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# Bringing in Large Scale Technological Change: A Case Study

Keng, Govan

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UNIVERSITY OF CALGARY

Bringing in Large Scale Technological Change: A Case Study

by

Govan Chia-Feng Keng

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## **Abstract**

This qualitative case study explored the broad issue of how to successfully bring about large-scale technological change, and more specifically it examined the factors involved in technological change adoption. The research question was “What are the factors that enabled or impeded the wide-scale implementation of a student information system in a large, complex urban school district?” The setting for this case study was the educational sites of the Vancouver Board of Education. The case involved the implementation of an electronic student information system called the British Columbia enterprise Student Information System or BCeSIS. Participants in this study included four key members of the change implementation team and 186 people who were directly impacted by the change initiative.

From the data, the following six findings emerged of which the first four factors enabled a technological change and the last two factors hindered the change: 1) an independent implementation team, 2) distributed leadership, 3) pilot/phased implementation schedule, 4) a customized training system, 5) lack of technological infrastructure/readiness, and 6) lack of comprehensive/cohesive messaging and communications. From the findings, four key conclusions were drawn: 1) a change implementation plan should be of a heuristic iterative design, 2) a prototype implementation model be used, 3) leadership density be created, and 4) change initiatives and strategies work best when they are institution specific.

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I thank my wife for her support, encouragement, and undying faith in my ability to accomplish this. I thank my children for their understanding and patience when daddy had to lock himself in the basement to “do his dissertation again”.

Thank you all very much!

## **Dedication**

This work is dedicated to my children, Alexander, Katherine, and Sophia, to my wife Judy, and to my father, the consummate teacher and scholar, John Chen-Shen Keng.

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## **Chapter 1**

### **Introduction**

This research sought to explore the broad issue of how to successfully bring about large-scale technological change, and more specifically, to discover the factors involved in technological change adoption. It was framed as a case study with the purpose of exploring the factors that enabled and/or impeded a specific technological change. Participants in this study included key members of the change implementation team and 186 people who were directly impacted by the change initiative.

This first chapter begins with a contextual overview of the study and background of the problem and setting, followed by the problem statement, statement of purpose, and statement of the research question. The chapter concludes with a discussion of the rationale and significance of the research study and the presentation of the limitations and delimitations of the study.

### **Context of the Study**

Technological developments in the past fifteen years have dramatically transformed the educational paradigm (Strong, 2008). The way information is processed, retrieved, shared, and stored has provided access to unprecedented amounts of resources that were previously limited by time and geographic constraints. Many educational institutions have struggled to keep pace with these technological advances (Bonk et al., 2007). But it is neither the inability to use technology nor the lack of technological ingenuity that hinder technological innovation in educational institutions. Rather, the

problems surrounding technology in education stem from the social and organizational ability of these institutions to adopt and embrace it (Hargreaves, 2003).

How the evolutionary shift of a large public organization, like a school district, from a paper-based to a digital realm occurs needs to be better understood and articulated. Research on issues such as the adoption of new technologies for student information systems and how technological change occurs have not been explored to any great degree from the viewpoint of educational practitioners (Heck & Hallinger, 2005). How such an organization brings about change and the factors that help or hinder the implementation of technology are worthy of further investigation.

During the last 10 years, the British Columbia education system has undergone a profound technological shift (BC Ministry of Education, 2011). As part of its endeavour enter into the digital age, it was changing its student information system from various independent paper-based systems to one that was virtual, province-wide, and networked.

The subject and setting of this dissertation was the large-scale implementation of a new student information system in a large, complex, and urban Canadian school district. Given this situation, this dissertation is presented as a case study of the implementation of a new technology.

## **Background**

In the late 1990s, British Columbia public school districts, the British Columbia Ministry of Education (BCMoE), and the province's independent schools searched for ways to reduce redundancies and create efficiencies in education. Archaic student information practices were identified as needing attention. At that time, every school

district had its own student information system and individualized processes that supported it. Very few of the school districts' student information systems communicated with each other. This led to the search for a product that could improve and streamline the province's student information systems. The BCMoE conducted a search with representatives from interested parties and made the decision to purchase a comprehensive student information system from a Canadian software company called aal Associates. At that time, variations of this student information system were used in several jurisdictions across North America.

