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Technology Education in Canadian Faculties of Education: Structure and Support in Teacher Education Programs

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Valerie Margit Irvine

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Abstract

Technology has recently been making a tremendous impact on the K to 12 school system. A number of provincial initiatives have been introduced to incorporate information and communication technology (ICT) education in the K-12 school system. With the high cost of implementing technology programs and the knowledge that properly trained teachers make the difference between the success or failure of a technology plan (Collis, 1996), administrators must look to teacher training to ensure financial investments in education are preserved. Our research community, however, is lacking information regarding how our preservice teacher preparation programs are tackling this issue across Canada. The purpose of this dissertation is to investigate the current structure of ICT education in Canadian Faculties of Education. The first set of objectives is to explore the structure of and support for technology education in teacher education programs at Faculties of Education across Canada. The second is to explore the existence of K-12 ICT curriculum and funding within each province.

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CHAPTER 1: INTRODUCTION

Research Problem

Provincial Initiatives in ICT Education

Technology has recently been making a tremendous impact on the K to 12 school system. A number of provincial initiatives have been introduced to incorporate ICT education in the K-12 school system over the past several years (Alberta Learning, 2000-2003; Alberta Learning, 1999; Alberta Learning, n.d.; Atlantic Provinces Education Foundation, 2001; British Columbia Ministry of Education, 2001a; British Columbia Ministry of Education, 2001b; British Columbia Ministry of Education, 2005a; British Columbia Ministry of Education, 2006; British Columbia Ministry of Education, n.d.; Manitoba Education, 2005; Ontario Ministry of Education, 1992; Quebec Ministry of Education, 2001; Saskatchewan Learning, 1988;). One such initiative is the *Information and Communication Technology Integration Performance Standards* put forth by British Columbia (B.C.) Ministry of Education (2005a). These standards are intended to support educators and learners as they use ICT to enhance learning across the curriculum and the initiative's website includes rating scales, tasks, and student samples. An older, but fairly thorough, *Provincial Education Technology Report 2000/2001* released by the B.C. Ministry of Education in April of 2002 reveals the current status of key topics, including location and number of computers, expenditures, support, in-service, and so on, with recommendations to increase expenditures on teacher inservice, number of computers for teacher preparation, and ratio of technology personnel to user, which was reported as one FTE to 300 users (a high ratio compared to 1:17 in the industrial sector). More initiatives exist in Alberta, where a mandated K-12 ICT curriculum was introduced in 2000 that requires ICT to be integrated into all subject areas. This is the first province to do so in Canada, which makes Alberta progressive in terms of its technology initiatives and uses. At the K-12 level, there were an estimated 8700 students participating in e-learning either part-time or full-time in the 1999/2000 school year (Alberta Learning, 2001). This was the highest of any province; B.C., for example, had only 4633 students as of September 2002 (B.C. Ministry of Education, personal communication, May 1, 2003). As of the 2005/2006 academic year, there were 17,275 K-12 students participating in distributed e-learning in B.C., representing a 373% increase over three years (B.C. Ministry of Education, personal communication, February 27, 2006). More recent statistics were not available from Alberta Education at the present time. Technology in K-12 education is also drawing interest at the federal level with Statistics Canada issuing a national *ICT in Schools Survey* (2004). This survey, conducted in the 2004, was sponsored by Industry Canada's SchoolNet program, whose mission is to ready learners for a knowledge-based society. Through the results of this survey, benchmark data were made available on the status of ICT integration in education across Canada. The data were collected on topics including hardware, software, Internet, Intranet, e-mail, school websites, videoconferencing, e-learning, teacher skills, professional development, technical support, ICT policy and planning, attitudes towards ICT, and challenges to use ICT.

Need for Teacher Education

With the high cost of implementing technology programs and the knowledge that properly trained teachers make the difference between the success or failure of a technology plan (Collis, 1996), administrators must look to teacher training to ensure financial investments in education are preserved. In order to facilitate change in the schools, inservice teachers would require more time to learn how to use technology in the classroom than that which is available at existing professional development opportunities. With the demands for planning, marking, and extracurricular activities, there is little time available to learn how to use computers and how to use them effectively in the classroom. According to the last curriculum cycle report conducted by the British Columbia Ministry of Education (2001) in the ICT area, 68% of teacher respondents identified lack of teacher inservice and support as a barrier to the teaching of information technology in grades 8 to 10. Sixty-five percent cited lack of teacher expertise as a barrier. These represent two of the top three barriers reported in the study.

K-12 students rely on their teachers to incorporate technology into daily lesson plans. If a teacher fails to do this, we may find that the students graduating from high school will not have the familiarity with computers that the curriculum documents describe. A study conducted by Davies (2002) confirmed this and found that a large majority of undergraduate education students begin university with low levels of ICT literacy. If universities do not adequately support ICT education in their teacher education programs, then these preservice teachers may not gain the technology skills they require in order to successfully use technology in their teaching. If these education students are allowed to graduate and enter the workforce without such training, the problem will continue whereby ICT skills are not being taught to students in K-12 schools, because of teachers' lack of knowledge.

This concern has been highlighted at the national level with the National Consultation on the Integration of ICT in Faculties of Education in Canada, held on April

7, 2004. A summary report, entitled "Emergent Framework for ICT Integration within Faculties of Education in Canada," was prepared by LaGrange and Foulkes (2004) on behalf of the Canadian Association of Deans of Education. The report presents principles to serve as a conceptual framework to guide dialogue among participants. Principle 5 states, "The use and practice of educational technology should be informed by critical research" (Lagrange & Foulkes, 2004, p. 11). This dissertation can contribute information to two research activities listed in that report that may present meaningful results: "conducting a systematic synthesis of best practices in Canadian Faculties of Education" and "collecting information on what ICT leaders think we should be doing in Faculty of Education classrooms" (Lagrange & Foulkes, 2004, p. 11).

Nature of Research in Technology Education for Teachers

The governmental and academic emphasis on integration at the teacher education level lends credibility to the argument that teacher preparation programs are critical to breaking this 'technology loop.' Due to obvious reasons of availability and community importance, educational researchers tend to study the structure of technology education at their own university setting (Kajder, 2005; Rademacher, Tyler-Wood, Doclar, & Pemberton, 2001; Walsh, Hagler, & Fowler, 2003; Willis & Tucker, 2001), and make recommendations for improvements in practice. Our research community, however, is lacking information regarding how our teacher preparation programs are tackling this issue across Canada. Rather than learning about a narrow slice of technology education at one university (most likely a university in the United States), it would be important to pursue a more in depth investigation of technology education at a university and, furthermore, to establish a bird's eye view of technology education at universities across

Canada. The previously mentioned *ICT in Schools Survey* by Statistics Canada (2004) is one of the first cross-Canada studies to be undertaken at the K-12 school level. It would be valuable to discover corresponding data at the teacher preparation level. In the United States, the Milken Exchange commissioned the International Society for Technology in Education (ISTE) to conduct a national survey of schools, colleges, and departments of education to determine how their preservice teachers were exposed to technology (Moursund & Bielefeldt, 1999). A copy of this survey is can be downloaded from the Milken Family Foundation website at http://www.mff.org. No such study exists for Canada. It is important to investigate the structure of preservice technology education, so educational researchers can better understand the phenomenon as it exists in Canada. Because of our differences from the United States (U.S.), in terms of educational policy, funding, organization, and culture, we should not make the assumption that the results of the above study can be generalized to our country. This U.S. survey has served as the basis for portions of the survey used in this dissertation.

Factors in Technology Education for Teachers

There are a number of factors involved in the preparation of technologically proficient teachers (Moursund & Bielefeldt, 1999). First, the structure of B.Ed. programs in terms of technology courses and programs needs to be considered. Second, there must be adequate support structure, including knowledgeable faculty members, availability of support staff, a technology advisory committee, a technology plan, computer and networking facilities, the existence of a technology budget, professional development for faculty, incentives for faculty to learn and use technology in their teaching, and an understanding of the challenges or obstacles to ICT use. Third, there must be some level of technology integration, both into the B.Ed. program and field experiences. The extent to which a Faculty of Education supports these various factors may influence the degree to which their graduates are technologically proficient.

Research Purpose

Of the three universities with which I have been associated, each teacher education program approached ICT education in a different way. The purpose of this dissertation is to investigate the current structure of ICT education in Education programs across Canada. The results will not only be useful for developing a descriptive standard for what is being done in terms of preparing preservice teachers to use technology, but they will also inform university administrators as to the various approaches being taken and perhaps contribute to the formation of best practices. According to Gall, Borg and Gall (1996), "Unless researchers can obtain an accurate description of an educational phenomenon as it exists, they lack a firm basis for explaining or changing it. Some of the most influential calls for reform of the educational system have used the findings of descriptive research to make their case" (p. 375). With the dissemination of these results, it is expected that university administrators would learn of new and different approaches to ICT education from their colleagues, which they may choose to incorporate into their teacher education programs. Future research will focus on the evaluation of these various approaches to determine the level of success in both a fiscal and educational perspective.

Research Objectives and Questions

The first set of objectives in this dissertation is to explore the shape of technology education in teacher education programs at Faculties of Education across Canada. The second is to explore the shape and existence of K-12 ICT curriculum and funding within each province. These two sets of objectives are separated into two unique studies. The research objectives for these studies are provided below.

Study One: Technology Education in Teacher Preparation Programs

1. To determine the current structure of technology education in teacher education programs across Canada. This includes identifying and describing the following:
   - (a) required courses in technology education
   - (b) elective courses in technology education offered within the last two years
   - (c) non-credit programs in technology education
   - (d) diploma programs in technology education
   - (e) graduate programs in technology education
   - (f) electronic portfolio programs
   - (g) the structure of these courses and/or programs
   - (h) level of participation in e-learning
   - (i) number and sex of FTE faculty members specializing in technology; number and sex of FTE faculty members in the Faculty
   - (j) size of academic program (number of students)
2. To determine the support for technology in terms of
   - (a) full-time equivalent (FTE) technology support staff
   - (b) available facilities (i.e., classrooms connected to the Internet, etc.)
   - (c) a technology advisory committee
   - (d) a technology plan
   - (e) an annual budget specifically to support technology
   - (f) faculty professional development opportunities in technology

(g) faculty incentives to use technology

(h) annual expenditures and sources of funding for library's collection development (physical, audio-visual, electronic, online)

(i) perceived obstacles that may inhibit technology use

Study Two: Provincial ICT Curriculum and Funding

1. Describe the K-12 ICT curriculum that may exist in each province or territory.
2. Identify provincial/territorial technology funds or expenditures that exist

Significance of the Research

Information and communication technologies are having a rapid and increasing impact upon all Canadians. Initiatives are currently underway toward integrating technology into the K to 12 classroom, where teachers will be required to develop technology skills (Alberta Education, 2000-2003; British Columbia Ministry of Education, 2005b). Since trained teachers determine the success of a technology plan, administrators must look to teacher training to preserve financial investments (Robyler, 2006). For this reason, considerable research has been conducted on educational technology in teacher training; specifically, with regard to educational computing courses (Balli, Wright, & Foster, 1997; Graham, Culatta, Pratt, & West, 2004; Neiderhauser, Salem, & Fields, 1999; Pierson & Thompson, 2005) and the integration of technology into teacher education programs (Banister & Vannatta, 2006; Collier, Weinburgh, Rivera, 2004; Falba et al, 1999; Gillingham & Topper, 1999; Rowley, Dysard, & Arnold, 2005). My program of research reflects the need to understand the nature of this impact and ways to effectively use technology to facilitate teaching and learning, so that students will be better prepared to enter the knowledge age. Since technology is one of the major forces transforming education, researchers must address the need to train preservice teachers in the appropriate use of technology. This is especially timely since many provinces are moving toward ICT integration or even mandated technology infusion to be incorporated into all K-12 subject areas (Alberta Learning, 2000-2003). Furthermore, with 38% (12,800) of all educators in B.C. being 50 or older in the year 2003 (Hawkey, 2004), there is a great opportunity to facilitate change in the way technology is used in the schools. Similar turnover is reported in the United States (Moursund & Bielefeldt, 1999). By redesigning teacher preparation programs to incorporate technology, those positions vacant from retirements can be filled by Faculty of Education graduates proficient in using technology in their teaching.

Exploration of the structure of technology education at Canadian universities is preliminary at present, so this proposed research produces new and important results to researchers, government representatives, and educational administrators. The studies described in the research literature often focus on the approach to technology education taken by a single university (Rademacher et al., 2001; Walsh, Hagler, & Fowler, 2003; Willis & Tucker, 2001). Knowing the status of technology education across dozens of universities will allow educational researchers and administrators to see the bigger picture. Superintendents, who are faced with a mandated ICT curriculum and applicants, who are not prepared to implement that curriculum, may be well served in knowing to what degree some programs are preparing students to teach ICT curriculum. Government representatives from provincial ministries of education may learn about the relative standing of their technology education and gain a realistic view as to whether their province is ready to implement a mandated ICT curriculum and whether the universities in their province need additional support in preparing technology education opportunities. Universities that do not offer technology education opportunities to their students may learn more about those universities that do offer technology education opportunities and the support required to provide these opportunities. Furthermore, universities that do offer a higher level of technology education may be able to use their relative placement in ICT education to develop recruitment and funding strategies. Finally, through the results of this dissertation, educational researchers might be able to gain a deeper understanding of the current practice of technology education across Canada and may begin to systematically conduct research on the best practices in approaching technology education.

Limitations

The first limitation of this dissertation is the nature of the design, which is non-experimental, so causal relationships cannot be confirmed by the findings. Because the design is primarily descriptive in nature, the results are limited by the types and quality of available measures. The parts of the dissertation that involve causal-comparative methods will allow the examination of possible causes and effects of educational phenomenon by comparing one Faculty of Education that holds certain characteristics with another Faculty of Education that either does not possess such characteristics, or possesses these characteristics to a lesser degree. Since this is an ex post facto design that does not carry out any manipulation, it is difficult to establish causality on the basis of collected data, but causal relationships can, however, be discussed. According to Hayduk (1987), "As long as social scientists find it useful to think of one thing as influencing, bringing about, effecting, determining, or causing another, there is no reason to abandon causal statements" (p. xv). The discovery of plausible cause-and-effect relationships will allow for development of theories that can be tested in future research and be useful for improving the use of technology in teacher education.

Delimitations

The first study is restricted to examining Faculties of Education at English-speaking universities across Canada. Institutions that require their faculty and/or students to subscribe to a statement of faith and/or related standard of conduct are also excluded from the sample.

Definition of Terms

When discussing technology, it is important to first specify the type of technology that is being considered. Extensive dialogue and writing on defining technology exists, and there is little agreement on defining the terms. In the broad sense, technology can be seen as encompassing a "way of doing things" (Alberta Learning, 2000-2003). In a common dictionary, technology is defined as "the application of knowledge for practical ends" (Random House, 1988, p. 1349). More narrow definitions exist, which reduce it to hardware and peripherals (computer technology) or a particular field (educational technology). For the purpose of this dissertation, the term "information and communication technology (ICT)" will be used to refer to the new ways (processes, tools, and techniques) in which we can "communicate, inquire, make decisions, and solve problems" (Alberta Learning, 2000-2003, p. 1). Unless otherwise specified, the term "technology" used in this document is to be taken as synonymous with ICT.

While Faculties of Education were a target group in this dissertation, the structure within each institution varied. In some, Education comprised a Department within a

Faculty. Some University Colleges operated Education programs with over 100 B.Ed. graduates in a given year. While the heads of these Education programs may be Deans, Directors, or Chairs, the term, "Dean," will be used in this document, although it is meant to be inclusive of other position titles. Similarly, when the terms "Faculty of Education" or "University" are used in this document, it is meant to be inclusive of Departments of Education or Schools of Education within both Universities and University Colleges.

Organization of the Dissertation

This thesis is organized onto five chapters. Chapter one provides an introduction to the thesis, including a definition of terms, a statement of the research problem being investigated, a description of the research purpose, objectives, and questions, followed by an overview of the significance of the study and its limitations and delimitations. Chapter two contains a review of the literature related to this research area. Chapter three describes the research methods while chapter four presents the results. A discussion of the results is provided in chapter five and chapter six concludes with sections on limitations, implications for preservice teacher education, and recommendations for further research, followed by a summary.

CHAPTER 2: LITERATURE REVIEW

At the base of every discussion of ICT in Education is the question of its purpose. What is the role of ICT in Education? Does it make any difference in student achievement? How does it affect the role of the teacher? If we accept that ICT plays an important role in education, then how do we support it? What are the obstacles faced by inservice teacher education? How can we handle ICT education in preservice teacher education programs? What type of support structure might be needed for Faculties of Education? There are some answers for these questions, but the diffusion of knowledge and practice on the use of ICT is very slow among stakeholders in the educational system and "there is much to learn from others" (Van Schie, 1997, p. 87). Van Schie (1997) further reports that it is necessary to keep in touch with the rapid changes in functionality and to stay accurate and up to date on the almost immediate application of it for educational purposes. This section will review the literature that addresses the issue of technology in K-12 schools as well as technology in both inservice and preservice teacher education. The one study that was found to have a direct bearing on this proposal is the Moursund and Bielefeldt (1999) survey of teacher preparation programs in the United States. No research conducted in this manner in Canada has been found.

The Role of Technology in K to 12 Schools

The rationale for the B.C. Ministry of Education's Information Technology curriculum (1996) includes the following four elements: 1) preparing for the workplace, 2) preparing the citizen, 3) relevance, and 4) preparation for post-secondary education. The rationale in the Alberta ICT curriculum (2000-2003) reflects similar themes: workplace preparedness, lifelong learning, and personal application. Alberta Learning also cites the pervasiveness of technology, its impact on changing the way we live, work and think, and the need to prepare our students to use and apply ICT effectively, efficiently, and ethically.

Student Outcomes

Regardless of the rationales provided in provincial ICT curricula, questions are being asked as to the role of technology in the classroom. More recently, the focus has been on the effect of technology on student outcomes (Bailey, 2004; Jones & Paolucci, 1998). In recent years, the emphasis at the provincial and federal level has been on "evidence-based policy" as supported by Industry Canada and the Council of Ministers of Education Canada at a recent E-Learning Symposium (Ungerleider & Burns, 2003). However, as Ungerleider and Burns pointed out, most research in the area of educational technology they reviewed (from years 2000-2003) did not meet their standards of rigor for inclusion in their systematic review of the literature. This view is supported by Jones & Paolucci (1998), who conducted an analysis of over 800 research articles from 1992-1998 on the learning effectiveness of educational technology, and assert that the investments in technology are often made at the expense of other resources. In their review, Jones and Paolucci found that only 12% of work is of an empirical and objective nature and call for further research of this nature: "To a large extent, the expenditures and adoption of technology are discussed at a policy level, whereas the research being conducted is at an individual variable level" (p. 12). A call for further research on student outcomes was issued.

Increasingly, school administrators want to find out whether technology makes a difference in student learning, before or to justify making expenditures in this area. Some researchers have found evidence that technology improves student outcomes (Woodrow, 1998), while others believe that technology does not necessarily enhance learning, but only provides "avenues for learning when placed in the capable hands of skilled professionals" (Richards, 1999, p. 13).

Technology tools can be important for the construction of knowledge as well as its dissemination and access. The argument for computers in the classroom can be furthered if we believe the student to be a constructor of knowledge and technology as a tool to be used for that knowledge construction. Unlike other classroom tools, like the chalkboard and overhead projector, the extensions and benefits of ICT are far-reaching. Similarly, the preparation required to use technology tools and understand their application in the classroom requires a significant amount of time and effort, not to mention cost. As schools, districts, and ministries of education are spending more and more on technology in comparison to budgets allotted for other educational initiatives, various stakeholders are questioning the expenditures and want to find out if the effect of technology on learning outcomes are significant and if it is cost effective (Jones & Paolucci, 1998). According to Dusick (1998), these are the wrong questions to ask:

> It is the role of educators to give students the knowledge they need to succeed. Knowledge today goes beyond rote learning and test performance. It includes the ability to search for information with all available media, to utilize technological tools to accomplish a variety of tasks, and to display concepts and ideas in three-dimensional form using multimedia. To do this, students must be self-efficacious in the use of computer technology. p. 11

One example of technology's positive effect on student outcomes is the "technology enhanced instruction" (TEI) project (Woodrow, 1998), which used the computer as a major learning medium in a Langley school district in British Columbia over four years. The results showed that the enrollment in physics increased to twice the provincial average, the enrollment of female students increased beyond the provincial average, and the government exam results were equaled or bettered. Despite these promising results, there are other issues to consider in evaluating the role of technology in schools.

Digital Divide

Seeing that technology is pervasive throughout all sectors of our community, the argument can be made that, if part of the purpose of education is to prepare students to enter the workforce, then it is important to educate them to use technology as a tool to seek, communicate, and present information - whether or not it makes a difference in learning outcomes within subject areas. Employers in countries that were members of the Organisation for Economic Cooperation and Development, which includes Canada, were found to have a high expectation of computer literacy (Kim, 2002). Kim further reported that technology development (and particularly the diffusion of ICT) is viewed as “one of the main causes for the rise in skill demand in recent decades” (p. 90). Davis (1997) specifically looked at the computer literacy expectations held by employers recruiting graduates from Cornell University and found that 83% of employers ranked computer competency skills as either “important” or “very important.” If our students graduate without technology skills, then they would be at a disadvantage in the labour market. Technology does not harm the learning process and benefits exist that are not directly measured by a specific learning outcome (Dusick, 1998).

When discussing the role of technology in K-12 schools, we must also consider the digital divide (Milken, 1998), in which economic standing determines student access to computers, and thus information and opportunity. If we believe that people should have equal access to knowledge, then the tools to access such knowledge should be taught (Woodrow, 1998). The public school system is the only place where we can find a cross-section of students from all socio-economic levels. This provides us with an opportunity to provide an equal foundation for technology education, regardless of whether students have access to computers at home. As Milken (1998) explained it, "equal opportunity is about having in the classrooms up-to-date computers, Internet connections, powerful content, teachers who are technologically fluent, and technical support" (p. 15). If we do not place computers in schools, then "our educational system will only widen the gap between the elite and the disadvantaged by taking valuable skills away from those who need it most" (Dusick, 1998, p. 12). The technology skills students can gain from experience in the classroom will help them to be competitive in the new economy when they graduate.

Improving Student Technology Skills

If we accept that the K-12 education system has an important role in teaching technology skills to students, then we must next examine how to improve student skills with technology. Various researchers have asserted that computers should not be taught directly, but rather to be taught by its direct application to the learning requirements of a subject (Woodrow, 1998). The integration of technology into K-12 education, however, is dependent on the teacher (Collis, 1996). Numerous researchers have argued for the idea of integration (McDonald & Davis, 1995), but some do not pay enough attention to the difficulties that teachers experience when trying to develop technology skills for the classroom (Carney, 1998). Integration is the 'gold standard' of technology's interaction with education, but it is an ideal that is difficult to achieve. Ideally, every student should have the opportunity to practice technology skills in every classroom and in every course (McDonald & Davis, 1995). This goal will not be achieved, however, unless teachers understand how to use technology and are prepared to apply it effectively in a learning environment. When it comes to improving student technology skills, we must look to the preparedness and professional development of the teacher.

Educational Change

Educational change is a movement that is most successful if the impetus is bottom-up, starting with the teacher (Collis, 1996), as opposed to top-down, as a directive from administration. The issue of technology integration, however, is a unique one in that many teachers do not have a good foundation in the use of technology (B.C. Ministry of Education, 2001b). Moreover, this foundation is required in order for teachers to understand fully the applications and benefits of technology to education, so as to develop a commitment to its integration (McDonald & Davis, 1995). Unfortunately, Larose, David, Lafrance and Cantin (1999, as translated in Karsenti, Brodeur, Deaudelin, Larose, & Tardif, 2002) discovered the lowest level of ICT use occurs in Faculties of Education. Meaningful change requires significant time and effort by all stakeholders. Without leadership and commitment, however, educational technology initiatives will not succeed (Sandham, 2001). Conversely, leadership that pushes forward too fast and without direction will likely curtail its own initiatives. Vision, skills, incentives, resources, and an action plan are essential to facilitate change; however, every one of these factors must be present (Drazdowski, Holodick, & Scappaticci, 1998). These factors can, for the most part, be provided by a school district or administrator; however, they cannot supply the skills - that is in the domain of the teacher. Fabry and Higgs (1997) outline five factors that affect the implementation of technology in the K-12 classroom: resistance to change, teachers' attitudes, professional development (training, time, and support), access to technology, and cost. As pointed out by Karsenti, Brodeur, Deaudelin, Larose, and Tardif (2002), three of these factors involve the human aspect. To overcome these obstacles, Fabry and Higgs (1997) recommend that school districts create a strong technology plan and address training issues.

Inservice Teacher Education

To support the integration of ICT into K-12 schools, teachers require sufficient training opportunities and support; however, the following section reports on the challenges that exist in the implementation of inservice professional development in the area of ICT integration, which makes it a more challenging area for teacher training and change. These barriers serve as reasons as to why preservice teacher education, at this point in time, may be a more suitable focus than inservice teacher education for change with respect to ICT.

Barriers to teaching ICT

If we look to the inservice teacher to facilitate change in technology use, we are faced with many obstacles. It is fine to state that the ability to use technology should be part of the professional profile of teachers, but realizing that standard is going to demand more "relevant and powerful programs of professional development for teachers – the agents who are being asked to drastically change what they teach and how they teach it" (Carney, 1998, p. 7). The process by which teachers can move to technology adoption depends on their personal view of technology, their social context, and their willingness to admit that their current practice is inadequate (Davis et al., 1996). Some of the major obstacles encountered at the inservice level are discussed below.

Lack of Awareness/Leadership

Davis, Kirkman, Tearle, Taylor, and Wright (1996) suggest that the first step in the adoption of technology is the acceptance of the belief that technology can enhance the quality of learning. If teachers recognize that technology can be useful for teaching effectively and for improving efficiency, then they can begin to establish philosophies and goals for using this technology in their day-to-day lives (Hornung & Bronack, 2000). Once this outlook has been adopted, teachers need relevant and ongoing support. Unfortunately, as Thomas Edison suggested in the 1921 issue of Popular Science, "We have an enormous capacity to develop supermachinery. But our desire to install the device is weak. Human inertia is the problem, not the invention" (cited in Woodrow, 1998, p. 5). Woodrow explains that we are in error to believe that this inertia is caused by the reluctance of established teachers to learn new tricks; rather, it is caused by our inability to demonstrate to them that technology can be used to enhance learning significantly. Haughey (2002) shares this belief that "integration of ICTs is not about technology but about change and change begins with the will to learn" (p. 19). We need more technologically savvy school leaders to help effect this change in belief system (Sandham, 2001).

Non-existent or Inappropriate Incentives

Faced with increasing class sizes and the demand to participate in a wide range of extracurricular activities outside of planning, preparation, teaching, marking, and other administrative duties, the question must be asked: 'What is the incentive to spend a significant portion of time that is required to learn how to use technology in the classroom?' The lack of incentives or the provision of inappropriate incentives to teachers can hinder inservice work (Hornung & Bronack, 2000; Sandham, 2001). Given current funding cutbacks and school closures that exist in many public school environments, this obstacle presents itself as one that is difficult to overcome.

