of providing support to instructors and should be integrated into an institution's infrastructure. Anderson, Varnhagen, and Campbell (1998) found that a variety of training opportunities are required to meet the diverse demands of faculty. The authors suggested three types of professional development models. The first suggestion was the development of a training program that includes noon-hour workshops, peer demonstrations, intensive multi-day institutes, and extended training sessions.

Workshops and training sessions can be effective if developed in a systematic way to build upon instructor's skills and knowledge (Truman & Sorg, 1997). Such sessions are often enhanced by the integration of laboratory orientation and printed manuals. The focus is on practicing activities, building on experiences, and increasing competencies required to perform in one's job (Abbey, 1997; Rowntree, 1998). Abbey found that those participating in workshops were early adopters (as discussed previously). She discovered that targeting the early majority required shorter, more frequent "how to" sessions.

The second suggestion made by Anderson et al. (1998) was to provide "just-in-time" training. This involves individualized or computer assisted learning, such as Web sites or asynchronous conferences, to provide information when faculty need it. Just-in-time support is often described as assistance when, where, and why instructors need help. This is contrasted with "just-in-case" training that provides ready-made information, just-in-case instructors need it in the future (Bates, 2000; Gallant, 2000).

The third suggestion made by Anderson et al. (1998) was to support one-to-one training from colleagues and peers, perhaps through a mentoring program. Individual consultation with faculty, in their own office, can be an effective strategy that allows

instructors to identify their own learning needs and then use their own equipment (Cravener, 1999). A mentorship approach, using students to teach instructors, is a popular method of providing training. These programs are beneficial because they provide one-to-one training that is cost-effective and rewarding for both students and instructors. Instructors are motivated to achieve their own goals at their own pace (Beisser, Kurth, and Reinhart, 1997; Gonzales, Hill, Leon, Orrantia, Sazton, & de Montes, 1997).

Sherry and Lawyer-Brook (1997) evaluated a trainer of trainers model used to train a core group of 26 teachers who returned to their respective schools to instruct their colleagues. They found this method of training was successful since it provided a method to diffuse information horizontally among teachers, the trainers were colleagues who had empathy for the learners, and although initial diffusion was gradual, a solid base of expertise was built during the project.

**Removing Barriers.** Barriers are those things that prevent instructors from incorporating technology into their teaching. A first step in providing support is to remove barriers, regardless of whether the barriers are real or perceived by instructors (Northover, 1999). Barriers identified in the literature (e.g. Anderson et al., 1998; Berge and Muilenberg 2000; Northover, 1999; Schefter, 2000) included:

1. Increased time commitment or faculty workload
2. Faculty compensation, incentives, pay
3. Lack of money and support for course development
4. Personal motivation
5. Lack of technical support
6. Lack of shared vision, support, and encouragement from dean or chair

7. Comfort level and knowledge about technology
8. Fear of the impact of technology on human component of teaching
9. Inadequate hardware or software

In response to identified barriers, instructors have listed incentives they wanted to help them overcome barriers. Incentives preferred by instructors typically include release time (a decreased teaching assignment), developmental funds, investment in infrastructure, training, support, and tenure and promotion (Anderson et al., 1998; Murray & Bowen cited in Williams & Peters, 1997). Recognition and reward is cited in the literature as an important incentive, especially as it related to tenure and promotion. Current practice is to use research and research publications as criteria for appointment, tenure, and promotion. Teaching excellence is not rated highly when evaluating instructors and the use of technology in teaching is rarely considered. The instructor who incorporates technology into teaching may not have the time to conduct research or write articles for publication and thus may not be rewarded during faculty reviews (Anderson et al., 1998; Bates, 2000; Frayer, 1999; Green, 1999).

Bates (2000) described the current “Lone Ranger” approach to technology integration, where one instructor works independently to develop on-line course material. The one instructor acts as content expert, instructional designer, graphical designer, and technical expert. Very few institutions provide the needed ratio of support staff to instructors, which should be one instructional designer for every 30 to 50 full-time instructors, and one technical support person for every 20 to 30 full-time instructors (Bates, 2000).

It is recognized that instructors and technical support staff often do not communicate with each other to identify problems and work together to find solutions. Maddux, Cummings, and Torres-Rivera (1999) wrote that a key component to creating an environment conducive to technology implementation is to provide mechanisms to help technical staff and instructors learn about each other. They suggested that a liaison person could help facilitate communication and understanding.

According to Maddux et al. (1999), the following are some things that technical support staff need to realize about instructors. Firstly, teaching is a time-critical activity. This means that when an instructor plans to teach using technology, the technology must work as expected, when needed. If support is needed to address a problem, that support is needed immediately. Technical staff must also realize that off-campus or distance courses have timelines. Support and implementation of services must be timely or instructors and students will become frustrated with the technology and may be reluctant to use it in the future. Secondly, instructors must be notified in advance of any technological changes. Instructors must be able to change class activities or advise students. This is especially important if servers must be down for maintenance or upgrades. Finally, technical support staff should be service oriented. Messages or requests should be dealt with in a timely, polite manner, using terminology appropriate for those who are not technical experts.

Instructors must also realize some things about technical support staff. Firstly, technical support staff should not be expected to correct poorly prepared applications. For example, Web sites should be checked for accuracy and handouts should include detailed step-by-step instructions that are tested by the instructor. Secondly, instructors

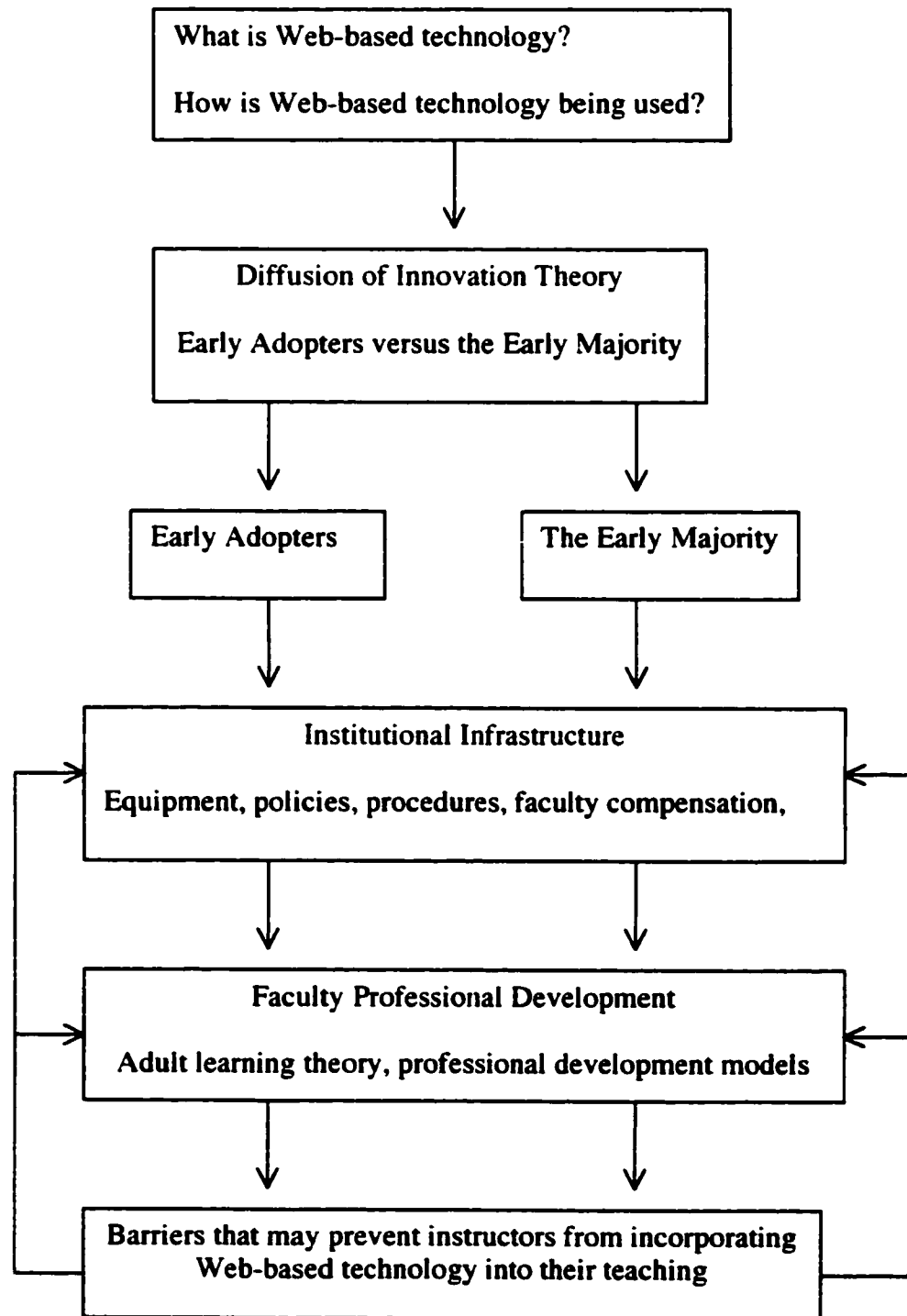
should make an effort to improve their computer literacy. Understanding basic computer terminology makes communication easier and more effective. Finally, instructors should realize that hardware and software must be maintained and upgraded. This may mean that servers or computer laboratories are not available at all times. Having a back-up plan ensures a class is not wasted, even if the back-up plan is to give a lecture scheduled for a future date.

### Summary of the Literature

Figure 1 shows the relationship among the different bodies of literature and how the different literature contributes to designing support mechanisms for instructors incorporating Web-based technology into their teaching. The figure also indicates the large number of factors that affect whether or not instructors decide to incorporate Web-based technology into their teaching.

The first consideration is how instructors will use Web-based technology, as this will affect the type of support that instructors need. For example, instructors who want use the discussion tool within WebCT would need professional development related to the design of an on-line discussion, the role of the instructor, and how the actual tool is used. Instructors wanting to create multimedia components for their courses would require support staff to create the multimedia in addition to professional development. The literature provides a basis to ensure faculty, support staff, and administration within an institution come to a common understanding of Web-based technology and education.





**Figure 1.** Relationship among Literature Topics

The diffusion of innovation literature describes how different groups of people adopt innovations at different rates. Geoghegan (1994) emphasized the need for support systems to be designed that meet the different needs of the early adopters and the early majority. The characteristics of the early adopters and the early majority influence the specific types of support systems that are required within an institution. Figure 1 indicates that the early adopters and the early majority have different characteristics and therefore different needs. These different groups of instructors would need different types of infrastructure and professional development support. Unfortunately, there is little explanation in the literature of what these differences should be.

Two broad types of support are identified in the literature, institutional infrastructure and professional development. Infrastructure includes equipment, policies, and procedures required to incorporate Web-based technology into teaching-learning situations. An important part of infrastructure is providing mechanisms that compensate instructors and recognize the need for resources such as funding and support staff. The second type of support is professional development. The literature provides many examples of professional development models that include workshops, brown bag sessions, one-on-one sessions, or mentorship programs. To ensure that faculty professional development is effective, it is essential that adult learning theory guides the development, delivery, and evaluation of instructor learning opportunities.

The final component of support is the removal of barriers that may prevent instructors from incorporating Web-based technology into their teaching. Most of the barriers discussed in the literature relate back to institutional infrastructure or faculty professional development. That is, if sufficient infrastructure and appropriate

professional development exist, there may be few barriers that prevent the utilization of Web-based education. Figure 1 contains feedback arrows to indicate the relationship among barriers, institutional infrastructure, and faculty professional development.

### **Chapter Three: Research Method**

The research method for this study was designed to explore the types of support needed and desired by college instructors to incorporate Web-based technology into their teaching. A qualitative research design was used to gather rich, descriptive data. This chapter describes the following components of the research design: (a) type of study, (b) the context, (c) the respondents, (d) the consent, (e) the data collection, (f) the data analysis, and (g) the trustworthiness of the data.

#### **Type of Study**

Using a case study approach, interviews were conducted to provide in-depth information about the experiences and opinions of instructors at a college in Alberta. Berg (1998) stated that “the case method is an extremely useful technique for researching relationships, behaviors, attitudes, motivations, and stressors in organizational settings” (p. 219). He also stated that case studies may examine a single aspect of an individual’s life. The aspect I chose is the support mechanisms wanted and needed by instructors to effectively incorporate Web-based technology into their teaching. I am interested in what instructors, themselves, identify as being important.

#### **The Context**

The college selected for this study was a college in Alberta that offers full-time, part-time, and distance studies to students. The college is divided into multiple divisions with a dean heading each division. Programs of study are offered within each division and most programs have a program chair. For example, the Science Program is part of the Arts and Science Division.

Although a wide variety of programs are offered at the college, the emphasis is placed on university transfer and career studies. University transfer programs provide students with the opportunity to complete two years towards a university degree. Upon completion of the first two years, students apply to transfer to a university. There is close communication between college program chairs and the local university to ensure course content and student evaluation meets university standards. Career studies provide students with a two-year diploma that is required for employment in some fields. These programs have advisory committees to ensure students learn the knowledge, skills, and attitudes needed to work within a given field.

A majority of instructors are part-time. Even if instructors are teaching full-time hours, many retain part-time status. This affects their benefits and salary. Some instructors are employed full-time outside of the college within their field of expertise. Other instructors teach at more than one institution. Teaching assistants and tutors are not used. Instructors mark assignments, answer student questions, and provide extra instruction as needed. Most programs have secretarial or support staff to assist with administrative tasks.

The library staff provides instruction to students and instructors on searching the Internet and using the on-line databases. Library staff members make office visits to instructors to provide one-to-one training as requested. Face-to-face library orientations are available to students. The library also provides services to distance students, including interlibrary loans, access to on-line databases, and mailing of library materials to distance students. In addition, the library provides an on-line mechanism for students to ask research-related questions.

Professional development days are offered twice per year, in October and February. Sessions are varied and contain choices regarding the integration of educational technology. An educational technologist offers workshops throughout the year to both instructors and staff. Topics of these workshops include Web page design, Internet search techniques, PowerPoint, and WebCT. These workshops are not well attended by instructors. The educational technologist is available to instructors for one-on-one consultation and to answer questions related to technology use in teaching. Because of time restrictions, the educational technologist is not able to provide extensive one-on-one education to instructors.

An instructional development department offers instructional design, graphical, editing, and course development services on a cost recovery basis. This department has a mentorship program that pairs computer literate students with instructors. The purpose of the mentorship program is to provide one-to-one technical support to instructors who have identified computer related projects they would like to complete.

The computing services department provides technical support to all college staff. The computing services staff install software, repair and upgrade hardware, as well as maintain the college network, servers, and e-mail system. This department does not currently have a mandate to serve clients who are not on campus. This has several implications for both instructors and students. There is no easy way to access campus e-mail when an instructor or student is off campus. Some instructors, who have the necessary computer skills, are able to set up their home e-mail program to access the college mail server. The college does not provide off-campus Internet access to staff or students. Finally, since the department does not have a mandate to serve distance clients,

they do not always provide support to staff or students with technical questions who are accessing material from their home computer. Even when computing services staff is willing to provide support, they do not always have the knowledge or skills to trouble-shoot using e-mail or the telephone.

In autumn of 1999, the college president presented a new mission, values, and key strategic directions that were developed and endorsed by the college board. It was at this time that the decision was announced to focus on university and career studies. Each college dean is responsible for a specific strategic direction. One key strategic direction is the use of technology to enhance student access to programming and services.

#### Respondent Group

The target group for this study was college instructors. A reputational approach was used to select nine participants for the study. I sent letters to all program chairs within the college (Appendix B). The letters briefly described my study and asked for names of full-time and part-time instructors who may be willing to participate. As I received names of volunteers from the program chairs, I made telephone contact to explain the purpose and nature of my study and to describe the respondent's involvement.

During the initial telephone conversation with the respondents I discussed the instructors' current use of Web-based technology in their teaching. I then grouped the instructors into three categories: (a) those who had never used Web-based technology in their teaching, (b) those who had used Web-based technology in their teaching for less than one year, and (c) those who had used Web-based technology in their teaching for two years or more. This process was repeated until I had three respondents in each group. I placed instructors into three groups to determine if different groups of

instructors wanted and needed different types of support. During my pilot study, I set guidelines to determine the instructors' "use" of Web-based technology, to ensure that instructors were placed in the correct group. I decided that using e-mail and distributing paper lists of external Web sites would not be considered unless the instructor taught students how to use the tools and resources, such as the Internet or a particular e-mail program. Many instructors relied on the library and computing services staff to provide technical instruction and support to students. If, however, an instructor taught students how to use the tools or resources of e-mail and Web sites, he or she was placed in a category of using Web-based technology.