The software called the Enterprise Student Information System was a web-based database system that integrated education related functions such as attendance, reporting, time-tabling, and record keeping. This system was rebranded the British Columbia enterprise Student Information System (BCeSIS) and adoption of this system was to be a phased implementation over a 10-year period, beginning in 2001.

To aid in the implementation of BCeSIS, the BCMoE contracted Fujitsu Consulting, a software management firm, as the change facilitators and provided financial incentives for early adoption. Being the most diverse and second largest school district in British Columbia, the Vancouver Board of Education (VBE) decided to wait until the system had been in operation for a length of time before implementing it.

In 2005, on advice from the VBE Director of Information Technology and affected stakeholder groups, the VBE agreed that it was time to implement BCeSIS. A Memorandum of Understanding with Fujitsu and the BCMoE was signed in December 2005 committing the VBE to BCeSIS implementation. The VBE's BCeSIS

Implementation Plan was developed and approved in 2006, with implementation set to begin in the 2007-2008 school year.

## **Setting**

The setting of this case study of the implementation of a student information system was the Vancouver Board of Education in the province of British Columbia. The Kindergarten to Grade 12 educational system in BC is comprised of 60 public school districts enrolling about 535,000 students. There is neither Catholic nor other school authority that is uniquely recognized by the province; all these other schools are grouped together and classified as Independent Schools. There are about 73,000 Kindergarten to Grade 12 students in Independent Schools.

British Columbia has a labour structure that separates school teachers from principals. In BC, only teachers and support staff are unionized employees. All other persons in education related positions like school principals and education coordinators are considered management and are exempt from union affiliation.

The Vancouver Board of Education (VBE) is the second largest school district in the province of British Columbia. It provides education and other instructional services to 54,000 Kindergarten to Grade 12 students, 2,500 full-time equivalent adults in continuing education programs, spans over 130 educational sites, and employs 4,100 full-time equivalent educational professionals, para-professionals, and support workers. The bulk of these employees are school teachers: there are approximately 1,600 elementary and 1,200 secondary teachers.

## **Problem Statement**

Technological change processes in large public institutions are complex and multifaceted. Change leaders in public institutions such as school districts are often relying on ad hoc initiatives or lessons and experiences from the corporate sector, which may only have marginal application to the public sector. There is little information on how a large public institution, like a school district, successfully brings about a technological change within the organization. The problem of educational change that is explored both at the system and individual levels needs to be better understood.

## **Statement of Purpose and Research Question**

The purpose of this case study was to explore with the change implementation teams and people directly affected by the change initiative their thoughts on the factors that enabled or impeded a technological change. It was anticipated that with a better understanding of the factors involved in technological change, then better-informed decisions could be made by public sector change leaders in planning and implementing change initiatives. To address this problem, the following research question was used to guide the study: What are the factors that enable or impede the wide-scale implementation of a student information system in a large, complex urban school district?

## **Research Approach**

With the approvals of the University of Calgary's Conjoint Faculties Ethics Review Board and Vancouver Board of Education's Research and Ethics Committee, the researcher conducted the study with human participants on the factors that enabled or



impeded the implementation of a student information system. This investigation was framed as a case study using multiple sources of data. Participants in the study were separated into two groups, those on the implementation team and others who adopted the system. In-depth interviews were conducted with members of the implementation team and the other participants of the study completed a structured survey questionnaire.

In-depth interviews consisted of three separate sessions over a set period of four weeks. This in-depth interview process utilized a cycle of refinement to ensure that the interviewees' thoughts, perceptions, as well as the overall essence of what they were communicating were captured in as much detail as possible. All in-depth interviews were transcribed verbatim, with interviewees identified only with a pseudonym. Where an interviewee added emphasis, intonation, and emotion, these were included in the transcripts as well. All interviewees approved the final version of the interview transcript.

One hundred eighty-six participants, representing about 9% of the study's population, completed the structured survey questionnaire. These participants provided responses on a Likert scale as well as open-ended comments to sixty questions.

The in-depth interviews, structured survey questionnaire, reviews of artifacts and documents, along with participant-observation were used to triangulate the data. A comprehensive review of the literature not only shaped the data-collection methods but provided a starting point for the discovery of the themes, findings, explanations, and hypotheses (TFEH) of the study. Various strategies were also employed to ensure that the conceptual framework guided the TFEH and that all data, including discrepant evidence, were addressed.