Lack of Time

Sandham (2001) puts it quite frankly: "If national leaders working at the crossroads of instructional technology and professional development lived in an educational utopia, both K-12 teachers and college professors would have ample time to learn how to work with technology" (p. 38). Time is likely the single largest obstacle to technology adoption by teachers, being cited by numerous researchers (Hornung & Bronack, 2000; Carney, 1998; Davis et al, 1996; Sandham, 2001). Again, there is no easy recipe to find time for teachers given the current educational system.

Lack of Professional Development

The professional development opportunities provided to teachers are typically in the form of the occasional professional day, which can vary in its topic. Given the handful of professional development days in a school year, it is likely that only one or two might focus on technology. This lack of comprehensive training is one reason why teachers are not integrating technology into their teaching (Hornung & Bronack, 2000). These short courses do not encourage teachers to continue to use technology beyond professional development day (Carney, 1998; Davis et al, 1996). This obstacle is closely connected with that of time as there simply is not the luxury of extended periods of time to focus on technology education during the school year. Furthermore, many rural school districts stress the issue of cost as hampering technology integration initiatives because money was tied up bringing in bandwidth and, thus, making it difficult to offer professional development (Montgomerie & Irvine, 2001). There are some positive developments in the area of inservice professional development, though. For example, in the province of Alberta, The Telus Learning Connection (Kullman, Cleary, & Bell, 2003) offers a flexible model that allows teachers to access a virtual space where they can learn about ICT and share resources.

Preservice Teacher Education

Given the significant obstacles encountered at the inservice teacher education level, there seems good reason to focus on preservice teacher education to help implement change in technology integration at the K-12 level. In a study conducted by Montgomerie and Irvine (2001), many respondents viewed student teachers or new teachers to be those to fulfill the role of technology leader. If school jurisdictions expect new teachers to take on this important role of technology mentor, then Faculties of Education face the challenge of preparing their students to be not only technology literate, but trained in technology integration.

Returning to the notion of a utopian education system, Drazdowski et al. (1998) have described the ideal preservice teacher education program – one which enables all education majors and faculty "to explore how various educational technologies, especially the computer, can enhance instruction, assessment, and professional productivity, as well as explore how technology-based tools can help solve authentic, real-world problems and issues" (p. 142). The realization of this dream is still far away, but the obstacles to preservice technology education are likely to be less formidable than those at the inservice level, since there is a growing expectation by the public and administrators that the beginning teachers of today will be technologically literate and able to integrate technology (Montgomerie & Irvine, 2001; Parker, 1997). Whether this expectation is currently being met is to be determined. Haughey (2002) reports that we have not been able to document large scale strategies for preparing teachers to use technology that have been successful in implementing technology integration; therefore, we need to move beyond small projects and look more broadly at solutions.

Provincial curriculum and technology preparation

The now-defunct Office of Technology Assessment in the United States released a report in 1995 stating "technology is not central to the teacher preparation experience in most colleges of education" (p. 165). Four years later, the International Society for Technology in Education conducted a *National Survey on Information Technology in Teacher Education* in the United States and found that teacher education programs did not prepare preservice teachers to use technology effectively in the classroom (Moursund & Bielefeldt, 1999). No literature was found to assess whether teacher education programs across Canada were doing any better.

Perhaps in response to these reports, a movement developed in the United States to make improvements to teacher education programs in terms of technology infusion. Namely, the Preparing Tomorrow's Teachers to Use Technology (PT3) grants (*Preparing tomorrow's teachers to use technology*, 2005; U.S. Department of Education, 2005) were created to support the transformation of teacher education programs so that future teachers will be able to use interactive information and communication technologies for improved learning and achievement. Since 1999, $399.6 million has been invested (in years 1999 through 2003 with no funding in 2004 or 2005) in over 400 projects from 52 of the 100 largest teacher education programs in the United States. While some funding opportunities exist in Canada to advance Internet infrastructure (*CANARIE*, 2002; *Alberta SuperNet*, 2003), K-12 school connectivity, and learning resource development (*Canada's Schoolnet*, n.d.), Canada has no equivalent counterpart to make investments solely in the area of technology in teacher education.

A *National Education Technology Plan* released by the U.S. Department of Education in 2004 contains seven action steps to help districts prepare students for the knowledge age. One of these steps is "teacher training," which describes recommendations, including the improvement of preservice teacher preparation in the use of technology, the opportunity for every teacher to take online learning courses, the improvement of teacher education through measurement, accountability, and increased technology resources, and the ability to use data to personalize instruction.

Furthermore, many programs in the United States now seek accreditation by the National Council for Accreditation of Teacher Education (NCATE, 1997-2006), which includes standards for technology that are continually reviewed by their own Task Force on Technology and Teacher Education. Unfortunately, there is no equivalent counterpart in Canada to pressure our teacher education programs to adopt technology standards. Education is a provincial responsibility, so each province is developing their own curriculum standards and provincial advocacy groups for technology in education tend to have disparate interests (e-learning, computers in K-12 education, etc.) and are not as effective as would be a unified federal voice. There are some cross-Canada initiatives to do with technology in education, however; the Council of Ministers of Education in

Canada (CMEC), in partnership with the Canadian Education Statistics Council and Statistics Canada, supported a Pan-Canadian Education Research Agenda (PCERA) through to 2003 (Council of Ministers of Education Canada, 2005; Canadian Education Statistics Council, 2003). The purpose of PCERA was to bring together provincial and territorial ministers of education, researchers, and stakeholders to discuss important issues of interest they had in common. PCERA commissioned research on selected topics and hold symposia to encourage communication. One such topic was technology for which a symposium was held in 2002 (Council of Ministers of Education Canada, 2002). There, Kozma (2002) suggested that both bottom-up and top-down approaches were needed to fill the gap between policy and practice. In the bottom-up approach, the emphasis was on K-12 school ICT plans, principal support, inservice teacher training, and technical/instructional support. In the top-down approach, Kozma emphasized a new curriculum, new roles for universities, new models for assessment, and new educational tools and activities. Fullan (1998) also supports a bottom-up/top-down approach in that successful educational reform requires the involvement, rapport, and coordination of both the "top-half" or provincial policy makers and the "bottom-half" or schools and local jurisdictions. Fullan further states his belief that policy reforms in curriculum and instruction are on the right track while those in teacher education are not.

As Venesky (2002) explained to an international seminar hosted by CMEC and the Organization for Economic Co-operation and Development (OECD), "information revolution has finally arrived, so where is the information curriculum?" Indeed, because K-12 ICT curriculum differs by province, the emphasis on ICT in teacher education programs differs. For example, while Alberta has a mandated core curriculum in ICT, British Columbia has no K-12 ICT core curriculum. As Kempthorne (personal communication, February 26, 2003) reported, information technology was included in the required areas of study in the past; however, it is no longer. Instead, the attempt has been made to take the ICT outcomes that were listed in the other K-7 and 8-10 documents and include them in the curriculum for the individual subjects as these are revised. This was because of a push from teachers to reduce the number of documents and outcomes they needed to go through in planning their program. Therefore, it is possible for a student to graduate in British Columbia without any specific ICT curriculum under the current program and graduation requirements. The learning outcomes are available but how schools choose to offer it to students is completely up to them. While the positive relationship between provincial curriculum standards and technology in preservice teacher education seems obvious, there is no research available that investigates their connection in provinces across Canada.

Program Structure

The approach to technology infusion in teacher preparation programs can take one of three approaches: 1) offer stand-alone coursework in technology, 2) focus on integration of technology throughout all courses, or 3) offer both stand-alone courses and technology integration. The research literature offers a high profile to the debate between courses and integration and presents the two approaches as mutually-exclusive, when it may be reasonable to accept both approaches. While integration is, without question, valuable in that it offers a deeper, reflective approach (McDonald & Davis, 1995), one limitation is that programs without a required technology course make assigning activities involving technology difficult for students and instructors, who may not have the necessary background (Richards, 1999). Richards (1999) reports a lesson learned in their program was that technology can intimidate students if they have not been "uniformly prepared prior to its use" (Richards, 1999, p. 10). The lack of updated, technology-enriched courses is reported as a limiting factor that deters the growth of preservice teacher education programs (Hornung & Bronack, 2000). This emphasis on uniformity in preparation, which is what requiring technology courses seeks to accomplish, can be found in technology integration approaches as well. For example, a Faculty of Education can publish established standards for students to meet during their program; this outcomes assessment approach has given rise to the popularity of electronic portfolio initiatives (Sandham, 2001).

Just as the single largest obstacle to technology integration at the K-12 level is the teacher, the buy-in of faculty members is a crucial element in adopting technology integration at the preservice teacher education level. Other obstacles reported by Parker (1997) include lack of awareness of instructional potential, lack of enough technology in the Faculty to make a difference, lack of training and personal expertise, and view of technology as a time-eater rather than a time saver until it has been mastered. While some researchers have asserted that technology has been successfully integrated throughout their preparation programs (Hornung & Bronack, 2000; Parker, 1997), others maintain that the thorough preparation of teachers to use technology during their programs is an idealistic view (Davis et al., 1996). Regardless of whether Canadian teacher preparation programs are currently successful in their technology integration, if public K-12 education is to continue serving student needs as we move into a global, knowledge economy, then teachers must be trained in the use and application of ICT (Woodrow, 1998). Woodrow (1998) emphasizes the use of technology as a learning tool, that "playing on the Internet does not constitute advanced technological application to learning needs" (p. 7). The next generation of preservice teachers must learn how to understand and be comfortable with ICT as a learning tool and not a computer toy. As Woodrow (1998) explains it:

> Faculties of education must immediately understand the burden of necessity placed upon them for the training of preservice teachers in the proper use of computer-multimedia technology in daily classroom learning. Humans know too much and understand too little. Information management is the science of the 21st century. Technology-enhanced instruction must be accepted as an essential, integrating aspect of modern curricula. (p. 7)

The practicum or "field experience" is one of the most important elements in a teacher education program. It allows preservice teachers to test out the theories and activities learned during their coursework, discover their teaching style, and reflect on their practice. More importantly, however, it allows them to work with a master teacher who can model good teaching practice. Unfortunately, many preservice teachers on practicum do not typically work with a teacher who can provide them with support and information on the use of technology (Hornung & Bronack, 2000). To overcome this obstacle, some programs provide access to computer laptops that can be signed out by students for use in their field experiences so that they can bring the technology to their practicum, but finding environments with technology-using teachers remains a dilemma (Drazdowski, Holodick, & Scappaticci, 1998). Nonetheless, it is important for prospective teachers to use technology in their teaching. It is not known to what extent Canadian Faculties of Education offer access to technology for preservice field experiences.

Support Structure

Key to the integration of technology throughout teacher preparation programs is the professional development of faculty members. Unfortunately, many professors are not prepared to use or model technology in their teaching (Sandham, 2001). Furthermore, there are few incentives for faculty members to learn how to use technology, since it is not included in the annual review for merit (salary) increments at most institutions. Sandham (2001) reports that the implementation of recognition and reward for faculty members who effectively use technology in their teaching could be all it takes to increase the infusion of technology. Furthermore, Huang (1994, as cited in Parker, 1997) found that faculty members' use of and attitudes towards technology has a significant impact on preservice teachers' implementation of technology in instruction. No research was found to date that investigates if and how incentives are used in Faculties of Education across Canada to support technology integration.

Another factor that deters the growth of preservice teacher education programs is the lack of a written plan for technology integration (Hornung & Bronack, 2000). Parker (1997) explained that many faculty members are willing to increase their use of technology provided that upgraded equipment, support personnel, and training were available. A multi-year strategic technology plan is necessary to provide a vision and obtainable objectives. Some items necessary for technology support that were included in the plan described by Parker (1997) included hardware, software, networking, computer lab availability, technology support, and faculty training and awareness. The overall challenge to the use of ICT for learning as presented by CMEC (2002) is that of fully integrating the use of technology throughout the operations, policies, and professional practice of schools and postsecondary institutions. More can be known about the shape and scope of technology plans and how they address operations, policies, and professional practice in Faculties of Education across Canada in supporting the use of technology.

Summary

Because we are lacking information regarding how our preservice teacher preparation programs are tackling this issue across Canada, it is important and timely to survey our teacher preparation programs to investigate the current structure and support of ICT education in Canadian universities. The results will provide valuable information to stakeholders who want to know how we are approaching this issue in a national sense.

CHAPTER 3: RESEARCH METHOD

Study One: Faculties of Education

Participants

The primary points of contact for this study were Deans of the Faculty of Education at Canadian universities. Since the organizational structure of each university differs, the Dean was chosen as the primary contact. The Association of Universities and Colleges of Canada (2001) currently has 93 institutions as members. Due to limited resources, this number was restricted to include only those Faculties of Education at larger English-speaking universities across Canada (approximately 35). Institutions that require their faculty and/or students to subscribe to a statement of faith and/or related standard of conduct were excluded.

Procedure

Following acceptance by a Research Ethics Board, a letter was mailed to each Dean describing the purpose and procedure of the study (see Appendix A). Details on informed consent, an agreement for the participant to complete and return, a questionnaire, and an interview guide (see Appendixes B, C, and D) were attached to the letter. This interview guide is an adaptation of the questionnaire used in the surveys by Moursund and Bielfeldt (1999) and Statistics Canada (2003).

The Dean was asked to return the completed questionnaire with completed consent form by mail, fax, or email (if they chose to download the electronic version) prior to participation in the telephone interview. If there was another individual in that

Faculty, who was in a good position to provide input for the questionnaire, the Dean was encouraged to solicit her or his assistance in completing the questionnaire.

Following receipt of the questionnaire, each Dean or designate was asked to participate in a semi-structured telephone interview. The interview was estimated to take ten minutes. This protocol was similar to the structure developed by Montgomerie and Irvine (2001), who found this method of data collection to be successful in obtaining a 100% response rate. The participants were contacted as soon as a completed questionnaire was received; however, if no questionnaire was returned within two weeks after initial mailout, the Dean was contacted via telephone to check to see if the letter and attachments had been received and to see if they wished to participate in the study by returning the questionnaire and participating in a telephone interview at a later date. All participants were offered an electronic copy of the results of the study.

In the letter, the participants were assured that his or her personal and university identity would be kept confidential and that only their responses would be used in the analysis and discussion of the results. Two copies of the informed consent form were attached to the letter. The first was to be returned with the questionnaire, while the second was to be on hand at the start of the telephone interview, when consent was requested again. The telephone interview was recorded and later transcribed. If a respondent chose to complete the consent form and interview guide and respond by mail, fax, or e-mail instead of by telephone, then those responses were be included in the analysis. There was only one instance in which interview responses were received by email as an alternative to a telephone interview.

Study Two: Ministries of Education

Participants

The Ministry of Education office from each province was contacted to identify the ICT curriculum standards for that province and whether any provincial technology funds or expenditures exist for post-secondary or K-12 sectors.

Procedure

The Ministry office was contacted by telephone to identify the person who would be in a position to answer questions on ICT K-12 curriculum and funding for K-12 and post-secondary institutions. That person was then contacted to obtain public information on 1) what K-12 ICT curriculum exists and 2) what public provincial or territorial funding for ICT exists. As approved by an ethics board, no consent form was required as public information was being collected and no personal opinions or feelings were being sought from Ministry representatives. No telephone conversations were being recorded. The Ministry was simply being contacted to help locate public information and documents on curriculum and funding. The Ministry representative was informed of the study overview, that the study had been approved by an ethics board, and that no consent form was required given the public nature of the information being collected. The representative was also notified that her/his personal identification was not being used and only the public data and Ministry identity would be reported.

Analysis

Analysis of Surveys

Since this is a descriptive study, the quantitative data were analyzed to yield frequencies and percentages. Where appropriate, minimum and maximum scores were reported along with mean and standard deviation. The minimum and maximum scores present information about the extremes of a given phenomenon related to technology structure and support.

Non-parametric statistics, using chi-square analysis, have been used to determine whether frequency counts show significant dependency based on various grouping variables (i.e., advisory committee, technology plan, technology budget, professional development opportunities, incentives for faculty to use technology, mandated curriculum) when considering components of program profile and support. This is an exploratory study, and, therefore, no a priori hypotheses have been generated and p was set at $<.05$.

Analysis of Interviews

The interview data were collected through semi-structured interviews (see Appendix D) via the telephone and digitally recorded, with participant consent, and then transcribed. Interview questions 1 ("Is your Faculty where you want it to be with regard to technology? If not, why not?"), 5 ("Is the amount of emphasis on technology in your provincial government's policy/curriculum appropriate for your Faculty?"), and 6 ("Do you perceive your academic programs as meeting the needs of students for technology? Please describe."), lent themselves to quantitative examination. Otherwise, a qualitative approach to analysis was used and supported through the use of NVivo qualitative software. The findings of the interview portion of the study are organized first, by interview questions, and, second, by the categories and themes found both within and among cases.

Overall, a qualitative analysis was more appropriate for the interview section of the study. An interpretive analysis of the structured interview questions was used to examine the data closely to discover constructs, themes, and patterns, which can help to describe the structure and support of ICT in Canadian Faculties of Education. A set of categories were developed to encapsulate the interview data. This was done as the data were reviewed in NVivo using constant comparison both within section (i.e., each interview question across participants), within participants across all questions, and then by construct or category. At each stage, the material was reviewed in its entirety before coding occurred. If a new category node was created, all previously reviewed materials were then re-examined for coding with this new node. This is consistent with the principles of the grounded theory approach, which derives constructs directly from data as opposed to theories already developed by other researchers (Gall, Borg, & Gall, 1996).

Each interview was turned into a separate rich text formatted document. Data were then coded by section into nodes by "question." The materials were then reviewed and coded by section (or question). A summary node was then created within each question node and included any material that had been coded. This created a shorter document from which results were reported. At the conclusion of reviewing and coding all seven question response documents, the new category nodes were re-examined within participants across all questions. Finally, the category nodes were examined across all participants and across all questions. A list of nodes used for coding can be found in Appendix E. Recorded audio and notes were used to record raw interview data. Participants will not be identified by name, nor institution, to protect confidentiality.

Trustworthiness

The results of the interviews are anticipated to be useful to participants in reflecting on their own experiences involved with technology education. As a researcher and practitioner in the field of educational technology, I am aware that I hold beliefs that favour the infusion of technology in education and that this might influence my interpretations. Given this predisposition to be in favour of technology education, how can readers be persuaded to believe that these findings are worthy of attention (Lincoln & Guba, 1985)? With regard to process, each interview began directly with a review of the study and assurances of confidentiality, followed with an invitation to participate in the study as well as to provide consent for audio recording. During the interviews, I retained the structure of the questions and avoided active participation so as not to influence participants. The criteria for trustworthiness (credibility, transferability, dependability, and confirmability) described by Lincoln and Guba (1985) are discussed below. Further information on my background can be found in my curriculum vitae (see Appendix G).

Lincoln and Guba (1985) describe a number of techniques to increase credibility in findings, so that the audience can be assured that any interpretations are authentic. Prolonged engagement is one criterion, which has been partially satisfied in this dissertation. Because I have been involved in technology education in various preservice teacher education settings, which included a few innovators, but mostly those unfamiliar or even unsupportive of technology in education, I feel I have invested sufficient time learning the culture around this phenomenon and intimately across three post-secondary institutions. I did not, however, have prolonged engagement with the participants in this study. I was only partially able to address the notion of triangulation, whereby one uses multiple methods, different sources, and different investigators. I have used multiple methods (survey and interviews) to gather information on this topic, but was unable to use different investigators due to the emergent design and the hard-to-reach population. No inter-rater reliability can be provided as I am the only person who has access to the raw data as outlined in the ethics application; therefore, no external auditing was conducted. I was able to consult with my supervisor, however, regarding the interpretation and analysis of the data while protecting participant confidentiality and anonymity. During the formation of the research questions, I did discuss wording with members of my supervisory committee and graduate student colleagues. In the absence of a debriefer (a disinterested peer serving as a devil's advocate), I continuously looked for disconfirming evidence and attempted to remain aware of potential biases in favour of ICT. Participants had a limited opportunity to participate in member checking, in that they had the opportunity to complete the survey and review the interview questions prior to participation in the interview whereby judgmental comments could be received. For example, one participant reported to me a perceived bias I had not expected, which was that of a "large institution bias," due to the reference to "regular" vs. "after-degree" programs. The term "regular" was acknowledged to as holding negative connotations.

Transferability was provided by means of a description of emergent themes as supported by relevant excerpts from participant transcripts. Furthermore, a wide range of information was provided as participants existed in different contexts and this range was represented in the quotations provided. Readers are expected to draw on these to apply the results to their own situation.

Dependability is to the naturalist what reliability is to the conventionalist as described by Lincoln and Guba (1985). Essentially, it refers to the replication of the study with the expectation that a dependable research study will produce consistent results. Lincoln and Guba (1985) suggest the process of the inquiry audit to establish dependability in a research process and in the research product. To satisfy this, research notes and portions of raw data from telephone transcripts are open to scrutiny by the supervisory committee, so long as any identifiable comments or portions are removed as per research ethics.

Confirmability refers to the ability to ground findings in the data through consistency of the report and logical inferences rather than inquirer bias (Lincoln & Guba, 1985). Since confirmability audits are resource-intensive (estimated to take one week to ten days by a consultant), none occurred for this dissertation. A database of notes was maintained, although not in the shape of a reflexive journal.

As Lincoln and Guba (1985) describe, there is "a major gulf between theoretical definitions of the trustworthiness criteria and the means of operationalizing them" (p. 329). It is believed that the actions taken during this study provide a minimally acceptable level of trustworthiness while maximizing the privacy of the participants and their institutions, which is believed to have contributed to maximizing the openness of participants as well as the response rate with this hard-to-reach group.

CHAPTER 4: RESULTS

Study One: Faculties of Education

Profile of Respondents

Thirty-five Faculties of Education were invited to participate in the study. Table 1 summarizes the responses received from Faculties of Education across Canada.

Table 1. Faculty Response Rate by Province

Province	Ratio of Participating Faculties of Education	
	Survey	Interview
British Columbia	4/8 (50%)	3/8 (37.5%)*
Alberta	4/4 (100%)	3/4 (75%)*
Saskatchewan	1/2 (50%)	0/2 (0%)*
Manitoba	1/3 (33%)	1/3 (33%)
Ontario	2/9 (22%)	1/9 (11.1%)*
Quebec	0/3 (0%)	0/3 (0%)
New Brunswick	1/2 (50%)	1/2 (50%)
Nova Scotia	1/2 (50%)	1/2 (50%)
Prince Edward Island	0/1 (0%)	0/1 (0%)
Newfoundland and Labrador	0/1 (0%)	0/1 (0%)
Yukon	n/a	n/a
Total Faculties of Education	14/35 (40%)	10/35 (28.6%)*

Note. Table represents participation rate in survey portion. Modifications for interview participation are shown marked with an asterisk (*) as not all Faculties completed an interview.

Fourteen Faculties participated in the study, yielding a participation rate of 40%. All fourteen participated in the survey (six were heads of Education programs in a capacity as dean, chair, or director, with the remaining eight being faculty members selected by the head of program). Ten Faculties participated in the open-ended interview portion. Six were the head of the Education program as dean, director, or chair, and four were designated faculty members. The size of education programs for participating Faculties of Education ranged widely as shown in Table 2. The mean number of annual B.Ed. graduates was 304 with a standard deviation of 322. The median was 200. Thirteen of the respondents, who reported number of Education undergraduate students who graduated annually, represented 3949 students in total.

Table 2. Frequencies for Annual B.Ed. Graduates

		Frequency	Percent	Valid Percent
	54	1	7.1	7.7
	60	1	7.1	7.7
	70	1	7.1	7.7
	100	1	7.1	7.7
	136	1	7.1	7.7
	200	2	14.3	15.4
	239	1	7.1	7.7
	280	1	7.1	7.7
	290	1	7.1	7.7
	420	1	7.1	7.7
	700	1	7.1	7.7
	1200	1	7.1	7.7
	Total	13	92.9	100.0
Missing	System	1	7.1	
Total		14	100.0	

Table 3 describes the post degree profile for annual B.Ed. graduates for participating Education programs.

Table 3. Statistics for Annual B.Ed. Post Degree Graduates

		Elementary	Middle & Secondary	Other
N	Valid	10	10	3
	Missing	4	4	11
Mean		86	99	39
Median		65	79	35
Std. Deviation		73	82	27
Minimum		20	0	14
Maximum		230	210	68

Table 4 describes the number of annual graduates for non-post degree education programs.

Table 4. Statistics for Annual B.Ed. Non-Post Degree Graduates

		Elementary	Middle & Secondary	Other
N	Valid	8	6	2
	Missing	6	8	12
Mean		112	87	144
Median		88	65	144
Std. Deviation		131	95	107
Minimum		0	0	68
Maximum		400	243	220

An option was allowed for Faculties of Education to choose an "other" category, which did not fit into the post degree or non-post degree options. No responses were received, so it can be interpreted that all undergraduate program profiles were included in the previous tables.

Survey Responses on Structure of Technology Education in Faculties of Education

Required courses in technology education

All Faculties of Education that responded reported they had an undergraduate educational technology course offering. The number of these courses ranged from 1 to 10 (see Table 5). With the largest frequency cluster at six responses, 42.9 percent of the Faculties reported an offering of 2 educational technology courses.

Table 5. Number of Undergraduate Technology Courses Offered

Number of courses	Frequency	Percent
1	4	28.6
2	6	42.9
3	1	7.1
5	1	7.1
9	1	7.1
10	1	7.1
Total	14	100.0

Of the 14 Faculties, 4 (28.6%) reported the educational technology courses as being elective only (see Table 6). Ten Faculties (71.4%) reported having at least one required educational technology course. Table 7 shows the breakdown of course requirement status by program size for 13 Faculties.

Table 6. Breakdown of Technology Course Requirement Status

Requirement Status			
Elective Only	Mixed	Required Only	Total
4	5	5	14
28.6%	35.7%	35.7%	100%

Table 7. Crosstabulation of Program Size and Course Requirement Status

		Technology Course		
		Elective Only	Mixed	Required Only
Program Size	200 or less	1	2	4
	201 or more	3	3	0

Note. Data are based on 13 Faculties due to missing value on program size

At first glance, it may appear that smaller programs (200 or less) are more likely to have required courses over larger programs (201 or more), perhaps because of greater integration in larger programs; however, a Pearson chi-square value of 5.154, p=0.076 is not significant (minimum expected count less than five).

Respondents were asked about the scheduling for any required ICT courses during their program. Responses are provided in Table 8. Ten respondents, representing 100% of those who reported offering required ICT courses, also spoke to the timing of the required course(s) in relation to major practica. Six reported the required course(s) were offered before any practica, one reported after, one reported between two major practica, and two reported courses before and after major practica.

Table 8. Frequencies for Timing of Required ICT Course Offering in Program

	Before Entering	Beginning	Midway	Near Completion
Number	1	6	4	2
Percentage	10%	60%	40%	20%

Note. n=10; percentage calculated on the 10 respondents that reported one or more ICT courses were required; respondents could reply in more than one category where applicable

Elective courses in technology education

Elective ICT courses were reported in 9 Faculties of Education; however, 5 of the 14 Faculties reported having only required educational technology courses (1 or 2). Table 9 shows a crosstabulation of course requirement status and program size, excluding programs only offering elective ICT courses. The results show that all remaining programs that reported offering only required educational technology courses were small programs, where programs that offered a mix of required and elective weighted on the large program side with three to two.