### Consent

During the initial telephone conversation with the instructors, I described the purpose and nature of the study. I also explained that confidentiality would be maintained by using pseudonyms for instructor names and programs of study, by reporting any results at a divisional level, and by transcribing interviews myself. Once verbal consent was obtained, and a tentative interview was scheduled, a written consent was sent to the respondents with instructions to call me with any questions (Appendix C). I received signed consent forms before the interview. At the beginning of each interview, before the tape recorder was turned on, respondents were asked if they had any questions about the consent.

### Data Collection

Semi-structured interviews were conducted with instructors at the college. A guide ensured that comparable information was gathered from each respondent (Appendix D). By using a semi-structured guide, I was able to engage in conversation



with the respondent. This allowed me to build rapport and explore new topics identified by the respondent. The interview guide was developed by modifying categories of existing instruments such as those used by the University of Alberta (1996) and St. Mary's University (1999). The interview guide was checked with a colleague who had conducted interviews with different instructors regarding their experiences while developing and teaching on-line courses. A pilot study was conducted to identify ways to improve my interview guide, interviewing skills, and recruitment information.

Respondents were asked if they wanted the interview to take place in their office or another location. Due to shared office space, two interviews were conducted in a human resources meeting room. The remaining seven interviews were conducted in the instructors' offices. I wanted to ensure the respondents were comfortable in the interview setting.

Respondents were given a copy of the interview guide prior to the interview. This allowed them to review the questions and become more familiar with the topic of conversation. Interviews lasted approximately one hour and were audio-taped. I transcribed the interviews verbatim, using pseudonyms for the respondents, program, and college departments. A verbatim transcription ensured I did not interpret the data nor miss important information. By doing the transcriptions myself, I helped maintain respondent confidentiality and became familiar with the data. I also asked respondents for permission to contact them in the future in order to clarify responses.

Because the first two interviews were part of my pilot study, I transcribed them immediately after the interviews. I identified initial themes and refined my interview guide. The remaining interviews were transcribed after all of the interviews were

complete. I also kept a journal to record my thoughts, beliefs, questions, and interpretations after each interview. These notes helped identify areas I wanted to explore further in subsequent interviews.

### Data Analysis

The interview data provided thick description from the instructors' perspective. Content analysis was used to code the data thematically. Content analysis is the systematic and objective analysis of written documents, such as interview transcripts, used to identify characteristics, themes, or ideas (Berg, 1998). The data were initially coded through a deductive process, using the literature and my problem sub-statements to guide the development of themes. The data were then analyzed inductively. New themes and ideas emerged from the data that did not fit into an existing theme. The notes I made after each interview were also helpful in identifying themes. A colleague reviewed the data once they were coded and organized into themes.

### Trustworthiness

The interview data provided rich descriptions of experiences and opinions of the instructors, however, this information is not generalizable. The context of the study is provided in an earlier section of this chapter to allow transferability.

The biggest threat to construct validity is researcher bias and expectations. Construct validity refers to whether a study actually assesses the construct it claims to measure. A construct is a concept that is inferred from observed behavior (Gall, Borg, & Gall, 1996). As well as documenting my beliefs, I made notes after the interview regarding my thoughts, feelings, and interpretations. The interview guide was checked with a colleague to ensure my questions were not leading. Interviews were audio-taped

and transcribed verbatim. During the interviews I paraphrased responses to confirm that I had understood the meaning of the response.

Member checks, to verify the data and interpretations, are perhaps the most important method of ensuring trustworthiness. Respondents were reluctant to agree to read complete transcripts due to time constraints. However, transcripts and summaries of interpretations were sent to each respondent. One instructor telephoned to clarify two areas of interpretation. This instructor used the telephone conversation to emphasize the support wanted to incorporate Web-based technology. The remaining instructors indicated that the summaries (and transcripts, if read) were accurate.

A colleague reviewed my interview guide and coding of themes to help develop and follow an audit trail. I also discussed my notes and the thematic coding process with my colleague. This helped me to further identify my biases and mitigate their effects on the interpretations of the data.

### **Delimitations**

This study was delimited to nine full and part-time college instructors. The findings provided in-depth data regarding the experiences and opinions of the nine respondents, however, they cannot be generalized across the college. Because only one institution was used in this study there may be a limited view on the use of Web-based technology and support mechanisms reported in the findings. Data from more than one institution may have provided a wider range of responses. Although findings of this study are not generalizable, information about the college is provided to allow the reader to assess the transferability of the findings to other contexts. The insights gained from the nine participants regarding the use of Web-based technology are of value to instructors or

persons offering support to instructors contemplating implementing the technology in their teaching.

This study focused on the support needed to incorporate Web-based technology from the instructor's perspective. Interviews with administration, support staff, or students may have provided a different perspective on the support instructors require to improve their knowledge and skills needed for effective technology integration, however this was beyond the scope of the present study.

### **Limitations**

The instructors who participated in this study were likely interested in the topic of Web-based technology in education. They may have discussed issues with colleagues or may have attended presentations on Web-based instruction and as a result, their responses may reflect opinions or experiences they heard from other instructors. The instructors may also have had strong beliefs regarding the support they want and need. Although three instructors who had never used Web-based technology in their teaching participated in the study, it is conceivable that there were no respondents who had never considered using Web-based technology or who did not really understand what it is. The findings may not indicate the type of support that this group would need. Unfortunately, these problems are limitations of using volunteers.

### **Summary of the Research Method**

Interviews with nine college instructors provided rich descriptive data on the support they wanted and needed to incorporate Web-based technology into their teaching. Instructors were grouped into three categories based on the length of time they had used

**Web-based technology. The data and the themes that emerged during data analysis are presented in the following chapter.**

## Chapter Four: Findings

The purpose of this study was to examine the support wanted and needed by instructors to incorporate Web-based technology into their teaching. Interviews with nine college instructors provided in-depth data. As described in chapter three, I analyzed the interview data deductively and then inductively. Four broad categories of themes emerged (a) Computer Use, (b) Factors Supporting the Use of Web-based Technology, (c) Barriers to Using Web-based Technology, and (d) Providing Support. The findings are reported as follows.

For the purpose of this study, the respondents were grouped into three groups, based on the length of time they had used Web-based technology in their teaching. Pseudonyms for group A begin with the letter “A”, pseudonyms for group B begin with the letter “B”, and pseudonyms for group C begin with the letter “C”. This information is presented in Table 2. Responses were organized, within each theme, according to the group to which the respondent belonged. This identified any differences among the groups.

### Computer Use

The data under this heading provide some background information about the instructors’ general computer knowledge and how they are currently using Web-based technology in their teaching. There are many interpretations of what Web-based technology means or includes. The responses are the instructors’ interpretations and provide a context to findings presented in future sections of this chapter.

Table 2

**Instructor Groups****Group A - Instructors who had never used Web-based Technology**


---

<b>Name</b>	<b>Age</b>	<b>Teaching Experience</b>
<hr/>		
Alice	35 – 40	10 – 15 years
Art	55 – 60	> 20 years
Amanda	40 – 45	< 5 years

---

**Group B - Instructors who had used Web-based Technology for less than one year**


---

<b>Name</b>	<b>Age</b>	<b>Teaching Experience</b>
<hr/>		
Brenda	40 – 45	10 – 15 years
Beth	35 – 40	5 – 10 years
Betty	30 – 35	< 5 years

---

**Group C - Instructors who have used Web-based Technology for more than two years**


---

<b>Name</b>	<b>Age</b>	<b>Teaching Experience</b>
<hr/>		
Chris	45 – 50	15 – 20 years
Cindy	35 – 40	10 – 15 years
Cheryl	30 – 35	< 5 years

---

Student characteristics were also included in this section as it provides data on student skill level and how students are using Web-based technology. During the interviews, many instructors spoke of student skills or students expectations when

describing their use of Web-based technology. Again this information provides a context of the students and issues that the instructors involved in this study face.

### **Computer Ownership**

All of the instructors owned a home computer, and all except Beth had Internet access. Beth did have Internet access until her modem broke, which she had not yet replaced.

The instructors had varying degrees of knowledge about their home computers. Alice and Art did not know the kind of computer they had. They were also unfamiliar with the terminology used to describe their computer. Art stated, "The only thing I can remember is the number 56 k. What's that?" Alice said:

I'm embarrassed to say that I actually had to ask my husband what kind it was... he told me that it's 26 kbps modem speed and I have no idea what that means.

The instructors who had used Web-based technology for one year knew the basic kind of computer they had, but they did not provide the more technical details that instructors who had used Web-based technology for over two years provided. Brenda explained, "it's an older computer, it's a Pentium 2. "

The instructors who had used Web-based technology in their teaching for more than two years knew what kind of computer they had, how old it was, and identified other peripheral equipment that they owned. Cheryl had "a Pentium 165. It's two and a half years old now. " Chris explained, "I have my own scanner ... and ink jet printer and laser printer."

All instructors also had access to office computers. The issues related to office computers will be presented in a future section of this chapter.



### **How Instructors are Using Web-based Technology**

The instructors who had used Web-based technology in their teaching were using it to supplement existing classroom based courses. Although Amanda had never used Web-based technology, she was considering how to use it to supplement existing print-based distance courses. The following list shows how instructors were using Web-based technology.

1. Posting grades
2. Exploring external Web sites for information
3. Having students explore external Web sites for information
4. Posting the course outline or syllabus
5. Posting answers to textbook or quiz questions
6. On-line discussion
7. Posting course notes
8. Posting content that they did not have time to teach in class, such as writing skills

Art and Alice said that it was important for students to learn how to use the Internet as a source of information. They stressed the need for students to learn how to evaluate the information they find on the Web. Library orientation and subsequently library staff provided this teaching to students. Alice stated:

It's about a two hour orientation and they are provided some basic information during that session on how to access the Internet and all the resources and databases and things ... we rely on the [library] staff to do that. We don't feel that's our area of expertise.

Although Amanda has never used Web-based technology, she was assessing the communication tools within WebCT, such as e-mail and computer conferencing, as a

supplement to print-based distance courses. She saw this as an “option that would help enhance communication between the instructors and students ... and would allow students to communicate with each other.” She also thought Web pages could be used to provide supplementary resources and reading to students, and that the Web pages could be updated more quickly than print.

Beth, Cindy, Chris, and Cheryl linked to Web sites that provided additional information related to the course content. This was often used as a resource and not a requirement for the course. Beth stated:

There are Web sites that go with the textbook. Web sites that I have come across being on the Internet ... [I] tell them that these might be interesting to look at. I find the eager students go and look, but a lot of students probably don't go.

Beth posted grades for the classes she taught at the university after students requested it. Although she's “not crazy about putting grades on the Internet” the process at the university was simple and her students were pleased. Cheryl made use of WebCT's grade reporting so students could only see their own marks. She was concerned about students matching identification numbers to other students' marks when complete class lists of marks were posted.

Beth, Brenda, and Chris put their course outline on the Web. All of these instructors noted that students frequently lost course outlines. Having outlines available on-line made it easier for them and their students because they didn't have to make extra copies throughout the year and students didn't have to come to their offices to get another copy. Chris had recently begun having only an on-line outline when he noticed that his print and on-line versions differed. “For a couple of years I was maintaining a Web course outline and a paper course outline, and you know what? They diverged at times.”

Brenda also used her Web-site to pilot course materials that were being developed as part of a provincially funded Learning Enhancement Envelope (LEE) project. Brenda stated:

I had posted [the pilot course] on my Web site and they viewed it using PowerPoint ... I've had my students go through it and give comments as well, because, although we know what we want, we've missed many, many things.

Brenda and Cindy put answers to quizzes and self-assessment textbook questions on-line. Although it took time to enter all the answers, it provided more detailed feedback to students than could be provided in class. It also decreased the number of students requesting individualized help. Cindy explained "actually, that is a benefit of the Web. When I first provided detailed feedback on the quizzes, I didn't get so many one-on-one questions."

Betty and Cheryl made use of on-line discussions. Both acknowledged the benefit of face-to-face discussions but also saw a benefit of on-line discussions for some students and topics. Cheryl noted that some students who are quiet in face-to-face discussions participate more actively in the on-line discussions. Cheryl stated:

We still have class discussions but now I sit and decide if something is done better in a face-to-face discussion environment where we can do it quickly and get it up on the board. If I want something more in-depth, I'll figure out how to put it in a [computer conferencing] forum.

All instructors in group C used the Web as a place to post student work. This work could be Web pages or examples of assignments or papers. The instructors noted the need to get student permission before posting their work. Cindy would "put some samples of their writing and the kinds of mistakes they made and how it could be revised. That they enjoyed." Cheryl said, "I teach some Web design and now I pick the top five [Web pages] and put them on our program site."

Brenda and Chris posted lecture or class notes on the Web. Brenda posted PowerPoint notes with some components missing. Students would have the basic information but were required to come to class to “fill in the blanks.” Students then did not have to copy all the notes presented in the lecture but they did have to go through a process of filling in some information. Brenda found this also freed up class time for discussion. Brenda explained, “I didn’t want them to sit there, and I figured I lose them if I gave them everything. They’re still doing something and having to think and go through a process.” Chris made his lecture notes available on the Web. He stated that he’s made notes available to students, either as print packages or on the Web, and that it hasn’t had an impact on class attendance.

Cindy used the Web to help students develop skills that she didn’t have time to specifically teach in class. These included things such as writing skills, common errors, and problem solving. “It’s more to enhance the course and skill development. Skills that [students] need but I don’t have time to teach.”

#### Student Characteristics and Student Support

Alice and Amanda expressed concerns regarding the computer skill level and computer access of their students. Alice’s program had slowly implemented the requirement to have assignments typed “because many of [their] students do not have a computer.” Most of her students have a limited income and the field they are entering has low wages. The program did not want to place an additional financial burden on the students. Many of Amanda’s students were in the not-for-profit sector and have limited resources for computers and Internet access. Amanda wanted to provide students with a choice regarding how they received their course materials. Her students are also mature

students with an average age of 30 to 45, some of whom were unfamiliar or uncomfortable with using computer technology. Cheryl also expressed some concerns regarding the cost of Internet access for students. Cheryl said, “if we go only Web-based, [students] are going to have to pay the money to get Internet access.”

The remaining instructors all stated that students did not have any problems using computers or the Internet. Cindy summed up the skill level of her students:

before you had to say what a double-click was and assume nothing ... now you can assume that 99% are computer literate and the one percent I can deal with one-on-one.

Instructors did not know if students were using home, work, library, or laboratory computers but assumed that many of their students had home computers and Internet access. They also assumed that if students did not ask questions, they were able to access on-line material without difficulty or they used library or computer services resources for help. Art said:

I’ve now had 120 [students] and never had them come back, so I assume they go to the library. The other thing is that a lot of students are way ahead of us, they really are. I’m surprised at how proficient some of them are.

Cindy stated:

I tell them if they have difficulty to come and see me and I will print out a copy from my computer. I’ve only had one person out of 30, so it’s not a problem.

The programs that Brenda and Chris teach in have made an effort to ensure students develop computer skills. Brenda stated, “they had to go to a PowerPoint session, they had to go to an e-mail session.” Chris confirmed that students leave his program competent using e-mail, word processors, and doing Web searches.

### Factors Contributing to using Web-Based Technology

During the data analysis process, themes emerged that could be grouped as factors that have contributed to instructors using Web-based technology. These themes included how and why instructors first started using Web-based technology as well as the types of support they found beneficial.

#### How Instructors got started using Web-Based Technology

Three of the instructors who were using Web-based technology got started because of a special project. Brenda had an opportunity to work on a LEE project to develop on-line laboratories in her area of specialty. She was especially interested in the project as it involved working with colleagues at the university, whom she enjoyed working with previously. She also believed the on-line laboratories would benefit students. Since professional development of instructors was part of the LEE project, she also knew that this was an opportunity to learn more about Web-based technology.

Brenda said:

Number one, I just have a really good rapport with the two guys at the university ... so I liked who I was going to be working with ... And I remembered when I took [the course] and did have the lab experience, how valuable they were. I can't imagine teaching this course without having the students have [a] chance to try things out.

Brenda was also involved in a mentorship program at the college that paired technically competent students with a faculty member. The faculty member had a specific computer related task that he or she needed help to complete. Brenda had wanted to create a Web site, but due to "the combination of time and the frustration, without having anyone to go to [for help]" she had never finished the Web site. The student partner and Brenda

worked together to learn the technology and decide what to include on her Web site.

“That helped me tremendously.”