## **Assumptions**

Based on the researcher's experience and background in VBE change initiatives, three primary assumptions were made regarding this study. First, technological change at the VBE is inevitable. This assumption was based on the premise that technological advancements have accelerated in the past decade that have created the necessity to replace or augment pre-existing paper-based, analog, and archaic systems.

Second, any change initiative at the VBE will be met with resistance. This assumption was based on the researcher's experience with the VBE. Numerous change initiatives in the past were received with cynicism and scepticism. Employee groups have become leery of the erratic change initiatives at the VBE that conditions and procedures for technological change were specifically negotiated and stated in the Collective Bargaining Agreement with teachers and support staff.

Third, for this technology to be effectively implemented, the change initiative required a change of current practices. This assumption was based on the fact that the current practices at the VBE cannot and will not adapt to a new technology if all the technology does is present an alternative way of doing things. The adoption of the technological change would require, as a pre-requisite, a new approach that differs from current practice so that the change initiative would be perceived as necessary.

## **The Researcher**

The researcher is a teacher with the Vancouver Board of Education and subscribes to the positivist approach to research. Namely, the researcher believes that knowledge is

conjectural, that data and evidence shape knowledge, and that being objective is an essential part of competent inquiry (Cresswell, 2000).

At the time of the study, the researcher was in a seconded role as District Trainer for BCeSIS and a member of the BCeSIS Implementation Team. The researcher brought to the study close to two decades of practical experience as a classroom and district teacher, technology department head, executive member of the teachers' union, as well as a thorough understanding and knowledge of the environmental context.

Realizing this, the researcher acknowledges that his employment experiences provided great insight and access as well as being a source of potential bias. Therefore, the researcher was extra cautious throughout the research design, analysis, and interpretation by referring to the findings and research literature rather than his own experiences. Importance was ascribed to empirical observations and measurement. The researcher remained committed to conducting empirical research and engaged in critical self-reflection throughout the study. Furthermore, to address subjectivity and strengthen the reliability, validity, and credibility of the study, several procedures such as the triangulation of data and reliability checks with professional colleagues were implemented.

### **Rationale and Significance**

The rationale for this study derives from the researcher's desire to learn how technological change can be effectively implemented. By gaining insight into the factors that affect a large-scale technological change, new strategies, approaches, and methods for future implementations of technology may be developed for educational institutions, perhaps making the change process smoother and more cogent. Increased understanding

of the technological change process that details factors that enable or impede wide scale adoption of technological change will also be of potential benefit to change agents working in large-scale public organizations.

### **Limitations and Delimitations**

Deciding on a particular research approach and design is related to selecting the most appropriate plan for addressing the research problem (Merriam, 2009). In choosing to perform a qualitative case study, it was decided that its strengths outweighed its limitations. Nevertheless, this research study contained several limitations: some common to qualitative research in general, some to case study research, and others to this particular study.

A qualitative research approach explores and attempts to understand individual's meanings ascribed to certain phenomena; it obtains evidence from people from their perceived understandings and realities. The analysis of the data are usually done in an inductive manner where the researcher makes interpretations as to its meaning. Qualitative studies in general are limited by researcher subjectivity (Bloomberg & Volpe, 2008). Potential researcher prejudice is an inherent problem and great care was taken to minimize its impact.

A case study focuses on a single unit. Therefore, issues of generalizability and transferability are sometimes considered limitations in this research approach. Although general knowledge is important, context-dependent knowledge is extremely valuable (Flyvbjerg, 2006). Furthermore, the unique learning of a particular case study can often

be applied to other situations. It is the reader, not the researcher who determines what can apply to his or her context (Stake, 2005).

Case studies are also limited by issues such as the integrity of the researcher, researcher bias, and the product of the case study. The researcher is the primary data collector. Although this has its advantages, reliance is placed on one person. As previously stated, researcher bias is present in all qualitative studies; but, there is no greater bias in a case study confirming preconceived notions than in other types of research (Flyvberg, 2006). The special feature of a case study, a thick description of a particular phenomenon, can itself be a limitation (Merriam, 2009). The amount of description, analysis, or summary is up to the researcher.