Table 9. Crosstabulation of Required and Mixed Required/Elective Technology Courses and Program Size

		Program Size	
		200 or less	201 or more
Technology Course Status	Required only	4	0
	Mixed Required and Elective	2	3

Note. X^2=3.6, df=1, p=.058 using 9 valid cases; minimum expected count is 1.33

Non-credit programs that focus on technology

Of the 13 valid cases (one blank response), none of the Faculties of Education reported offering any non-credit programs that focus on technology.

Diploma programs that focus on technology

With 13 valid cases to report (one blank response), 11 Faculties of Education reported offering no diploma programs that focus on technology. Of the remaining two Faculties, one reported having one graduate diploma program, while the other reported two (one in Educational Psychology and one in Secondary Education). A t-test showed no significance when compared on program size ($p=.208$).

Graduate programs that focus on technology

Of the 13 valid cases (one blank response), 11 Faculties of Education reported offering no graduate programs that focus on technology. Of the remaining two Faculties, one reported offering two graduate programs and one reported offering seven. Another Faculty reported their M.Ed. admissions were suspended, while under review and revision. Two other Faculties reported offering graduate courses, although they offered no graduate programs that focus on technology (one offered one graduate course, while the second offered six graduate courses). A t-test showed no significance when compared on program size ($p=.374$).

Electronic portfolio programs

Of the 13 valid cases (one blank response), eight Faculties of Education (61.5%) reported that no e-portfolio program was offered, while five (38.5%) reported that such a program was offered. Of this five, two reported the program was optional (15% of 13 valid cases), while three (23%) reported the program was required. Of the eight Faculties that reported no such e-portfolio program, two (15%) reported they were in the process of developing one. Of the remaining six Faculties without an e-portfolio program, one Faculty referenced an online showcase for peer-reviewed publishing of student undergraduate projects and another reported e-portfolios were not officially required in their program, but were expected if they took one of two undergraduate technology courses. Similarly, a third Faculty reported that they encouraged the process, but did not have anything formal in place.

The structure of these courses and/or programs (i.e., topics covered)

Specific descriptions of courses cannot be provided in order to preserve the identity of institutions that participated in the study; however, Table 10 provides a breakdown of content for required ICT courses as described in university calendar descriptions. Where two courses were required, the collective content of both course descriptions were used to complete the table. A majority of course descriptions were very broad in nature and referenced basic skills and integration of technology. Eight course descriptions referenced basic skills in their course descriptions, but only four of those went into any further description of what those skills were. Only three course descriptions were found to reference critical issues or theory.

Table 10. Overview of Structure of Required ICT Courses by Participating Institution

	Institution													
Component	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Basic skills or technology productivity/multi media	X	X	.	X	-	X	X	X	X	X	.		.	.
- Word Processing			.	X	-	X					.		.	.
- Internet tools	X		.	X	-	X		X			.		.	.
- Digital Media Processing (Scan, etc.)	X		.		-						.		.	.
- Presentations	X		.		-	X					.		.	.
- Spreadsheets	X		.	X	-						.		.	.
- Databases	X		.	X	-	X					.		.	.
- Digital Video	X		.	X	-						.		.	.
- Digital Sounds	X		.		-						.		.	.
Integration of Technology/ Program Planning		X	.		-	X	X	X		X	.	X	.	.
Alternate Delivery Option	X		.	X	-						.		.	.
Students Apply Work in Field			.				X				.		.	.
Theory, Critical Analysis, and/or Issues			.				X		X	X	.		.	.
E-portfolio			.							X	.		.	.
Grade (G) vs. Pass/Fail (P)	G		.	P	-			G			.		.	.
Specific (S) vs. Broad (B)	S	B	.	S	-	S	B	B	B	B	.	B	.	.

Note. A period (.) designates a Faculty with no required course; a dash (-) designates a missing calendar description; an X indicates a component is present whereas a blank cell indicates a component is absent from the calendar description.

Level of participation in e-learning

All 14 universities responded to the questions regarding level of online course delivery in the undergraduate education program. Eleven Faculties (79%) reported an estimate of 80-100% of Education undergraduate courses being delivered in a face-to-face environment with no supplemental online or electronic materials (See Table 11). The mean percentage for face-to-face courses was 77.4% (SD=22.3).

Table 11. Percentage of Face-to-Face Undergraduate Education Courses With No Supplemental Online or Electronic Materials

% F2F	Frequency	% of Total
25	1	7.1
50	1	7.1
60	1	7.1
65	1	7.1
70	1	7.1
71	1	7.1
80	2	14.3
93	5	35.7
97	1	7.1
100	3	21.4
Total	14	100.0

Table 12 presents the data on the percentage of blended undergraduate Education courses; that is, courses that were Face-to-Face supplemented with online or electronic components. Only one Faculty reported more than half of a program offering blended instruction. Eleven Faculties (79%) reported 25% or less of courses were supplemented with online or electronic components. The mean percentage for blended courses was 18.6% (SD=20.7).

Table 12. Percentage of Blended Undergraduate Education Courses

% Blended	Frequency	% of Total
0	3	21.4
2	1	7.1
4	1	7.1
5	1	7.1
15	1	7.1
20	2	14.3
24	1	7.1
25	1	7.1
30	1	7.1
40	1	7.1
75	1	7.1
Total	14	100.0

Table 13 presents the data on the percentage of online undergraduate Education courses; that is, courses that were delivered via distributed electronic learning. Twelve Faculties (86%) reported 5% or less of courses were offered entirely online. At the upper end, one Faculty reported 25% of their undergraduate courses were online. The mean percentage for online courses was 4.4% (SD=6.6).

Table 13. Percentage of Undergraduate Education Courses Delivered Online

% Online	Frequency	% of Total
0	5	35.7
1	1	7.1
2	1	7.1
3	1	7.1
5	4	28.6
10	1	7.1
25	1	7.1
Total	14	100.0

Faculties were asked to report an estimated percentage of the total undergraduate student population that was receiving instruction through online courses during the school year on either a full-time (half or more of their total course load) or part-time basis (less than half of their total load). Reponses are reported in Tables 14 and 15.

Table 14. Estimated Percentage of Undergraduate Education Students Receiving Instruction Online On a Full-Time Basis

% Online full-time	Frequency	% of Total	Valid %
0	11	78.6	84.6
5	2	14.2	15.4
Total	13	92.9	100.0
Missing	1	7.1	
Total	14	100.0	

Note. Full-time is half or more of total course load

Table 15. Estimated Percentage of Undergraduate Education Students Receiving Instruction Online On a Part-Time Basis

% Online Part-Time	Frequency	% of Total	Valid %
0	7	50.0	53.8
2	1	7.1	7.7
5	3	21.4	23.1
10	1	7.1	7.7
20	1	7.1	7.7
Total	13	92.9	100.0
Missing	1	7.1	
Total	14	100.0	

Note. Part-time is less than half of total course load)

As shown in Table 14, a majority of Education students do not receive instruction online on a full-time basis as 78.6% of institutions reported that none of their students received full-time online instruction. Table 15 presents the part-time online enrollment, which is greater than full-time enrollment in that only 50% of Faculties reported that no undergraduates were receiving instruction on even a part-time basis. At the most, one Faculty reported as many as 20% of undergraduate Education students were enrolled in part-time online courses. This response was provided by a Faculty with three faculty members who specialize in technology as well as three PEA staff, who specialize in technology. A cross tabulation of results shows the spread of responses for part-time (Table 16) and full-time (Table 17) online enrollment by number of faculty specializing in technology.

Table 16. Crosstabulation of Part-Time Online Enrollment of Education Undergraduates and Number of Faculty Specializing in Technology

		% of Online Part-Time Instruction				
		0%	2%	5%	20%	Total N
Number of IT Faculty	0	1	0	0	0	1
	1	3	0	0	0	3
	2	3	0	0	0	3
	3	0	0	1	1	2
	4	0	0	1	0	1
	9	0	1	0	0	1
Total N		7	1	2	1	11

Table 17. Crosstabulation of Full-Time Online Enrollment of Education Undergraduates and Number of Faculty Specializing in Technology

		% of Online Full-Time Instruction		
		0%	5%	Total N
Number of IT Faculty	0	1	0	1
	1	3	0	3
	2	3	0	3
	3	2	0	2
	4	0	1	1
	9	1	0	1
Total N		10	1	11

Number and Sex of FTE Education Faculty Members

The number and sex of FTE faculty members in Faculties of Education who participated is reported in Table 18.

Table 18. Number and Sex of FTE Education Faculty members

	IT Faculty			FTE Faculty		
	Male	Female	Total	Male	Female	Total
Mean	1.3	1.1	2.4	18.4	20.7	39.0
Std. Deviation	1.2	1.3	2.4	16.2	18.2	34.2
Min	0.0	0.0	0.0	1.0	3.0	4.0
Max	4.0	5.0	9.0	50.0	58.0	108.0

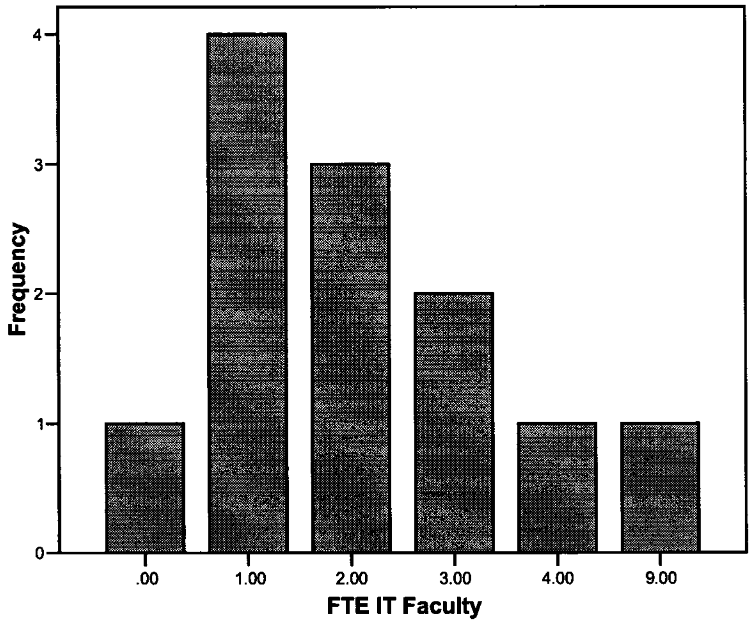
Note. n=13, missing=1 for FTE Faculty; n=12, missing=2 for FTE IT Faculty

The mean number of full time equivalent (FTE) faculty members is 39 while the median is 26 with a standard deviation of 34. The Faculties had a fairly equal representation of men and women (mean scores were 18 male and 20 female). The ratio statistics for male faculty to all faculty members is 0.44 with a standard deviation of 0.12 (minimum was .017 and maximum 0.61). The ratio of female faculty to all faculty members was 0.56 with a standard deviation of 0.12 (minimum was 0.39 and maximum was 0.83).

Number and Sex of FTE Faculty Members Specializing in Technology

The number of faculty members reported who specialize in technology per Faculty varied widely (see Figure 1). The mean was 2.4, while the median was 2.0 with a standard deviation of 2.4 (see Table 18). In looking at the sex of faculty members specializing in educational technology, the mean number of men who specialized in educational technology was 1.33 (SD=1.23) while the mean number of women was 1.08 (SD=1.31).

Figure 1. Number of FTE IT Faculty members



The ratio of faculty specializing in technology to all faculty members ranged from 0.0 to 0.50 over 11 valid cases. The mean of IT faculty per Faculty of Education was 1.3 with a standard deviation of 1.4. The ratio statistics for male technology faculty to all technology faculty members is 0.55 with a standard deviation of 0.33 (minimum was 0.0 and maximum 1.0). The ratio of female technology faculty to all technology faculty members was 0.45 with a standard deviation of 0.33 (minimum was 0.0 and maximum was 1.0).

Profile of Integration

When considering integration, a great deal of responsibility lies with the faculty members, who must model or integrate ICT in some way. When participants were asked to estimate what percentage of faculty members routinely uses ICT in their teaching, thirteen responded. The mean percentage was 49.15% with a median of 50% and standard deviation of 24.48. The minimum reported percentage was 15% while the maximum was 80%.

A four-point Likert scale was used to explore to what extent various specific technology applications were incorporated into teaching practices within each Faculty (1=Never, 2=Some of the time, 3=Most of the time, 4=Always). The results are reported in Table 19.

The highest integration level was found to be reported with the most basic productivity software. Word processing was the technology application with the highest mean score, representing a midpoint between most of the time and always. Special needs software was reported with the lowest mean score.

Table 19. Incorporation of ICT into Teaching Practices

Technology Application	Mean	Median	Standard Deviation	Min	Max
Using Word Processing or Desktop Publishing*	3.46	3.00	.52	3.00	4.00
Using Presentation Software	2.93	3.00	.73	2.00	4.00
Disseminating Information Via the Internet/Intranet (e.g., publishing projects)	2.79	3.00	.58	2.00	4.00
Online or Distributed Electronic Learning	2.36	2.00	.74	1.00	4.00
Using Software for Specific Subject Areas (e.g., math, etc.)	2.18	2.00	.67	1.00	3.00
Using Software Supporting Creative Works (e.g., music, art, etc.)	2.14	2.00	.53	1.00	3.00
Using Spreadsheets and Database Software for Simple Data Manipulation and Statistical Analysis	2.07	2.00	.62	1.00	3.00
Using Software for Special Needs	1.86	2.00	.77	1.00	3.00

Note. Results ranked by mean score; an asterisk (*) designates an N of 13 where all others have an N of 14

All participants were asked to describe any features of their teacher education programs that use ICT in a unique or exceptional way. The 10 responses are provided in Table 20.

Table 20. Reports of Unique ICT Features in Teacher Education Program

Faculty adopting teaching for utilization of mobile labs
[Course name] is unique in that it infuses the ICT outcomes into the Elementary Program of Studies and expects students to plan, design, and "test-drive" their learning events with children in schools.
Learning bench, virtual practicum
All students get an introductory module [Name]. There is specialization in technology that students can opt for by taking 4 technology-related courses and doing a practicum in a school that takes advantage of technology in significant ways.
8 workstation video editing suite
Students create technology-based second language acquisition lesson aids and professional portfolios for job interviews.
Electronic portfolios required for all B.Ed. teacher candidates
The technology course is a requirement in our B.Ed.
We have a iPre-service laptop program - a pilot for this year
We have two integrated research projects: [Name] (for improving digital competencies from pre-internship through internship) and [Name] (promoting mentorship technology relationship with Faculty members). Also, we incorporate group blogs with students, even for those leaving the program. Blogging is becoming very important in our Faculty. We have various mini-labs throughout, and the use of a portable iBook lab is quite popular.

Survey Responses on Support for Technology in Faculties of Education

Full-time equivalent (FTE) technology support staff

The number of FTE technical support staff reported as serving Faculties of Education varied widely. Two participants reported that technical support was handled centrally. While one reported that they could not provide an FTE equivalent, the other provided a numeric response. Of the 13 valid responses, the mean number of FTE technical support was 3.08 (SD=3.03). The median was 2.0. The minimum score reported was 0.1, while the maximum was 12.0. When looking at the number of technical support staff, one must consider the size of the group being supported. A ratio was calculated to investigate the ratio of technical support staff to total faculty members, as well as the ratio of technical support staff to both IT faculty and to Education undergraduate students. The number of valid cases varies depending on the variables included as they have different participants missing different items. Using a valid N of 12, the mean of the ratio of technical support to total number of faculty members was 0.11 (SD=0.11, Median=0.07), with a maximum score of 0.33 and a minimum score of .03. Using a valid N of 11, the mean of the ratio of technical support to total number of IT faculty members was 1.11 (SD=0.70), with a maximum score of 2.50 and a minimum score of .05. With an N of 12, the mean of the ratio of technical support to Education undergraduate students was 0.02 (SD=0.16) with a maximum score of .06 and a minimum score of 0.01. When asked if this number was adequate, five respondents reported no, while eight respondents reported yes. Four of the five participants who responded no stated the number of technical support staff required to meet the needs of students and faculty in order to be adequate; these responses were often double their existing number (one to four, three to six, four to six, and two to four). Table 21 shows the breakdown of responses by ratio of tech support to all faculty members. Because cells were less than five, the Fisher exact text was applied to the regular chi-square test (p=.013) and resulted in a score of p=.028, which is significant at the p=.05 level. This indicates that there is significant dependency among these categories.

Faculties of Education were asked to report on satisfaction with technical support using a four-point Likert scale. The results are provided in Table 22. A satisfaction scale was created using the first seven items and excluding the overall satisfaction item. A reliability coefficient of .943 (Cronbach's Alpha) was calculated for this seven-item

Table 21. Crosstabulation for Adequate Number of Tech Support and Ratio of Tech Support to All Faculty Members

		Ratio of Tech Support to All Faculty Members		Total
		0.0-0.08	0.09-0.33	
Adequate Number of Tech Support?	No	5	0	5
	Yes	2	5	7
Total		7	5	12

Note. 0.09 was chosen to separate the ratio categories because it was a mid-point between the median and mean value of ratio.

scale. The correlation between the aggregate of the seven items and the separate overall satisfaction item was .959, significant at the .01 level (2-tailed), indicating that a relationship exists and the scale is a reliable measure of satisfaction with technical support.

Table 22. Satisfaction with Technical Support

	Min	Max	Mean	Standard Deviation
Availability	1.00	4.00	3.00	.91
Reliability	2.00	4.00	3.15	.90
Timeliness	2.00	4.00	3.08	.86
Ability to Fix Problems	1.00	4.00	3.00	1.15
Ability to Maintain Equipment	2.00	4.00	3.00	.91
Success rates	2.00	4.00	3.00	.91
Ability to support cutting edge applications	1.00	4.00	2.46	1.05
Overall satisfaction	1.00	4.00	3.00	1.00

Note. 1=Poor, 2=Good, 3=Very Good, 4=Excellent, Valid n=13

Some Faculties reported that they had professional staff who specialized in technology. This position is not considered a part of technical support, but is someone who serves a professional/management and often administrative role. The mean number of FTE professional staff in the Faculty who specialized in educational technology was 1.14 (SD=1.51). The minimum number reported was zero, while the maximum number was five. Upon investigation, the outlier Faculty that reported five had commented that these positions were University positions as opposed to Faculty ones. Upon removal of this outlier and using 13 valid cases, the figures changed to a mean of .85 (SD=1.07) with a minimum of 0 and a maximum of 3. Frequencies are shown in Table 23. These management positions provide an additional supporting role for the implementation of technology in a Faculty of Education; however, the largest portion (6 or 46.2%) of Faculties of Education had no such position.

Table 23. Frequency Table for Professional Staff Specializing in Technology

Number of Professional Staff	Frequency	%
0	6	46.2
1	5	38.5
3	2	15.4
Total	13	100.0

Available facilities (i.e., classrooms connected to the Internet, etc.)

Information was collected on the computer facilities provided in each Faculty. The results are shown in Table 24. The quantity of classrooms varied widely as shown in the minimum/maximum scores and the standard deviation. While a large number of these classrooms appear to have Internet connections, there appear to be few with projection systems installed. The proportions for Internet access to total classrooms and projection

Table 24. Classroom Facilities in Faculties of Education

	Total Classrooms	Classrooms Connected to Internet	Classrooms with Projection System
Mean	18.62	16.54	3.38
Median	10.00	7.00	3.00
Std. Deviation	22.5	22.84	1.89
Minimum	2.00	1.00	.00
Maximum	85.00	85.00	6.00

Note. 13 valid cases; 1 missing

systems to total classrooms yield a more accurate picture of Internet and projection installation and are provided in Table 25.

Table 25. Percentages for Internet and Projection Systems in Classrooms

	% of Classrooms with Internet	% of Classrooms with Projection Systems
Mean	85	50
Median	100	50
Std. Deviation	25	36
Minimum	19	0
Maximum	100	100

Note. 13 valid cases; 1 missing

Frequencies for these proportions are provided in Table 26 and Table 27. The highest frequencies for Internet systems in classrooms were at the 100 percent with 8 responses.

Table 26. Frequencies for Percentage of Classrooms with Internet

% of Classrooms with Internet	Frequency	Valid %
19	1	7.7
50	1	7.7
70	1	7.7
75	1	7.7
96	1	7.7
100	8	61.5
Total	13	100.0

Note. 13 valid cases; 1 missing

Unlike the Internet access in classrooms, the distribution of responses for projection systems in classrooms were more spread out as indicated in Table 27.

A crosstabulation of Internet installation by program size (see Table 28) or projector installation by program size (see Table 29) is provided. A chi-square did not report any significance on either set, even though Table 29 appeared to show that smaller programs have a higher ratio of classrooms with projection systems. This may be due in part to the smaller number of classrooms a program of 200 or less may have to support. Overall, this study did not have enough power to draw any strong conclusions regarding significance.

Table 27. Frequencies for Percentage of Classrooms with Projection Systems

%	Frequency	Valid %
0	1	7.7
7	1	7.7
18	1	7.7
20	1	7.7
22	1	7.7
43	1	7.7
50	2	15.4
60	1	7.7
75	1	7.7
100	3	23.1
Total	13	100.0

Note. 13 valid cases; 1 missing

Table 28. Crosstabulation of Internet in Classrooms and Program Size

		Ratio of Classrooms with Internet to All Classrooms		Total
		0.0-0.84	0.85-1.00	
Program Size	200 or less	2	4	6
	201 or more	2	4	6
Total		4	8	12

Note. 0.85 was chosen to separate the ratio categories because it was the mean value of ratio of classrooms with Internet

Table 29. Crosstabulation of Projectors in Classrooms and Program Size

		Ratio of Classrooms with Projectors to All Classrooms		Total
		0.0-0.45	0.5-1.00	
Program Size	200 or less	1	5	6
	201 or more	4	2	6
Total		5	7	12

Note. 0.5 was chosen to separate the ratio categories because it was the mean value of ratio of classrooms with projectors; X^2=3.086, df=1, p=.079 using 12 valid cases; minimum expected count is 2.5

The number of computer labs, both stationary and mobile are provided in Table 30. Using 13 valid responses (one missing), there was an average of 87 students per computer lab. The median score was 56 while the standard deviation was 64. The minimum number of students per computer lab was 27 while the maximum was 233. There appeared to be no relationship between program size and ratio of students to computer lab.

Table 30. Computer Facilities in Faculties of Education

	Number of Stationary Computer Labs	Number of Portable Computer Labs
Mean	3.29	.64
Std. Deviation	2.33	1.15
Minimum	1.00	.00
Maximum	8.00	4.00

Note. 14 valid cases; 0 missing

There was an "other" category, where some Faculties reported an open-ended response (see Table 31).

Table 31. Open-ended Responses to Computer Facilities

4 classrooms with projectors but no computers
8 laptops for loan
Not sure # classrooms; all classrooms with internet and projection systems; We maintain a set of 6 laptops that are used by faculty
2 Portable data projectors
All of our classrooms are Internet accessible but not easily done without technical support. We are in the process of developing easy access for all education classrooms in the building.
Faculty has 1 laptop, 1 infocus machine, 1digital video, 1 digital camera
1 computer lab 20+ computers
7 roving workstations
5 Multimedia carts

The ratios of mobile labs to all computer labs in a Faculty of Education yield a more accurate picture of their implementation. The mean percentage of mobile computer labs to all computer labs was 9 (SD=14) with a minimum percentage of 0 and a maximum percentage of 40. This provides a more accurate estimate of within-Faculty presence of mobile computer labs as opposed to total counts.

The presence of mobile computer labs in Faculties of Education is very low with a mean under 10%. The frequency table for percentage of mobile computer labs to all computer labs (mobile and stationary included) is provided in Table 32 and shows the highest frequency at 0% with 64.3% of responses. The largest percentage of mobile computer labs is at 40%, but with a frequency of only one. Of the 13 participants who responded to this item, six out of seven (or 86%) of those with 200 or fewer students reported having no mobile lab, while two out of six (or 33%) of programs with 201 or more students reported having no mobile lab. Of the five Faculties that reported having mobile labs, the number of students to each mobile lab ranged from 140 to 420.

Table 32. Frequencies for Percentage of Mobile to all Computer Labs

% of labs that are mobile	Frequency	% of total
0	9	64.3
13	1	7.1
14	1	7.1
25	1	7.1
33	1	7.1
40	1	7.1
Total	14	100.0

Participants were asked to rate the overall facilities in serving their education program for both students and faculty using a 5-point Likert scale (1=very inadequate, 2=inadequate, 3=adequate, 4=good, 5=very good). It is important to note that no standard checklist was provided to help rank facilities. Each rating was defined within each institution. Responses for rating facilities for students are reported in Table 33.

The mean and median responses indicate the respondents rated the facilities provided for students as adequate (3) to good (4). Frequency tables for each of the four items for rating facilities for students are shown in Tables 34 through 37.

Table 33. Rating of Facilities in Serving Students

	Quantity	Quality	Access	Support
Mean	3.50	3.57	3.57	3.50
Median	3.50	4.00	4.00	4.00
Std. Deviation	1.09	1.16	1.09	.85
Minimum	2.00	1.00	2.00	2.00
Maximum	5.00	5.00	5.00	5.00

Note. 14 valid cases; 0 missing

Table 34. Quantity of Facilities for Students

	Very inadequate	Inadequate	Adequate	Good	Very Good
Frequency	0	3	4	4	3
Percentage	0.0	21.4	28.6	28.6	21.4

Note. 14 valid cases; 0 missing

Table 35. Quality of Facilities for Students

	Very inadequate	Inadequate	Adequate	Good	Very Good
Frequency	1	1	4	5	3
Percentage	7.1	7.1	28.6	35.7	21.4

Note. 14 valid cases; 0 missing

Table 36. Access to Facilities for Students

	Very inadequate	Inadequate	Adequate	Good	Very Good
Frequency	0	3	3	5	3
Percentage	0.0	21.4	21.4	35.7	21.4

Note. 14 valid cases; 0 missing

Table 37. Support for Students

	Very inadequate	Inadequate	Adequate	Good	Very Good
Frequency	0	2	4	7	1
Percentage	0.0	14.3	28.6	50.0	7.1

Note. 14 valid cases; 0 missing

The responses for rating facilities for faculty members are shown in Table 38.

Table 38. Rating of Facilities in Serving Faculty

	Quantity	Quality	Access	Support
Mean	4.29	4.00	4.07	4.29
Median	5.00	4.00	4.00	5.00
Std. Deviation	1.07	1.18	0.92	1.07
Minimum	2.00	2.00	2.00	2.00
Maximum	5.00	5.00	5.00	5.00

Note. 14 valid cases; 0 missing

The mean and median responses show that respondents rated the facilities provided for faculty members as good to very good. A one-point increase over ratings of facilities provided for students. Frequency tables for each of the four items for rating facilities for faculty members are shown in Tables 39 through 42.