Cindy developed some ideas of what she'd like to create on-line after attending an Interface conference in 1994. At that time she also had colleagues at other institutions who were using the Web in their teaching. Although she did not receive any direct support or ideas, she was able to evaluate Web-based activities that were created by other instructors and decide what she wanted to develop for her own students. Her Dean gave her one course release time to do development in 1995.

Chris had a sabbatical in 1996 when he did a graduate course on learning to use and access the Web. “That was probably what really got me using the Web.” His project for the year was to put a new course and all support materials on the Web.

The other three instructors in groups B and C had some previous computer experience. Using the Web to deliver educational materials was a progression in their own computer learning and use. Betty had a degree in fine arts, but she found that her degree had not provided her with the computer skills needed. After taking and teaching many computer-related courses, she ended up in a masters program at the university. “I took a summer course there and it was all the media course with PowerPoint, HyperStudio and all the fun stuff. After that I was hooked.” It was recommended that she apply to the college, and now she is able to incorporate the Web-based technology she learned into her teaching.

Beth took her first computer course in high school and continued using computers through graduate studies. “I took a course in Basic in High School, and this is when computers were saving things on audio cassettes . . . . As the computers developed, I

went along with it.” Cheryl’s university degree and field of study involved computer technology. She also stated she had always used computers in any of the jobs she had, such as secretarial jobs. She said she learned through “the school of hard knocks” but thought it was not particularly upsetting or frustrating because she was young when she learned.

### Sources of Support

Although the instructors in group A had never incorporated Web-based technology into their teaching, they accessed a number of resources and people to support them in their computer use. All instructors in group A relied on family members as their main source of support. Family members were easy to access and provide the step-by-step instructions that instructors in group A stated they needed. Alice said:

If there’s something special that I want to do, that I’ve never done before, I ask [my husband] first... And if he doesn’t know, he calls my brother-in-law who is in that field. And so he’s been a great resource for both of us, to help do things that we wanted to, or when something breaks down he’s the first person we call.

They also frequently asked for secretarial or clerical support to perform a certain task using a particular computer program or to do activities such as printing, photocopying or accessing information. Art emphasized the support he had received from colleagues who had been willing to help him use computer technology. “Many staff members and secretaries have helped me out. They continually help me out and support me.” Alice and Amanda called computing services to ask questions and for assistance to get office computer equipment to work. The computing service department was considered the “first place to call” if computer equipment or the network within the college “didn’t work.”



Library staff was also a source of support for instructors in group A. Firstly, library staff was identified as providing information and resources to students so they were able to use the Web to access information. Instructors in group A also asked library staff questions related to their own research and course development. Alice stated that she and other instructors within her program have attended student library orientations to learn about Web-based library resources and Web searching. Alice said, "I've gone back [to the library] for some individual [help] ... I got one-on-one tutoring on search techniques."

Amanda was the only instructor in group A to make use of the educational technology facilitator at the college. The educational technology facilitator offers free workshops on topics related to educational technology to college staff. This person is also available to answer one-on-one questions after an instructor has taken a workshop and is using the technology. All of the instructors in group B had accessed the educational technology facilitator by taking specific workshops.

Beth acknowledged the role of her graduate supervisor in exposing her to computers. "He was really good... he could write his own programming." She also stated that she doesn't need a lot of support to learn how to use different programs or the Internet. "I've never come across anything on the Internet that I could not figure out on my own."

Brenda found that the LEE project and team members had been the biggest sources of support for her. She was very comfortable with the group and was willing to ask questions "and that [was] actually part of the project too, for the collaborators to

learn, to develop some skills.” Betty stated that her masters degree helped her develop both her educational and technical knowledge and skills.

The instructors in group C identified the college infrastructure as a source of support. This included office computer equipment, computer laboratories, laboratory monitors, and access to servers. It should be noted that only one division at the college had a server that instructors could use to put up Web sites. Chris, Cindy, and Brenda belonged to that division. Chris, Cindy, and Cheryl also acknowledged the support of colleagues, but described the support as collaborative in nature, where they helped each other. As Cheryl stated, “We’re lucky in this hallway because we have a lot of knowledgeable people ... we make use of that peer-to-peer help as well.”

Chris and Cindy emphasized that they learned how to use the computer and Web-based technology on their own using books as an important resource. Cindy stated, “I’m a very pragmatic person. If I needed to know [something] I would learn it.”

### **Barriers**

For the purpose of this study, barriers included anything that would prevent an instructor from using Web-based technology or from accessing support systems in place. Amanda and Art stated that the college had wonderful professional opportunities, yet both instructors identified barriers that prevented them from accessing these “wonderful opportunities.”

### **Time**

All nine instructors stated that time was the largest barrier to using technology in their teaching. Amanda stated:

I believe that the college has tremendous professional development support...but I don't think from a reality perspective that faculty have time to access that opportunity.

Four instructors linked the time available to their part-time or sessional status. Beth said:

Well I think it would be different if I was a full-time instructor. Because I'm a part-time instructor, driving back and forth between here and the university, I do not tend to spend as much time on [Web-based technology].

Alice, Amanda, and Cindy stated that other issues get priority over Web-based technology. If they were going to learn how to use the technology, then develop materials, and then teach with the technology, they would have to give up something they are currently doing. They were not prepared to do that. Cindy stated, "[I place a priority] on keeping current with content. Not only for my class, but it keeps me enthused too." Brenda, Betty, Cindy, and Chris chose to incorporate Web-based technology that they thought would save them time. This included putting answers to textbook or quiz questions on Web sites to prevent so many one-on-one consultations.

Even though Cindy and Chris have used Web-based technology, they are reluctant to do more because of the time it takes to develop new material and maintain old material. All instructors in group C stated that they would like course release time to develop Web-based material. Cindy stated "Right now I am teaching five courses...I think the classes have to come first." Chris said, "Well before I put a [complete] course on WebCT I would probably want adequate if not generous time allowance ... give up a couple of my courses of teaching."

### Money

None of the instructors cited pay as a barrier to using Web-based technology in their teaching. Instead of more money, they preferred release time or a change in status.

Money was a barrier only in terms of purchasing equipment or accessing instructional support, such as an instructional designer, graphic artist, editor, or Web developer.

Amanda acknowledged that many of her part-time instructors are employed full-time outside of the college. She stated that she would need financial resources to contract them for professional development activities, course development, and teaching Web-based courses.

### **Infrastructure**

Another barrier to incorporating Web-based technology was the lack of infrastructure within a program or the college. Infrastructure issues were either related to equipment or policy.

**Equipment.** Alice and Beth were sharing an office and a computer with a colleague. Both found this frustrating and although they were “making it work” they both expressed that they would like their own computer. Beth said:

He has the desk with the computer and he works a lot on the computer ... I do not feel comfortable taking away his space. If I had a computer of my own, that would solve most of the problems.

Instructors also faced challenges if they wanted to use technology in class as they had to book a cart with computer, take it to their class, and then take it back to the library. Beth “finds it is too much of a hassle.” Cindy stated there are problems trying to book computer laboratories for classes as they are frequently full.

Cindy, Chris, and Cheryl mentioned problems with the speed or access to servers. Cindy and Chris stated they were able to use their divisional server, however, they questioned when the rest of the college was going to provide this support to all faculty. Cheryl stated that the slow speed of the WebCT server was “frustrating for the students.”

**Policy and procedure.** Amanda stressed the lack of support to assist her small program to complete the day-to-day tasks. She would like a mechanism within the college to provide necessary infrastructure so technological resources could be accessed. Amanda said, “it’s hard to access those technology opportunities when you’re barely getting by on the day-to-day kinds of issues.” The day-to-day issues included teaching, administrative tasks, and managing staff within the program.

Cheryl and Betty observed that there was no college wide direction or initiative to guide faculty interested in Web-based technology. There was the perception that “everyone was going in their own direction” with “a whole bunch of little teams.” There was also no centralized communication system where instructors could share experiences and questions. Betty and Cheryl both wanted a centralized place to find out what was required to put material on-line. They suggested access to templates, design specifications, expert trainers, and research on instructional design. The department that provided instructional design, graphical, editorial, and technical support for the college operated on a cost recovery basis. Programs were required to pay for any consultation or to have any course materials developed.

Chris and Amanda expressed reluctance to deliver on-line courses until the college addressed workload and payment issues for faculty. Both instructors acknowledged the potential time commitment. Amanda specifically wanted:

Equity for both staff and students for alternative delivery... The way in which people are compensated and perceived in alternative delivery has not caught up with the demands for more use of technology.

Chris stated he would not put anything up on the Web as he is “comfortable right now having [his] class of 30 students.” He was worried class size would be increased without appropriate compensation.

Instructors could not check their college e-mail from home because of the e-mail program that was used by the college. This was especially difficult for part-time instructors to use e-mail as a reliable communication tool with students since the instructors were not on campus daily or did not have their own office computer. Alice stated:

One of my biggest frustrations with the college is that I would like to be able to access my e-mail through home. When I phoned to try to get some assistance with that, I was basically discouraged and was told that this is not something that the college wants to do.

Alice, Brenda, and Cheryl said that there was not enough program support to use Web-based technology. Alice stated that her program does all course development as a team with one core instructor to ensure all the courses are consistent. Individual instructors do not have the autonomy to change activities or delivery method. “So even if I was interested in doing that I would then have to convince the [core instructor] to change.” Brenda and Cheryl wanted their programs to provide some suggestions or direction so faculty could work together to plan, develop, and implement Web-based technology. Brenda thought that colleagues or her program chair could suggest what workshops or technology other staff had found helpful and what was being successfully implemented by other instructors. Cheryl was frustrated that her program chair did not respond to some of her ideas regarding the use of Web-based technology. She was left to proceed on her own. Cheryl stated, “it’s been, sure what are your thoughts and how are

you going to do it?” Betty would like her program to provide research articles on instructional design and what has worked in her field of study. She did not have time to do that on her own.

### Not Understanding How to Use and Access Technology

Alice, Amanda, and Brenda all discussed that not knowing enough about the technology was a barrier to using Web-based technology in their teaching. Alice did not know how to go beyond presenting factual text-based information to providing learning opportunities for students that were more “hands on.” An example was teaching students how to create attractive poster displays for use in schools. “I’ve wondered how a person could do that, but I haven’t gone beyond wondering.”

Amanda was spending time evaluating the components of WebCT that would be appropriate for her students. Although Amanda was able to conceptualize the possibilities she was unable to identify and do the very detailed things to accomplish what she had planned. “I’m fairly good at conceptualizing ... but I have great impatience in terms of getting there.”

Brenda didn’t take workshops in the past because she didn’t know what they were about. Notices about workshops usually had a little description, but if she had never heard of it before, she didn’t pursue it. As she became more computer literate she was more comfortable asking questions and deciding if a particular use of a Web-based technology was something she wanted to pursue. Before Brenda learned some of the terminology she did not understand what was being discussed. She stated:

At some of our department meetings, for example, things would be discussed in the past and I’d think, what the hell are they talking about. And I see that in people’s faces now, that aren’t as computer literate.

Brenda now makes a point of looking at the workshops that are being offered to see if there is anything that will help her. She has a little more knowledge about what there is and what her needs are.

### **Motivation**

Art, Beth, Cindy, and Chris mentioned the need for instructors to have motivation to learn and implement Web-based technology. Art was first introduced to computers in education as an administrator in the K-12 sector. At that time he only had five years until retirement and was not motivated to learn. He regretted not having learned more at that time “now I’m kicking myself that I didn’t immediately jump right in.”

Beth acknowledged that she used to have current skills, but she had not kept up with her own learning and development. “I always thought I was pretty good at doing those things, but now ... [I] feel like I’m falling behind.”

Cindy and Chris said that an instructor must be intrinsically motivated to learn to and use Web-based technology. The instructors must be interested and willing to find resources and spend time learning and developing. Cindy stated, “I think that unless people have an intrinsic motivation to do it, if they have to rely extensively on help all the time, then you have to evaluate whether it’s the best teaching strategy.” Chris felt that “people who are motivated will find the support.”

### **Providing Instructor Support**

This section provides data on how instructors preferred to learn new computer-related skills, the support instructors would like to have, and instructors’ level of



innovation. Level of innovation was included in this section because I believe that different types of support are required depending on the instructors' level of innovation.

### Learning to use Web-based Technology

The instructors in group A have not used Web-based technology in their teaching, therefore, findings for this theme includes information on how they prefer to learn any computer-related skills. The instructors in group A preferred one-to-one help. Alice, Amanda, and Art explained that they do not like to learn by “trial and error.” Alice did not usually push beyond the limits of her own knowledge and understanding. Art did not like to “hack around” because it was easy for him to get off track from his original task. The instructors actively sought out people that would show them the step-by-step procedure of what needed to be done to complete a computer-based task. Amanda explained:

I'm very bad at using the help function on the computer. I just about never use it. I'll think about it myself for a little while. My next step is to get one of my colleagues to help me ... If they can't, strangely enough, the next person I go to is my husband, or one of my friends, my sister is a computer trainer, someone in my personal circle.

These three instructors also said that they often need to be shown a task, or the steps involved, more than once. They tended to forget what they had been told or shown if they did not use the information right away. Alice and Art frequently wrote down the steps when someone was explaining how to perform a certain task. They would then refer to their notes when they had to repeat the process on their own. Amanda stated that she doesn't retain computer skills and thus “needs refreshers.”

Alice, Amanda, and Art did not like attending workshops as they did not use the information right away and then forgot it. Art was cautious about taking courses if he

wasn't going to use the information. He wanted to learn slowly and then use any new skills or knowledge gained in a workshop. Alice shared her frustration at the different skill levels of workshop participants and an "assumed level of knowledge." However, she said she would attend a workshop when she felt she had the need for it. "So if I had decided to do something in one of my courses, that's when I would take it."

Art and Alice liked to use books to learn computer-related skills. They preferred step-by-step manuals that described what button to click on to accomplish a certain function. Art explained "learning how to send a message and send an attachment. I wish I had a little book that would tell me these types of things."

The instructors in group B made use of workshops to learn how to use Web-based technology. Often the workshop provided an initial "hands-on demonstration" to learn the basics. Instructors in group B were then willing to proceed on their own. Betty said that, although she's not afraid to "click buttons" and use the help function, she prefers a hands-on demonstration from technology experts.

Despite liking workshops, there were some frustrations with workshops. Brenda, like the instructors in group A, found that if she did not use the information and practise the skills soon after the workshop, she forgot what she had learned. "I find for me. . . to learn something, I have to be able to use it right away." Beth stated that even though she had never used a program, she found the introductory workshop too basic and became impatient. She said she would prefer more advanced courses.

Betty described how she liked to learn new technologies in relation to the master's program she took. She found the constructivist approach too unstructured and that she preferred more direction to get started. She said

For some of us who need a little bit more structure and guidance, I found it frustrating. And sometimes I think I spent more energy going through a dead-end as opposed to having an instructor recognize that not all students are the same and say, "O.K., you can go through steps one, two, and three and then you get a jist of what to do, and then continue."

All of the instructors in group B stated they used books and help functions. Beth said she is sometimes unsure of what book to use. She thought a combination of an introductory workshop and then a good resource book for more advanced functions would be the best method of learning for her.

Beth also emphasized that she liked learning things on her own. She thought people learned how to do things better by doing them on their own, not having someone take them though all the steps. She also thought being able to do things on her own gave her more flexibility. She could make changes when she wanted and have her Web pages look the way she wanted. Beth related this to taking a graduate degree, because "the idea of learning something new is not threatening." She explained "from the nature of our degrees, we're used to going out and doing things by ourselves and learning." Cindy also stated that becoming an independent learner in graduate studies helped develop the skills she needed to learn new technologies.

All of the instructors in group C were able to use books to learn Web-based technologies. They actively sought out books and on-line information on using Web-based technologies in general, or for a particular program. Cindy explained:

I expect my students to pick up a book and read it, so why can't I? And it is cheating if I'm always doing it in the area that's my area. I should be able to pick up a computer book and learn it.

The instructors in group C frequently sorted out their own problems or questions through independent study and clicking buttons.

Chris and Cheryl participated in workshops to get started using a new Web-based technology. Cheryl described the benefit of taking a WebCT workshop “because in two hours I was up, I was in, saw what it was about and could take my books and continue on my own.” Chris and Cheryl had also taken graduate courses in educational technology and learned how to use different Web-based technology by participating as a student. Cheryl stated that she particularly liked the independent learning style of on-line learning.