A perceived limitation specific to this case study could be the researcher's integral role in this technological implementation. Since the researcher was immersed in facilitating the technological change, a perceived limitation could be inherent in the selectivity of the data sources and data collection methodologies. Other limitations of the study were that the participants had difficulty adjusting to the researcher as an interviewer. A conscious attempt was made to have open and honest conversations. Furthermore, the data collected by the structured survey questionnaire were in a form similar to survey research; therefore, it was limited to the choices and short responses found in survey research.

In addition to the above limitations of the study, the researcher delimited this study to the case of the implementation of BCeSIS at the VBE. The research was delimited to the vast majority of employees who had adopted this technological change. Employees who had not adopted BCeSIS were excluded from the study. The study was

delimited to the Vancouver Board of Education and the employees who use the software program. Further delimitations were the use of four methods of data collection: the collection of artifact and documents, participant-observation in the form of the researcher being part of the implementation team, responses from the structured survey questionnaire, and in-depth interviews.

In presenting this research, this dissertation proceeds as follows: the first chapter introduced the problem under study, the second chapter summarizes the literature relevant to this dissertation and presents the conceptual framework, the third chapter describes the study's methodology, the fourth chapter presents the study's findings, the fifth chapter discusses, analyzes, and interprets the findings, and the last chapter concludes, makes recommendations, and summarizes the study.

## Chapter 2

### Literature Review

The critical review of literature explored the current research on how technological change can be effected in large educational institutions. To this end, four main topics became the focus of the literature review: change theories and implementation, change leadership, change models, and capacity building for change. In presenting the interconnectedness of these four areas as it relates to the research study, this chapter will proceed as follows:

1. An introduction to the literature review, the criteria used for selecting the literature, and how each section progresses.
2. Selected literature on change theories, specifically focussing on organizational and individual change were reviewed and presented to provide background and understanding of the change process;
3. Technological change and technological change implementation in the context of Rogers' (2003) *Diffusion of Innovations* is detailed and discussed;
4. Educational leadership literature related to the implementation, management, and facilitation of change is presented and discussed;
5. Research literature involving learning for change, specifically workplace learning, empowering employees, and the promotion of the benefits of new workplace learning technologies, is presented and discussed;
6. The conceptual framework is discussed; and
7. A summary of the literature review that identified key points is presented.

## **Introduction**

In conducting the literature review, the researcher used information from multiple sources: books, articles, dissertations, and course notes and resources. These were accessed via various libraries at the Universities of Calgary and British Columbia, scholarly publications at the researcher's place of employment, ERIC via Ebsco, and ProQuest. The course notes and resources were from courses the researcher took as a doctoral student at the University of Calgary.

No specific time frame delimited much of this literature review. The reason a period was not specified was due to the researcher's belief that given the nature of the selected topics, a time frame could preclude the inclusion of relevant material. For topics in which there have been profound recent developments, such as the technological change and learning technologies, the literature reviewed mainly consisted of studies that were from 2007 onwards although a few older studies were included due to their relevance to the topic.

In presenting this literature review, each topic and sub-topic was generally separated into two competing themes or schools of thought. These two schools of thought were then examined in a critical manner to draw attention to the disparate findings and to identify gaps that may have existed. Throughout the review, where gaps or inconclusive evidence existed, the researcher attempted to relate them to this research study.



## **Change Theory**

Keeping in mind that the purpose of this case study was to determine how change occurs, a critical survey of the relevant change theory literature is presented in three sections: organizational change, individual change, and technological change. In the first section, broad theories and ideas on the process of organizational change is presented and discussed. In the second section, selected literature on individual change adopting characteristics and how best to help individuals accept change are presented. Finally, technological change and the process of implementing change are discussed. Throughout the change theory literature, there exists a common understanding that change leads to the betterment of an individual or an organization or both. It was assumed that if there were no net benefit, real or perceived, then there would be no change.

Charles Darwin concluded that it is not the strongest of the species that survives, nor the most intelligent; it is the one most adaptive to change (Darwin, 2003). Although this idea was meant to describe the evolution and self-perpetuation of organic life-forms, its meaning rings truer than ever for today's educational institutions. Rogers (2003) believed that educational practices are about 25 years behind what is considered best practices, which lends support to the notion that educational institutions have much compulsory change ahead of them.