Table 39. Quantity of Facilities for Faculty

	Very inadequate	Inadequate	Adequate	Good	Very Good
Frequency	0	1	3	1	9
Percentage	0.0	7.1	21.4	7.1	64.3

Note. 14 valid cases; 0 missing

Table 40. Quality of Facilities for Faculty

	Very inadequate	Inadequate	Adequate	Good	Very Good
Frequency	0	3	0	5	6
Percentage	0.0	21.4	0	35.7	42.9

Note. 14 valid cases; 0 missing

Table 41. Access to Facilities for Faculty

	Very inadequate	Inadequate	Adequate	Good	Very Good
Frequency	0	1	2	6	5
Percentage	0.0	7.1	14.3	42.9	35.7

Note. 14 valid cases; 0 missing

Table 42. Support for Faculty

	Very inadequate	Inadequate	Adequate	Good	Very Good
Frequency	0	2	0	4	8
Percentage	0.0	14.3	0	28.6	57.1

Note. 14 valid cases; 0 missing

Technology advisory committee

Each participant was asked to complete a section on ICT planning and funding. Of the 14 Faculties, nine (64.3%) reported having a technology advisory committee. This leaves five (35.7%) Faculties reporting they had none. There was no relationship between size of program and the existence of a technology advisory committee.

Technology plan

Even though nine Faculties reported having a technology advisory committee, only six reported to have a written technology plan in place. Eight (57.1%) of Faculties reported having no such plan. The six Faculties with a written technology plan, representing 42.9% of the 14 participating Faculties, all reported their plans provided details about hardware acquisition, software acquisition, and upgrading and replacement. When asked how often they updated these plans, three reported annually, one reported every three years, one reported every three to five years, and one reported it was reviewed, but generally not updated. Five of these six reported their plans were multi-year plans. There was no relationship between the presence of a technology plan and program size nor was there a relationship between technology plan and budget.

Annual budget specifically to support technology

When asked if an annual budget was provided specifically to support technology, nine (64.3%) of the 14 reported they did have a specific budget. The remaining five (35.7%) did not. A breakdown of responses is provided in Table 43. These figures were reported for the 2004-05 academic year with the exception of one for the 2003-04 academic year, which is noted below.

Table 43. Size and Source of IT Budget

Size of Budget	Source(s) of Funding
Not able to be shared	Not able to be shared
Varies with our needs. We decide each year how large it should be.	-
$6,000	Base budget
$22,500	Tuition fees and external grants
$45,000	-
$75,000	Base budget
$200,000	Operating/University
$285,000	Operating budget, endowment funds
$1.5 million, plus department expenditures (2003-04 academic year)	Operating and ACCESS grants
Again, this is centralized. Can tell people at large institutions wrote this - made too many assumptions	-

Note. 9 cases reported having a specific budget for technology. Text in italics denotes response from participant who reported no IT budget

The five Faculties that reported not have a specific budget to support technology were then asked how much they estimated to spend annually to support technology (see Table 44). A comparison of program size and presence of a specified budget for IT is present in Table 45. A chi-square test showed no significance (X^2=2.23, df=1, p=.135 using 13 valid cases; minimum expected count is 2.31). Because cells were less than five, the Fisher exact text was applied to the regular chi-square test and resulted in a score of .266, which is not significant at the p=.05 level.

Table 44. Amount Spent on ICT by Faculties With No IT Budget

Size of Budget	Academic Year
On actual technological equipment last year about $200,000. On IT support salaries, about $180,000.	2003-04
-	
This is an institution-wide area of expenditure for leasing and replacing equipment. Estimate $12-15,000/yr for B.Ed. program (Faculty and students).	2003-04
$175,000 (includes computer personnel; base budget and soft money; designated department supply money).	2003-04
$7,000	2003-04

Note. n=5

Table 45. IT Budget and Program Size

		Program Size		Total
		200 or less	201 or more	
IT Budget	No	4	1	5
	Yes	3	5	8
Total		7	6	13

When looking at the amount of budget per undergraduate student graduating annually, there were only six valid cases to consider when taking into account the missing data from each variable being considered. The mean value was $606 per student while the median was $506 per student (SD=463.34). The minimum amount per student reported was $44 while the maximum reported was $1250.

Faculty professional development opportunities in technology

Participants were asked to complete a section of the survey on teacher skills and professional development. When asked what percentage of faculty members possess the technical skills required to use ICT for administrative purposes (e.g., preparing grades, recording attendance), thirteen of the respondents responded. The mean response was 77.15% (SD=36.16) with a median of 98%. Frequencies for responses are reported in Table 46. The minimum was 5% and the maximum was 100%.

Table 46. Frequencies for Percentage of Faculty Members with Skills to Use ICT for Administrative Purposes

% of Faculty	Frequency	Valid %
5	1	7.7
15	1	7.7
25	1	7.7
80	1	7.7
90	2	15.4
98	1	7.7
100	6	46.2

Note. 13 valid cases; 1 missing

When asked the same question, but with regard to technical skills required to engage students in using ICT effectively to enhance their learning, the mean response of thirteen respondents was 39.61% (SD=22.02) with a median of 50%. The minimum score was 12% and the maximum was 75%. Frequencies are provided in Table 47.

Participants were asked about the emphasis ("What emphasis is placed on the following strategies to help faculty members learn how to use ICT?") and effectiveness ("How do you perceive the effectiveness of the following strategies in helping faculty members learn ICT for use in their teaching?") on different approaches to professional development for their faculty members. A four-point Likert scale was used (1=none, 2=little, 3=some, 4=a lot). The different approaches asked about were 1) on campus training sessions (half or full days), 2) mentoring/coaching activities with other instructors, 3) information-sharing with other staff members (e.g., technical support), 4) summer programs, 5) e-learning, 6) personal-learning activities, 7) professional development funds for conferences/workshops. A final option for "other" formats was provided in which participants were asked to describe if chosen. For the responses on both emphasis and effectiveness on professional development strategy, one participant chose this "other" option and rated a faculty-based professional development unit as used "a lot" for both categories.

Table 47. Frequencies for Percentage of Faculty Members with Skills to Engage Students in Using ICT Effectively to Enhance Their Learning

% of Faculty	Frequency	Valid Percent
12	1	7.7
15	1	7.7
20	3	23.1
23	1	7.7
50	4	30.8
60	1	7.7
70	1	7.7
75	1	7.7

Note. 13 valid cases; 1 missing

The descriptive statistics for the fourteen responses toward emphasis on the seven designated strategies are shown in Table 48.

Table 48. Emphasis on Professional Development Strategies

Professional Development Strategy	Mean	Median	Standard Deviation	Minimum	Maximum
Info Share With Staff	2.79	3.00	.70	2.00	4.00
On Campus	2.64	3.00	.74	1.00	4.00
Personal Learning*	2.62	3.00	.65	1.00	3.00
Mentor	2.57	3.00	.85	1.00	4.00
E-Learning	2.50	2.50	1.22	1.00	4.00
Professional Development Funds	2.14	2.00	.86	1.00	3.00
Summer Program	1.36	1.00	.63	1.00	3.00

Note. Results ranked by mean score; an asterisk (*) designates N of 13, all others N of 14

The strategy with the highest mean is information sharing with staff, such as just-in-time help with technical support staff, whereas the strategy with the lowest mean involved offering programs in the summer. Overall, there does not seem to be a single strategy that is consistently prominent across Faculties of Education that receives a lot of emphasis. Frequencies of responses provided in Table 49 support this. The strategy that received the highest frequency of responses in the "a lot" of emphasis category was e-learning with four responses, but it was the fifth ranked strategy of emphasis by mean score out of the seven provided options. It was also the strategy with the largest variability in response with a standard deviation of 1.22 on a four-point scale. The positive and negative ends of the scale have mirrored frequency counts.

Table 49. Frequencies for Emphasis on Professional Development Strategies

Professional Development Strategy		None	Little	Some	A Lot
E-Learning	Frequency	**4.0**	3.0	3.0	**4.0**
	Valid %	**28.6**	21.4	21.4	**28.6**
Info Share with Staff	Frequency	0.0	5.0	**7.0**	2.0
	Valid %	0.0	35.7	**50.0**	14.3
On Campus Training	Frequency	1.0	4.0	**8.0**	1.0
	Valid %	7.1	28.6	**57.1**	7.1
Mentor	Frequency	2.0	3.0	**8.0**	1.0
	Valid %	14.3	21.4	**57.1**	7.1
Personal Learning*	Frequency	1.0	3.0	**9.0**	0.0
	Valid %	7.7	23.1	**69.2**	0.0
Professional Development Funds	Frequency	4.0	4.0	**6.0**	0.0
	Valid %	28.6	28.6	**42.9**	0.0
Summer Programs	Frequency	**10.0**	3.0	1.0	0.0
	Valid %	**71.4**	21.4	7.1	0.0

Note. Ranked by Frequency of Response in "A Lot" Category; Bold text designates highest frequency response, an asterisk (*) designates N of 13, all others N of 14

The descriptive statistics for the fourteen responses toward effectiveness on the seven designated strategies are shown in Table 50. The strategy with the highest mean is information sharing with staff, just as in the emphasis scale. The strategy with the lowest mean again involved offering programs in the summer. In comparing Table 48 on emphasis placed on the strategy and Table 50 on effectiveness of strategy, where strategies are ranked by mean score, on-campus training was ranked second for perceived emphasis, but fell to fourth for perceived effectiveness. The more personalized strategies, Information Sharing with Staff, Mentoring, and Personal Learning are the top three strategies for effectiveness and are three out of the top four for emphasis.

Table 50. Effectiveness of Professional Development Strategies

Professional Development Strategy	Mean	Median	Standard Deviation	Minimum	Maximum
Info Share With Staff	3.21	3.00	.70	2.00	4.00
Mentor	3.14	3.00	.95	1.00	4.00
Personal Learning	2.86	3.00	.95	1.00	4.00
On Campus	2.79	3.00	.70	2.00	4.00
Professional Development Funds	2.79	3.00	.80	1.00	4.00
E-Learning*	2.46	3.00	.78	1.00	3.00
Summer Program*	1.85	2.00	.69	1.00	3.00

Note. Results ranked by mean score; an asterisk (*) designates N of 13, all others N of 14

The two strategies, Information Sharing with Staff and Mentoring, have the highest means. Frequencies of responses provided in Table 51 support this, showing the Mentoring strategy with a greater portion of responses in the "a lot" category. In fact, Mentoring is the strategy that received the highest frequency of responses in the "a lot" for effectiveness.

Faculty incentives to use technology

All participants responded to the questions regarding incentives for faculty members to use technology. Six participants (42.9%) reported they had no incentives offered to faculty, while eight (57.1%) reported they did have incentives to offer. The

Table 51. Frequencies for Effectiveness of Professional Development Strategies

Professional Development Strategy		None	Little	Some	A Lot
Mentor	Frequency	1	2	5	**6**
	Valid %	7.1	14.3	35.7	**42.9**
Info Share with Staff	Frequency	0	2	**7**	5
	Valid %	0	14.3	**50.0**	35.7
Personal Learning	Frequency	2	1	**8**	3
	Valid %	14.3	7.1	**57.1**	21.4
On Campus Training	Frequency	0	5	**7**	2
	Valid %	0	35.7	**50.0**	14.3
Professional Development Funds	Frequency	1	3	**8**	2
	Valid %	7.1	21.4	**57.1**	14.3
E-Learning*	Frequency	2	3	**8**	0
	Valid %	15.4	23.1	**61.5**	0
Summer Programs*	Frequency	4	**7**	2	0
	Valid %	30.8	**53.8**	15.4	0

Note. Ranked by frequency of response in "A Lot" category; bold text designates highest frequency response; an asterisk (*) designates N of 13, all others N of 14

breakdown of incentives by number of students graduating annually is reported in Table 52. Because cells were less than five, the Fisher exact text was applied to the Pearson chi-square test (p=.048) and resulted in a score of p=.103, which is not significant at the p=.05 level.

The descriptions of these incentives provided by participants are shown in Table 53. Some comments are more abstract in nature in describing these incentives (i.e., "better instruction"), making it difficult to accept the above statistics as representing a more tangible incentive (i.e., "faculty evaluation" for annual merit).

Table 52. Incentives to Use Technology and Program Size

		Program Size		Total
		200 or less	201 or more	
Incentives to Use Technology	No	5	1	6
	Yes	2	5	7
Total		7	6	13

Note. Pearson X^2=3.9, df=1, p=.048 using 13 valid cases; minimum expected count is 2.77; Fisher's exact test yields p=.103

Table 53. Comments Describing Faculty Incentives to Use Technology

	Comment
1	Faculty Evaluation now includes integration of technology as one consideration
2	Faculty are provided desktop computers and professional development opportunities in-house
3	Interest-free loan to purchase hardware or software.
4	Grant acquisition and a general interest expressed by students/university.
5	Every faculty member has a desktop in their office and access to everything
6	Access to laptop and other equipment - LCD etc.
7	Better instruction.
8	Student benefit, keeping up-to-date, conference funding, strategic opportunities funding, better teaching and learning

Eleven of the participants (78.6%) reported that technology was not included as a performance indicator in the annual review of faculty members. Three participants (21.4%) reported that technology was, however, included in the annual review of performance. Two of these participants reported it was not, however, a separate category from research, teaching, and service, whereas one participant reported it was a separate category. Upon further inspection of their annual report, it appears that technology was a separate component within the teaching category, but not a separate category in and of itself.

Annual expenditures and sources of funding for library's collection development

When it came to reporting expenditures, a number of the respondents reported the statistics were difficult to obtain as it was not under their control. Many reported the library, often centrally, handled that financial aspect. Only eight participants provided responses for this question. From the numbers that were provided, it is difficult to know whether the participants reported expenses incurred by the library or by the Faculty of Education. Some provided a budgetary amount in one category (such as the physical collection), but noted that the budget for electronic materials were included in the physical collection budget. The total expenses for all three categories (physical collection, audio-visual materials, and electronic materials) might be the most accurate figure, rather than the breakdown of each. The mean annual expense was $43,705 (SD=43,240). The median was $28,048. The minimum reported amount was $1200 while the maximum reported amount was $138,843. The interest of the question was to get a look at the ratio of electronic to paper resources. From the values that were provided, the mean ratio statistic calculated based on six responses for electronic materials to physical materials (not including audio-visual) was .137 (SD=.26) with a median of .039. The minimum value was 0.0 while maximum value was 0.66.

Perceived obstacles that may inhibit technology use

All fourteen participants responded to the section on obstacles, namely, obstacles that inhibit ICT use in their Faculty. A four-point Likert scale used (1=not at all, 2=very little, 3=somewhat, 4=extensively). Upon review of the scale design, the 'not applicable' item was placed in the same line as the other scale items, which may have created some error in the interpretation. Since the respondents had to write in a numeric response in a field rather than circling a point on a scale, one can hope that they referred to the field titles rather than the scale numbers. The descriptive statistics for this scale are provided in Table 54.

Table 54. Obstacles That Inhibit ICT Use in Faculties of Education

	Type of Obstacle	Mean	Median	Standard Deviation	Min	Max
Hardware	Sufficient Number of Computers	2.43	2.00	1.22	1.00	5.00
	Up to Date	2.79	3.00	1.05	1.00	5.00
Software	Sufficient Licenses	2.79	3.00	1.19	1.00	5.00
	Up to Date	3.00	3.00	1.24	1.00	5.00
Instruction	Instructor Time for Prep	3.29	3.00	.73	2.00	5.00
	Instructor Knowledge/Skill	3.14	3.00	.77	2.00	4.00
	Instructor Attitude	3.14	3.00	.95	2.00	5.00
	Student Knowledge/Skill	2.36	2.00	.633	1.00	3.00
	Student Attitude	2.43	2.00	.85	2.00	5.00
	Administration Attitude	2.21	2.00	1.19	1.00	5.00
	Making Room in Programs for ICT Courses/Activities	3.21	3.00	.70	2.00	4.00
Other	Sufficient Funding for Technology	3.27	3.00	1.01	2.00	5.00

Note. 14 valid cases

The largest obstacle overall was time with a mean score of 3.29 (between somewhat and extensively). This was followed by sufficient funding for technology (3.27), making room in programs for ICT courses or activities (3.21), instructor attitude or buy-in (3.14), and instructor knowledge or skill (3.14). The smallest obstacle reported was administration attitude or buy-in with a mean score of 2.21 (between very little and somewhat). This was followed by student knowledge or skill (2.36), student attitude or buy-in (2.43), and sufficient number of computers (2.43).

Interview Responses on Technology in Faculties of Education

This section presents the research findings from the interviews with representatives from ten Faculties of Education. Six participants were the head of the Education program as dean, director, or chair. Of these six, four represented universities while two represented university colleges. Four participants were faculty members identified as appropriate participants by the dean, director, or chair. Of these four, two represented universities, while two represented university colleges. Of the remaining four study participants who did not follow through with the interview, all potential interviewees were faculty members as opposed to Deans or other heads of program.

Participants are not be identified by name, nor institution, to protect confidentiality. A pseudonym has been assigned to each interview participant as shown in Table 55, but the sex of each substitute name does not have any relationship with actual participants. The institutional status, position of interview participant, number of faculty members and students, number of faculty members whose area focuses on ICT, and ratio of technical support to both faculty and students are included as attributes.

Table 55. Profile of Participants

Person	Institutional Status	Position	Number of Faculty/Students: Faculty	Number of Faculty/Students: Students	# of IT Faculty	Ratio of Tech Support to Faculty/ Students: Faculty	Ratio of Tech Support to Faculty/ Students: Students
Greg	UC	Faculty	< 40	≤200	0-2	**.33**	**.04**
Laura	U	Head	**40+**	**201+**	n/a	**.11**	.01
Chris	UC	Head	< 40	≤200	0-2	.08	.01
Ryan	U	Head	**40+**	**201+**	**3+**	.04	.01
Todd	UC	Head	< 40	≤200	0-2	**.33**	**.06**
Claire	U	Faculty	**40+**	n/a	**3+**	.06	n/a
Deb	U	Faculty	**40+**	**201+**	**3+**	**.09**	.01
Rachel	UC	Faculty	< 40	≤200	0-2	.03	.00
Joan	U	Head	< 40	≤200	0-2	**.17**	.02
Mark	U	Head	< 40	≤200	0-2	n/a	n/a

Note. UC = University College; U = University; bold text mark values in the upper category by being above a previously designated cut-off value or mean

Question 1

Is your Faculty where you want it to be with regard to technology? If not, why not?

A large majority of participants (9/10) reported their Faculty was not where they wanted it to be with regard to technology. The one participant, who indicated yes, was quoted as saying, “Yes, in context of all Faculties. We’re in the upper half at least” and mentioned it was evolving (Laura). This participant’s Faculty was recorded through the survey as being the one with the largest budget specifically for technology with the recorded size being five times larger than the second largest budget. It was also the largest Faculty, but the ratio of IT budget to number of students still exceeded the next faculty by a factor of 1.23. A second participant, Ryan, made reference to being ahead of a majority of other Faculties, "I think our faculty is further ahead than almost, well, certainly the majority of Faculties," however, he answered no to whether his Faculty was where he wanted it to be and reported "there is always more to do."

Three of the respondents made a reference to growth or evolution in the area of ICT within their Faculty (Laura, Deb, and Claire). Four made reference to the fact that technology is always changing – a moving target (Laura, Ryan, Greg, and Claire). When asked if their faculty was where they want to be, three participants noted that faculty development was an area of focus or for improvement (Laura, Ryan, and Claire).

> We have institutional professional development by students. It's evolving. (Laura)
>
> I think there is more professional development work that we want to do. (Ryan)
>
> The other plan is that we're running all kinds of different workshops and technology initiatives for the Faculty so that they can take part in these things. (Claire)

Four participants (Deb, Joan, Chris, Rachel), different from the three who commented on faculty development, made reference to the level of skill or knowledge about technology, but the comments about this topic varied. Two felt faculty themselves were good with technology, while two had grave concerns about faculty expertise.

> More new faculty members are tech savvy and more access [to the Internet in classrooms and technology equipment] is required. (Deb)

> I think the faculty themselves are quite good with technology, it's just that we don't have the equipment and we don't have the smart classrooms that we would like. (Joan)

> No, not really where we want it to be. The reason is faculty are in the middle ages with no expertise. More critically, there is no desire or motivation. ... The students know more than the faculty. (Chris).

> I think right now probably my biggest concern is the fact that some colleagues just are not skilled enough to actually teach with technology and while they can use certain applications for displaying their works, such as PowerPoint and so on, they are not actually infusing technology and technology expectations into their actual teaching particularly of methods courses. (Rachel)

Four universities referenced faculty buy-in (Greg, Chris, Mark, and Todd).

> The Faculty is not at the level it could be. The reason... We have competent educational technology staff. It's a philosophical discussion. If we taught it [the technology skills] rather than create it [the technology products] for them. We all have computers. I think to get at the core. Philosophy is at the core. Faculty would not use technology if not mandated. They find it to be too much work, too much information. (Greg)

> No, not really where we want it to be. The reason is faculty are in the middle ages with no expertise. More critically, there is no desire or motivation. (Chris)

> I would say as far as interest, yes. As far as resources, no. To have the equipment and the time both individually and as a group, we don't have the, I think, the facilities that we would like to have, but I would say all of the faculty are quite interested in using appropriate technologies if and when necessary for various instructional purposes. (Mark)

> I'd like to see more faculty use ICT day to day, of course. This is not happening, even thought we have portable carts with computers. Classrooms are connected to the Internet. So, physically everything is in place, but faculty members are not picking it up. (Todd)

Three appear to point to a lack of buy-in, priority level, or interest, whereas Mark indicates faculty interest is there, but resources is the obstacle holding them back –

similar to Joan's comment with regard to faculty skill. Todd appears to have the opposite problem, whereby the resources (equipment) are there, but the faculty adoption is the barrier. Another comment on infrastructure as an obstacle was made by Deb:

> We are presently unable to use the Internet in all teaching classrooms even though the wiring is there. There is quite a bit of competition for equipment and the competition is growing month by month. (Deb)

One participant, Chris, commented on how students were exceeding the faculty in technological preparedness, "The students know more than the faculty," while Laura reported that faculty professional development was conducted by students. Chris went on to report that they had a failed attempt at implementing laptop leasing for students to be paid for by students; he further reported a lack of collaboration or communication with regard to exchanging ICT implementation expertise and experience.

> They had laptops at [University A] in Music; Dean of Education at [University B] has laptops. Only he is aware of what to do so it's a failure for us. (Chris)

Joan, who answered that their Faculty was not where she wanted it to be, commented on the interest to move courses online.

> No, it's not. I would personally like to design my course so that it's offered online or, I'm using the wrong language, so it's a web-based kind of program. I think some faculty have done that, but I wouldn't say it's across the board anywhere really in this university. (Joan)

She went on to comment further on the need for better technical support in their Faculty.

> If you wanted to have the sound speakers revisited because something has gone wrong and there is no sound, that's just about impossible. I think they have too few people working on those middle places - the tech person. Then there is the little cluster of people in the computer labs, but

> they are not people you would get in to fix your LCD projector connections. Stuff like that. (Joan)

Question 2

What would you like to see done differently in your Faculty with regard to technology?

When participants were asked what they would like to see done differently with regard to technology in their Faculty, the respondents emphasized the awareness or professional development of faculty members. Some participants referred to creating change in a number of ways.

> I would like all of us to have more opportunity to take training, or is that the right word, to have education in it. Maybe even release time so we can learn how to use new technologies because I would guess that all of us have just done it on our own time even as to taking computer tech courses like 15 years ago that we just did alone and because, in thinking of myself, I was interested. I think there are opportunities, but they are always at odd times, like, you know, WebCT course offered Friday morning and of course you're teaching. (Joan)

> I would like to see more of the faculty being asked to do one project per year that either integrates or teaches technology. Where they could be going - like to see that. If not using technology, then give that to others to use. There is a handful of faculty who don't even type. It's not in the job description. (Greg)

Other participants, however, reported they would continue on the trajectory of faculty development already under way.

> We would only enrich what we're doing. We have continuing professional development for faculty provide resources to sustain professional development for faculty and students. (Laura)

> We have good tech support and good equipment within our Faculty. I've been fortunate to have been able to put in the hands of all of my faculty the level of equipment they want and have good in-house technical support for them. It's made quite a difference in terms of the faculty

> willingness to become more involved and more understanding of the role technology could play. I think there is still work to be done in increasing faculty's awareness of the relevance and appropriate use of technology today, so I would say there is still work to do with faculty professional development. There probably always will be. I attend many of these kinds of sessions around the world to see what it is and how forward thinking we need to be because the field moves quickly and so I think for the faculty - current faculty at least - that there is going to be a learning curve for some time. (Ryan)

The issue of faculty buy-in was still apparent. Rachel, who sees buy-in as an obstacle summarized the concern:

> Well, we've provided I think the infrastructure and the hardware. I don't think we've done enough professional development, but you can't force people into professional development in an area they don't feel comfortable with. All I've tried to do is, I think, coordinate efforts so that people that I work with know basically how to access resources, know how to use everything that is available, and what I've tried to do as coordinator of this area is offer workshops and things, but to date I just don't get any response. (Rachel)

Rachel further reported they would be doing away with the required educational technology course for the purpose of integrating technology into all other courses. The faculty member previously responsible for teaching the technology courses would then have to support integration into the courses of other faculty members as part of the teaching workload. She reported that this move toward integration could have an impact on faculty buy-in.

> I think if we start to begin to make that move, the expectation is going to be evident and clear, whereas in the past it's sort of been like, hmm, well, that's technology. If we're lucky it will go away but, in fact, what I'm trying to do is actually increase the environmental pressure to say it's not going away. (Rachel)

The reference, again, to buy-in from faculty was evident in Todd's response, which juxtaposes the requirement for students to learn ICT with faculty members' perception that the current professional development opportunity is not appropriate.

> What we need to do is look for faculty perspective on ways to use ICT that you'd like to do. There is an institutional ICT group that does a great job of providing instruction free of charge to faculty, so the opportunity is there. Somehow, people don't feel it's appropriate. Students take a mandatory course, though. (Todd)

While faculty buy-in was a dominant theme, other constructs were apparent. The need for equipment was mentioned. Mark referred to the need for equipment to support infusion into subject area courses.

> I think it would be really nice if we had enough resources and enough expertise within the Faculty so that we could say "alright, we need some more technology in the language program, therefore, … the faculty member who does the program could go with the students to a lab or bring the equipment into the classroom and actually guide them through some activities or help them with the IT in their program right there - hands on. As a matter of fact, that's one of the initiatives we're looking at is getting a class set of laptops. We're wireless now in the Faculty, so that any classroom basically can be a lab, so language instruction could take the 30 machines into the classroom and do hands-on stuff with the students for IT and language. (Mark)

This supports Ryan's comment made previously in this section on the impact good tech support and good equipment on faculty willingness to become more involved and more understanding of the role technology can play.

Two participants did make reference to research in the area of ICT in education as something they would like to see done differently in their Faculty. Mark reported faculty were interested in doing more research with technology as a tool, but lack of hardware was an obstacle.

> I know some faculty want to be involved in creating digital video research and using that as classroom presentations, working with that with their students. Again, unless we have a digital video lab, that would be next to impossible to do. So, again, I would say faculty are using what we have well in their teaching and having their students use it in their own work, but as far as, again, the resources aren't there. The hardware, software, etc. (Mark)

Ryan reported the need for further research in this area to inform practice.