#### Support Instructors Would Like to See

The instructors in group A all wanted access to one-on-one tutoring. To be beneficial, instructors stated the tutoring must be at a mutually convenient time, and on a task identified by the instructor. Alice and Amanda emphasized the need for the tutor to be a person that understood both the technical and educational aspects of using the Web-based technology. Alice said:

I would want to be able to have access to some one key person who would help me with the instructional design of that course on-line. [Someone] who understood that course and the instructional aspect as well as the technical aspect. And that's where I get frustrated. You have someone who has wonderful technical skills, but then you try and talk about the educational aspects or what happens in the course and they don't understand, or they don't have the same sense about it to help really.

Amanda stated that the tutor would have to be someone she felt comfortable with, someone she could trust. Amanda would like more clerical or administrative support staff “to help with the day-to-day issues.” She said this would allow her to delegate tasks and give her time to evaluate and learn Web-based technology and then develop and integrate material into her teaching

Amanda, Alice, and Art all wanted support staff that could do the technical things like creating and maintaining HTML pages. They would rather use their time and energy to conceptualize and focus on content and educational aspects.

Beth and Betty stated they would like access to technology experts and training. They emphasized that these people should know a lot about the different Web-based technologies and specific programs. Betty particularly wanted expert trainers for specialized software, such as multimedia software developed by Macromedia. Beth would like to have an expert come to her office to help her through a task she was unable to figure out on her own. She said the person (or people) would have to be reasonably accessible and suggested they should be available within a week. Beth liked the system for putting up grades at the university. She said that a Web-site is available to easily submit grades. She thought this would be nice to get started in other Web-based technologies, if systems were in place so she could use a technology without having to learn all the technical aspects. For example, she would like to put up a Web page without learning HTML or how to upload files onto a server.

Brenda found that the LEE project was a great way to learn about Web-based technologies. However, she stated that she would like her program chair to provide suggestions or directions of what Web-based technology to explore, what workshops to take, and what skills instructors should be developing.

The instructors in group C described infrastructure issues in the support they would like to see. Cheryl wanted “one-stop shopping.” She wanted to have one place to go for consultation on design, and suggestions of how she might want to use Web-based technology for her classes. She would also like access to other instructors, to share

information or act as “peer coaches.” Cheryl wanted the college to set specifications to ensure college-wide consistency of design and style for Web pages.

Chris wanted editors to edit Web-based materials before students accessed them. He wanted editors to not only correct grammar mistakes, but to ensure a site is functional, that the links work and that the material “looks good on screen.”

Cheryl and Chris acknowledged the money that would be required to provide the support they wanted. They said that if the college thought Web-based technology was important then there had to be some money available for faculty or support staff. Despite the benefit of editors, Chris did not think the college would provide financial support. He stated “the college is not going to look good if the Web sites are full of grammatical errors ... but they’d have to spend some money and that’s unlikely to happen.”

Cindy wanted access to highly technical support staff to do higher levels of design or animation that she did not do herself. She did state however, that support would have to be timely. That is, she would want material ready for the class that she developed it for.

### **Level of Innovation**

During data collection I grouped the instructors based on the length of time they had used Web-based technology in their teaching. This was done to see if differences in values, beliefs, and comfort level with computers affected the support instructors wanted and needed. This theme provides some explanation of the differences between instructor groups identified in other themes.

Instructors in group A saw Web-based technology as one of many tools they could use as teachers. Alice and Art stressed that they had taught for many years without

the computer and if it wasn't available, they could still do their job. Alice expressed her frustration with those who rely on technology. She said, "I see many people around me that believe that technology is the answer for everything. It's just this panacea. I see technology as a tool. It's not the only way to do something." Art described himself as a traditionalist, that he liked to deal with his students in person. Although he was beginning to use e-mail to send messages to his class, he admitted he usually liked to see the person, or at least hear a voice.

Art had the opportunity to work with other instructors who are using Web-based technology in their teaching, and has been able to learn from them. He said:

One of the reasons I didn't want to get involved in computers is that I thought it was taking away from what a teacher and a student can have. But now I realize it can complement what a teacher and a student have.

He noted the additional or individualized work that could be done with the computer and how some students could benefit. Art recalled his reluctance to adopt computers in the K-12 school system. After learning skills such as using e-mail and a word processor, he could see a real benefit for both teachers and students. He said, "I thought, this is ridiculous, it's going to cost too much money, then [I thought] hmmm, there are some good things here."

Alice described how she did not need to use computer or Web-based technology. She could "live without it." She had her first computer for ten years and was able to complete the tasks she wanted to complete. She did not have any need to upgrade. Alice explained, "I don't get wazooed by the technology. I'm not the type of person who goes, oh, isn't that neat, I have to do that, I have to have that."

Amanda stated that, because her program is a distance program, she had examined many of the issues that those in traditional face-to-face programs are beginning to examine when looking at Web-based technology. Although she doesn't know about specific software, she does know what she wants to accomplish by using Web-based technology. She also said the program had previously been involved in computer-based testing and making a television series to complement the program.

As reported in the Computer Use section of this chapter, the instructors in group A were unfamiliar with computer terminology. They readily admitted they did not know the correct terminology and asked what certain words meant.

The instructors in group B described their comfort level with computers and Web-based technology by including words such as, fun, good, and exciting. Beth took her first computer course in High School, in the early 1980s, and had continued using and learning more about computer technology since then. She indicated that there were things she did now, using the computer, that she would not like to go back to doing the "old way." These included e-mail and calculating grades. Beth stated that e-mail was a wonderful way to communicate, especially with her parents, who were living outside of Canada. She found that "snail mail" was too slow, letters often got lost, and that it cost too much to just send a little note. She stated "e-mail is good ... e-mail is wonderful." Beth also found that using spreadsheets for calculating grades for her classes was "a God send." She stated, "the first courses I taught, I calculated them all by hand. It's stupid."

Brenda described the LEE project she was involved with. Although she was nervous about the project before she started, she saw it as a great learning opportunity. She stated that it had been fun learning about Web-based technology and becoming



familiar with the terminology. She also had greater confidence to ask questions because she knew the questions to ask and was able to understand what's available.

Betty had the initiative to take computer courses related to art and design. She thought it was necessary to learn about computer technology to work in the field. She continued seeking computer and education courses until she enrolled in her masters program.

The instructors in group C all sought out learning activities specifically related to Web-based technology. Cheryl and Chris both took graduate level courses, starting in 1996. They initially took these courses on Web-based technologies because they were interested in the topic. The courses helped them learn how to use the technology in their own teaching. Cheryl also enrolled in a course at another institution that was competitive to her program. She noticed that some of their courses were on-line and she thought "I need to go and find out about this, and what better way than to register."

Cindy began investigating Web-based technology for teaching in 1994. She was interested in learning and attended a conference held at the college. Although she hadn't always been interested in computer technology, she said she was "just a very pragmatic person" and learned what she needed to learn to accomplish her teaching goals.

Cheryl was comfortable trouble-shooting problems when she used Web-based technology when teaching. If the college network or server was down or slow, she would print some notes that students could share during discussion. Cheryl also acknowledged the fact that computer technology is changing so quickly, she couldn't expect to know everything. Cheryl explained:

I'm never concerned about having a black and white answer because there is a gray area and lots of variables. My students are somewhat phobic about computers and I want to not overreact and make sure they understand it's just like anything else, there's going to be problems. We'll try and solve them if we can, and some things will go unsolved.

Cheryl realized her comfort level with computers was because she had an education and taught in a computer-related field. She said it would be easier for her to learn and use Web-based technology than someone who didn't have a computer background.

Chris described himself as a "power-user." He stated that he took his first computer course the first day he started at the college, in 1984. Chris found that the computer has allowed him to do things that he previously had not been able to do. Examples included e-mail for fast communication, especially over long distances, creating newsletters, and publishing a book. Chris liked using the computer and the Web so much that he had little patience for those who didn't. He said, "it's a pain in the butt, these luddites ... I have one guy who won't publish his e-mail address. How am I supposed to correspond with [him]?"

Cindy originally booked computer laboratories for students, but found frequent server crashes were too stressful. She found she was making two lesson plans for each class, one as a back-up in case the technology failed. Cindy moved to using Web-based technology as a supplement that students did outside of class time. Cindy also acted as a resource for instructors within her program. She had given workshops and demonstrated how she is using Web-based technology for her students.

### **Summary of Findings**

The following list summarizes the main finding of this study:

1. All instructors in the study owned a home computer and all except one had Internet access. All instructors had access to an office computer. Instructors in group A were unfamiliar with the terminology to describe their computers.
2. Those instructors using Web-based technology used it to supplement existing courses. They used Web-based technology to post grades, provide links to other Web sites, post a course outline or syllabus, provide answers to textbook or test questions, facilitate discussions, and provide course notes.
3. Two instructors in group A stated that their students did not have the skills or access to use Web-based technology in their learning. Alice, Amanda, and Cheryl expressed concerns regarding the cost of computers and Internet access for students. The remaining instructors stated that students did not have any problems using computers or the Internet.
4. Three instructors using Web-based technology got started through a special project that provided money or release time. Three instructors using Web-based technology had previous computer experience.
5. Instructors in groups A cited family members, secretarial staff, colleagues, and library staff as sources of support. Group B instructors accessed the college educational technology facilitator and colleagues. Instructors in group C identified college infrastructure such as office computer equipment, computer laboratories, laboratory monitors, and access to servers as sources of support. Instructors in group C stated that colleagues were supportive in a collaborative role, that is they helped

each other. Group C instructors preferred books and on-line resources to help them learn a new application.

6. Group A instructors stated that they relied on library and computer services department staff to provide their students with the skills necessary to access Web-based materials.

7. Barriers to using Web-based technology in teaching included time, money, college infrastructure, motivation, and not understanding how to use and access technology.

8. Instructors in group A preferred one-on-one support for learning how to use new computer technology. They did not like to learn by trial and error and forgot steps if they did not practice using a certain computer program or feature. Instructors in groups B and C were comfortable clicking buttons. They were likely to take a workshop to get started and then proceed on their own.

9. Instructors in group A would like access to one-on-one support. They stated that they would like a technically competent person to support them, who also had educational skills. Instructors in group A were more interested in how to use the technology in their teaching than how to actually create material that could be posted on the Web. Instructors in group B stated they would like more suggestions or direction from their program chair on how Web-based technology might be incorporated into their classes. Instructors in groups B and C wanted access to technology experts, especially those who had design or multi-media skills. Instructors in group C identified how college infrastructure could support them,

including ways to share information with other instructors and access to support staff such as editors.

10. Instructors in group A tended to see Web-based technology as one of many tools they had available to them for teaching. They were not interested in the technology unless they saw a benefit to using it. Instructors in group B saw benefits of using Web-based technology both personally and professionally. This included e-mail and using a spreadsheet for calculating grades. Instructors in group C sought out learning activities related to Web-based technology, including graduate courses and conferences. They were comfortable trouble-shooting technical problems and often acted as a resource for other instructors.

Chapter five compares and contrasts the findings in this chapter to the literature.

## **Chapter Five: Discussion of the Findings**

The purpose of this chapter is to discuss the findings from this study in relation to the literature. The main sections include: (a) Web use, (b) diffusion of innovation, (c) providing support, and (d) barriers. Web use and diffusion of innovation provide background information that should be considered when examining support systems for instructors. The section on providing support examines institutional infrastructure, professional development, models of support, and whether instructors accessed support systems that are available within the college. Barriers include anything that would prevent instructors from using Web-based technology or from accessing support systems.

### **Web Use**

According to Statistics Canada (2001), 49.8 % of Canadians had a home computer and 33.1 % had Internet access from home in 1999. Alberta was slightly above the national average with 34.1 % of households having a regular Internet user from home. All instructors participating in my study owned a home computer and all, except one, had Internet access. Rogers (1995) wrote that those with higher education levels are more likely to adopt a new technology. This may explain why computer ownership in this study is higher than the average statistics. Instructors would likely have higher education levels than the general population and therefore may be more likely to adopt a new technology.

The following examples of educational applications of Web-based technology are found in the literature:

1. computer conferencing
2. on-line quizzes

3. instructor or course Web pages
4. a way to post student work
5. course notes
6. course syllabus
7. links to resources
8. multimedia (Anderson & Garrison, 1998; Green, 1997, 1999; Jonassen, Davidson, Collins, Campbell & Hagg, 1995; Khan, 1997; Santi, 1997).

The list found in the literature is very similar to the ways in which instructors in my study were using Web-based technology. The most prevalent use was Web pages that were designed to provide students with course outlines, course notes, answers to quizzes or textbook questions, and links to additional resources. Instructors also made use of on-line discussions and quizzes for their students within WebCT. Cheryl found that on-line discussions resulted in a more in-depth examination of a topic or question than classroom discussions. She also noticed that students who typically did not participate in face-to-face discussions were active in the on-line discussion area. Cindy used Web-based technology to teach students writing skills that weren't covered in the content area she taught. Brenda was the only instructor in my study involved in creating multimedia applications that were used to offer interactive laboratories to students. The on-line laboratories provided students an opportunity to manipulate models and practice theoretical applications. Brenda's project had funding to hire the necessary technical and artistic staff.

Green (1999) wrote that most colleges are creating hybrid courses, using a combination of traditional and computer-based teaching. This was supported in the

present study as all the instructors were using Web-based technology to supplement their existing courses. The instructors in the study noted benefits to using Web-based technology to enhance classroom instruction. Information could be posted on Web pages that was easily accessible to students and saved instructor time by decreasing one-on-one consultations. Posted information included course outlines, course notes, answers to textbook or quiz questions, and links to Web-based resources. Cindy acknowledged that there can also be intangibles of using Web-based technology. For example, students may not obtain higher marks but their enthusiasm for the discipline may increase. Choosing activities that enhance current teaching-learning situations wasn't dramatically changing the way that education was delivered at the college in this study. For example, instructors were choosing ways that Web-based technology could supplement existing delivery methods.

### **Diffusion of Innovation**

Diffusion of innovation theory can help identify why instructors have adopted Web-based technology into their teaching at different rates. According to Geohagan (1994) there is a chasm that separates the early adopters from the early majority. Because the characteristics of early adopters are different than the characteristics of the early majority, the different groups require different kinds of support. Instructors in my study were grouped into three groups to determine if different groups of instructors required different types of support. Group A instructors had never used Web-based technology in their teaching. Group B instructors had used Web-based technology in their teaching for less than one year. Instructors in group C had used Web-based technology in their



teaching for two years or more. Topics in this section include early adopters, the early majority, and crossing the chasm.

**Early Adopters.** The literature describes those within early adopter groups as innovators or risk takers. They are able to cope with a high degree of uncertainty and will accept the occasional set-back if an innovation does not work as expected.

Innovators form support groups with other innovators. They like to experiment and are self-sufficient using an innovation. They adopt an innovation if they see an advantage over the old way of doing things (Geohegan, 1994; Moore, 1991, 1995; Rogers, 1995). Geohegan (cited in Johnson, 1999) stated that only ten percent of academics are early adopters.

The findings in this study support the description of early adopter groups found in the literature. For the purpose of this study, I defined early adopters as those instructors who had used Web-based technology in their teaching for two years or more. Cheryl and Cindy demonstrated that they were able to cope with uncertainty and accept set-backs. If the college network or server was down, Cheryl had a back-up plan for her class. She acknowledged that there were going to be problems using Web-based technology when teaching, but was confident that she could work to solve most of them. She also stated that some problems would go unsolved and that this was an important thing for her students to understand.

Cindy experienced difficulties using Web-based technology when she used computer laboratories to instruct face-to-face classes. Frequent server crashes were stressful for her and her students. Cindy re-evaluated the technology and decided to use Web-based technology as a supplement to her face-to-face classes.

All instructors in group C indicated that they formed support groups with other innovators. Cindy worked with instructors at another institution who taught in the same content area as she did. Cheryl and Chris sought instructors at the college who were also interested and competent in the use of computers and Web-based technology in their teaching. Instructors in group C were self-sufficient in using Web-based technology. They used books and on-line information to learn how to do specific tasks or use a particular computer program. They also experimented by “clicking on buttons” within a software application to see what happened and what would work.

Instructors in groups B and C stated that they saw advantages to using Web-based technology over the old way of doing things. Beth stated that she liked e-mail better than regular mail because of the speed of communication over long distances. Brenda saw how the creation of an on-line laboratory would benefit student learning. Cindy was able to teach writing skills to her students using lessons designed for Web-based delivery. These were skills students needed to successfully write a paper, especially once students transferred to university. Cindy did not have time to provide this instruction in her regular class since it was outside of the required curriculum for her subject area. Chris provided many examples of how Web-based technology had enabled him to do things had not previously been able to do. These included e-mail to communicate over long distances, creating on-line newsletters, and publishing a book.