Change in organizations such as educational institutions can be thought of as being organization focussed or employee focussed. Organization focussed change is often considered to be top-down or mandated change; whereas, employee focussed change is often thought of as employee development and generally results in some

immediate benefit. Regardless of its type, change tends to create apprehension and uncertainty among employees (Prochaska et al., 1994).

The resulting apprehension and uncertainty creates conflict between an individual and the organization which when resolved, improves either the individual, the organization, or both (Argyris, 1964; McGregor, 1960). It is the satisfactory or unsatisfactory resolution of this conflict that either harmonizes or hinders organizational change (Argyris, 1964; Bohlman & Deal, 1991). Change theory, therefore, as it applies to educational institutions, can be regarded on one hand as change that focuses on the organization as a whole and the other, on the individuals who go through that change.

**Change for organizations.** The theories and practices of educational change stem from the fields of sociology and organizational management. Educational change theories became formalized from the flood of educational reforms that took place since the 1980s (Waks, 2007). Educational change theory, in its simplest form, is either innovation focussed or capacity-building focussed. Innovation focussed reform examines and traces a specific innovation to determine the factors associated with its success. Capacity-building focussed reform seeks to determine how innovative capacity can be further developed for organizational improvement.

The literature on organizational change as presented here refers to the process of change and how they apply to educational institutions. Waks (2007) provided a framework for the eight stages educational institutions go through from the desire to seek change to the reorganization and betterment of the organization:

1. misalignment: changes are taking place elsewhere that brings the institution out of alignment with others

2. protest: dissatisfaction is expressed with the current arrangement
3. ad hoc alternatives: new ideas proliferate, actions are taken, often without a satisfactory plan for broader implementation
4. entrepreneurship: new ideas and actions, possibly based on step 3, emerge with elements to broaden their appeal
5. responsible innovation: some of these innovations are brought into existence by responsible and accountable change agents; change is formalized
6. social construction: a process of social construction and negotiation is initiated, some innovations/innovative practices are rewarded, others rejected
7. institutionalization: rewarded innovations and practices gain further resources and participants; these changes take traction and gradually become part of the institution
8. reorganization: employees adapt structurally to the new institutional pattern, some wind up in niche areas, others leave the organization

Although Waks (2007) provided a framework for the stages of change, how change actually does occur and how this change aids in the sustainable improvement of an organization remains open to question. If change can be summarized and guided by a framework, why then can it cause so much friction? Can organizational change just be the innovation of an institution (Havelock, 1970)? Innovation is the intentional revision of a process or procedure that is designed to produce tangible benefits and results (Havelock, 1970). Innovation can be viewed as the utilization and dissemination of knowledge and has been successfully used to bring about organizational change by

American elementary school teachers and those in the agricultural field (Havelock, 1973). Can a revision of a process or procedure bring about sustained improvement in organizations?

Can organizational change be adaptation? Adaptation can be thought of as incremental changes that evolve over time in response to external stimuli (Cameron, 1984). Cameron (1984) in studying American higher education institutions faced with declining enrolment and dropping revenues, found organizations successfully renewed and maintained excellence when they adapted and were flexible to paradoxes in change implementation.

Can organizational change be institutionalization? Institutionalization is the modification and improvement caused by a process or innovation (Curry et al., 1992; Waks, 2007). The process of institutionalization consists of mobilization, implementation, and a return to stability and equilibrium. This may work for segments of the institution but can it be incorporated throughout? Can constant modification and improvement be the basis of sustained organizational change?

Can organizational change be reform? Reform is described as a change or innovation that is dictated top-down or from an outside organization (Kezar et al., 2001). Reform as a method in bringing about organizational change can work, but can this type of change be sustained (Senge, 2006)?

The researcher accepts that all the above models of organizational change are valid and have been applied successfully. However, there does not appear to be much thought given to how these models can create self-sustaining and multi-dimensional change that promotes continuous improvement: true organizational change, change that

can be sustained for the continued betterment of educational institutions, needs to be transformative (Cooperrider & Whitney, 2000; Mulford, Silins, & Leithwood, 2004; Waks, 2007).

Transformative change is all encompassing. It is not just adaptation, institutionalization, innovation, or reform. It is the sum of these and other theories combined (W. Mulford, personal communication, July 2008). This sustained change needs to be as much an individual phenomenon as an organizational phenomenon for the change to be truly effective (Sarason, 2002). Furthermore, it has been argued that the main challenge is not so much in bringing about change, it is in creating and sustaining the necessary conditions so that transformative change for the betterment of the organization can continuously occur (Senge, 2006).