> I would like to see us enhance still further our research in this area so that we can stay ahead of understanding the impacts and kinds of things that are happening in Education in technology. (Ryan)

Other constructs did surface in the responses from participants, like reference to increased collaboration with other organizations for e-learning

Question 3

Please discuss the strategies being used for faculty development or faculty renewal in the area of technology.

There was a wide variety of strategies for faculty development or faculty renewal with regard to ICT reported by the various participants. Two participants commented on the role of technical support staff in faculty development. Deb mentioned that technical support staff provided assistance to faculty members in the area of WebCT for full delivery or supplemental use.

> Support staff helps faculty members to offer WebCT courses and to integrate face-to-face teaching with WebCT support. This is a huge area of growth, especially as new staff come on the scene. This year, for example, I integrated all of my face-to-face courses with WebCT. (Deb)

Greg also commented on the role of tech support in terms of professional development, which seems to reflect a faculty-centred approach on a just-in-time basis.

> We have a very good technician who comes to your office to help or come to your classroom and help plan with computers. (Greg)

Workshops are a common strategy among the participants interviewed. Seven participants made reference to workshops or sessions that were either operated within the Faculty or through a campus unit. Claire even made reference to programs that are offered outside of the university and based in the community.

> As I was saying, we're running a lot of different workshops. We're always looking at programs that are being offered around the university and the community for example and in other places and encouraging faculty to take part in these. ...We have another group in the university and what they do is they look at various ways they can support the faculty and faculty will come to them and say 'I want to include some video streaming in my instruction' and they'll help ... And they'll help them implement that. They have a lot of the state of the art equipment to do that and to capture digital stuff and to translate it and that kind of thing. (Claire)

Joan referred to WebCT courses, while Todd reported offering mentoring workshops. Greg referenced the same strategy of workshops, but mentioned that a campus lab was dedicated to faculty members.

> We do have professional development opportunities on campus. The [name] group puts on workshops entry/intermediate/advanced levels of MS Office, Dreamweaver, etc. They can take workshops in them. We have dedicated labs for faculty on campus with hardware readily available. This lab is accessible only by faculty. ... for faculty to do digital video, dubbing of tape, etc. There is professional development within our own Faculty to let people see what each of us does. We have exemplars to show what we've done to others on campus. (Greg)

The professional development sessions described by Ryan seem to have a focus on faculty awareness and knowledge of ICT expectations that are within their provincial curriculum

> We do professional development sessions for the faculty members who are teaching in the teacher education program, so that they are aware of the technology the ICT expectations in the curriculum for the province and

> that they are prepared to be able to work with that to embed and infuse it in their everyday work in the teacher education program … We are trying to infuse it throughout the way we teach, the way we learn, the way we do business in the Faculty, so it becomes a natural expectation. We do have some catch-up programs both for students and faculty, who are late comers so they can move along with the mainstream, which is now well beyond the early adopters. (Ryan)

Rachel echoes this notion of knowledge and awareness in professional development over just skill development.

> We're talking about people who are instructing preservice who themselves never ever learned to teach using technology as a tool or to teach with technology. The understanding of that curriculum is very minimal on the part of so many people that I run into. Teachers in schools. Principals in schools. Instructors at this level. So, I think, just to shift their thinking into how to interpret that curriculum, so you're not just taking kids into a lab and having them hammer away at a keyboard that there is a lot more to teaching with technology than what we used to think of learning a tool. (Rachel)

The obstacle of time was raised in Joan's response, where faculty workload seemed to prevent faculty from utilizing the professional development efforts of the administration.

> I would say our department's administration is making a good effort, but it doesn't always work for us in Education because we are so busy and we teach so much - and we are quite computer literate already. (Joan)

Still different from the others in the workshop strategy, one Faculty has a special stream of sessions for untenured faculty members.

> Regular, weekly, announcements about inservicing and workshops are made … Our Dean has arranged special professional development sessions for untenured staff. Once a term, untenured staff get together for a seminar/workshop supporting ICT use in teaching and research (e.g., building personal websites) … Also, there are regular workshops on Website construction, data management, SPSS, archiving, and others related to teaching and research. (Deb)

Two participants, Chris and Mark, stated that there was little being done in the area of faculty development.

> Unfortunately, we're doing very little. There is some in-house support from the [University] and an educator. Some teaching has favoured education. (Chris)

> As far as anything specific, there is nothing. (Mark)

In contrast, Laura described a professional development unit that was offered within their faculty.

> We have a professional development unit that focuses on this. We provide mobile labs. Technology skills are learned in context of their current capabilities. We are advancing the university-level opportunities accessible to faculty to set up this professional development unit. (Laura)

Rachel described a unique approach to removing the stand-alone ICT course and infusing it into all other subject areas. The ICT instructor would then use that freed teaching time to work with other instructors on integration.

> The expectation for me there is that I work with those [number of] instructors in year one to get them teaching with technology at least a small amount. (Rachel)

While this is a program initiative, it also functions as a professional development initiative.

The issue of incentives was raised by six of the participants. Three responses focused on equipment, with two focused on putting a "laptop of their choosing" (Claire) or "good equipment" (Ryan) into the hands of each faculty member, while the third described the campus lab dedicated for faculty on campus with "hardware readily available" there (Greg). Deb described competitive internal university grants to support teaching and learning with technology as an incentive. Chris pointed out in his response that there was not much in the way of course release or financial support and they "need to work on that." Claire commented on the issue of ICT being recognized in annual salary increments or 'merit.'

> We've tried to formalize it with the agreements and so on with our union people so that it actually becomes a part of the contract because it was difficult before for people who were doing webpage development and online course development. (Claire)

Two participants, Todd and Ryan, made reference to some type of collaboration, either internal through an increased culture of educational technology faculty and students, or externally, through attendance at a forum or partnership with an educational technology network. Todd's description of the forum seemed to have an impact on the attendee, but despite efforts to translate it to other faculty in a scaffolding approach, it did not work. This points perhaps to the importance of direct experiences, since the institutional offerings referred to are a source of a direct professional development strategy.

> Last winter, the University of [Other University] hosted a forum. The head of our B.Ed. program went. It worked for [her/his] use and s/he showed us, but it hasn't been translated [to our faculty members]. We're relying on what the institution has to offer. (Todd)

Ryan's Faculty appears to have an emphasis on collaboration in both internal and external ways. The increase in educational technology faculty members supports a collaborative environment in this area, whereas most Faculties have one or no faculty members who focus on ICT. This could speak to an issue of critical mass. The involvement in provincial and international committees related to ICT is a service contribution, but also appears to keep the Faculty on top of latest developments in the field. It would be highly difficult for a single faculty member in this area to be able to do this to any capacity.

> We have hired in our Faculty [a number of] new faculty members who are in the area of educational technology, so that we can explore a variety of different areas in educational technology. We applied for and received government support … to support new graduate students in the Faculty and to enable them to work with us. We sit on as many provincial and international committees as we can in the area of educational technology, so that we can bring home to the Faculty cutting edge ideas. We have partnered with a group called [name] that's quite a forward thinking group. (Ryan)

Question 4

Please describe any features of your teacher education program that integrate ICT in a unique or exceptional way.

While there were a few interesting initiatives described by participants, the overall standing was fairly mainstream in comparison to the initiatives described in the research literature. Mark describes the effort to infuse technology, but points out that the effort is not likely to be unique.

> I would say all of us in one way, shape, or form, are infusing technology into all of our courses. … I'm not sure I would call it unique. I would hope most institutions in Canada are doing that, so I would say students are working a little bit with video. I had a student actually use my office to create a role-play situation that was videoed and then shown to students for a discussion ... And, again, so each course is integrating them in their own way, varying, of course, from instructor to instructor. (Mark)

Three participants made reference to e-learning, either offering fully online distributed delivery or using online materials to supplement face-to-face classes.

> The use of WebCT is not exceptional. There is no whiteboard in the Faculty. I am at a loss to describe what is exceptional. I have my own ideas - would like to see a blended learning model - go for part of the class and do project-based learning. (Chris)

> There aren't any [exceptional or unique features]. We teach one online class with another institution. I expect the answers will be different in a couple of years when [we will be partnering with another institution]. It's still traditional. (Todd)

> Three new staff members are using WebCT for discussion groups and journaling online in their classes. This is hardly innovative, but is a change and an addition to WebCT users since the previous year. (Deb)

Two participants described e-portfolio initiatives.

> Students this year create e-portfolios that chronicles their work as they go through the program so they have something to present to match program outcomes. In the past, it was text-based, but now it's mandatory that it's electronic. Video clips of teachers, documents from various letters of reference or hiring committees. (Greg)

> ...we have required all of our [secondary] teacher candidates to create electronic professional portfolios. In this, the second year of requiring electronic portfolios, the early and middle grade teacher candidates have requested the same for their program and it is likely that they will take this on in the future depending on the skill of the facilitators/instructors and the growing demand from the teacher candidates. (Deb)

Deb's response also included a second initiative that focused on interdisciplinary expertise to develop an integration unit that utilized ICT. Both of these initiatives were supported through the same internal grant program to support ICT initiatives. Greg expands on his previous description of e-portfolios to describe the contributions and expectations from education students

> Students design websites for the schools they do a practicum for. ... Students more and more are expected to give presentations using the web or PowerPoint or projectors - that's another feature of our program. (Greg)

Rachel focused on collaborative projects that connected preservice and inservice teachers in the practicum classroom for ICT projects.

> ...we're playing with a lot of this crossing over the desk where we have preservice people as I said with the risk-taking attitude and the

> accountability issues, because they have to perform and create, because of course it's for a grade, with the wisdom of the classroom teacher, saying 'that's really good, but we're going to do it this way' and we're hoping to see again another set of really exciting things happening. (Rachel)

Rachel and Laura commented on the existence of an ICT hands-on field experience.

> I think another piece of that that's kind of exciting is that all of my students test-drive their projects in schools, so they actually go into elementary classrooms with their projects, put them on the network for the school and then teach them in a real classroom and get real feedback and then re-evaluate their project, make the changes, and then hand it in for grading. (Rachel)

> We have one exemplar field experience where technology is set up in the classroom for science using probe capabilities. (Laura)

Three participants reported the stand-alone courses as being unique and exceptional in their design or delivery. Deb describes an elective course, while Joan and Rachel describe a required one.

> Finally, [we] offered a new undergrad elective course on how to teach using distance education materials … I did this in cooperation with the [Ministry of Education], using their course materials. … We offer some interesting electives including media literacy and video making. (Deb)

> Well, I do think the course I teach in year two is probably well, I think, it's just an exceptional course in the sense that it doesn't treat ICT from a tool perspective. What it does is actually expect students to understand the tool, then take the tool and develop it into a cross-curricular performance-based learning event. So, all of the work they do with me - the expectation is that they, first of all, are teaching children and, secondly, using technology to enhance the teaching and using technology to teach things that are better taught with technology. (Rachel)

Joan commented on their required course in her response, but her emphasis quickly turned to the leadership from the faculty member.

> I think probably [faculty member's] course is due. [S/he] is very well known in technology, she's done reports for the … government. [S/he] has done [her/his] Ph.D. in technology in writing about it and its impact on schools, so we are very lucky we have [her/him]. I think [s/he] was one of the other people who filled out the form with me. I felt "oh, my god, I cannot write this without [faculty member]." S/he's been a mentor and a guide, really, for everyone in the Faculty and s/he's pushed us to heights. I think maybe that happens if you have someone who is sort of, not a guru, but a mentoring kind of a person. An expert and they're willing to share. I took my first computer course from her/him and I was a professor, but I went and took her/his course and I just learned so much. And of course people just bug her/him all the time. … S/he's totally a leader within the Faculty and s/he is a leader within technology (Joan)

Two participants commented on laptop initiatives.

> We have this pilot laptop program and we put laptops in the hands of teacher candidates … basically we instructed them that we'd like them to try to involve the technology wherever possible. So, if they were lesson planning, when they were on their teaching blocks for lesson presentations delivery, for record keeping, for helping students find resources - whatever application they could see the technology might apply that they could do that and then we asked them to keep logs and record what they were doing. Then we meet with them probably, turns out to be once a month and we will run a workshop for them, bring in a speaker that is using technology in some kind of unique way or has some neat tips for them on how to use the technology - that kind of thing, so those students have the benefit of using that state of the art laptop and we're kind of tracking how they're using this thing and if it's a good idea and if it's a really good idea… (Claire)

Claire noted that the selection of the pilot participants was by self-nomination followed by selection by committee and the demand did not exceed the allotted spaces by much. The laptop loan was just for the period of study, so it would have to be returned, which may have been one of the reasons they were not overwhelmed with applications. When asked if those self-nominated candidates had a background in ICT, Claire noted that was not the case. Out of the cohort, "there was probably only a couple who were really computer experts. The others were just interested in the technology" (Claire).

Laura's focus for laptops was not to assign them to students, but to use them in courses for integration and professional development.

> The use of mobile labs in combination with the professional development staff. We take technology integration into courses in the preservice classrooms. These provide hands-on opportunities to learn how it can help to achieve curricular goals. Having the professional development staff assisting professors. (Laura)

Ryan described the lack of a required course pushed them to focus on integration across the program. This idea parallels that of Rachel's response to the third interview question, whereby a required course was being removed to make way for a focus on integration by the instructor instead. The environmental pressure then exists to integrate ICT as opposed to the topic not being covered anywhere.

> I think probably the main feature in our program that is unique is that we were able much more easily to have technology integrated into work across a program and we were forced to do that because we didn't have a spot to say everyone will take a technology course. We do have some students who are able to do special topics in the area and go further, so I think that would be one of the main features. (Ryan)

Ryan further describes the result of the environmental pressure on teaching and learning within their Faculty, which is present through available ICT infrastructure and planned space.

> We decided to make the library an information resource centre where there would be a seamless integration of a computer and a book as a way of getting information. We then went a step further and decided that all of the seminar classrooms that we could possibly put into that space would be right in the space, so when you go to class X, you would be in a library and one where technology was available for you during the course of your class and your seminars. There were a number of breakaway rooms for groups say studying, let's say grade four math curriculum, they can go in together, they can bring into that room without having to sign out materials that would be appropriate for their class. It's also completely equipped so they can go online and say "this is the provincial government's guide and here are the links they want" and do both of those

> kinds of work right in that centre. It's a whole new floor that is both classroom and information resources. … That was very instrumental in making the teacher education program a more seamless program in terms of how you use technology in your everyday work. I have had faculty members tell me that they have been forced to change the way they work with students because that base [infrastructure] is available, so students expect it to be used. Students in many cases use it better than many professors and so they have learned to really appreciate how learning and technology are integrated - from watching their own students and how their own students take it up. (Ryan, Section 4, Paragraph 33)

Question 5

Is the amount of emphasis on technology in your provincial government's policy/curriculum appropriate for your Faculty?

The responses from participants for the question, "Is the amount of emphasis on technology in your provincial government's policy/curriculum appropriate for your Faculty?" could be coded and reported in a quantitative manner. Four participants reported "Yes," four participants reported "Yes, but…" and two participants reported no. The two respondents who reported "No" were from the Province of British Columbia, so were referring to policies and curriculum within that province. The "Yes, but…" category was created to capture those respondents who said the curriculum or policy was, in fact, appropriate, but reported it was not being adhered to or otherwise implemented correctly. The four participants were representative of Faculties in Western and Central Canada. Of the four responses reporting "Yes," all were from either Alberta or the eastern provinces. It's interesting to note that Alberta was the only province with a mandated core curriculum (moving towards an infusion approach as opposed to an integrated one), whereas the eastern provinces have the Foundation for the Atlantic Canada Technology Education Curriculum in common.

Claire's response was coded "Yes, but" for the quantitative overview; her comments make it clear that she does not think it is where it could be.

> I guess it's appropriate. I mean, there is no curriculum document for technology in and of itself. It's kind of integrated into all the curriculum documents, which is probably right. We used to study computers, you know, in Faculties of Ed we study how it helps in the different curricula. I think they're moving in the right wind. ...Certainly, in all of the documents, there is a smattering throughout. I think it could be more. I think if they looked at the documents and updated them all, there should be more technology included. (Claire)

Rachel's response was also coded "Yes, but" for the reason that, although the curriculum was deemed appropriate, it was not being adopted properly.

> Well, there's a significant emphasis in [province] on technology in the curriculum and I guess - is it appropriate for the Faculty? I think the biggest problem with any kind of curriculum change and new curriculum is that it's very difficult to get everybody on board, particularly if it's university level. The attitude is "well, this isn't really my area, I'm psychology, I'm special needs, I'm social studies" I think it took the [provincial] government a little bit of time to realize that the ICT curriculum standing alone in the program of studies sent a very clear message that this too shall pass and maybe if we just don't turn that page, no one will really notice that we're not doing it. And, I think, now as they move to the infused curriculum where you're going to see the blended outcomes, you're teaching social studies and the outcome has a performance piece to it that says you have to use technology to do this research. I think that will start to move people, particularly faculty into a much greater awareness. To date, I don't think many of them have even opened the curriculum and we were a very practice-based group, so it's not that they don't open the program of studies. It's just that if we can avoid ICT, "thank you, but [the ICT instructor] does it, is a little bit of what's been happening here for the past [several] years and it's finally starting to shift ...So, I think the emphasis is probably appropriate, but, as usual, I'd hate to say this. It sounds cynical, but as usual the emphasis isn't on the human resource where the people who actually have to implement the curriculum. The curriculum is lovely. It's a lovely curriculum, but it's very difficult to shift people, particularly people who never - we were not raised as that techno generation. (Rachel)

Her comments raise the issues of faculty skill and knowledge level, faculty buy-in or awareness, and, faculty support.

> Every faculty member and many faculty members in many universities across this country have not kept up, just as teachers haven't. Somehow, they missed that professional obligation and it seems to me that there ought to be maybe more support for assisting people to make the switch, but you and I both know that doesn't happen very readily. They give teachers curricula. They expect them to implement it with not a great deal of support. Well, if you're teaching preservice people and you want those people to be outstanding teachers when they get into schools, you better take a look at some faculty support and faculty awareness. They totally ignore that whole piece! These people are critical to the new generation of teachers and they're not even aware. Now, I've had my little rant. (Rachel)

Greg and Deb further corroborate this notion of the provincial ICT curricula being appropriate, but that it is not being implemented as intended.

> I think yes. The emphasis is appropriate. I just wish that faculty would understand that IRPs state technology is to be integrated into all areas. Many faculty here, despite the fact that they are teaching teachers, don't integrate technology. The amount of emphasis is good. It's just that faculty are not aware. (Greg)

> Yes, although there is still an ongoing misunderstanding about what technology is and how it can be used. Many understand it only a computers for kids and teachers. Whereas, technology to enhance learning and access to learning would be more appropriate. Some find it difficult to see the advantages of technology-use development since it means time and financial commitment to innovation and adaptation for improving teaching and learning. Superficiality of technology use is a drain on the system. I would like to see more support for a broader range of technology integration, for example, through the arts, language, and special education. (Deb)

The comments from the four participants whose responses were coded as "Yes," were more brief. Joan's positive response includes some semantic cuing that the effort was there ("they tried"), but that it may not be where it should be.

> I think so. They have tried to bring it across the curriculum. … Probably we could do more, though. (Joan)
>
> The K-12 curricular indicators are appropriate, so yes. It's a jumpstart in some ways. The K-12 curriculum came out before post-secondary teacher preparation programs could accommodate it for our own preservice students. (Laura)
>
> I think so. I don't feel that they're pushing us ahead of what we need to be pushed. I believe that schools will be irrelevant if we do not come to understand how young people today access knowledge, create knowledge and transmit it to each other. Anything that the provincial government has done at this point is, in my mind, completely appropriate. (Ryan)
>
> I think part of our province, the way they're going and the way we're going in our program is that every teacher is a technology teacher. (Mark)

Mark's full response was not clear during the interview, so when the question was restated, his response was "I would say so, yes."

Chris and Todd reported "No" to this question. Chris' comment on the lack of funding to support the curriculum appears connected to his response. His comment, "that is the <u>only</u> curricular use of technology coming from the government," seems to indicate the curriculum, however, is lacking as well.

> I would say not. … [The Minister of Education] identified technology as being important, then we asked where is the money? He said there is no pool designated for this sort of thing. The provincial curriculum moved to [snipped for anonymity] and the tech component to that [snip] that students can choose to use technology - that is the only curricular use of technology coming from the government. The money is not there to support it. It is a desire, but there are no resources there. (Chris)

Todd reports negatively about his province's curriculum, while making a comparison to the efforts of another province's curriculum. His comment also appears to touch on financial support being lacking from the province in this area.

> We don't have that kind of sophistication or coordination apparent in IT at the K-12 level as it exists in Alberta. It's there, but it's piecemeal. There is no support from the Ministry. I hear from B.Ed Advising that we need to teach the need to learn how to use ICT in distance delivery (video conferencing). One high school offers physics online or by video conferencing. As a faculty, we need to look at that need and this is in response to pressure from schools and not from the Ministry of Education. (Todd)

Question 6

Do you perceive your academic programs as meeting the needs of students for technology? Please describe.

The sixth and final question asked during the interview focused on whether the academic programs at the undergraduate level met the needs of students with relation to technology. The ten responses to this question were coded for quantitative interpretation. None of the participants responded with an outright "No" response to this question. Five participant responses were coded into a "yes" category where they felt their programs were meeting the needs of the students. The remaining five responses seemed to avoid categorization into a "yes" or "no" response and were coded as "needs improvement.' Excerpts from each respondent are provided below to provide further context to each coded response. Claire, Rachel, Greg, Joan, and Ryan provided responses that were coded into the "yes" category for their program meeting the needs of students with regard to technology.

> Well, you know, I mean when they come to us, of course, they may know a lot of technology, but they don't necessarily know the pedagogy involved in using the technology, so I mean, I guess the program sets them up so we can easily work with the skills they have to then look at the pedagogy and develop the pedagogy with them. I mean, we don't spend anytime anymore on developing skills, so they already come to us knowing how to navigate MS Word and all those programs, but certainly as far as how to use it in their classroom, no they don't do much of a job

of that at all. So, we kind of take them from that basis. … [So, to summarize, your academic programs meet the needs for technology with regard to pedagogy using them with the skills they come with and you focus on the pedagogy?] Yes, right. They pick that up in the B.Ed. year. (Claire)

Well, you know, I'd hate to pat myself on the back, but I think we've done a really good job here and when we do our exit interviews and so on and the [provincial] government has a whole process where they take a look at new grads and ask some questions as to whether or not they can meet the KSAs, etc., etc. Our students generally stand out for their ability to use and teach with technology. I think many of them got jobs in schools over the last few years because of that. They do stand out. … I've had support once my program took off to keep our lab totally up to date. I've had a [program] grant for the last five years with the latest and best applications, software, class server, all those kinds of things, but I'm finding that I'm at the stage that I don't know if I can keep up. I guess what I have to realize is what I bring to it is some of that wisdom of teaching with technology, not just here is the tool, who can do all of the glitzy things, but rather I think what I can bring to them is an understanding how to build guts into something as opposed to just glitz and it's really tricky. It's a very fine balance, but I think we're doing a good job. (Rachel)

Yes, I do. … Every single year, we have a new crop of students. We're getting better at meeting their needs. We have entry requirements that they be used to technology. They're starting to use technology outside of our educational technology courses. There is proof that with technology they can get jobs - coming in as a great white hope - we're getting that feedback. (Greg)

Yes, because I think a lot of our B.A. or B.Sc. students when they come to us - they haven't been using much technology except to write an essay or something like that. Except for the odd computer science grad that we get, so, yes, we're meeting their needs. In fact, it's a bit of a learning curve for some of the kids when they take the technology courses, which is surprising isn't it. (Joan)

I do at the current time. I say that with a qualification that one cannot ever sit still in this – I see change in terms of how learning is going to be influenced by technology. (Ryan)

The remaining five responses are those that presented themselves in a way that they could not be coded as a "no," so, rather, a "needs improvement" category was used to represent a “not yes” response. These responses refer to meeting “very basic needs,” meeting needs “in some way,” “as much as resources are available,” “moving in the right direction,” and one that offered respect to instructors in the area, but reported “there is so much more that can be done.”

> Both [programs] feature a course - an ICT course - and we have a very good person that teaches it. It has high ratings by students - it’s the kind of person who can relate it to them. We are in some way meeting that need. (Chris)

> I think you’re talking more at the undergraduate level, so as much as the resources are available. (Mark)

> It meets the very basic needs. When you go into the classroom with one Apple computer which doesn’t meet the needs of technology and isn’t - it’s obsolete. As for any learning in the program, they’re not… (Todd)

> We’re moving in the right direction. The single course [snip] sets the stage for preservice teachers to gain basic skills as integration of technology with curriculum. There is more and more room for improving good skills. (Laura)

> I have great respect the instructors of our technology programs and see growth in our teacher candidates and the program itself. Yet, I have just recently come from the school system and see there is so much more that can be done when it comes to technology use in all subject areas for a multitude of purposes, using a multitude of technology types (e.g., handhelds, software to support special needs and ESL). (Deb)

One of these participants reported that a majority of their classrooms did not reflect the province’s document expectation for computer ratio per classroom.

> One of the province’s goal/expectations, is every classroom in the province … has four computers in it that can be accessed at different times by the students and the teacher. We have one of our four classrooms that actually has that set up. (Mark)

Rachel and Greg reflected on the importance of ICT education on employability of students and one way that it meets their needs.

> When we do our exit interviews and so on and the [provincial] government has a whole process where they take a look at new grads and ask some questions as to whether or not they can meet the KSAs, etc., etc. Our students generally stand out for their ability to use and teach with technology. I think many of them got jobs in schools over the last few years because of that. They do stand out. (Rachel)

> We have entry requirements that they be used to technology. They're starting to use technology outside of our educational technology courses. There is proof that with technology they can get jobs - coming in as a great … hope - we're getting that feedback. (Greg)

Study Two: Ministries of Education

Thirteen provinces and territories were included in the study invitation. The Ministry office for K-12 Education was contacted by telephone to identify the person who would be in a position to answer questions on ICT K-12 curriculum and funding for K-12 and post-secondary institutions. In most cases, these were identified as two separate people or departments. While the study idea was sound in design, it was not one that could be executed well as significant obstacles existed and are described below.

Provincial or Territorial K-12 ICT Curriculum

In many instances, upon contact, no curriculum person could be identified in the area of ICT. A general contact was provided or a contact for another curriculum area was asked to speak to the issue. Alberta was the only province that reported providing a mandated K-12 ICT core curriculum. Although the ICT curriculum document was stand-alone, this curriculum was not intended to stand alone, but to be infused within other core curriculum areas (Alberta Learning, 2000-2003). That being said, they reported that this was not likely to be continued as the ICT curriculum was to be infused into all other core areas in the near future – as programs of study are revised. Alberta Learning (2005) made a distinction between infusion into the curriculum and integration within the curriculum:

"Infusion refers to the process of including and contextualizing ICT outcomes as an integral part of another program of studies. Integration is the process of incorporating ICT outcomes into courses or lessons for a core program. Until ICT outcomes are infused, teachers must decide how to integrate them with other programs" (p. 2). Through personal communication on March 10, 2006, Alberta Learning reported that "once infusion is complete, the recommendation will be to re-designate the ICT Program of Study as a framework."