The Early Majority. The literature describes those within later adopter categories as being pragmatic. They must see proof of a benefit over the old way of doing things. These groups rely on references from people they trust. They have high expectations and want an innovation to be reliable with proven applications. This category is often

referred to as the early majority. They require significant support and are sensitive to the price of acquiring and using an innovation (Rogers, 1995; Moore, 1991, 1995; Geohegan, 1994).

The description of the early majority was supported in this study. Instructors in group A stated that they could continue to teach without Web-based technology or even a computer. They saw the computer as only one tool they could access. Art described himself as a traditionalist. He liked to deal with students in person and felt that a computer could take away from that relationship. Amanda had heard from another instructor that developing or teaching an on-line course increased her workload three to four times as compared to traditional lecture courses and was therefore reluctant to use Web-based technology.

Instructors in group A wanted one-on-one instruction to use a particular computer or Web-based application. They got frustrated if something didn't work or if they forgot how to do something. Art stated that he would like a step-by-step guide for doing things like sending an e-mail attachment.

Instructors in group A indicated a sensitivity to the cost of using Web-based technology. This included the cost of hardware, software, upgrades, and creation of educational materials. Art stated "it's going to cost too much money" when first exposed to the idea of computers in education. Amanda and Alice were reluctant to use Web-based technology because it could place an additional financial burden on students. Hiltz and Benbunan-Fich (1998) acknowledged the cost of a learning technology that requires every teacher and student to have a computer and Internet access. However, these authors did not feel the expense was prohibitive to offering on-line education.

Group B instructors wanted support and guidance from their program chairs. They particularly requested information on how and why they should learn and use Web-based technology. They wanted to know what others were doing.

By comparing the literature to the findings of this study, I found that the instructors in group C had characteristics of early adopters while instructors in groups A and B had characteristics of the early majority. Instructors in group B saw an advantage to using Web-based technology over the old way of doing things, which is a characteristic of early adopters. However, because they were not risk takers and requested support and guidance, I believe that they fall in the early majority category. Only after receiving support to use the technology have they seen an advantage over the way they used to teach. For example, Brenda took workshops after she had seen how others were using the technology and she understood what the workshop would cover and how she may be able to use it in her teaching. If I grouped instructors into more categories of adopters, it is likely that group A and B instructors would be spread over the later adopter categories.

Crossing the Chasm. The literature suggests that an individual will only be in one adopter category. Geoghegan (1994) wrote that there is a need to “cross the chasm” so the early majority will use a new educational technology. In this study both Chris and Cindy were unwilling to do any more development of Web-based educational materials. Cindy decided that, given her current time constraints, she would concentrate on keeping current with the content in her field of study. Chris wanted to be compensated for development by being given release time. Chris also wanted college policy developed to address class size for on-line courses. The continued use of an innovation seems to

depend on the barriers faced by instructors. Barriers to using Web-based technology will be discussed in a future section of this chapter.

Geoghegan (1994) addressed the fact that alienation can occur between early adopters and the early majority. This alienation is due to emphasis on the technology instead of teaching with technology. In addition, many of the early adopter's projects are highly visible and highly funded. This alienation was evident in the findings. Alice expressed frustration at those who relied on technology. "I see many people around me that believe that technology is the answer for everything." Similarly, Chris could not understand those who did not use the computer or Web-based technology and referred to them as Luddites.

### **Providing Support**

The literature describes two broad types of support that are needed by instructors incorporating Web-based technology into their teaching. The first type of support is the institutional infrastructure. Infrastructure includes hardware, software, policies, technology integration plans, as well as rewards and incentives for faculty members (Bates, 2000; Ely, 1999). The second type of support is faculty professional development. Professional development provides instructors with the necessary knowledge and skills to successfully use the technology in ways that benefit them and their students (Bates, 2000; Berge, 1997; Ely, 1999; Frayer, 1999).

**Infrastructure.** Instructors need access to hardware and software to effectively integrate Web-based technology into their teaching (Bates, 2000; Ely, 1999; Johnson, 1999). Instructors in my study supported the literature by expressing their need for the following equipment:

1. Office computers
2. A classroom computer with projection equipment for classroom presentations
3. Reliable computer laboratories
4. Reliable servers on which they can post course materials for students to access
5. A reliable network so students can access the servers and Web pages
6. Specialized software, such as multimedia software developed by Macromedia

Beyond the necessary equipment, there must be leadership, policies, and procedures to guide the use of Web-based technology (Bates, 2000; Ely, 1999, Frayer, 1999; Johnson, 1999). This is supported in the study by the fact that instructors wanted policies and procedures in place related to the use of Web-based technology. They wanted a centralized area where instructors could share ideas and gain access to templates, design specifications, and trainers; trainers who understood both educational and technical aspects of Web-based instruction. Chris would also like to see mechanisms for ensuring a certain level of quality for Web-based instruction, but was unsure who would monitor or define quality.

The literature describes the emphasis that is placed on research and publication in determining promotion and tenure at the university level. The college instructors in this study placed an emphasis on teaching and student contact. Although the priorities of universities studied in the literature may be different from those of the college in this study, the effect is the same. Instructors are not evaluated on their use of technology or the implementation of technology into their teaching. Instructors place a priority on the values of their institution because that is how they are evaluated and thus may affect their promotion or status.

Instructors in this study also identified student support as being an important part of institutional infrastructure support. Alice and Art recognized the support that library and computer staff provided by ensuring that students have the necessary skills to access Web-based information. The literature describes the importance of providing support to students as they access learning opportunities that is less instructor directed than traditional lectures (Duchastel, 1996-97). Student support should include new student orientation to applications such as e-mail and Internet browsing as well as ongoing technical and pedagogical support (Rossner & Stockley, 1997; Santi, 1997). Student support is not identified in the literature as a way to provide instructor support.

A final aspect of infrastructure support is adequate numbers of support staff (Bates, 2000). I believe that, in addition to adequate numbers of support staff, the support provided must meet the needs of the instructors. I have therefore included support staff in the section on faculty professional development.

Professional Development. The literature on adult learning theory provides assumptions and principles that should be used to develop and deliver professional development to instructors wanting to incorporate Web-based technology into their teaching. When instructors evaluate Web-based technology, decide on applications for their courses, and learn how to use the technology, they are adult learners. In addition, they are going to be using Web-based technology in an adult learning situation as they teach college students.

Knowles' (1980, 1990) assumptions about adult learners are supported by the findings of this study. Knowles stated that adults need to know why they need to learn something, and are ready to learn in relation to real-life situations. This was

demonstrated by the fact that Betty, Brenda, and Cheryl wanted direction and guidance from their program chairs regarding what workshops to take and how other instructors were using Web-based technology. Instructors in my study sought out learning experiences that would allow them to apply their new knowledge and skills to a teaching situation. For example, Brenda got involved in the LEE project to develop an on-line laboratory. She chose different learning opportunities to help her in the creation and evaluation of the on-line laboratory. Alice stated that she would not attend a workshop until she was ready to use something within her teaching.

Adults come to a learning situation with a wide variety of experiences (Knowles, 1980, 1990; Vella, 1994). Each instructor in the study had unique experiences in terms of his or her content area, teaching experience, and experience using computer technology. They also had unique experiences in learning how to use different computer and Web-based technology. Past experiences affected instructors' willingness to participate in professional development activities and how they wanted to utilize Web-based technology in their teaching. For example, Alice had a negative experience with a prior workshop and was reluctant to attend future workshops.

Adults respond to internal motivators more than external ones (Knowles, 1980, 1990). Cindy and Chris mentioned the fact that internal motivation was needed to incorporate Web-based technology into teaching. Instructors in groups B and C described internal motivating factors that affected their use of Web-based technology. They did not mention external motivators (e.g., another person or situation) as providing the incentive to learn about and use Web-based technology. Although instructors wanted



to know what other instructors were doing, they were still internally motivated to seek out resources and support and to ultimately integrate the technology.

Principles developed by Brookfield (1996) and Vella (1994) were also supported by the findings.

1. A needs assessment should be done to ensure that the learning situation will match the learner's needs and goals (Brookfield, 1996; Vella, 1994). Brenda stated that before she got involved in the LEE project, she did not know what different workshops were about or why she should be interested. Alice stated that she had wondered how to go beyond offering text information through Web-based technology but "never went beyond wondering." Betty said she would like to see workshops or tutorials on specific software such as multimedia software. Often workshops are planned without faculty consultation. The focus of many workshops is on how to use a particular technology instead of how to teach using technology (Geoghegan, 1994). For example, a workshop on WebCT usually demonstrates to participants how to use the particular features of WebCT, there is often little discussion on why instructors would want to use the various feature or how these may benefit students or the instructor.

2. A collaborative relationship between the learner and facilitator helps provide a safe learning environment (Brookfield, 1996; Vella, 1994). Amanda stated that a support person she would access would have to be someone she trusted. Alice stated that if she was to develop material for Web delivery, she would want to work with one person who could understand both the educational and technical aspects involved.

3. Praxis involves action. Adults learn by doing, reflection, and practice (Brookfield, 1996; Vella, 1994). The instructors in the study mentioned that they often

forgot what they learned if they did not use it. They also wanted a centralized location within the college to share ideas and opinions with other instructors.

4. A professional development activity should include an evaluation component.

Vella , Berardinelli, and Burrow (1998) wrote of the importance of evaluating the immediate learning of the individual, the transfer of new skills and knowledge to the individual's job, and the impact of the learning on the organization. According to the findings of my study, there were no evaluation or follow-up processes integrated into faculty professional development.

I found it distressing to discover that many of the instructor complaints and frustrations in this study could have been eliminated if professional development facilitators put the assumptions and principles of adult learning theory into practice.

Bandura (1995, 1997) acknowledged the role that an individual's self-efficacy plays in their learning. If people do not feel they will be successful engaging in particular learning activities, they will avoid those situations. Bandura described four types of influences that affect a person's self-efficacy; (a) mastery, (b) vicarious, (c) social persuasion, and (d) physiological and emotional states. Examples of mastery and vicarious influences were present in the findings of my study.

Bandura (1995, 1997) described mastery experience as guided, enactive mastery and is the most influential source of efficacy information. Instructors in group B and C had experienced success and were thus willing to learn how to use Web-based technology for more applications. Cindy saw the benefit of putting quiz and self-assessment answers with detailed feedback on Web pages. Students compared their answers to the suggested answers and Cindy has found she has less one-on-one requests for answers and feedback.

Because this experience was successful, Cindy had the self-efficacy or belief that she could use Web-based technology in new ways. Cindy began to develop on-line lessons to teach writing skills to her students. Cheryl saw the benefit of on-line discussions and how a deeper discussion could evolve than in her classroom discussion. She also saw students who were quiet in face-to-face discussions participate more in the on-line discussions. The successful use of on-line discussions increased Cheryl's belief that she could successfully utilize other features of WebCT.

Vicarious experiences occur when people see others similar to themselves succeed in a similar situation. Brenda observed how an instructor at the university used Powerpoint presentations and thought she could integrate technology into her instruction. Once Brenda knew what she wanted to accomplish, she believed she could learn how to use the software. The key to vicarious experience is that instructors see people similar to themselves succeed in a similar situation.

Models of Support. Anderson, Varnhagen, and Campbell (1998) described three different types of professional development models:

1. Training programs such as workshops and peer demonstrations
2. Just-in-time training that includes individualized learning through the use of Web-sites or on-line discussions.
3. One-on-one training from colleagues and peers. This could also include a trainer-of-trainer models.

Unfortunately, the literature does not describe actual content or the process involved with the models. However, the instructors in this study emphasized the process of how they learned rather than the specific model of support.

Instructors in group A preferred one-on-one tutoring and step-by-step instructions. Art stated he would like a “definitive” book that has all the steps for all the tasks he would like to do on the computer. All three instructors in group A indicated that they did not like to explore a new computer program on their own and did not tend to “click on the buttons” to see what happened. None of the instructors in this group used the help functions available in the software they were trying to incorporate in their teaching. Alice indicated that this was because she often didn’t know what certain features or functions were called. Instructors in group A emphasized that they would not learn a new program until they knew how they were going to use it and that they would have the time and opportunity to practice the application.

Instructors in group B were willing to take introductory workshops and then continue on their own with books or by clicking on buttons. Brenda related a story of how she learned to use PowerPoint. She saw how an instructor at the university posted a PowerPoint presentation on the Web. Students printed the presentation that had pieces missing. During class, the instructor would discuss concepts and students would fill in the blanks. Brenda knew she wanted to offer the same thing to her students and learned PowerPoint by exploring and clicking on buttons. She stated that she knew what she wanted to do and thought “it’s just the technology I have to conquer.” This example shows how much it helped one instructor learn the technology when she knew why she wanted to learn it. She was also confident that she could accomplish the task and therefore had the necessary self-efficacy. Brenda also described how the LEE project she was involved in had helped her learn, increase her confidence, and seek more learning opportunities. Because she felt comfortable working with the other instructors and

because one part of the project was professional development of instructors, she was willing to ask questions about computer terminology and applications.

Although instructors in group B were willing to attend workshops and learn on their own, they still stated that they would like some one-on-one instruction. Beth stated that she would like someone to come to her office to help with tasks she identified. Betty wanted access to trainers who used specialized multimedia software.

Instructors in group C identified themselves as independent learners and were able to identify their learning needs, access experts or resources, and decide what best met their identified needs. They preferred books and on-line resources. Cheryl particularly liked on-line learning as a student. She enjoyed the bulletin board because she could read what others said and then respond. She incorporated bulletin boards into the courses she taught. Cindy and Beth discussed the fact that their doctoral degrees had helped them become independent learners. Cindy stated that other college instructors with doctoral degrees learned new things on their own and enjoyed the challenge of learning. I did not find any literature that mentioned different education levels of instructors and how that affects the support they need to incorporate Web-based technology into their teaching. This may be because most research is done at universities where all instructors are required to have graduate degrees. During the interviews, all instructors in group C demonstrated to me how they had used Web-based technology in their teaching. They were all comfortable moving between different programs on their computer and navigating the Web.

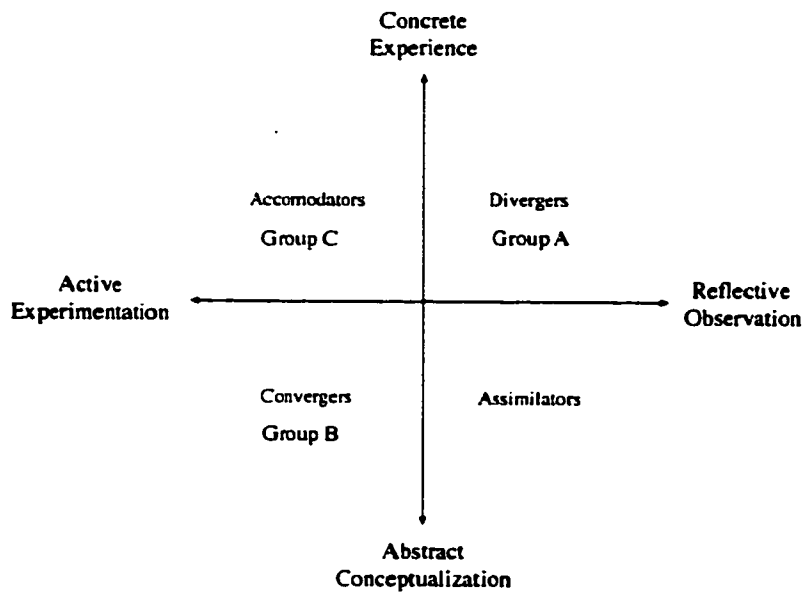
Different learning styles and comfort levels with the computer indicate that different support must be provided to different groups of instructors. The preference for

learning of the different groups is similar to skill acquisition literature by Dreyfus and Dreyfus (1996). A novice uses rules to determine actions within a situation. This is similar to the step-by-step procedures that group A instructors preferred. As expertise develops, so does intuition, and an individual understands similarities to past experiences. The instructors in group C demonstrated intuition when they described how they learned new computer based applications. They also stated that learning the technology was not difficult, and navigated on their computer and on the Web without difficulty. Adams (2000) outlined the process for helping teachers move from being novices to experts.

Adams provided the following example strategies:

1. Spending a moment looking at the screen, scanning for icons on the toolbar and desk-top, reading descriptive labels on cursor-over pop-ups, trying toggle switches and always remembering the undo command.
2. Looking across drop-down menus for words synonymous to what you want the computer to do.
3. Checking out right click functions (or click and hold on a Mac).
4. Checking in the software help function, an underutilized treasure trove of tutorials and tips. (p. 116)

As stated previously, the models of support address ways to deliver professional development opportunities, but they do not focus on specific ways to teach instructors with different learning styles. I believe that more attention should be paid to what will be taught and the process within the learning situation instead of whether it will be offered in a workshop, as self-study information, or as a one-on-one tutorial. Harapniuk (1998) suggested that adult learners should be taught to click on buttons and experiment. This would match the hands-on learning style in Kolb's model and may help instructors develop the skills as demonstrated by group C instructors. Figure 2 shows where the different groups of instructors fit into Kolb's Learning Model.