The website addresses for ICT curriculum documents for each province or territory can be found in Appendix F. Information on other resources for reference are also provided. The purpose of this second study was to determine whether any province offered any required ICT core curriculum and whether they had any significant budget for ICT that might influence responses in the survey. The response on ICT core curriculum has been answered, but beyond that it is too difficult to determine levels of curriculum integration for comparison by province or territory.

Provincial or Territorial ICT Funding

In many instances, upon contact, no person at Ministries of Education could be identified to speak to the issue of funding. The ICT curriculum contact person was not the same person to speak to funding. Messages left for the ICT funding contact were often not returned or, if they were, no data could be provided regarding budget details.

There were two major reasons why funding information was not easily obtained: One funding contact that did provide funding information reported it would be meaningless to use such a number as these types of funding infusions vary dramatically from year to year and tend not to be an annual budget. It might be that every few years a large infusion may take place and then significantly less funding is available until the next infusion. For this reason, comparing provincial or territorial expenditures would result in a large amount of error. A number of other respondents reported that a general ledger amount is transferred to school boards and that allotment for ICT would need to be determined at that level. No information was available at the provincial level. The priorities of school boards vary and ICT expenditures are something decided on among other priorities at the school board or district level. For these reasons, there are no useable responses for the question of funding of ICT by province or territory.

CHAPTER 5: DISCUSSION

In this study, the purpose was to explore the current structure of ICT education in teacher education programs across Canada. The findings reported in Chapter Four provided valuable information on the nature of the structure and support mechanisms, while also providing personal accounts of program leaders or their advisors related to those mechanisms. The results from both quantitative and qualitative findings will be discussed under headings by constructs identified during the qualitative analysis. Each major heading in this chapter represents a major theme from the analysis: 1) Structure of ICT in Education, 2) Infrastructure, 3) Obstacles, 4) Faculty Development, 5) Support, 6) Planning and Leadership, and 7) Change. A series of sub themes are then discussed under each heading.

Discussion of Major Themes

Structure of ICT in Education

The theme surrounding the structure of ICT in education surfaced throughout the interviews. It included a number of sub themes, such as stand-alone ICT courses, the integration of ICT throughout a program, practicum experiences in ICT, and the adoption of e-learning. Additional sub themes addressed the topics of relative standing in comparison to other Faculties of Education, whether programs met the needs of students, and the relationship of ICT to the employability of students.

ICT Education Course Offerings

Overall, each Faculty of Education seemed to vary in the way they handled ICT education in their programs. This included programs that offered elective ICT courses only, ones that had mix of elective and required courses, and those that offered required courses only. In terms of number of courses, six participating Faculties of Education (43%) reported offering two educational technology courses. None of the Faculties reported offering zero courses in this area. The number of faculty members specializing in technology did not seem to have much bearing on the number of undergraduate technology courses offered. The two Faculties reporting the highest number of faculty members in technology offered just two courses in this area, when the number of courses reported across all participants ranged from one to ten (highest frequency at two). It could be that the focus is on integration as was mentioned by another respondent, whose Faculty was planning on removing the stand-alone ICT course and, instead, using that faculty member's time to work on integration across all courses; however, further research is needed to confirm this.

Electronic Portfolios

One strategy to support integration of ICT into preservice teacher education programs is the implementation of electronic portfolios (e-portfolios), whereby students are expected to collect materials and reflections on knowledge and practice in an electronic format. Despite the predominance of literature in this area, a majority of participating Faculties who responded to the item on e-portfolios (8 out of 13 or 61.5%) reported no such opportunity was offered in their program, thus it appears that the best practices from the literature are not being adopted or implemented by most institutions to date. Of the remaining participating Faculties who reported offering e-portfolios, some reported the e-portfolios were optional and of those who reported them as a requirement, it seemed unclear to what extent as some were connected to a single course in the program. Two of the participants who were interviewed reported the implementation of e-portfolios as something unique or innovative in their program, despite the literature on this topic being available for many years. Similar to the complaint about the curriculum being good, but not adhered to, it seems the literature in educational technology may have good recommendations, but, again, they are not being implemented as expected. The reasons why this is will need further exploration, but will be discussed later in this chapter.

Integration vs. Stand-Alone Courses

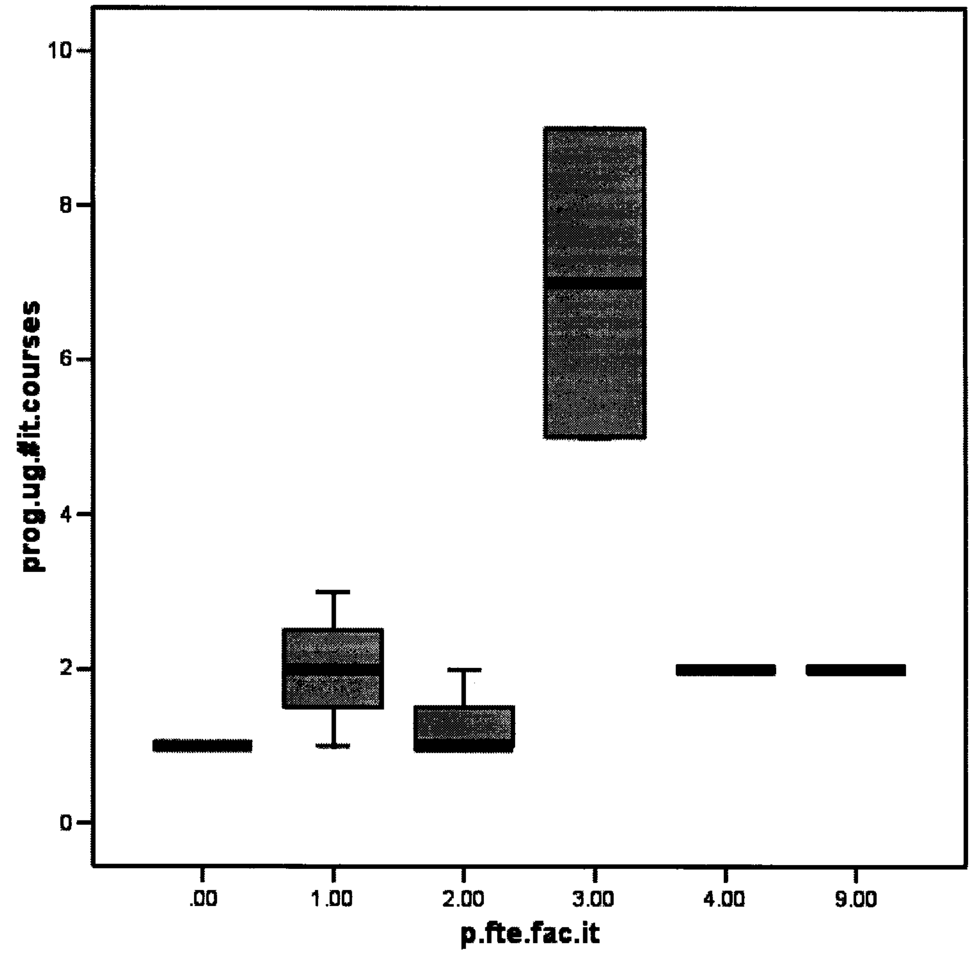
The results, particularly those from the items on integration into teaching and courses/programs offered, seem to point to a majority of Faculties of Education not supporting the model of integration that is advocated in the literature. If we accept that the K-12 education system has an important role in teaching technology skills to students, then we must next examine how to improve teacher skills with technology. Various researchers across decades have asserted that computers should not be taught directly, but rather to be taught by its direct application to the learning requirements of a subject (i.e., Woodrow, 1998). The integration of technology into K-12 education, however, is dependent on the teacher (Collis, 1996), and the teacher education programs hold responsibility in the preparation of new teachers who are able to model this. Researchers have argued for the idea of integration (McDonald & Davis, 1995), but some do not pay enough attention to the difficulties that K-12 teachers experience when trying to develop technology skills for the classroom (Carney, 1998). Just as in the K-12 sector, it appears that there is not enough attention being paid to the difficulties that faculty experience when trying to develop technology skills for the post-secondary classroom. Integration is the 'gold standard' of technology's interaction with education (Collier, 2004; Wheatley, 2003), but it is an ideal that is difficult to achieve. When faculty ICT experts were talking about the integration into their education program, a number commented on there being a lack of support. Furthermore, when asked about the appropriateness of curriculum, a number of responses mentioned the same issue of lack of support or adoption, even though the curriculum was deemed appropriate. The problem was that it was not being followed. When K-12 ICT curriculum was being discussed in the interviews, the approach of integration of ICT outcomes into all curriculum packages seemed to be not successful if it allowed the teacher to ignore those outcomes. The approach taken by Alberta to 'infuse' ICT outcomes in such a way so it cannot be ignored might be one solution around this. How this same issue can be addressed at the post-secondary level for education faculty members is another issue, and one that may be hard to do as it has been in the past.

The results on the profile of integration showed a disappointing mean of 49.15% for percentage of faculty members estimated to be routinely using ICT in their teaching. The spread was fairly large, however, with a standard deviation of 24.48. If every content teacher is to be a technology teacher through integration, then Canadian Faculties of Education in general are only half-way to meeting this goal. Their use of ICT in teaching appears to be limited to word processing, using presentation software, and disseminating information via the Internet as these categories held an mean and median close to 3 (most of the time). The remaining technologies (e-learning, subject-area software, creative works software, spreadsheets and databases, and special needs software) reported means and medians closer to a score of 2 (some of the time). These latter categories represent greater interaction and potential for learning for students, whereas the more common technologies reporting use most of the time represent a top-down or teacher-centred approach to using technology.

The Role of the Faculty Member Specializing in Technology

There seemed to be a pattern in the role of faculty members specializing in ICT with course offerings and integration (see Figure 2).

Figure 2. Number of IT Courses by FTE IT Faculty Members



Faculties with zero to two faculty members in technology had between one and three ICT course offerings. The Faculties with three ICT faculty members spiked at five and nine course offerings in the area of technology. The two Faculties (with Ryan and Claire) with four or more faculty members specializing in technology were back down to offering only two technology courses, which is a small number given the number of faculty members in this area. This could be important for Faculties to consider. The phenomenon could perhaps be due to the fact that a greater degree of integration across the program was achieved. Because these two Faculties cannot be compared quantitatively against the data from the remaining faculty due to the low number of the sample, qualitative responses were used to look for any difference in integration. These two universities seemed to have overall more positive responses with regard to integration of technology. Claire mentioned ICT being recognized in their annual salary review for faculty. In response to interview question three, Ryan spoke about networking across provincial and international committees to bring home cutting edge ideas. Furthermore, in response to interview question four on unique or exceptional ways their teacher education program uses ICT, Ryan and Claire's responses were two of three that stood out in a way that was truly exceptional and unique. Their accomplishments went above innovation on a small scale. Perhaps the ability to attract research and infrastructure funding as a node of faculty members in ICT helps to accomplish this. It seems there is a critical mass of faculty members specializing in technology necessary before technology integration into a program can be acquired to the extent that there is a reduced need for course offerings given the number of IT faculty members. Based on these findings, the number for critical mass appears to be four faculty members specializing in technology, although this will need to be further explored through additional lines of research. The ratio of students to technology faculty member needs to be taken into account here, however. For instance, Rachel described the removal of a technology course in order to free up her time to focus on integration, but her program had approximately only 70 students graduating every year with two faculty members specializing in technology. The ratio of faculty member specializing in technology to number of students graduating annually in Rachel's program is 35. Of the two Faculties with the highest number of faculty members, one had missing data preventing report of ratio, but the second reported a ratio of 46 students per faculty member specializing in technology. Of 11 valid cases due to missing data in one of the two items, the mean number of students graduating annually to technology faculty member was 144 (SD=204, min=1:27, max 1:700). Table 56 presents the number of education undergraduate students per faculty member specializing in technology listed across from the participant pseudonym for those who participated in the interview and for whom data were available.

This ratio statistic appears to have a fairly strong relationship with the type of response provided by participants in the interviews. More accurate than a critical mass for integration, the critical *ratio* of education students graduating annually to faculty member specializing in technology appears to be approximately 50 or less, although the strength of integration appears to have a continuous relationship. On one extreme, with a ratio of 1:27, Todd appears to have plenty of resources and collaboration, but he does not reference anything unique or innovative in their program. The issue, therefore, appears to be an obstacle with faculty buy-in, regardless of infrastructure and efforts made. This corresponds with his negative views on his province's role; specifically, the lack of coordination or sophistication that is present elsewhere. The other participants on this end of the ratio spectrum appear to have more positive reports, but the two with the next

Table 56. Education Undergraduate Students Per IT Faculty Member

Participant	Number of IT Faculty	Number of Students Per IT Faculty
Todd	0-2	27
Rachel	0-2	35
Ryan	3+	47
Joan	0-2	60
no interview	3+	67
Greg	0-2	68
Deb	3+	93
Chris	0-2	100
Mark	0-2	200*
no interview	0-2	239
no interview	0-2	700
Laura	n/a	n/a
Claire	3+	n/a
no interview	n/a	n/a

Note. Mark reported there was no faculty member specializing in technology in their Faculty with 200 education students graduating annually, so the ratio is 0:200

highest ratios (Rachel and Ryan) also came from the province Todd referred to as being coordinated and sophisticated in its ICT initiatives. This may point to provincial leadership playing an important role in integration at the preservice teacher education level and perhaps the buy-in of faculty members. On the other extreme, with Mark reporting no faculty member specializing in technology in their program of 200 annual graduates, the lack of this faculty member in technology is evident. Responses were fairly consistent in their negative framing. Mark reported no resources for technology repeatedly. There was nothing in place with regard to faculty development. There was nothing unique or innovative in their program with regard to ICT. He reported that his province was moving toward the curriculum model that every teacher was going to be a technology teacher, but it seems evident that without the leadership of a technology faculty member, it will be difficult to accomplish this model in his teacher education program.

Size of Program

Although there seemed to be a visual pattern that smaller programs had an emphasis on required courses, whereas larger programs had an emphasis on electives only, the chi-square cell count was less than five in more than 20% of the cells, so the significance level found (p=.076) may not be correct. A higher response rate may have met the general rule of no more than 20% of cells with less than five. It may warrant further investigation to determine whether size of program is, in fact, related to course structure. As one respondent reported, leadership may instead be the factor as one smaller program reported doing away with their required ICT course in favour of that instructor working with other faculty on integration.

Post-Degree Programs Specializing in ICT and Education

It is interesting to note the lack of programs available for post-degree education in the field of educational technology. Despite the move to technology integration through provincial curriculum, there are minimal opportunities available for students and teachers to pursue further education in this area to go beyond the basics. It is surprising to discover that none of the participating Faculties offered any non-credit or diploma programs that focus on technology. When asked about graduate programs, only two Faculties out of 13 offered graduate programs in this area with two and seven streams reported available. While that model may be suitable for graduate training for the purpose of entering academia, where there are pods of faculty members in educational technology and graduate students are expected to relocate to those hotspots, but it does not support the further education and leadership training within the region where an inservice teacher lives. For the population of inservice teachers who want to learn more about the area and earn their salary increase, relocation is not likely to be an option. The quality of training in an area where zero or one faculty members exist in educational technology in a given program must be weaker. Committee expertise outside of an educational technology faculty member is limited to research design or content area knowledge outside of the realm of ICT. If every teacher is supposed to be a teacher of technology, then there should be more emphasis in post-degree or graduate programs in the field of educational technology.

E-Learning

All Faculties were asked to respond to the level of participation in distributed electronic learning in their undergraduate education program. It appears that a large majority of programs run via a face-to-face delivery format with 79% reporting 93-100% of their courses being offered this way. It is expected that this is largely due to the fact that a large majority of K-12 schools delivery their instruction face-to-face and their corresponding teacher education programs teach about and model in this same delivery format. Three of the participants from the interviews reported e-learning either for full online delivery of a course or for supplemental materials or collaboration as being innovative or unique in their program. One program reported offering more than half their program via blended instruction, whereas ten (71%) reported 25% or less of courses were supplemented with online or electronic components. Eleven Faculties (78.6%)

reported no students in their undergraduate program were receiving instruction online on a full-time basis, but it is interesting to note that two reported either "5%" or "less than 5%" as their responses, so there are cases where this does exist, but that is the highest reported percentage for full-time online instruction. The number gets higher at the part-time level with one Faculty reporting 20% of part-time students receiving their instruction entirely online. The highest frequency was, again, at no part-time students receiving instruction online with 50% of participating Faculties stating this. While e-learning has been pervasive in many other programs across campuses, it appears it has not become a major emphasis in undergraduate education programs in Canada. It appears that critical mass or level may play a role here as the outlier Faculty with 20% of its part-time students completing their studies online had three faculty members specializing in technology and three PEA staff. Of the Faculties with zero to two faculty members in technology, none of its part-time students completed their studies online. Of the Faculties with three or more faculty members in technology, some portion of part-time students was completing their studies online (between 2 and 20%). It is interesting to note that this was not consistent at the full-time level. While Faculties with three or fewer faculty members reported no undergraduate students receiving full-time instruction online, one of the two Faculties with four or higher reported a value of 5%, but it was the Faculty with nine faculty members specializing in technology that still reported a percentage of zero. This may be because their online interests are at the graduate level, which was discussed elsewhere, but not included in this question.

Infrastructure

The topic of infrastructure was investigated through the survey, but this also surfaced as a theme within the interviews. The sub themes that surfaced as a result of these interviews were on laptops, hardware, software, platform, open source software, and unused equipment.

Available Facilities

The availability of technology infrastructure appeared to vary widely across participating Faculties of Education. As reported in the Chapter Four, the percentages for internet connections in classrooms ranged from 19% to 100% with a mean of 85% (SD=25), while the percentages for projection systems in classrooms ranged from 0% to 100% with a mean of 50% (SD=36). It should be of concern to ICT curriculum and integration advocates that there are Faculties of Education in Canada with only 19% of their classrooms with Internet connections or have no projection systems in any of their classrooms. The excitement around portable computer labs was evident in some of the interview discussions as well as the literature, which speaks to its pedagogical benefits; however, across all participating Faculties, the mean number of portable labs was 0.64 with a large standard deviation of 1.15. Nine out of 14 (64%) Faculties reported having no portable labs at all. There appears to be a case of haves and have-nots as evident with participant comments, although some reported resources being available but not utilized due to low faculty buy-in. It would be useful to do a follow-up study that looks in-depth into three Faculties of Education: 1) with resources and faculty buy-in, 2) with resources but no faculty buy-in, and 3) without resources, but with faculty buy-in. While ICT infrastructure is a key component to technology integration, it is useless without faculty interest and technical support to keep the momentum moving.

The participants did report ratings of their facilities for both students and faculty on a five-point scale. The results showed facilities being ranked as adequate to good (mean ranged from 3.50 to 3.57) for students in terms of quantity, quality, access, and support. For faculty, they were reported as good to very good (mean ranged between 4.00 and 4.29) across the same variables. This seems to indicate that student facilities could use some improvement as their ratings were one point less than those for faculty members. If the intention is to utilize hands-on experiences for students in their learning experiences and model integration, then this area will need some attention.

Obstacles

A section of the survey was devoted to obstacles, but this issue also surfaced during the interviews as a theme. Sub themes described obstacles in terms of lack of faculty interest, lack of infrastructure, lack of expertise, and lack of time (workload being too high).

The top five obstacles reported in the results section point to 1) time, 2) funding, 3) lack of room in programs for ICT courses or activities, 4) faculty buy-in, and 5) faculty knowledge or skill. All five had mean scores that reported the extent of each obstacle as between somewhat and extensive. The pattern from the section on obstacles indicated that students, administration, and computer infrastructure were small obstacles overall. When planning for technology integration and considering incentives, which will be discussed later in this chapter, these obstacles that focus on time, program room, funding, and faculty members (skill and buy-in) should be given considerable weight and attention. Because programs are often designed by councils made up of faculty members, making room for ICT programs or activities is more likely to be an obstacle of faculty buy-in. With 41.7% of Faculties reporting either zero or one faculty members specializing in technology, making headway in a committee will be a difficult task.

Faculty Development

The topic of professional development for faculty members was explored through the survey, where strategies were rated in terms of effectiveness and emphasis; however, faculty development also emerged as a theme for the interviews. The comments within this theme were divided into the sub themes of skills or knowledge, money or incentives, faculty buy-in or awareness, and specific professional development strategies.

Professional Development Opportunities

The level of ICT knowledge and skill of faculty members appeared to vary widely across participating Faculties. While most seemed to have competencies for administrative tasks, participants reported that less than half (mean=39.6%) of faculty members had the skills to engage students in using ICT effectively to enhance their learning. With 77% of Faculties reporting a percentage of 50% or less of prepared faculty members and the highest percentage across all Faculties being only 75%, it appears this is an area of either relative neglect or a situation whereby the interest or buy-in level of faculty members makes this a difficult obstacle to achieve.

Upon investigation of the strategies being used for professional development, it was found that there was not a single strategy that received a lot of emphasis. I had the sense that efforts did not appear to be coordinated in any way, with the exception of Laura's professional development unit, which was within the Faculty as opposed to a campus-wide initiative. The results on the perceived effectiveness of strategies showed assistance from technical support staff, which was also the strategy that received the most emphasis as well. Overall, there seemed to be congruence between the strategies emphasized and the strategies perceived effective, with the exception that on-campus opportunities receive some emphasis (second highest mean for emphasis), but are not perceived to be as effective (fourth highest mean for effectiveness). For effectiveness, the one-to-one strategies (information sharing with staff, mentoring, and personal learning) received the top three mean ranks with mentoring receiving the highest frequency in the "a lot" category. These one-to-one strategies help the learner to gradually develop abilities by moving from their current ability to a more advanced level guidance to minimize frustration. It would be prudent for administration or leaders in Faculties of Education to make one-to-one strategies a priority in their planning. The on-campus opportunities are often in the shape of stand-alone workshops, which cannot implement any effective transformational change to teaching. They tend to be generic in nature for all Faculties of study and are more about the technology itself than the faculty member's immediate context. The one-to-one learning strategies reflect the gold standard of integration that teacher education programs are striving for as opposed to the stand-alone technology courses. Whether the transformation is at the teacher education level or faculty development level, the philosophical approach is the same.

<u>Incentives</u>

Incentives for technology integration can operate on two levels. One, the incentive to learn by participating in some form of professional development. Two, the incentive to teach by participating in some form of mentoring or instructional capacity.

Where faculty buy-in is an obstacle to integration, Faculties have to consider implementing incentives for working with technology. Since time (or lack of) is a major obstacle, and the reward for using technology is small or not at all present, some Faculties reported including integration of technology in faculty evaluation processes, such as for their annual salary increment report, as one way to get them involved. Overall, the eight Faculties (57.1%) who reported offering incentives, described incentives that I perceived as rather uninspiring. The presence of a desktop office computer or professional development opportunities is fairly standard and should not be interpreted as an incentive. The provision of interest-free loans for hardware or software still requires repayment. Better instruction through the use of technology is an indirect result, and not necessarily a tangible reason that motivates faculty. For some of the participants, faculty members were a seemingly immovable group with regard to technology integration, despite the presence of resources and infrastructure; therefore, something greater must be done to serve as a true incentive. The faculty evaluation report is a true self-serving incentive for faculty members as it translates to their personal income, but there may be uncertainty as to whether it is honestly valued since it is embedded within the other categories and does not have a hard and fast measurement like publication count or teaching evaluation score, which is easy to administer. Similar to the participants' complaints about curriculum not being implemented despite the language embedded into content areas, Faculties may wish to consider separating out technology as a category of its own with application to any of the three areas of research, teaching, and service. Otherwise, create greater structure within each category to indicate its value. This could be accomplished through personal learning plans and their annual completion to be used in annual evaluation reports by faculty members. Furthermore, technical support personnel could be better supported or their roles could be redefined to assist faculty with their learning goals.

The focus surrounding the topic of incentives has been on the first level of inciting the faculty member to learn. With effective programs reported by participants as those with high ratios of expert to learner (most being 1:1), however, there is potential for a major obstacle in cost for implementation. To overcome this, innovative programs will have to be designed to make it worthwhile for expert faculty members to share their expertise. One possible solution might be for course release points to be assigned to expert faculty members for mentoring novice faculty members as part of an ongoing program.

Support

A large portion of the survey was devoted to support for ICT education. This section will discuss those results, but also the theme of support, which emerged from the interviews. Sub themes that surfaced were in the areas of technical support and faculty support, with the latter describing topics of needed support for faculty members.

Technical Support and Professional Administrative Staff

The role of the technical support staff member is pivotal in moving towards any technology integration model. As reported in the results section, there appears to be a critical mass issue again with the ratio of technology support staff to FTE faculty members. A majority of Faculties (71%) with a ratio score of .08 (1 tech support for every 12 faculty members) or less were not satisfied with their technical support. The lowest reported ratio was .025 (or one technical support person for every 40 faculty members). However, 100% of Faculties with a ratio score of .09 (one technical support person for every 11 faculty members) or higher reported satisfaction with their technical support. Because initial use of many new technologies require a high learning curve, the just-in-time support that can be found down the hall is critical in maintaining the risk-taking attitude necessary for continued attempts at learning new skills. The highest reported ratio among Faculties of Education was 0.33 (1 tech support person for every three faculty members). It is interesting to note that the two Faculties that reported this high ratio were University Colleges, but this standing was not consistent across responses of all University Colleges, since the other two University Colleges had low ratios, one of which was the lowest at 1:40. These results can be utilized by university administrators for further exploration into their current structure of support.

The results of the satisfaction scale reported in Chapter 4 point to an overall rating of very good on a four-point scale (1=Poor, 2=Good, 3=Very Good, 4=Excellent). The distribution was quite large, however, with standard deviation scores of approximately one point and min and max scores ranging from poor to excellent on most items. It is interesting, however, to note that the lowest mean score was found on the item that measured the ability to support cutting edge applications. This might suggest the need for greater training or release time for technical support staff to learn more about the latest technologies so they can support faculty members when that technology, either as hardware or software, becomes available.

There did not appear to be any relationship between professional or administrative technical staff members and technical support satisfaction, existence of a technology advisory committee, likelihood of faculty using technology in their teaching, or participation in e-learning. It was not evident in the results how these positions have had an impact on the role or use of technology in a Faculty of Education. Perhaps this needs to be explored further as an independent study to determine duties or accomplishments or whether the case is that administration begets administration without quantifiable results.

Planning and Leadership

The results of the survey regarding planning and leadership are discussed here as are the results of the theme of the same name. Associated sub themes were created on technology advisory committees, technology plans, collaboration, funding, specific examples of leadership, the impact of policy or curriculum, and the role of research.

Isolation in Individual Leadership

The notion of critical mass, previously mentioned, comes up again in a qualitative response under the sub theme, "planning and leadership/collaboration/isolation." Rachel describes the isolation experienced in her role as a faculty member specializing in technology.