**Figure 2. Instructor Groups within Kolb's Learning Model**

**Note.** Adapted from Experiential Learning: Experience as the source of learning and development, by D. Kolb, 1984. Englewoods Cliffs: Prentice Hall and Characteristics of Quadrants in Kolb's Learning Styles Inventory, by L. Border, 1998 [On-line]. Available: <http://www.colorado.edu/gtp/print/kolb.html>.

Group C instructors seem to have the learning style of accommodators. They take risks and learn by trial-and-error and hands-on experiences. Group B instructors fall within the converger quadrant. They also like hands-on experience but like to find practical applications to solve problems. Group A instructors do not like hands on experiences. They learn by listening and discussing and like personal involvement (Border, 1998).

**Accessing Existing Support.** The literature describes numerous examples of the support that educational technology departments within educational institutions can provide to instructors (Fayer, 1999; Anderson, Varnhagen, & Campbell, 1998; Bates, 2000). Support can be offered through work-shops, brown bag sessions, peer demonstrations, just-in-time training, mentorship programs, or one-on-one training. However, the findings of this study indicate that most instructors did not access this type of support.

Instructors in group C tended to be self-sufficient. They accessed books and other members of early adopter groups. They were confident trouble shooting and were able to decide how using Web-based technology benefited them and their students. Chris emphasized that all he had learned about computers and Web-based technology had been self-taught except for one or two computer workshops he took when he began teaching at the college in 1984. Cheryl did attend one workshop to get started using WebCT. She went to the workshop knowing what she wanted to learn and do. The background knowledge Cheryl gained at this one workshop enabled her to continue on her own.

Instructors in group A relied on family members and secretarial staff for support. Amanda indicated that she would try to access a number of sources, her husband, friend, or sister, before calling a technical person at the college. Amanda said, “usually by the time they [the technical support staff] do get here I’m gone or it’s too late.” Instructors in this group found workshops frustrating. They often forgot what was taught or did not find the workshop suited to their level of computer expertise. Art and Alice were especially reluctant to attend workshops. Alice said “I find that if I take [a workshop] and don’t use it then it’s lost time.”



Instructors in group B were the most likely group to access educational technology experts. Instructors in this group preferred hands on demonstrations, through workshops, and then they were comfortable to proceed on their own. Instructor complaints about workshops included the fact that they didn't know what the workshops were about or why they should take them. Beth found that a workshop she took was much too basic, despite the fact that she had never used the computer program before. Brenda also accessed a mentorship program that provided one-on-one instruction. The mentorship program paired faculty with computer literate students. Students acted as mentors to provide support to faculty members wanting to accomplish a specific task.

There is very little in the literature about how to get instructors to access support available within their institution. Bates (2000) suggested that institutions must have adequate numbers of support staff to adequately support faculty. There seems to be an assumption that if support is available instructors will access it. Chris stated that if an instructor is motivated to learn about and incorporate Web-based technology into his or her teaching, he or she would find the necessary support. This statement suggests that instructors know what they want to accomplish when using Web-based technology and what support they need to attain their goals. This may be an assumption made by early adopters and technology experts. However, the instructors in groups A and B were unsure how Web-based technology could be used in their teaching situation and were unsure of what support they needed.

Maddux, Cummings and Torres-Rivera (1999) acknowledge that there is a communication problem between instructors and support staff. They don't understand each other's roles and challenges. In addition, each group has its own language, jargon,

and priorities. A bad experience makes instructors even more reluctant to work with technical staff. This was supported in the findings by statements Alice, Amanda, and Brenda made. Alice was frustrated when a technical person didn't understand the educational aspects of what happens in her course. Amanda expressed a need to work with "someone I could trust." Brenda stated she "felt like an idiot" when she didn't understand computer jargon used in meetings and was reluctant to ask for clarification.

Three instructors in the study got involved in using Web-based technology because of special projects. Cindy got course release time. Chris had a sabbatical during which he took a graduate level on-line course and then developed on-line material for a course he would teach. Brenda became involved in a LEE funded project. In addition to receiving monetary compensation, Brenda had the opportunity to learn about Web-based technology and how to use it for development of on-line laboratories. Johnston (1999) wrote of how specialized grants for specialized projects can help instructors start using Web-based technology.

### **Barriers**

Art and Amanda believed that the college had many professional development opportunities, yet they did not access these opportunities. Removal of the barriers that prevent instructors from using Web-based technology in their teaching is an important part of providing support. Barriers identified in the literature (e.g., Anderson et al., 1998; Berge & Muilenberg 2000; Northover, 1999; Schefter, 2000) included:

1. Increased time commitment or faculty workload
2. Faculty compensation, incentives, pay
3. Lack of money and support for course development

4. Personal motivation
5. Lack of technical support
6. Lack of shared vision, support, and encouragement from dean or chair
7. Comfort level and knowledge about technology
8. Fear of the impact of technology on human component of teaching
9. Inadequate hardware or software

**Time.** The instructors in this study cited time as the biggest barrier to using Web-based technology in their teaching. Alice, Brenda, Beth, and Cheryl all equated lack of time to their part-time or sessional status. Cindy and Alice stated that, given limited time, they would place a higher priority on content and student contact than developing Web-based materials.

Instructors who found Web-based technology effective were those who found ways to use the technology to save time. Brenda and Cindy put answers to quiz and self-assessment questions on Web pages. Students could get detailed feedback on questions and potential responses to the questions, an approach which subsequently decreased one-to-one consultation time with students.

Beth and Chris put course outlines on Web pages so students could always find the necessary information. This decreased office visits from students requesting new outlines.

All instructors indicated that they would like more time as compensation for implementing Web-based technology into their teaching. Alice, Brenda, and Beth indicated that time would be provided if they were hired full-time. Amanda stated she would have more time if she received support to do some of the everyday tasks she is

required to do to help run and promote her program. Betty, Chris, Cindy, and Cheryl wanted release time. Chris stated he did not want more money because there are “only so many hours in the day.” The instructors also recognized that it takes time to learn about new technologies, develop materials, implement the technology, and provide initial student support.

The literature mentions peer coaching or the use of colleagues to support instructors wanting to use Web-based technology in their teaching. Cindy had had release time to provide workshops to faculty members within her program when she was developing on-line material. She said she was reluctant to offer help to other faculty because of the time it could take. Brenda stated that she would not approach faculty within her program for help because she knew they were busy. She also did not think it was part of their job. The literature does not address the concerns expressed by Cindy and Brenda regarding asking peers for support.

Money. Money was cited as a barrier to purchase equipment or access support staff. Support staff included clerical, technical, or instructional personnel or departments. Instructional support included an instructional designer, graphic artists, multimedia technicians, and editors. Access to computer equipment was also recognized as an important type of support. Alice and Beth found sharing a computer to hinder their use of Web-based technology in their teaching. Accessing a cart with a computer to take to class, or trying to book a computer laboratory were also seen as barriers. Since classroom based computer technology was not readily available, instructors tended to choose Web-based activities that students could do outside of scheduled class time. Chris and Cindy acknowledged the support they received by having access to a divisional

server and having the ability to put Web pages up outside of WebCT. Chris wondered when this support would be available for all instructors within the college. The literature seems to assume a certain level of computer access by both instructors and students (e.g., Bates, 2000; Hiltz & Benbunan-Fich, 1997).

Fear of impact of technology on the human component of teaching. Art, Beth, and Betty stated that they would not want Web-based instruction to replace personal contact they have with their students. They all saw an important place for face-to-face instruction. Chris expanded on this idea by stating that there have been no college discussions on the pedagogical issues surrounding Web-based instruction. He suggested that the college should examine how alternative approaches are going to be used and when it is not appropriate to use Web-based technology. For example, skill demonstration and practice of swimming can be difficult on a computer. Although best practices in the use of Web-based technology is beyond the scope of this study, there are many examples and research studies within the literature (e.g., Berge, 1997; El-Tigi & Branch, 1997; Lee & Boling, 1999; Szabo & Kanuka, 1998).

Alice was the only instructor to note that, even if she wanted to incorporate Web-based technology she would be unable to change delivery of the course without approval. This is not addressed in the literature, probably because most research is done at the university level where there is an assumed level of instructor autonomy.

Knowledge about technology. Not understanding how to use and access technology was also a barrier in this study. Brenda did not know what workshops were about or why she should take them. Alice did not know how technology could be utilized to teach hands-on activities such as creating a bulletin board display.

**Lack of shared vision and encouragement.** Instructors wanted policies addressing compensation for developing and teaching an on-line course, including institutional policies regarding class size. Instructors also wanted guidance regarding what instructors should be looking at in relation to their own students and subject area.

The findings indicated that instructors did not feel that the college provided encouragement or recognition of Web-based instruction. Cheryl felt like she had to fight for time, resources, and help. She also had to justify why and how Web-based instruction could enhance student learning. Alice mentioned the fact that there is no computer department support to instructors or students using their home computer. Amanda wanted policies and procedures in place that recognized part-time instructors and alternative delivery. She described the registration process for distance courses and pay equity for instructors as two issues she would like addressed by the college. She felt that there was an assumption at the college that alternative delivery was easier than classroom delivery and that alternative delivery was not valued.

### **Summary of the Discussion of the Findings**

This chapter presented the findings in relationship to the literature. The main sections included: (a) Web use, (b) diffusion of innovation, (c) providing support, and (d) barriers. The majority of findings in my study were supported by the literature, however there were three exceptions.

Although Chris and Cindy were early adopters of Web-based technology in their teaching, they were unwilling to continue development unless they got release time or saw the development of institutional policies. There seems to be an assumption in the

diffusion of innovation literature that once instructors start using a technology they will continue to do so.

Group A instructors wanted support provided to their students to ensure students could access Web-based materials. They stated that this student support was a type of instructor support. Student support was not identified as a type of instructor support in the literature.

The final exception related to costs of computer equipment and Internet access for students. Alice and Amanda did not want equipment requirements to place a financial burden on the students. Hiltz and Benbunan-Fich (1997) wrote that cost of equipment for instructors and students was not prohibitive to using Web-based technology.

An overview of the discussion of the findings in relation to the literature can be found in Table 3. The overview presents the findings, supporting literature, contradicting literature, and new findings. The next chapter provides conclusions to the research questions and resulting recommendations regarding the support instructors want and need to incorporate Web-based technology into their teaching.

Table 3

Summary of the Discussion of the Findings

Findings	Supporting Literature	Contradicting Literature	Not in the Literature
1. Instructors owned computers	Statistics Canada (2001) Rogers (1995)		
2. Use of Web-based technology	Anderson & Garrison (1998) Green (1997, 1999) Jonassen et al. (1995) Khan (1997) Santi (1997)		
3. Characteristics of instructors group Early Adopters versus Early Majority	Geoghegan (1994) Moore (1991, 1995) Rogers (1995)		
4. Unwillingness of early adopters to continue using technology	Bowman (2001) Bruchal (2001) Cartwright (1996) Richards (1999)		
5. Infrastructure Support			
Group A - office computers - college direction - student support	Bates (2000) Ely (1999)		X
Group B - leadership and direction - compensation	Bates (2000) Ely (1999) Bates (2000) Ely (1999) Fraye (1999) Johnson (1999)		



Findings	Supporting Literature	Contradicting Literature	Not in the Literature
Group C			
- computer equipment	Bates (2000) Ely (1999)		
- policies & procedures	Bates (2000) Ely (1999)		
- compensation	Bates (2000) Ely (1999) Fraye (1999) Johnson (1999)		
6. Professional Development			
Group A			
- One-on-one	Anderson et al. (1998)		
- Support they can trust	Brookfield (1996) Knowles (1990) Vella (1994) Maddux et al. (1999)		
- Step-by-step	Dreyfus & Dreyfus (1996) Adams (2000)		
Group B			
- Workshops	Anderson et al. (1998)		
- Mentorships			
Group C			
- Self-study	Geoghegan (1994)		
- Experiential learning	Harapniuk (1998) Kolb (1984)		
7. Barriers			
Time	Anderson et al. (1998)		
Compensation	Bates (2000)		
Funding for Development	Berge & Muilenberg (2000) Northover (1999)		
Motivation	Scheffer (2000)		
Equipment			
Knowing how to use technology			
Lack of leadership			
Policies to enable use of technology			
Lack of instructor autonomy to change delivery method			X
Cost to students		Hiltz & Benbunan-Fich (1997)	

## Chapter Six: Conclusions and Recommendations

The use of Web-based instructional technology is causing the re-evaluation of institutional support structures available for instructors (Bates, 2000; Daniel, 2000; Ely, 1999). Instructors require appropriate infrastructure and professional development to incorporate Web-based technology into their teaching (Bates, 2000; Berge, 1997; Ely, 1999). The purpose of this study was to examine ways to provide support to instructors so that they will be better able to use Web-based technology and make decisions regarding the technology that are beneficial for them and their students. Specifically, the research question posed for this study was, “what support do instructors need in order to be able to effectively incorporate Web-based technology into their teaching. This chapter consists of four sections: (a) overview of the study, (b) research questions and conclusions, (c) recommendations, and (d) personal reflections.

### Overview of the Study

The overview of the study begins with a summary of the study and the main findings. Because it is important to consider factors that may have effected the research findings, the research participants, the design, and the researcher will also be discussed in this section.

Main Findings. I believe that the support currently offered by the college in this study does not meet the needs of many instructors. Changes within the college’s strategic direction by upper administration have not increased the use of Web-based technology. In addition, attendance at many faculty professional development workshops has remained low. This may be due to the fact that much of the training focuses on the use of the hardware and software but does not emphasize how to integrate the technology into

teaching (Cole, 2000). As well, groups of instructors who adopt technology at different rates may need types of support other than workshops (Geoghegan, 1994).

Interviews with nine instructors at an Alberta college provided rich data about the experiences and opinions of the instructors. Instructors were placed into one of three groups based on the length of time they had used Web-based technology in their teaching. Group A instructors had never used Web-based technology in their teaching. Group B instructors had used Web-based technology in their teaching for less than one year. Group C instructors had used Web-based technology in their teaching for two years or more. Analysis of the data indicated that there were indeed differences among the groups of instructors, in terms of the type of support they wanted and needed to incorporate Web-based technology into their teaching.

Instructors in group A preferred one-on-one tutoring with step-by-step instructions. They saw Web-based technology as only one tool they could use in their teaching. These instructors were unsure of computer terminology and did not understand how Web-based technology could be used to enhance student learning. Group A instructors were reluctant to access technical support staff and frequently turned to family and friends. If they were to access technical support staff, the support staff would need to understand both the technological and educational aspects of using the technology. Group A instructors stated they would not take a workshop unless they had plans to use the technology in a particular teaching situation.

Group B instructors were more likely to access technical staff by phoning the computer help-desk or by attending workshops. They liked hands-on demonstrations and were then able to proceed on their own. After an initial orientation, these instructors

were comfortable “clicking on buttons” to learn a software application. One instructor indicated that as she learned more about Web-based technology, the terminology, and how to use it, she was more willing to ask questions or enroll in workshops.

Instructors in Group C cited computer equipment as an important source of support. Computer equipment included office computers, servers on which to post Web-pages, classroom computers and projection equipment to facilitate presentations using applications such as PowerPoint, and reliable computer laboratories. Group C instructors preferred on-line resources and books. They were also comfortable clicking on buttons and experimenting in their learning.

Instructors in groups B and C indicated a need for policies and procedures within the college. Policies and procedures would guide on-line course development, faculty compensation, and class size. These instructors also wanted a centralized place to share ideas with other instructors and to access templates and design specifications.

The above findings were supported in the literature. However, there seemed to be an assumption within the diffusion of innovation literature that once instructors began using Web-based technology, they would continue to incorporate Web-based technology into their teaching. This was not supported by the findings in my study. Although two instructors in group C had used various Web-based applications in their teaching, they were unwilling to continue further development until they were given release time and the college established policies for class size of on-line courses.

Instructors within the study expressed frustrations regarding the process of many professional development opportunities. I believe many of these frustrations could be eliminated if support staff implemented the principles of adult education. The following

are some examples of the principles of adult learning that should guide professional development activities. Firstly, support staff should conduct a needs assessment before creating a professional development programs to ensure the activities are appropriate for the target instructors. A safe environment should be created that fosters a relationship between the instructor, as learner, and support staff. The environment and process must acknowledge instructors past experiences and address real-work situations. Finally, there must be an evaluation of the learning and the impact on instructors' teaching. I found it unfortunate that most of the educational technology literature did not integrate adult learning theory when recommending support systems or designing faculty professional development.