> I don't know how others feel out there, but it's quite lonely sometimes and I feel like I'm forever breaking ground. Only in the last year or two has there been a really, in my opinion, an increased awareness of who is doing this kind of work and who is maybe making a difference and there's been some acknowledgement of that and so that has really helped, because I really felt for awhile that I literally felt I was in it alone - a lone wolf on the prairie. You think you'd be really connected and really in with thinking if you're working in the area of technology, but I found that when I spoke about things, I don't know if people just didn't understand what I was talking about or they just didn't want to understand. I don't know what it was, but I found it very difficult to find a community of people that I could connect with and last year was part of a study for [Project Name] and there was a group of people where we did make some connection, but it wasn't enough and I really think that if anything comes out of your study, there really needs to be more talk and more thinking about this. It's very hard work, you really are breaking ground a lot of the time and at a

> university everybody just thinks you're having fun when you're working in a lab with students and it's not. (Rachel)

Many faculty members in a Faculty of Education do not have pressure to provide leadership in their area of research among their colleagues across departments, nor do they feel a pressure to address accountability from students or external bodies when examining the level of technology integration or preparedness of students. From the interviews with participants, it seemed evident that this resulted in an extra workload pressure, but when the results from effort are far from expected, many of the participants reported a feeling of helplessness or isolation as Rachel described above. As reported in the interviews, many colleagues from other areas within a Faculty simply did not understand, appreciate, or buy-in to the initiatives a technology faculty member creates through hard effort and large obstacles. Because the numbers of faculty members specializing in technology were so few across many of the participating faculties, there was less of a team or group that could bear the brunt of the effort. Those Faculties that reported a larger number of faculty members in technology appeared to have a culture of greater acceptance and greater results. It will be important to address this issue of critical mass when it is unlikely for some of these Faculties to create additional positions. This could be done through stronger initiatives to connect faculty members specializing in technology across the country. It is highly likely that Faculties already with a team environment and resources will be less motivated to facilitate external relationships with Faculties of fewer resources and so forth as the university setting is a competitive one across Canada and even globally. Nevertheless, a networking initiative for faculty members specializing in technology may be fruitful for those who lack such an environment. If nothing else, it could provide dialogue that may not otherwise exist.

Academic special interest groups tend to be focused by specific area of study or by specific association or conference strand. For this reason, Canadian faculty members in technology may not be together at the same networking opportunity. A Canadian-based network for people in these tenure-track positions may be fruitful and one possible solution for a workplace environment fraught with more obstacles than a single faculty member can handle. The alternative to increasing the number of faculty members specializing in technology being recruited into a Faculty is to work on the notion of Rogers' (2003) diffusion of innovation where the existing IT faculty members as change agents may be the key to transforming colleagues into adopters and thus creating a critical mass of adopters; however, as evident in some of the interviews, not much could be done to motivate non-IT colleagues regardless of funding or leadership attempts.

Faculty Leadership

The successes reported by a few of the participants had in common the support of their Dean and/or its faculty members. Some of the initiatives that required decanal support included massive restructuring (removing a stand-alone course with the move to integration), full-day retreats on the technology in the Faculty, course release for technology faculty members to coordinate ICT initiatives, hiring multiple new faculty members in the area of educational technology, and implementation of technology advisory committees, specific budgets, and plans. These Deans often did not have any content area knowledge of the topic, but relied on their educational technology faculty member or team to help provide direction. This could be seen as an opportunity for faculty members in this area, but there are also burdens as well as described by Rachel:

> I've had excellent support from the technical people here, but it's still a struggle, because it's very difficult for someone at the level of Dean and I don't care whose Dean it is – unless they're in the classroom teaching with technology, it's very difficult to understand and so sometimes I feel like I have to carry the cross a bit too often. You know, to try and sell this to other people and to try and convince others, I don't think that should have to be the job that I have to do. There is enough doing the teaching and looking after all the pieces and trying not to have to be the technician. I've really worked had not to do that. (Rachel)

Joan, in her role as Dean, noted her reliance on their Faculty's educational technology faculty member: "I felt 'oh, my god, I cannot write this without [name].'" and further reported that "of course, people just bug [her/him] all the time" (Joan). Todd spoke to the issue of leadership indirectly with the need to demonstrate to faculty for the purpose of buy-in: "Unless we find better ways of demonstrating to Faculty the ways to integrate ICT, we're not going to move it much further" (Todd). The question is, of course, who is expected to do that? To provide the leadership and coordination? The answer is the educational technology faculty member. With annual salary reviews having a large emphasis on research productivity, the educational technology faculty member is at a disadvantage for the large service and leadership role they are expected to play. With the variety of research topics within the broad field of educational technology, the immediate research area of an educational technology faculty member may not be related to technology integration or preservice teacher education in any way. It is likely that faculty members in technology are aware of the research focus, which takes them further away from a leadership role within the Faculty. This is even more so if the focus on their research program is in a topic unrelated preservice teacher education. This is an unfortunate case when the service to the program is greatly needed, not only for the immediate students and fellow faculty, but for accountability to the K-12 school system, including its teachers, students, and parents.

Technology Advisory Committee

It was surprising to discover that only 64% of Faculties of Education (9 of 14) reported having a technology advisory committee. There did not seem to be any pattern across Faculties with regard to a relationship between existence of a technology advisory committee and number of faculty members specializing in technology, nor technical professional administrative staff. It could be that this has more to do with leadership or activism to promote technology use within the faculty, which was previously addressed. Mark referred to the demise of their technology advisory committee and the reasons why:

> We have a technology committee, but it ended in existence last year. It really hasn't operated this year and, again, unless there is a budget item attached to technology, it's a more frustrating endeavor than anything productive. (Mark, Section 3, Paragraph 13)

Technology Plan

Despite the presence of a technology advisory committee in nine Faculties, only six of those had a written technology plan, representing 42.9% of the fourteen participating Faculties. This means that 57.1% of Faculties reported having no technology plan. With the seeming lack of resources at many of these Faculties, it seems prudent that even more attention be paid to the allocation of funds for purchases of hardware and software. There was a significant difference between groups with or without a technology plan on the obstacle item "having sufficient funding for technology" at .035 using a t-test. This may point to an expressed need to implement such plans for forecasting and planning for hardware and software needs for the Faculty.

Technology Budget

The results showed a majority of Faculties did have a specific budget allocated for technology expenditures. The variation in the size of the ICT budget was quite large. Of the six Faculties which reported an actual figure, a calculation was made to create a ratio of dollars spent per annual B.Ed. graduate. The mean was $606 (SD=463) with the minimum and maximum being $44 per student and $1250 per student. The theme of technology haves versus have-nots appears to surface again from the quantitative data. Whether the cause is faculty buy-in, provincial or institutional leadership, or critical mass of faculty members specializing cannot be determined, but these are suspected as possible reasons.

Impact of Leadership on K-12 Schools

Faculties of Education have a primary responsibility of serving the profession of teaching and that means accountability to what is happening at the K-12 school level. In some cases, the schools are ahead of what is being done with regard to technology in a Faculty of Education. In most cases, however, we are expected to provide leadership in the area to guide practice. Chris spoke to the topic of the responsibilities of Faculties of Education:

> We are in our infancy in education. We are not nearly tapping ICT in the public schools. I largely blame that on teacher education programs. The cycle needs to be broken. The way to do that is through teacher education programs. Students need to learn how to use ICT pedagogically. (Chris)

Joan referred to the same theme of accountability and support for K-12 schools with regard to technology: “it’s not out there in the schools yet, so we’re taking it out there. We help.” (Joan).

Change

Throughout a number of the interviews with participants, the topic of change kept surfacing. It seemed to cause many participants to pause before providing responses as they appeared to be aware that the area of technology is fast-moving and always changing and for a variety of reason. This was, therefore, coded as a major theme with sub themes being that technology is always changing, the pressure to change, and the growth in this area.

Given the previous discussion, there are a number of factors that influence the success of any technology integration initiative. In order to implement positive change with regard to ICT education, I believe a comprehensive approach is required to address the number of areas previously mentioned. This includes the four areas that the Moursund and Bielefeldt (1999) study noted, which were facilities, faculty development, coursework, and field experience. However, these are inter-related not only within themselves, but also among other factors, such as planning and leadership and support. Bielefeldt (2001) noted that the lack of money and time are obstacles and that personal commitment to an ICT education was key. This notion was further expanded on alongside the diffusion of innovation (Rogers, 1995), whereby the "supporting the innovation means supporting the innovators" (Bielefeldt, 2001, p. 11).

CHAPTER 6: CONCLUSION

This final chapter will describe the limitations of this research, the implications for policy and practice, and will provide recommendations for further research in this area.

Limitations

There were a variety of limitations in this study. Table 1 reporting the response rate by province showed a geographical bias with proximity to the University of Alberta. This could perhaps be attributed to the significant time difference with eastern universities or less interest in participation with a distant institution with which a Dean may have little involvement. I had difficulties even reaching a Dean in many instances for reasons that the Dean was out of town, busy, or it was simply difficult to get past the secretary. In some cases, the Dean indicated interest in participation, but delegated participation to an alternate person. That alternate, then, would then not return emails or phone calls.

I had the sense that not all Deans were comfortable talking about the topic of technology. Where one Dean reported the need to work collaboratively with a faculty member in providing a response (I felt "oh, my god, I cannot write this without [name]"), it is possible that not all Deans would make the effort if not comfortable with technology themselves. It may also be possible that other Deans were not interested in sharing information about their hard-earned strategies for technology integration.

The length of the questionnaire was an obstacle to some participants. One Dean reported they started the questionnaire, but then decided not to pursue completion of it or participation in the interview. The reason cited was that the amount of time spent on it was not going to provide enough of a return to them.

One respondent reported s/he perceived a "large institution bias" in the way the study package was framed. For example, the reference to "regular" when discussing post-degree vs. regular programs, was interpreted as negative. It did not prevent her/him from participating, but it could have been an issue with other smaller universities.

Lastly, there may have been discomfort among individuals in providing a response that would represent their Faculty and/or Institution. One participant voluntarily provided her/his consent to participate, but added on that s/he received consent from her/his Faculty to participate as well. The ethics of participation was seen by this person at two levels: one at the institutional level and the other at the individual level.

Should any follow-up studies be conducted across the country, the following steps are recommended.

1. A higher authority, perhaps a federal organization, be involved to increase response rate and perhaps Canadian Association of Deans of Education be approached to advocate participation.
    a. Problem addressed: geographical bias, weight or importance of research; overcome barrier of Dean's secretary
2. A smaller university be consulted to provide input on the research materials
    a. Problem addressed: large institution bias
3. Shorten the questionnaire and/or use only a structured telephone interview with one or more stakeholders from that Faculty. The latter strategy used

by Montgomerie and Irvine (2000) resulted in a 100% response rate with school district superintendents.

   a. Problems addressed: Reduce effort of participant; Increase response rate

4. Address the issue of non-tech savvy Deans through emphasis in research invitation letter and provide options to support them in their response. Perhaps include more than one participant per Faculty or add on a focus group approach.

   a. Problem addressed: Dean discomfort discussing technology

5. Include language in research invitation letter and consent form to address individual vs. institutional participation

   a. Problem addressed: Concern regarding representation of self versus Faculty

Implications for Preservice Teacher Education

In this section, I am providing recommendations for policy and practice within a preservice teacher education program; however, I would like to point out that these are to be given the appropriate weight after considering these recommendations are based on research that is exploratory and descriptive in nature and combined with the use of self-reported experiences of a small number of participants.

Faculties of Education should consider each of the themes addressed within the discussion with an attempt to determine which areas are weak within their own program. It would be advisable to conduct a program evaluation and interview of stakeholders to determine the obstacles and enables in place as they appear to vary across institutions.

Faculties might explore their relative standing to some of the topics examined within this study, such as ratio of technical support, for example. Based on the results of this study, it appears that Faculties of Education should explore the impact of technical support on the ICT integration within their programs and consider ensuring their ratio is one technical support person per 11 faculty members. The technical support satisfaction survey might be used as a measure to determine need and/or impact.

Faculty Development

Faculties are encouraged to consider faculty development initiatives that move away from the typical workshop or seminar session. Rather, creative initiatives might be explored that focus on one-to-one learning, such as time with technical staff, a faculty mentor, or programs that support personal learning plans.

Funding for Leadership, Collaboration, and Infrastructure

Funding bodies, be they institutional, local, provincial, or national, are encouraged to support the networking, leadership training, and implementation efforts of faculty members who are more or less charged with caretaking the ICT education within a Faculty of Education. Where only zero or one faculty members exist with a specialization in technology, Faculty and institutional administration should consider investing in the creation of more positions in this area or at least support positions to assist with implementation of integration initiatives.

Collaborative programs should be created to help to network faculty members specializing in ICT and education. Given that many Faculties have few tenure-track faculty in this area, it would help to reduce the feeling of isolation reported in the interviews, but also increase networking that may help with plans for leadership, sharing of teaching experiences, and the design of research.

With regard to infrastructure, since a number of programs reported to be facing a shortage of funds and facilities, the provincial and/or federal governments might consider the creation of funding initiatives similar to that which has existed in the United States to help support ICT education in teacher education programs. While funding has been provided for initiatives such as bandwidth and video conferencing, the basic needs of many programs are often not being met. As reported in the interviews, the lack of hardware and software is often an obstacle to the ability to conduct research. Funding that can support infrastructure can have a two-fold effect: one, supporting ICT implementation in programs, and two, supporting the infrastructure required for research.

Graduate Programs & Research

There is a plethora of research that has yet to be conducted in the area of educational technology and its application in a variety of areas, from early childhood, K-12, preservice teacher education, inservice teacher education, faculty development, program evaluation, e-learning, and so forth. The speed with which the domains and literature within this field has expanded has been remarkable; however, the human and financial capacity for research in this area has lagged behind. For those faculty members who are the sole specialist in ICT within a Faculty of Education, the collaborative networks previously mentioned might allow for an increase in identifying colleagues interested in adjunct faculty status, so that any graduate research that is conducted under their supervision have appropriate expertise to complete their supervisory committees. Furthermore, since every teacher is supposed to be a teacher of technology, then there should be more emphasis in post-degree or graduate programs in the field of educational technology. There currently appears to be a paucity of coursework or programs in the area and most are pooled into a few pods across the country.

Recommendations for Further Research

As a result of this study and a review of the literature, the following are recommendations for future research in this area:

1. This study should be repeated with a modified design for greater response and/or to improve the depth by focusing on a few select teacher education programs.
2. Research should be conducted that examines the design or implementation of new models of ICT education in a pre- and post- manner. A longitudinal study of a Faculty in a state of transformation or that is undertaking a new initiative, such as a mobile lab, laptop program, or a move from course-based work to integration across a program would be an important source of study.
3. Research should be undertaken to focus on expansion of the issues touched on in this study; namely, these include looking at the notion of critical mass of faculty members specializing in technology in more depth or factors that impact the buy-in or lack of buy-in when the presence or absence of infrastructure appears not to have an impact.
4. The evaluation of various faculty development models should be explored for their effectives and where bimodal responses existed,

explore faculty development initiatives that might be tailored to individual differences.

5. Further research on incentives should be explored, but should outline concrete examples of what can be considered an incentive so as to avoid abstract descriptions, such as 'better instruction.' This might also include a comparison of salary review templates across the country.

Summary

This study found that there were many differences across Faculties of Education in their structure and support for ICT Education with many obstacles that prevent the integration of ICT throughout preservice teacher education programs. A feeling of disconnect and isolation was evident across a number of participants during the interviews. This study provided evidence that more attention to supporting planning and leadership, infrastructure acquisition, faculty development and awareness, and research may need to be considered by stakeholders including educational institutions, governments, and funding bodies. With these additional supports in place, teacher education programs could then focus more on the pedagogy and implementation of ICT education.

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Appendix A: Cover Letter to Deans for Study One

We are writing to ask you to participate in a very important study supported cooperatively by researchers from Faculties of Education at the University of Alberta and the University of Victoria. As you know, there is a growing demand for teachers to be able to use information and communication technology (ICT) in their teaching. We would like to determine the present status of ICT in teacher education programs. This study will be a comprehensive measure of ICT program structure and support across Canada. In order to provide a true picture of the ICT integration in Canadian Faculties of Education, it is essential that your institution participate in this research, even if your Faculty does not use ICT. While participation in this study is voluntary, your co-operation is important to ensure that the information collected in this study is as accurate and as comprehensive as possible. By participating, you will provide invaluable information that will help develop future research addressing more specific issues.

We will be conducting interviews with the Dean from Faculties of Education from every province and territory across Canada in order to obtain a complete view of the country. This is not an evaluation of any Education program. The results of the study will help researchers, government representatives, and educational administrators to better understand the current state of ICT education, so they are better able to support areas of need and develop realistic initiatives.

This research has been funded by the Government of Canada Social Sciences and Humanities Research Council (SSHRC) and is being conducted by Valerie Irvine, who is a SSHRC doctoral fellow in the department of Educational Psychology at the University of Alberta and a sessional instructor and research coordinator at the University of Victoria. This research and will comply with the University of Alberta Standards for the Protection of Human Research Participants (http://www.ualberta.ca/~unisecr/policy/sec66.html). There are no known or anticipated risks to you by participating in this research.

The study will be conducted by means of a questionnaire to be returned via fax, mail, or email and then followed by a telephone interview. The interview/questionnaire combination was designed in order to make it possible for us to obtain all necessary data while requiring a minimum of your time. We expect the questionnaire and interview guide to take approximately ten minutes each; however, we will certainly allow additional time for any comments that you might wish to contribute. We have enclosed an interview guide summary for your review and preparation.

In order to provide answers to specific questions on the questionnaire, it may be necessary to get input from academic or technical support staff in your Faculty. If there is a representative for your Faculty who would be in a good position to provide input for the questionnaire, please feel free to solicit their assistance in completing the questionnaire.

Valerie Irvine will be calling you in the next few months to invite you to participate in the interview. If you wish to schedule a time, or if you have a "best time to call," please contact Valerie using the mail address, telephone number, or email address provided below.

Valerie Irvine, Ph.D.(c)
Faculty of Education
University of Victoria
PO Box 3010 STN CSC
Victoria BC V8W 3N4

Tel: (250) 472-4132
Fax: (250) 721-7767
Email: virvine@ualberta.ca

We would like to assure you that your personal and institutional identification will be kept confidential and only responses will be reported. Access to personal and institutional identification will be known only by Valerie Irvine. The interview responses will be compiled into aggregate data for analysis and any comments quoted will be reported anonymously. Please find enclosed two copies of the consent form for your review. We will ask that one copy be returned along with the questionnaire and one copy be referred to at the start of the telephone interview, which, with your permission, will be taped for data analysis purposes. We will be pleased to send you an electronic summary of the results once the study has been completed.

Thank you for your cooperation.

Sincerely,

Larry Beauchamp, Ed.D.
Dean of Education, University of Alberta

T. Craig Montgomerie, Ph.D., Professor, University of Alberta

Valerie Irvine, SSHRC Doctoral Fellow, University of Alberta

Encl.
- questionnaire
- interview guide
- two consent forms

Electronic copies of these files are available in either Word or PDF format from: http://www.ualberta.ca/~virvine/study.html

Appendix B: Consent Form for Deans for Study One

Technology Education in Canadian Faculties of Education: Structure and Support in Teacher Education Programs

CONSENT FORM

An electronic copy of this file is available in either Word or PDF format from:
http://www.ualberta.ca/~virvine/study.html

This study has been reviewed and approved by the Faculties of Education and Extension Research Ethics Board (EE REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the EE REB at (780) 492-3751.

If you know now that you do not wish to participate in this study and do not wish to receive our phone call, please notify Valerie Irvine at virvine@ualberta.ca or (250) 472-4132.

Voluntary participation in this study involves the following steps:

1. Completion of questionnaire and one copy of this consent form, both of which are to be returned via mail, fax, or email. In the case of email submission, you will be required to type "I give consent" next to the signature field below.

   Two weeks after mailout, if we have not received a copy of the questionnaire and consent form and have not received any notification from you indicating that you do not wish to participate in the study, we will contact you by phone to follow-up on your participation in the study.

2. Upon receipt of the questionnaire and consent form, you will be contacted by telephone to participate in a short interview, which will be recorded. At the start of this interview, you will be asked to refer to this consent form and to indicate whether you give consent to participate in the interview.

Please review the following details regarding consent for participation before signing and returning this form:

- I have read the information letter, questionnaire, and interview guide (also available at http://www.ualberta.ca/~virvine/study.html) and understand the purpose of this study and the procedures being used.
- I understand that participation in this research is voluntary
- I understand that participation involves completion of a questionnaire and participation in a recorded telephone interview
- I understand that if, at any time during the interview, I can stop the interviewer to ask questions or share additional comments.
- I am free to withdraw from participation in the interview at any time without prejudice to pre-existing entitlements

- I can opt out without penalty and any collected data will be withdrawn from the data base and not included in the study.
- I understand my rights to privacy, anonymity, and confidentiality will be protected in the following manner:
  - No disclosure of personal or university identity will be made in any presentation or publication of the data.
  - Most information collected will be reported in aggregate form (e.g., in charts, etc.). Where it serves a purpose, a quote may be used, but no identification will be associated with it and it will not be used if it contains information that may reveal the participant's or university's identity.
  - Only the investigator, Valerie Irvine, will have access to identifiable information.
- I understand data storage, use, and dissemination will be handled in the following manner:
  - Once Valerie Irvine has inputted your data, she will be working with it on a private computer that is behind a firewall and located in a secure and alarmed location accessed only by her. Back-ups of the data will be stored on CD, which will also be stored in a secure and alarmed location.
  - The data will be destroyed in five years time.
  - The results of this study may be shared with others in the following ways: 1) presentation at conferences, 2) publication in peer-reviewed journals, 3) publication in Valerie Irvine's doctoral thesis, 4) via the Internet (e.g., emailed to participants, posted on a website, published in an online journal, etc.), or 5) referenced in teaching
- I understand the above conditions of participation in this study and have had the opportunity to have my questions answered by the researcher.

In the case of email submission, you will be required to type "I give consent" in the signature field below.

__________________	__________________	__________________
Name of Participant	Signature of Participant	Date

When complete, please return one copy of this consent form along with your completed questionnaire via either mail or fax to:

Fax: (250) 721-7767

Mail: Valerie Irvine, Ph.D.(c)
Faculty of Education
University of Victoria
PO Box 3010 STN CSC
Victoria BC V8W 3N4

Appendix C: Questionnaire for Deans for Study One

Technology Education in Canadian Faculties of Education: Structure and Support in Teacher Education Programs

QUESTIONNAIRE

An electronic copy of this file is available online at
http://www.ualberta.ca/~virvine/study.html

By downloading a Word file of this document, you have the option of completing the form by typing in your responses on your computer and saving them.

Administration

Where you do not know an answer to a question below, please answer "Don't Know" or, if possible, consult with a person in your Faculty who can provide input for the answer. Please answer for the current academic year (2003/2004) unless a question states otherwise.

Please keep a copy of your completed questionnaire, so that you can refer to it during the interview.

Section A: Identification

Name:
Institution:

Section B: Profile of Faculty

1. Number of FTE faculty members:
   Male:
   Female
2. How many FTE faculty members specialize in instructional technology?
   Male:
   Female
3. How many FTE professional staff (not technical support) specialize in instructional technology?

Section C: Technical Support

4. How many FTE technology support staff serve the Faculty?
5. Do you feel the current number of FTE technology support staff in your Faculty is adequate?
   If not, how many would be required to meet the needs of students and faculty?
6. How satisfied are you with the technical support provided to your Faculty? Please choose one answer for each. Poor/Good/Very Good/Excellent
   Availability of technical support
   Reliability of technical support
   Timeliness of response for support
   Ability of staff to adequately fix ICT problems

Ability of staff to maintain equipment
Success rates of support and maintenance
Ability of staff to engage in cutting edge applications
Overall satisfaction with technical support

Section D: Technology Infrastructure

7. What computer facilities are provided in your Faculty?
    - how many classrooms are there in total?
    - # of classrooms connected to the Internet
    - # of classrooms with a computer projection system?
    - # of computer labs
    - other

8. Considering your hardware, software, and connectivity, in your estimation, please rate the overall facilities in serving your program for each of the groups listed below. Please use the following categories: very inadequate, inadequate, adequate, good, very good

    For STUDENTS:
    In terms of quantity (numbers of computers, peripherals, etc.)
    In terms quality (new equipment, available features, updated software, maintenance)
    In terms of access (scheduled open times, equipment loaned out, etc.)
    In terms of technical support and individual help

    For FACULTY:
    In terms of quantity (numbers of computers, peripherals, etc.)
    In terms quality (features, updated software, maintained regularly)
    In terms of access (scheduled open times, equipment loaned out, etc.)
    In terms of technical support and individual help

Section E: ICT Planning and Funding

9. Does your Faculty have a technology advisory committee?
10. Does your Faculty have a written technology plan? If so,
    Does it provide details about: hardware acquisition
    software acquisition
    upgrading & replacement
    Is it a multi-year plan?
    How often is it updated?
    Is it available for viewing? (if so, please provide a copy)
11. Is an annual budget provided specifically to support technology?
    If yes, How large is it?
    (specify the academic year for which you have numbers)
    What are the sources of funding for the technology budget?
    If no, How much do you estimate to spend annually to support technology?
    (specify the academic year for which you have numbers)
12. Please report the annual expenses for the education library's collection development using the following breakdown: (specify the academic year for which you have numbers)
    Physical collection (e.g., books, magazines, paper journals)
    Audio-visual materials (e.g., CDs, videos)
    Electronic materials (e.g., CD-ROMs, online subscription to journals)

Section F: Obstacles

13. Please indicate which of the following are perceived as obstacles, perceived or otherwise, which inhibit ICT use in your Faculty.
    not at all/very little/somewhat/extensively/not applicable

    Hardware
    - obtaining sufficient number of computers
    - ensuring hardware is up to date

    Software
    - obtaining sufficient copies/licenses for instructional purposes
    - ensuring software is up to date

    Instruction
    - finding time for instructor preparation, planning, and instruction
    - instructor knowledge/skill level
    - instructor attitude (buy-in)
    - student knowledge/skill level
    - student attitude (buy-in)
    - administration attitude (buy-in)
    - making room in programs for courses or ICT activities

    Other
    - having sufficient funding for technology
    - other (specify) ________________

Section G: Teacher Skills and Professional Development

14. What percentage of faculty members in your Faculty possess the technical skills required to use ICT for administrative purposes (e.g., preparing grades, recording attendance)?
15. What percentage of faculty members in your Faculty possess the technical skills required to engage students in using ICT effectively to enhance their learning?
16. What emphasis is placed on the following strategies to help faculty members learn how to use ICT?
    - please choose one answer for each: none/little/some/a lot
    - On campus training sessions (half or full days)
    - Mentoring/coaching activities with other instructors
    - Information-sharing with other staff members (e.g., tech support)
    - Summer programs
    - E-learning
    - Personal-learning activities
    - Professional development funds for conferences/workshops
    - Other, please specify:
17. How do you perceive the effectiveness of the following strategies in helping faculty members learn ICT for use in their teaching?
    - please choose one answer for each: none/little/some/a lot
    - On campus training sessions (half or full days)
    - Mentoring/coaching activities with other instructors
    - Information-sharing with other staff members (e.g., tech support)
    - Summer programs
    - E-learning

Personal-learning activities
Professional development funds for conferences/workshops
Other, please specify:

18. Are there any incentives for faculty to use technology? If so, please describe them.
19. Do you include Technology as a performance indicator in the annual review of faculty members? If yes, is it evaluated separately from research, teaching, and service?