Research Participants. A reputational approach was used to select nine college instructors for the study. I sent letters to all program chairs within the college, asking for names of instructors who may be willing to participate. As I received names of potential volunteers from the program chairs, I made telephone contact to explain the nature and purpose of my study. Instructors were grouped into three categories: (a) instructors who had never using Web-based technology in their teaching, (b) instructors who had used Web-based technology in their teaching for less than one year, and (c) instructors who had used Web-based technology in their teaching for two years or more.

Those instructors who volunteered to participate likely had an interest in using Web-based technology in their teaching, even if they had never used it before. It is also likely that the program chairs who asked faculty if they would be willing to participate had an interest in Web-based technology. This prior interest in the subject may have

affected the instructors' responses. It is conceivable that some instructors may have felt pressured by their program chairs to participate in the study.

The size of the sample in this study is also an important factor to remember when reviewing the findings, conclusions, and recommendations. The data from the nine interviews provided rich information about the experiences and opinions of the instructors interviewed, however, readers should transfer the findings to other contexts with caution.

**Design.** Using a case study approach, nine interviews were conducted to provide in-depth information about the experiences and opinions of instructors at a college in Alberta. A semi-structured interview guide was used to gather comparable information yet allowed me to engage in conversation with each respondent. The data were initially analyzed deductively using the literature and my problem substatements to guide the development of themes. The data were then analyzed inductively and new themes emerged. Member checks were used to verify the data and interpretations and a colleague reviewed my interview guide and coding of themes. Despite these precautions, it is conceivable that another researcher could have developed different categories, themes, and interpretations from the data.

**Researcher.** The biases and experience of the researcher are final factors to consider in a study of this nature. I am employed as an instructional designer at a college within Alberta. One of my roles as an instructional designer is to provide technical and instructional support to instructors and students. I also provide professional development sessions related to the use of Web-based technology in teaching. I am very interested in

the opinions and experiences of instructors and would like to incorporate recommendations from this study into my practice.

During the interviews, I was very conscious of my role as researcher versus that of instructional designer. My skills as an interviewer improved as the study progressed and I believe my biases were less evident to the respondents.

In the fall of 2000, I was involved in developing a proposal for funding that would examine a model of professional development for instructors developing Web-based educational materials. During proposal development, my data collection was complete. I found it extremely beneficial to discuss a possible model with colleagues who were familiar with the literature and professional development that instructors may need. I was conscious of my personal biases throughout the study and documented my thoughts and feelings in a research journal. However, my biases may have affected my analysis of the data and subsequent findings. For this reason I employed member checking and an audit to ensure that my analyses were not unduly biased.

### **Research Questions and Conclusions**

The research design in my study provided rich data from which themes emerged. The themes provided answers to my problem substatements and main research question. I believe that different groups of instructors require different levels or types of support to incorporate Web-based technology into their teaching. For the purpose of my study, I grouped instructors into three categories: (a) those who had never used Web-based technology in their teaching, (b) those who had used Web-based technology in their teaching for less than one year, and (c) those who had used Web-based technology in

their teaching for two years or more. This section includes a discussion of the responses to the research questions as well as conclusions drawn from the responses.

Substatement one: What sorts of computers and Internet access do instructors have? All instructors in the study had home computers and all except one had Internet access. Instructors in group A, those who had never used Web-based technology in their teaching, did not know the type of computer they had or what some of the computer terminology meant. Instructors in group C, those who had used Web-based technology in their teaching for two years or more, knew the type of computer they had and referred to peripheral equipment such as printers and scanners.

Since 1998 I had worked with college instructors who had current computer hardware and software. The college also promotes its computer laboratories and innovations for students. Because of this, I had assumed that all college instructors would have easy access to office computers that were connected to the Internet. This was not the case for two instructors who had to share an office computer. They did not have ready access to a computer whenever they needed it and thus felt frustrated when they wanted to complete computer-based applications. The responses to this research question demonstrate that instructors do not necessarily have easy access to computers nor do they have general computer knowledge or skills.

Substatement two: How are instructors using Web-based technology in their teaching? The six instructors using Web-based technology were using it to supplement face-to-face instruction in existing courses. Applications the instructors used included Web-pages on which the instructors posted course outlines, course notes, student work,



links to external resources, and answers to quiz or textbook questions. Instructors also used computer conferencing or on-line quizzes for their students within WebCT.

Brenda was involved in creating an interactive on-line laboratory through the use of multimedia. Face-to-face laboratories had been discontinued due to the cost of equipment and instructor time. The face-to-face laboratory had provided students with an opportunity to manipulate models and apply theoretical knowledge. The on-line laboratory was being developed to mimic some of the hands-on experiences that had been delivered in the face-to-face laboratory.

Cindy created on-line lessons on writing skills, a topic she did not have time to cover in her traditional classroom instructional format. Cindy provided examples of correct grammar as well as common mistakes made by her students. She believed the on-line lessons helped students when they transferred to the local university.

Instructors in the study used Web-based technology to enhance student learning or to make their teaching easier. For example, some instructors posted course outlines on their Web page so students wouldn't come to their offices for new copies throughout the term. Some instructors used on-line discussions to help students explore a topic in more depth than was feasible during classroom time.

The college in this study was a traditional face-to-face institution and instructors did not want to replace face-to-face teaching through the use of technology. Art was afraid that the replacement of face-to-face instruction would be detrimental to the relationship between instructors and students.

Substatement three: What type of support do instructors see as most important or useful as they try to incorporate Web-based technology into their teaching? Instructors in group A had characteristics of the early majority, as described by Rogers (1995). They preferred one-on-one tutorials and step-by-step instructions. None of the instructors in this group liked to explore on the computer or “click on buttons” to see what happened. They acknowledged that they needed support to identify why or how they might use the technology to enhance their teaching before they would want to learn how to use a certain computer program or application. If instructors knew they were going to a certain Web-based technology or application, they would be willing to take a workshop. Alice and Art expressed reluctance to attend workshops unless they knew how they would use the technology in their teaching and that they would have time to practice new skills. Alice stated she found a past workshop she attended to have an assumed level of computer knowledge. She found this frustrating as she found it difficult to follow the steps performed by the workshop leader.

Group A instructors relied on family members and secretarial staff to answer computer related questions. These instructors were reluctant to access technical support staff. They stated they would like one person to be available to come to their office, when it was convenient for them, to work on a task they identified. Group A instructors would like to work with one person they trusted who appreciated and understood both the educational and technical aspects of using Web-based technology in education.

Given Kolb's (1984) learning model and the findings of this study, professional development support for group A instructors should consist of one-to-one tutoring. Activities should provide opportunities for instructors to listen to information and discuss

how Web-based technology could be incorporated into their teaching. Step-by-step manuals and clear instructions may help these instructors learn a particular software application. Instructors in group A would not like trial-and-error learning activities.

All three instructors in group A emphasized that they could do without a computer. To them the computer was just one tool they could use for teaching. They were often frustrated with technical staff or other instructors who loved the technology for technology's sake. This group of instructors was also concerned regarding the computer skills and access of their students. Alice and Amanda were concerned that Web-based instruction could place a financial burden on some students.

Instructors in group B were the most likely group to attend workshops. They liked hands on demonstrations, but were comfortable to engage in independent learning afterwards. They also liked one-on-one instruction and technical help to accomplish a specific task that they identified they needed help with.

The instructors in group B stated that sometimes they did not know what workshops were about or why they should take them. They stated they wanted guidance and direction from their program chair regarding what workshops to take or information on how other instructors were using Web-based technology. Brenda found it particularly useful to work on a project with a colleague at the university. The colleague was able to discuss the purpose of using the technology and how end goals may be reached. Her colleague had the skills and knowledge and was able to share that with other project team members.

Considering Kolb's (1984) learning model and the findings of this study, professional development support for group B instructors should include workshops and

mentorship programs. These instructors would benefit from initial hands-on demonstrations of applications that could solve practical problems. It would therefore be essential for support staff to involve instructors in planning learning activities to address real-work issues. Group B instructors would be willing to click on buttons and learn some material on their own after initial workshops.

Instructors in group C fell into the early adopter category, as described by Rogers (1995), and tended to be self-sufficient. They learned how and why to use Web-based technology by reading books, accessing on-line information, taking graduate level courses, and talking to other early adopters. They often learned by exploring and clicking buttons and were comfortable navigating through computer programs and the Web. They required minimal support and were able to trouble-shoot and overcome obstacles. For example, when Cindy first began using Web-based technology to teach, she did not have access to a server at the college. She was able to post her Web pages on the university server for the first year.

Given Kolb's (1984) learning model and the findings of this study, professional development support for group C instructors should consist of self-study resources and access to technical experts. These instructors would learn best through active experimentation and should be provided with hands-on, trial-and-error learning activities.

Instructors in group C requested infrastructure and policy support. They acknowledged access to servers to post Web pages, computer equipment, and software as being important types of support. Computer equipment included office computers, reliable computer laboratories, and classroom computers and projection equipment so they could use software such as PowerPoint for classroom presentations. They also

stated that their students had access to computers and the Internet and had the skills to access Web-based educational materials. These instructors wanted design templates, guidelines, and editors to ensure a certain level of quality of on-line course materials. They also wanted policies to address instructor compensation for development and future class size of on-line courses.

It is important to note that three instructors were involved in using Web-based technology because of special projects. Support received during these projects included release time or pay, graduate level education, and access to other instructors using Web-based technology. Brenda also had access to support staff such as a graphic designer, instructional designer, and multi-media expert for work on the multimedia on-line laboratory. This may indicate that instructors must have a particular reason for instructors to get involved in learning and using Web-based technology in their teaching. In addition, perhaps instructors must be provided with recognition and compensation.

Substatement four: What barriers do instructors face when incorporating Web-based technology into their teaching? Instructors identified the following barriers that prevented them from incorporating Web-based technology into their teaching:

1. Time. Time was cited as the largest barrier to using Web-based technology. Instructors wanted release time or a change in status, such as a change from part-time to full-time status. Instructors placed a priority on keeping current with the content, providing consultation to students, and marking assignments. They recognized the fact that it took time to learn the technology, develop material, and then teach with the technology.

2. **Money.** Money was cited as a barrier in terms of purchasing equipment or accessing instructional support, such as an instructional designer, graphic artist, editor, or Web developer. These support systems operated on a cost recovery basis and instructors could access these people only if funding was available.

3. **Access to computer equipment.** This included office equipment, computer laboratories, and computers and projection equipment for classroom presentations.

4. **Not wanting to replace face-to-face contact with technology.** Art was reluctant to use Web-based technology as he believed it would take away from the personal contact he had with students.

5. **Not understanding how to use or access the technology.** Group A and B instructors stated that they often did not understand how Web-based technology could be used to enhance student learning. They were unfamiliar with terminology and did not know what some technology workshops were about.

6. **Not having the autonomy, as an instructor, to change the course delivery method.** Alice stated that, even if she wanted to use Web-based technology, she would have to get permission from her program chair and the core instructor for the course to change the delivery method.

7. **Motivation and staying current with the technology.** Instructors acknowledged that they need internal motivation to learn and implement Web-based technology. They also discussed the effort that it takes to stay current with changing technologies.

8. **Lack of recognition and compensation.** Instructors wanted recognition for the time that it takes to develop course materials and integrate Web-based technology into

their teaching. Most instructors wanted to be compensated by being given release time or access to support staff.

9. No policies addressing class size of on-line courses. Chris was reluctant to put a complete course on-line as he was concerned about potential class size.

Main research question: What support do instructors need in order to be able to effectively incorporate Web-based technology into their teaching? The responses to the substatements indicate differences among the three groups of instructors regarding the types of support that should be provided. Responses to the main research question provide conclusions to this study.

Instructors in group A fell within the early majority category of innovation adoption (Rogers, 1995). They were unsure of how to use Web-based technology in their teaching and did not know how it may benefit them or their students. They liked face-to-face contact and were worried that technology might replace that contact. Instructors in this group were unfamiliar with computer terminology and were reluctant to ask technical support staff for assistance. They relied on family members and secretarial staff. This may, in part, be due to the fact that they were frustrated regarding the time it could take for a response from technical staff or the fact that support is not available for instructors who work off-campus. They also wanted technical staff to understand educational aspects of developing course materials.

Group A instructors wanted one-on-one professional development from someone they could trust. They needed to know why and when they would use a technology before they were willing to spend time learning. They did not like to click buttons or

explore a computer program when learning. They wanted clear, concise step-by-step instructions to complete a particular task.

Instructors in this group emphasized that they could teach without the technology and were frustrated by those who relied on the technology. Another type of support instructors in group A discussed was technical support for their students so that students could access Web-based materials without difficulty. The instructors relied on technical experts within the library and computer department to provide any student support and instruction. Group A instructors were also worried whether students would have access to computers and the Internet. They did not want computer requirements to place an additional financial burden on students.

Barriers had a significant effect on why instructors in group A did not use Web-based technology in their teaching. Barriers prevented them from having access to professional development opportunities, technical staff, and equipment.

Instructors in group B also had characteristics of the early majority, but were all utilizing Web-based technology in their teaching because they had identified how the technology could benefit them and their students. This group of instructors tended to access the support systems in place within the college. This included attending workshops and asking questions of the computer services department. Brenda indicated an initial reluctance to attend workshops as she did not know what they were about. After learning more about the technology and specific applications, she took more workshops because she knew how she may be able to use the technology in her teaching. Betty had recently obtained her masters degree in Educational Technology and was interested in continuing to learn Web-based applications.



Instructors in group B preferred an initial hands-on demonstration and were then comfortable proceeding on their own. They were comfortable exploring a new computer program and clicking buttons, even if this was not their preferred learning style.

This group of instructors were reluctant to ask other instructors for support. This is related to the fact that they believed other instructors were busy. They would like leadership from their program chairs to suggest what technology related professional development they should participate in. They also wanted to know how other instructors were using Web-based technology. Barriers were varied with this group of instructors, however, many of the instructors had learned to overcome some of the barriers they faced.

The instructors in group C had characteristics of early adopters (Rogers, 1995). They tended to be self-sufficient when learning how to use the technology. They understood computer and Web-based terminology and preferred to read books and click on buttons when learning something new. All instructors in this group knew what they wanted to accomplish through the use of Web-based technology and how that could benefit them or their students.

Group C instructors wanted access to many different types of computer equipment. Reliable and fast servers were requested to post course Web-pages or for applications such as WebCT. These instructors expressed frustration that computer laboratories were in high demand and difficult to book. In addition, computer laboratories were often not reliable for use due to network or individual computer technical problems. Classroom computer and projection equipment were needed for

classroom presentations such as those created with PowerPoint. They also wanted guidelines and templates to direct Web design and provide an element of quality control.

Instructors in group C were reluctant to continue developing more Web-based material until there was some recognition for the time it took. Release time was the preferred method of recognition and reward. Chris was worried about potential class sizes for on-line courses and wanted policies to address that issue. Cheryl suggested that the college have a central location where instructors could go to access policies, procedures, templates, support, and to share ideas with other instructors.

Instructors in group C identified few barriers that prevented them from using Web-based technology. This may be because they had already overcome many barriers. They were able to evaluate the technology and its benefits and decide if that is where their priorities should be. Despite their knowledge and expertise, they were reluctant to offer formalized support to other instructors because of the time commitment. Group C instructors indicated that students either had the skills to use the technology or that courses were offered to students to help increase their skills.

### **Recommendations**

The conclusions drawn from the research questions indicate that it is essential that institutional support systems recognize the diverse needs of different groups of instructors. Instructors need different types of support, such as equipment or professional development, at different levels. From the conclusions drawn, three recommendations follow.

Firstly, the use of Web-based technology must be part of an overall strategic plan. There must be leadership and support from upper levels of administration that are voiced

as clear goals and guidelines. Only once clear goals are established will faculty and support staff know what is expected of them. Administration must also be willing to provide the necessary resources to reach institutional goals, otherwise individual instructors may be unwilling to expend time and energy to overcome multiple barriers. To develop an adequate infrastructure the following types of support must be provided: (a) access to equipment, (b) access to support staff, and (c) policies and procedures.

Instructors need access to computer equipment to learn how to use Web-based technology and then to integrate it into their teaching. Access to equipment means that all instructors should have their own office computer. As well as having classroom and computer laboratory equipment that is available and reliable, instructors should have space on a reliable college server to post Web pages or access course delivery systems such as WebCT. Instructors need the resources to purchase necessary software as well as the resources to learn how to use the various software packages in a manner that benefits them and their students.