Section H: Profile of Integration

20. To what extent are the following technology applications incorporated into teaching practices in your Faculty? Please mark one answer in each row.
Never/Some of the time/Most of the time/Always
Using software for special needs students
Using software for specific subject areas (e.g., geographical, mathematical, etc.)
Using spreadsheets and database software for simple data manipulation and statistical analysis
Using word processing or desktop publishing
Using presentation software
Using software supporting creative works (e.g., music, art, etc.)
Disseminating information via the Internet/Intranet (e.g., publishing projects)
Online or distributed electronic learning
Other (specify) _______________
21. What percentage of faculty members do you estimate to be routinely using ICT in their teaching?
22. What percentage of undergraduate courses in your Faculty fall into the following categories:
Face-to-Face: ___%
Face-to-Face supplemented with online/electronic components: ___%
Online: ___%
23. What percentage of your Faculty's total undergraduate student population is receiving instruction through online courses during the current school year?
on a full-time basis (half or more of their total course load)
on a part-time basis (less than half of their total course load)
24. Please describe any features of your teacher education program that use ICT in a unique or exceptional way.

Section I: Profile of Academic Programs

25. Number of annual B.Ed. graduates:
After-degree B.Ed.:
Elementary:
Middle:
Secondary:
Other, please specify____________:
Regular B.Ed. program (4 or 5 year program):
Elementary:
Middle:
Secondary:
Other, please specify____________:
Other programs, please specify___________:
26. Number of undergraduate courses in your Faculty that focus on educational technology.
For each course, provide:
Course code and number (i.e., EDUC 101):
Course title: (will obtain from calendar)
Course weight: (will obtain from calendar)

Course description: (will obtain from calendar)
Topics covered: (will obtain from calendar)
Is this course required or an elective in any of the B.Ed. programs? If so, please describe.
If required, at what point in the teacher education program, do most students take this course? [before entering, at beginning, midway, by completion]
If required, do most students take this course before or after their practicum?

27. Number of diploma programs in your Faculty that focus on technology
    For each program, provide:
    Diploma title:
    Diploma description: *(will obtain from calendar)*
    Courses included: *(will obtain from calendar)*
28. Number of graduate programs in your Faculty that focus on technology
    For each program, provide:
    Program title:
    Program description: *(will obtain from calendar)*
    Courses included: *(will obtain from calendar)*
29. Number of non-credit programs related to technology
    For each program, provide:
    Program title:
    Program description: *(will obtain from calendar)*
    Topics covered: *(will obtain from calendar)*
30. Do you have an electronic portfolio program for students in your Faculty? If so, please describe.

Appendix D: Interview Guide for Deans for Study One

Technology Education in Canadian Faculties of Education: Structure and Support in Teacher Education Programs

INTERVIEW GUIDE

An electronic copy of this file is available in either Word or PDF format from:
http://www.ualberta.ca/~virvine/study.html

Administration

This guide is provided to help prepare you for the telephone interview. You may use this guide to help you to prepare responses in advance; however, you may also be asked to elaborate on your responses to the questionnaire.

Have you had the opportunity to review the information letter and consent form for this research?

If NO, please contact Valerie Irvine at virvine@ualberta.ca to obtain them or find them online at: http://www.ualberta.ca/~virvine/study.html

If YES, do you give consent:
1) to participate in this study
2) for this interview to be recorded

Questions

1. Is your Faculty where you want it to be with regard to technology? If not, why not?
2. What would you like to see done differently in your Faculty with regard to technology?
3. Please discuss the strategies being used for faculty development or faculty renewal in the area of technology.
4. Please describe any features of your teacher education program that integrate ICT in a unique or exceptional way.
5. Is the amount of emphasis on technology in your provincial government's policy/curriculum appropriate for your Faculty?
6. Do you perceive your academic programs as meeting the needs of students for technology? Please describe.
7. Please feel free to provide any further comments you may have.

Appendix E: Node Listing

(1) /Faculty Development

(1 1) /Faculty Development/Skill or Knowledge
(1 2) /Faculty Development/Money or Incentives
(1 3) /Faculty Development/Faculty buy-in or awareness
(1 5) /Faculty Development/Professional Development Strategies

(2) /Planning & Leadership

(2 1) /Planning & Leadership/Tech Advisory Committee
(2 2) /Planning & Leadership/Technology plan
(2 3) /Planning & Leadership/Collaboration
(2 4) /Planning & Leadership/Funding
(2 5) /Planning & Leadership/Leadership
(2 6) /Planning & Leadership/Impact of Policy or Curriculum
(2 7) /Planning & Leadership/Research

(3) /Obstacles

(3 1) /Obstacles/Faculty Interest
(3 2) /Obstacles/Infrastructure
(3 3) /Obstacles/Expertise
(3 4) /Obstacles/Time~Workload

(4) /Change

(4 1) /Change/Technology is always changing
(4 2) /Change/Pressure to Change
(4 5) /Change/Growth in this area

(5) /Support

(5 1) /Support/Tech Support
(5 6) /Support/Faculty Support

(6) /ICT in Education

(6 1) /ICT in Education/Stand-alone course
(6 2) /ICT in Education/Integration
(6 2 1) /ICT in Education/Integration/Isolation
(6 2 2) /ICT in Education/Integration/e-portfolios
(6 2 3) /ICT in Education/Integration/Student Skill & Pedagogy
(6 2 4) /ICT in Education/Integration/Students versus Faculty

(6 3) /ICT in Education/Tech Practicum
(6 4) /ICT in Education/Relative standing
(6 5) /ICT in Education/E-Learning
(6 6) /ICT in Education/Program meeting needs~
(6 7) /ICT in Education/Employability of Students

(7) /Infrastructure

(7 1) /Infrastructure/Laptops
(7 2) /Infrastructure/Hardware~Software
(7 3) /Infrastructure/Platform
(7 4) /Infrastructure/Unused equipment
(7 5) /Infrastructure/Open Source

Appendix F: Information on ICT Curriculum by Province

Websites for ICT Curriculum Documents for Canadian Provinces and Territories

Province	Curriculum Website Address	Other Resources
BC	http://www.bced.gov.bc.ca/irp/	ICT Integration: http://www.bced.gov.bc.ca/technology/
AB	http://www.education.gov.ab.ca/	Information and Communication Technology: http://www.education.gov.ab.ca/k%5F12/curriculum/bySubject/ict/
SK	http://www.sasked.gov.sk.ca/	Understanding the Common Essential Learnings: Chapter V on Technological Literacy (1988) http://www.sasklearning.gov.sk.ca/docs/policy/cels/el5.html Technology and Media section (i.e., in English Language Arts (1999) http://www.sasked.gov.sk.ca/docs/ela102030/intro.html#tech Social Studies (1995): Technology is 1 of 20 concepts to be covered through K-12 and is found marked for grades 3, 9, 11, and 12
MB	http://www.edu.gov.mb.ca/	Literacy with ICT (n.d.) http://www.edu.gov.mb.ca/ks4/tech/tfs/index.html Technology as a Foundation Skill (1998) http://www.edu.gov.mb.ca/ks4/docs/support/tfs/index.html A Model for Implementation (2005) http://www.edu.gov.mb.ca/ks4/tech/tfs/continuum.html Interdisciplinary Middle Years Multimedia was a pilot project spanning several years and developed interdisciplinary materials and a computer integration model (n.d.): http://www.edu.gov.mb.ca/ks4/tech/imym/index.html ICT-related projects K to Senior 4 (n.d.) http://www.edu.gov.mb.ca/ks4/tech/index.html
ON	http://www.edu.gov.on.ca	Integration Of Computers Across The Curriculum (1992) http://www.edu.gov.on.ca/extra/eng/ppm/116.html
QC	http://www.meq.gouv.qc.ca/	Cross-curricular competencies (2001) http://www.meq.gouv.qc.ca/DGFJ/dp/programme_de_formation/primaire/pdf/educprg2001bw/educprg2001bw-020.pdf ICT as a "methodological" competency

		RECIT: A Network of Resource Persons for the Development of Students' Competencies Through the Integration of Technologies (n.d.) http://www.meq.gouv.qc.ca/drd/tic/pdf/recitanglais.pdf Resources: The Connected Classroom (n.d.) http://www.qesnrecit.qc.ca/cc/index.html
NB	http://www.gnb.ca/0000/index-e.asp	See Foundation for the Atlantic Canada Technology Education Curriculum*
NL	http://www.ed.gov.nl.ca/edu/	See Foundation for the Atlantic Canada Technology Education Curriculum* or visit http://www.ed.gov.nl.ca/edu/sp/foundations/tech_edu/te_found_nf-lab_full.pdf
NS	http://www.ednet.ns.ca/	See Foundation for the Atlantic Canada Technology Education Curriculum*
PE	http://www.gov.pe.ca/educ/	See Foundation for the Atlantic Canada Technology Education Curriculum*
YT	http://www.education.gov.yk.ca/	Draws curriculum documents from British Columbia
NT	http://www.ece.gov.nt.ca	Draws curriculum documents from Alberta
NU	http://www.gov.nu.ca/education/eng/index.htm	No ICT curriculum documents

Note: BC=British Columbia, AB=Alberta, SK=Saskatchewan, MB=Manitoba, ON=Ontario, QC=Quebec, NB=New Brunswick, NL=Newfoundland & Labrador, NS=Nova Scotia, PE=Prince Edward Island, YT=Yukon Territories, NT=Northwest Territories, NU=Nunavut, *= Foundation for the Atlantic Canada Technology Education Curriculum can be found online at the Council of Atlantic Ministers of Education and Training Web Site: http://camet-camef.ca/default.asp?mn=1.4

Appendix G: Curriculum Vitae

FACULTY CURRICULUM VITAE

VALERIE M. IRVINE

JUNE, 2006

Faculty: Education **Dept: Curriculum & Instruction**

1. DEGREES AND DIPLOMAS

Degree *or* Diploma	Field	Institution	Year Granted
Ph.D.	Educational Psychology (Instructional Technology)	University of Alberta	Fall 2006
University Teaching Program	Post-Secondary Education	University of Alberta	2001
M.Ed.	Educational Psychology (Instructional Technology)	University of Alberta	Fast-tracked to Ph.D. *
B.A.	English Literature	University of British Columbia	1995
B.Ed.	Intermediate Elementary Education	University of British Columbia	1997

Title of Doctoral Dissertation

Technology Education in Canadian Faculties of Education: Structure and Support in Teacher Education Programs

* after starting the Master's program, I was the only student out of 300 in the department's graduate program to be fast-tracked to the Ph.D. program. The criteria included high grades (straight 9.0 gpa), a research proposal, and strong letters of support from various faculty.

2. POSITIONS HELD PRIOR TO APPOINTMENT AT UNIVERSITY OF VICTORIA (Academic and other)

Dates	Title, Institution
2000-2001	Research Associate, Dean's Office, Faculty of Education/Division of Technology in Education, University of Alberta
1999-2000	Sessional Instructor, Department of Policy Studies, Faculty of Education, University of Alberta
1999-2000	Research Consultant, Faculty of Education, University of Alberta
1998-2000	Research Assistant, Department of Educational Psychology/Division of Technology in Education, Faculty of Education, University of Alberta
1998-2000	Teaching Assistant, Department of Educational Psychology, Faculty of Education, University of Alberta
1997-1998	Teacher, Coquitlam School District No. 43, British Columbia

3. MAJOR FIELD(S) OF SCHOLARLY OR PROFESSIONAL INTEREST

- Educational Technology
- E-Learning
- Post-Secondary Education
- Teacher Education
- Interdisciplinary Collaboration
- Research Methods
- Quantitative Methods

4. MEMBERSHIP HELD IN LEARNED AND PROFESSIONAL SOCIETIES

Dates	Association, title etc.
1999-pres	Association for the Advancement of Computers in Education (AACE)
2001-2002	American Educational Research Association (AERA)
2004-pres	Alberta Distance Education and Training Association (ADETA)
2001-2004	International Society for Technology in Education (ISTE)
2001-pres	Computer Using Educators of British Columbia (CUEBC)

5. SCHOLARSHIPS, FELLOWSHIPS, HONOURS, AWARDS, GRANTS AND FUNDINGS FROM ALL AGENCIES INCLUDING THE UNIVERSITY OF VICTORIA

Date	$Amount	Details
*All have Irvine as Principal Investigator unless otherwise listed		
2006	$675,000	Technology Integration & E-Learning Research Lab Canadian Foundation for Innovation Leaders Opportunity Fund Grant
2006	$50,000 for development of full application Applied for	(team member). EOI for development of strategic and business plan: A Knowledge Management and Translation Platform to Support Health Services and Policy Research in British Columbia, Michael Smith Foundation for Health Research
2006	$4,000	Technology Integration & E-Learning Research Lab University of Victoria, VP Research
2005	$249,290 Applied for	(collaborator) Investigating Teachers' Information and Communication Technologies Perspectives and Practices in British Columbia K-12 Educational Learning Environments, SSHRC
2005	$5,330	E-Learning Workstation, Academic Equipment Funds
2005	$20,000	Implementing interprovincial professional development and parent information sessions via video conferencing Knowledge North Grant
2005	$1,874	Summer Career Placement Fund, Service Canada
2005	$30,000	Exploring the nature and effects of community-based, cohort-based e-support on parents of infants and toddlers Human Early Learning Partnership Research Grant
2005	$1,000	Travel Award, Office of Research Services, University of Victoria
2005	$1,350	Travel Award, Office of Research Services, University of Victoria
2004	$5,000	Michael Smith Foundation for Health Research Grant Preparation Program for New Investigators, University of Victoria

2004	$35,000	Start-up Funds, University of Victoria (3.5 times the base allotment for Education)
2004	$10,000	(co-applicant) Learning and Teaching Grant, University of Victoria
2002-04	$1,750	Learning and Teaching Grant, University of Victoria
2001-2003	$35,400	Doctoral Fellowship, Social Sciences and Humanities Research Council, Government of Canada
2002-2003	$2,000	Scholarship in Educational Computing, Alberta Society for Computers in Education
2001-2003	$7,984	Walter H. Johns Graduate Fellowship, University of Alberta
2001	$3,500	Graduate Fellowship, University of Alberta
2000-2001	$200	Student Service Award, Graduate Students' Association, University of Alberta
1999-2001	$9,000	Faculty of Graduate Studies Scholarship (Tuition), University of Alberta
2000	$800	J. Gordin Kaplan Graduate Student Award, Faculty of Graduate Studies, University of Alberta
2000	$500	Travel Award, Faculty of Education, University of Alberta
1999-2000	$1,800	Scholarship in Educational Computing, Alberta Society for Computers in Education
	$1,212,778.00	TOTAL TO DATE of Applied for and Secured Funds (not including research and teaching assistantships)

6. APPOINTMENTS AT UNIVERSITY OF VICTORIA
a. Academic:

Inclusive Years	Rank	Academic Unit
July 2004 – pres	Lecturer - will upgrade to Assistant Professor (tenure track) upon completion of Ph.D. in 2006	Faculty of Education
April 2003 – January 2004	Research Coordinator	Faculty of Human and Social Development
September 2001 – April 2003	Sessional Instructor	Faculty of Education

6. APPOINTMENTS AT UNIVERSITY OF VICTORIA
b. Administrative:

Inclusive Years	Rank	Academic Unit
N/A		

7. SCHOLARLY AND PROFESSIONAL ACHIEVEMENTS
a) Refereed Publications

Irvine, V., Hall, W., & Hunting, V. (2005). Exploring the nature and effects of community-based, cohort-based e-support on parents of infants and toddlers. *E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2005*(1), pgs to follow.

Irvine, V., & Davies, J. (2005). Developing an Overview of K-12 ICT Curriculum in Canadian Provinces and Territories. *Society for Information Technology and Teacher Education 16th International Conference 2005*(1), pgs to follow.

Davies, J., & **Irvine, V**. (2005). Technology Professional Development in Action at a Canadian Faculty of Education. *Society for Information Technology and Teacher Education 16th International Conference 2005*(1), pgs to follow.

Smolin, L., Lawless, K., Leneway, R., **Irvine, V.**, Judd, D., Pruitt-Mentle, D., & Radinsky, J. (2005). Models of Inservice Professional Development: An Exploration of Effective Practices. *Society for Information Technology and Teacher Education 16th International Conference 2005*(1), pgs to follow.

Smolin, L., Lawless, K., Leneway, R., **Irvine, V.**, Judd, D., Pruitt-Mentle, D., & Radinsky, J. (2005). University/School Professional Development Partnerships:

A Sharing of Models and Evaluation Issues. *Society for Information Technology and Teacher Education 16th International Conference 2005*(1), pgs to follow.

Irvine, V., Mappin, D., & Code, J. (2003). Preparing Teachers to Teach Online: The Role of Faculties of Education. *World Conference on Educational Multimedia, Hypermedia and Telecommunications 2003*(1), 1978-1981.

Irvine, V., & Williamson, M. (2003). Barriers and Opportunities in Implementing E-Learning in Post-Secondary Education. *World Conference on Educational Multimedia, Hypermedia and Telecommunications 2003*(1), 2833-2836.

Irvine, V., & Montgomerie, T. (2001). A Survey of Current Computer Skill Standards and Implications for Teacher Education. *World Conference on Educational Multimedia, Hypermedia and Telecommunications 2001*(1), 806-811.

Montgomerie, T.C., & **Irvine, V.** (2001). Computer skill requirements for new and existing teachers: Implications for policy and practice. *Journal of Teaching and Learning, 1*(1), 43-55.

Montgomerie, T.C., **Irvine, V.**, & Davenport, M. (2001, Jan 14-18, 2001). Design and Implementation of a Next Generation Distance Education System. In Proceedings: PTC2001 From Convergence to Emergence: Will the user rule?. Honolulu, HI: Pacific Telecommunications Council.

Irvine, V., & Montgomerie, T. (2000). The Role of Active Learning in the Comparison of Web-based and Face-to-Face Instruction. *World Conference on the WWW and Internet 2000*(1), 893-894.

Montgomerie, T., & **Irvine, V.** (2000). Specifying the Next Generation Distance Education System. *World Conference on the WWW and Internet 2000*(1), 922-923.

7. SCHOLARLY AND PROFESSIONAL ACHIEVEMENTS
b.) Books, Chapters, Monographs:

N/A

7. SCHOLARLY AND PROFESSIONAL ACHIEVEMENTS
c.) Other Publications: REPORTS

Williamson, M. & **Irvine, V.** (2003). *E-learning in Canada*. Ottawa, ON: Human Resources Development Canada.

Montgomerie, T.C., & **Irvine, V.** (2001). *Computer Skill Requirements for New and Existing Teachers: Implications for Policy and Practice*. Edmonton: University of Alberta.

7. SCHOLARLY AND PROFESSIONAL ACHIEVEMENTS

d.) Papers, Lectures, Addresses (International and National):

Year Details (Conference, Title of paper, City/Country, Month/Yr.)

International - Refereed

Irvine, V., Hall, W., & Hunting, V. (2005, October). Exploring the nature and effects of community-based, cohort-based e-support on parents of infants and toddlers. Paper presented at *E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*, Vancouver, Canada.

Irvine, V., & Davies, J. (2005, March). Developing an Overview of K-12 ICT Curriculum in Canadian Provinces and Territories. Paper presented at the *Society for Information Technology and Teacher Education 16th International Conference*, Phoenix, Arizona, USA.

Davies, J., & **Irvine, V**. (2005, March). Technology Professional Development in Action at a Canadian Faculty of Education. Paper presented at the *Society for Information Technology and Teacher Education 16th International Conference*, Phoenix, Arizona, USA.

Smolin, L., Lawless, K., Leneway, R., **Irvine, V**., Judd, D., Pruitt-Mentle, D., & Radinsky, J. (2005, March). Models of Inservice Professional Development: An Exploration of Effective Practices. Paper presented at the *Society for Information Technology and Teacher Education 16th International Conference*, Phoenix, Arizona, USA.

Smolin, L., Lawless, K., Leneway, R., **Irvine, V**., Judd, D., Pruitt-Mentle, D., & Radinsky, J. (2005, March). University/School Professional Development Partnerships: A Sharing of Models and Evaluation Issues. Paper presented at the *Society for Information Technology and Teacher Education 16th International Conference*, Phoenix, Arizona, USA.

Irvine, V. (2003, July). *Computers in education program: Teaching computer use and integration online*. Poster presented at the National Educational Computing Conference, Seattle, USA.

Irvine, V., & Mappin, D. (2003, June). *Preparing teachers to teach online: The role of faculties of education.* Paper presented at EdMedia: World Conference on Educational Multimedia, Hypermedia, and Telecommunications, Honolulu, Hawaii.

Irvine, V., & Williamson, M. (2003, June). *Barriers and opportunities in implementing e-learning in post-secondary education.* Paper presented at EdMedia: World Conference on Educational Multimedia, Hypermedia, and Telecommunications, Honolulu, Hawaii.

Irvine, V., & Montgomerie, T.C. (2001, June). *A survey of current computer skill standards and implications for teacher education.* Paper presented at EdMedia: World Conference on Educational Multimedia, Hypermedia, and Telecommunications, Tampere, Finland.

Montgomerie, T.C., **Irvine, V.,** & Davenport, M. (2001, January). *Design and implementation of a next generation distance education system.* Paper presented at the Pacific Telecommunications Conference, Honolulu, Hawaii.

Irvine, V., & Montgomerie, T.C. (2000, November). *The role of active learning in the comparison of web-based and face to face instruction.* Paper presented at WebNet 2000, San Antonio, Texas.

Montgomerie, T.C., & **Irvine, V.** (2000, November). *Specifying the next generation distance education system.* Paper presented at WebNet 2000, San Antonio Texas.

National – Invited Lecture

Irvine, V. (2003, May). *E-learning in K-12 and post-secondary education: Practical issues.* Paper presented to the E-Learning Research Symposium, hosted by Industry Canada and the Council of Ministers of Education Canada, Ottawa, Canada.

Provincial - Refereed

Irvine, V. (2003, May). *Teaching educators via technology to use technology without making it about technology.* Paper presented at Learning Online in BC, the annual conference of the Computer Using Educators of British Columbia, Vancouver, Canada.

Irvine, V., & Mappin, D. (2003, May). *Preparing preservice teachers to teach online: The role of faculties of education.* Paper presented at Learning Online in BC, the annual conference of the Computer Using Educators of British Columbia, Vancouver, Canada.

Irvine, V. & Mappin, D. (2003, May). *Preparing the next generation teacher: How Faculties of Education can respond to the growth of online learning.* Paper presented at Making IT Work: Teaching, Learning, and Technology, the annual conference of the British Columbia Computer Consortium Conference.

Irvine, V. (2003, May). The Medium is not the Instructional Strategy: Why Online Education Keeps Getting the Short End of the Stick. Paper presented at Making IT Work: Teaching, Learning, and Technology, the annual conference of the British Columbia Computer Consortium Conference.

Irvine, V., & Montgomerie, T.C. (2000, March). *Helping passive learners to become active learners.* Paper presented at Odyssey 2000 (Joint Conference of the Learning Resources Council and the Computer Council of the Alberta

Teachers' Association), Kananaskis, Alberta, Canada.

Montgomerie, T.C., & **Irvine, V.** (2000, March). *Implementing technology in developing countries.* Paper presented at Odyssey 2000 (Joint Conference of the Learning Resources Council and the Computer Council of the Alberta Teachers' Association), Kananaskis, Alberta, Canada.

Irvine, V. (1999, November). *Active vs. passive learning in an online environment.* Paper presented at the Virtual School Symposium. Edmonton, Alberta, Canada.

7. SCHOLARLY AND PROFESSIONAL ACHIEVEMENTS

e.) <u>Professional Activities</u> (Workshops, clinics, institutes and consultations for which documentation can be supplied. Other professional communications, e.g., letters to editors, etc.):

Dates	Details
1999	Active Learning Seminar, EDPY 202: Instr. Applic. of Technology.
2000	Active Learning Seminar, EDPY 202: Instr. Applic. of Technology.
2004	Learning Commons Noon-Hour Workshop

8. TEACHING DUTIES AT THE UNIVERSITY OF VICTORIA

a.) Courses Taught

*Maternity leave commencing April 3, 2006

Year(s)	Course	Hours/Week	Term	# Students
2005-06	EDCI 491 directed studies	2	2	1
2005-06	EDCI 591 x 2 directed studies	2	Summer	1
2005-06	EDCI 336 S01	3.5 week term	2	34
2004-05	EDUC 406 F01	2	1	25
2004-05	EDCI 336 S01	2.5 week term	2	32
2004-05	EDUC 406 S02	2	2	23
2004-05	EDUC 406 S03	2	2	26

8. TEACHING DUTIES AT THE UNIVERSITY OF VICTORIA

b.) Graduate Student Supervision

Year(s)	Student	Degree	Type of Supervision*
2005-06	Name removed for publication	M.Sc.	Committee Member
2004-05	Name removed for publication	M.A.	Committee Member
2005	Name removed for publication	M.Ed.	Chair
2004-05	Name removed for publication	M.Ed.	Chair
2004-05	Name removed for publication	M.Ed.	Chair

9. ADMINISTRATIVE ACTIVITIES: Committee and Service Activities
a. University and Faculty Committees:

University	Dates	Details
University of Victoria	2005-06	Member, E-Learning Working Group
	2005-06	Member, Workload Working Group
	2004-06	Member, Learning Commons Advisory Committee
	2004-06	Chair, Learning Commons Information Technology Sub-Committee
	2004-05	Member, Learning Commons Vision and Space Sub-Committee
	2004-05	Member (one meeting), Hiring Committee for the Technology Support Position for the Faculty of Education
	2004-05	Invited Member (one meeting), Faculty Web Site, Deans and Chairs Council
	2004-05	Member, Faculty Council

9. ADMINISTRATIVE ACTIVITIES: Committee and Service Activities
b. Department/School Committees and Responsibilities:

Dates	Details	
University of Victoria	2004-05	Member, Secondary Education Council
	2004-05	Member, Elementary Education Council
	2004-05	Member, Hiring Committee, Educational Technology Senior Instructor
	2004-05	Invited Member (one meeting), Faculty Web Site, Deans and Chairs Council
	2004-05	Member, Department Council
University of Alberta	1999-2001	President, Educational Psychology Graduate Student Council
	1999-2001	Member, Educational Psychology Department Council
	1999-2001	President, Instructional Technology Student Association
	1999-2001	Member, Instructional Technology Instructors' Group

9. ADMINISTRATIVE ACTIVITIES: Committee and Service Activities
c. External Academic/Professional Service

Dates	Details
2005	Reviewer, Technology and Teacher Education SIG Canadian Society for Studies in Education (CSSE)
2005	Reviewer, MICCA Educational Technology Policy, Research and Outreach, University of Maryland
2000	Guest Reviewer, B.C. Advanced Systems Institute, http://www.asi.bc.ca/

9. ADMINISTRATIVE ACTIVITIES: Committee and Service Activities
d. External Community Service

Dates	Details
2004-present	Member, Greater Victoria Early Childhood Coalition
2003-present	Email List Administrator for Child2003-04 Greater Victoria Parent E-Cohort
2003-present	Founder, Parents of Infants and Toddlers of Oak Bay/Mothers of Oak Bay Special Interest Group