Just as we cannot assume universal access to computer and the Internet by instructors, we cannot assume that all students have home access to a computer and the Internet. If accessing Web-based materials is a course requirement, the institution must provide some level of access to students. This could be provided through adequate numbers of computers in the library or computer laboratory that are available extended hours and weekends.

The second part of developing the infrastructure is to ensure there is good access to support staff. It is imperative that both instructors and students have access to technical support when and from where they need it. For example, if out of class

applications of Web-based technology are used then students need support out of class. This support could be provided when students are using a computer in the library, in a computer laboratory, or at home. If part-time instructors are using Web-based technology, they also need support from their home computer. Technical support staff must be able to communicate with instructors and students without using computer jargon. They must also be willing to listen and to answer all types of computer-related questions. If an institution expects that instructors and students will access Web-based material from off-campus locations, support staff also need the skills to trouble-shoot and provide support over the telephone or by e-mail

Instructors should also have access to instructional support staff including instructional designers, graphic artists, Web developers, and editors. Material on the Web should be considered published material and should reflect the quality expected by the institution and students. Again, it is important for instructors to have access to instructional support staff in a timely manner. To be effective, support must be available when instructors need it to complete a task that has been identified by the instructor. Support staff must have a good understanding of educational pedagogy, or andragogy, as well as the technology to ensure the focus is on “teaching with the technology.” If all support staff could be accessed through a centralized location, it may be easier for instructors to know what support is available and how to access the support they need.

The final piece to creating an infrastructure is the development of policies and procedures related to the use of Web-based technology in teaching. Instructors wanted access to guidelines and templates for designing Web-based instruction that might help ensure some level of quality control. They also wanted recognition, rewards, and

compensation for the development of Web-based course materials, preferably through release time or a change in status. Finally, there must be policies that address issues of class size for Web delivered courses. This would probably be accomplished through the faculty agreement.

The second main type of support needed is professional development. Any professional development model must follow the assumptions and principles of adult learning. The model must include a needs assessment and recognition of past experiences. Professional development activities must also be in relation to a real-life context. For example, if an instructor wants to develop a Web page to post course notes, professional development should be related to accomplishing that goal. A collaborative relationship should exist between the instructor and a support person who acts as a facilitator. The facilitator must be someone the instructor trusts, who provides a safe learning environment and mechanisms to increase the instructor's self-efficacy. A model that emphasizes action, practice, evaluation, and a reassessment of learning needs would help instructors integrate new knowledge, skills, and attitudes.

A professional development model must also recognize the different needs of the different adopter categories. Group A instructors would need one-on-one sessions. These sessions should focus on helping the instructors to understand Web-based technology and how to use it. Instructors in Group A would benefit from simple step-by-step instructions and having one person to contact with questions. Group B instructors would access workshops, mentorship programs, or brown bag sessions. Group C instructors tend to learn on their own and may benefit from self-study resources.

Finally, there must be a communication process within the institution that identifies and removes barriers. There may be great support systems in place, yet if barriers to using Web-based technology are perceived as being too great, instructors will not integrate Web-based technology into their teaching.

Figure 3 shows how the different components of supports could be integrated to meet the needs of different groups of instructors. This provides a process that could be utilized to develop appropriate support mechanisms. The process acknowledges the themes within the literature as well as the specific findings of this study.

The first step is to examine how Web-based technology is used within an institution. There should be common understanding of what Web-based education is and how it can benefit both instructors and students. The way in which Web-based technology is used may also influence the type of support required by instructors. For example, an instructor creating multimedia materials would probably need professional development as well as access to multimedia experts.

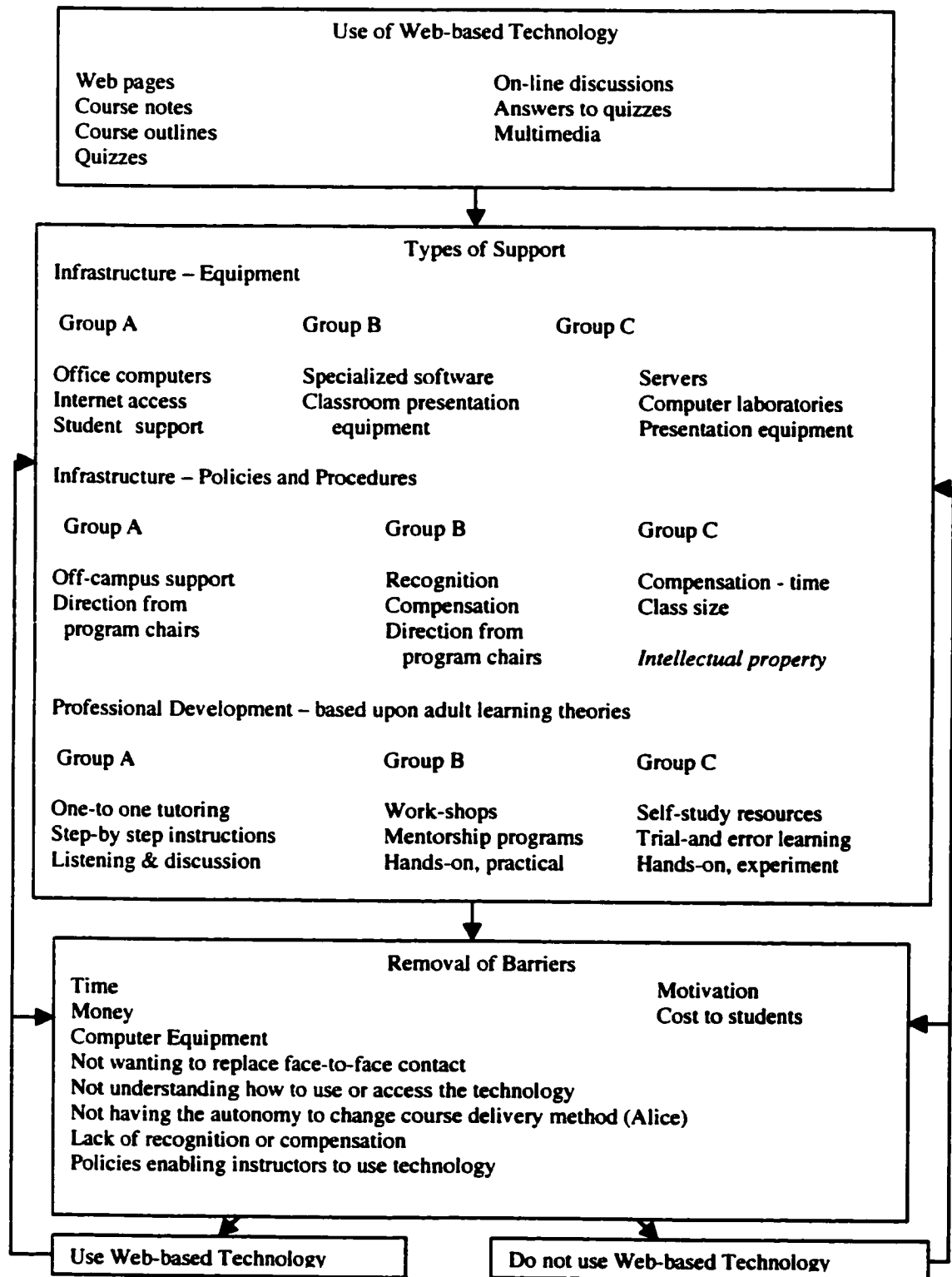


Figure 3. Process for Providing Instructor Support

The second step is to design and develop appropriate support mechanisms. A key at this stage is to acknowledge that different groups of instructors require different types of support. Two broad types of support were identified in the literature and in the findings. The first is institutional infrastructure that includes equipment and policies and procedure. It should be noted that intellectual property is included in figure 3, despite the fact that it was not present in the findings of this study. This topic is discussed in the literature (e.g., Bates, 2000; Berge & Mrozowski, 1999) and I believe support mechanisms should address issues of fair use and ownership of Web-based course materials. The second type of support is faculty professional development. It is essential that any faculty professional development opportunities are guided by the assumptions and principles of adult learning theory. In addition, individual learning styles must be considered. In particular, there should be a needs assessment to determine appropriate activities and content, a collaborative relationship between support staff and instructors, strategies to increase instructor self-efficacy, and a method of evaluating the impact of the professional development on instructors' teaching.

A final component of the process is removing barriers that may prevent instructors from incorporating Web-based technology into their teaching. Barriers often relate back to infrastructure and professional development issues. There should therefore be a feedback mechanism to identify barriers and determine ways to increase or modify existing support systems.



### **Personal Reflections**

Although the findings and subsequent conclusions supply rich descriptions of the numerous types of support needed by instructors, it is recognized that immense resources would be required to develop a strategic plan and integrated support. I personally believe that Web-based technology provides an opportunity for instructors to enhance current course materials and perhaps increase student access, learning, or interest in the subject. However, it takes knowledge and skills to use Web-based technology in a way that exploits the benefits in ways that other technologies could not. If Web-based material is not superior to other materials presented through other technologies, one must question whether or not it is appropriate to expend resources. One must also recognize an institution's history, culture, and how change occurs within the institution before developing support systems. There may also be times when instructors are aware of different strategies but decide that Web-based technology is not appropriate for them, their students, or the content area. The focus must be on the teaching goals and student objectives. The best technology for accomplishing those goals should be used in that situation, whether the technology is lecture, discussion, overheads, video, or Web-based technology.

I enjoyed conducting this study and having the opportunity to listen to the opinions and experiences of the nine instructors I interviewed. I was disappointed, however, that many of the issues identified by instructors could be addressed if support staff put the assumptions and principles of adult learning theory into practice. If support staff do not apply adult learning theory, I wonder how well they consult instructors on appropriate use of Web-based technology that will enhance student learning.

As I progressed through the data analysis process, other questions arose that could be possible areas of future study.

1. This study focused solely on support instructors need to incorporate Web-based technology into their teaching. I did not ask about other issues or other support mechanisms needed so instructors could effectively teach students. Although other issues surfaced, as they pertained to using Web-based technology, it would be interesting to see where this topic would fit on a list of instructors' priorities.

2. There seems to be an assumption that new technology is better than old. Unfortunately new technology is often used in the same ways as old technology. For example, many PowerPoint presentations are not much different than previous overhead slides or notes written on the chalk board. Many college instructors are content experts and are very interested in their subject area. They are not interested in learning about teaching and learning. Another research question may be "what support do instructors want and need to become more effective teachers?"

3. I briefly discussed the limited literature that addressed learning how to use a computer. Adams (2000) and Harapniuk (1998) examined ways to help adults navigate around the computer screen. I would like to examine this issue further. I have observed many instructors, who are new computer users, looking in the middle of the screen while most navigational or task functions are on the peripheral of the screen. This contrasts with books, where the important content is in the center and the adjunct notes or pictures are in the margins.

4. Does a person's learning style or even personality affect whether they will be good Web-based teachers or learners? For example, Cheryl liked the independent

learning style of Web-based learning as a student and incorporated things she liked into the courses she taught. Art described himself as a people person who liked personal contact. I imagine there are some students who would prefer not to have on-line learning experiences. I wonder if student expectations of postsecondary education will change as high school graduates gain more computer skills. It would also be interesting to see if there are differences between students who choose people related fields of study versus the more scientific and technical fields.

### **Summary**

As stated in chapter 1, a major challenge facing educational institutions is assisting faculty to integrate technology into instruction (Green,1999). As I reviewed the literature, I noticed that there have been a number of studies looking at issues of instructor support. In addition, adult learning theory is abundant and provides guidelines for developing professional development opportunities. Unfortunately, the literature and theory does not seem to be used in practice. I wonder if support staff is not reading the literature or if administrators are not making resources available for the development of the required institutional infrastructure. It seems that a necessary component of support is the collaboration among faculty, support staff, and administration to ensure the appropriate support mechanisms are available and utilized by instructors to incorporate Web-based technology into their teaching.

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## **Appendix A**

### **How I Learned How to Use the Computer**

When I began learning how to use computer technology, beyond simple word processing and spread sheet functions, I relied heavily on experts. I attended non-credit classes and followed exactly what the instructor did. I read books, again following the procedure in a linear manner. I also relied on my husband's expertise. I'd write detailed processes down so I could complete a function if he wasn't near-by.

I was always excited when something worked, yet expected things not to work. I'd ask my husband questions over and over on how to accomplish my goal. If it seemed too difficult to do on the computer, I'd go back to my old, non-technical processes.

One day my husband got very frustrated at having to re-explain something to me. His frustration increased when I asked him how to do something he had not done before. His comment changed the way I learned how to use computer technology. He said, "I don't know how to do that. I'd have to look it up or just click on the buttons to make it work." This was a revelation to me. Up until that moment I had always assumed that, somehow, computer experts knew exactly what to do to make something work. So, I began clicking buttons to see what would happen. It wasn't always what I wanted, but I began learning all sorts of things I had never learned through books or classes.

Many days I am still amazed that I am now considered a computer expert by many. I do not love the technology simply because it exists. I don't have the latest version of most of the software I use, I don't know the speed of my processor, and I like to do much of my work on paper. However, if something needs to be figured out with a

particular piece of software, I am just as able to click everywhere to see what happens as any other computer expert.

**Appendix B****Information Letter to Program Chairs**

**Lynn Feist  
Instructional Designer**

**Date**

**Dear \_\_\_\_\_:**

**I am an instructional designer in the college. For my master's degree at the University of Alberta, I am conducting a study on the support instructors need to incorporate Web-based technology into their teaching.**

**The general purpose of this study is to investigate instructor perceptions on technology integration and the support systems wanted and needed by instructors.**

**I am inviting you to identify instructors in your area whom I may contact. Instructors will be grouped according to the following criteria:**

- 1. Instructors who have used Web-based technology in their teaching for more than two years.**
- 2. Instructors who started using Web-based technology in their teaching within the last year.**
- 3. Instructors who have never used Web-based technology in their teaching.**

**For the purpose of this study, Web-based technology refers to using computers and the Internet to facilitate course delivery. In particular it involves applications accessed by the user through a Web browser such as Netscape or Internet Explorer. These could consist of Web pages developed by an instructor, e-mail, computer conferencing, external Web sites, electronic journals, and on-line quizzes. All aspects of this study related to purpose and methodology will be disclosed to participants.**

**I will contact with you in the near future. Thank-you for your assistance.**

**Sincerely,**

**Lynn Feist**

## Appendix C

### Letter of Consent

**Lynn Feist  
Instructional Designer**

**Date**

**Dear \_\_\_\_\_:**

**As stated in our recent conversation, I am conducting a study on the support instructors need to incorporate Web-based technology into their teaching. This is part of my masters degree at the University of Alberta. As a participant in this study, you will be interviewed once, at a time and location convenient to both of us. The interview will last approximately one hour and will be audio-taped. Tentatively, I will interview you on \_\_\_\_\_.**

**Please acknowledge your consent by signing this letter and returning it in the envelope provided. I have enclosed two copies so that you can keep one for your records.**

**You may withdraw your consent to participate in the study at any time by contacting me by telephone or e-mail as listed above. You will be provided with transcripts to check their accuracy. If you decide not to participate after the interview, the information will not be used in the study.**

**Once my thesis is complete, the audio-tapes and any notes taken during the interview will be destroyed. Your name or identifying program description will not be included in any written work. Your Dean or Program Chair will not be informed of your participation. All aspects of this study related to purpose and methodology will be disclosed to participants.**

**Thank-you for agreeing to participate in this study. Your time and insight will be valuable in assessing the support that should be provided to instructors. If you have questions about the study now or later, please contact me at \_\_\_\_\_ or my supervisor, Dr. José da Costa at 492 -5868.**

**Lynn Feist**

**I, \_\_\_\_\_ acknowledge that I consent to participate in the study described above.**

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Date**



## **Appendix D**

### **Interview Guide**

- 1. What sort of computer and Internet access do you have at home?**
- 2. Talk about your use of Web-based technology in your teaching (for instructors currently using the technology).**
  - a) when did you start?**
  - b) why did you start?**
  - c) how do you use the technology?**
- 3. How would you like to use Web-based technology in your teaching? (For instructors not currently using the technology.) Do you use any other technology in your teaching?**
- 4. How do you prefer to learn technological skills such as Web-based technology?**
- 5. What issues or barriers do you face in using the technology?**
- 6. What support have you found beneficial? This category will include exploring administrative (time, money, recognition), technical, and informal (family, other faculty) sources of support.**
- 7. What support would you like to see in place at the college?**
- 8. Discuss the pros and cons of using Web-based technology in your teaching.**