**Change for individuals.** As there are many models that theorize organizational change, there are just as many that focus on the capacity building of individuals during this change process. Individuals exalt in the principle of change; however, individuals often oppose it in practice, disliking and being uncomfortable with even the smallest changes to daily routines (Evans, 1993). Change at the best of times creates uncertainty, anxiety and hope, at the worst of times resistance, negativity, and fear (Evans, 1993; Fullan, 2003; Moerschell, 2009). So what is this change that stirs up so much emotion? Can it be personal change: many people readily seek out such change, for example, the desire to change one's image to better oneself? Why then can change be difficult?

Some change models and theorists such as Zaltman and Duncan (1973), Prochaska, Norcosse, and DiClemente (1994), and Schein (1978) attempted to pre-empt and anticipate where the difficulties and roadblocks may lie before and during the change

process. Others such as the Concerns Based Adaptation Model (CBAM), Fullan and Stiegelbauer's (1991) *New Meaning of Educational Change*, and Rogers' (2003) *Diffusion of Innovations*, focussed on individual change adopting characteristics and attempted to address the obstacles, needs, and required support to aide individuals in adopting change.

In planning strategies for change, Zaltman and Duncan (1973) theorized that the focus needs to be on addressing the resistance to change and conditions hindering it (Zaltman & Duncan, 1973). Resistance interferes with the change process but when the cause of the resistance can be diagnosed, interventions and processes that address the core of the resistance, can often set the stage for successful change implementation. Resistance to change, when approached and used in a meaningful manner, can be a source of constructive feedback (Ellsworth, 2000).

Change anxiety and resistance to change is often associated with incomplete or less than satisfactory experiences with stages of the change process (Prochaska et al., 1994). Change has predictable stages: pre-contemplation, contemplation, preparation, action, and maintenance (Prochaska et al, 1994). To be successful in bringing about change, effective management and accomplishment of objectives are required to alleviate change anxiety.

Furthermore, the way people perceive a change effort affects their ability to adopt it successfully. People believe and view change in four ways: they cannot change, they do not want to change, they do not know what to change, and they do not know how to change (Dembo & Seli, 2004). Furthermore, an individual's desire to implement change

or adopt an innovation varies with his or her stage of employment (Schein, 1978). Schein (1978) stated that employees go through an employment continuum:

1. priorities shift from work to personal concerns
2. focus of employment changes to material from intrinsic rewards
3. mastery of the job lessens the need for recognition of performance
4. flexibility and openness is reduced

The further the employees progress along this continuum, the less likely they are to readily embrace change or adopt an innovation. In understanding and identifying an individual's employment stage, change implementers can then position a change that resonates with an individual's state on the employment continuum.

Regardless of the reasons why an individual may not take to change or is unsuccessful at it, there are models that help change agents make the change process smoother. The Concerns-Based Adoption Model (CBAM) is one of the most powerful and most-used frameworks for addressing change at the individual level (Ellsworth, 2000).

The CBAM is an empirically based framework that provides guidance to facilitators of change. The CBAM focuses on the individuals' experiences as they implement change. The model revolves around the change agent as having access to a variety of resources and tools for obtaining data and feedback to aid those during the change process. The idea is to collect data then use this data to make concerns-based interventions thereby assisting individuals to become more effective. In employing the CBAM, it is assumed that a specific innovation will be adopted. "The CBAM is not

directly concerned with organizational development, per se, but rather with individual innovation adoption” (Hall, Wallace, & Dossett, 1973, p. 4).

In order to detail what the CBAM is and how it works, the model’s creators defined the word Concerns in three stages: self-concern, task concern, and impact concern. The first stage is personal concern, namely how the change affects an individual and concern about the additional demands and expectations placed upon that person. Second, as these self-concerns become resolved, the concern shifts to the nature of the task and task performance. The concern at this stage is on understanding and successfully making the change. Finally, the focus shifts to concern about the impact an individual has on others and strives to make sure that the change is implemented well. (Hall, Wallace, & Dossett, 1973).

The Concerns-Based Adoption Model was successfully used in part by technology adoption researchers such as Sherry, Billig, Tavalin, and Gibson (2000) in their longitudinal study of the Boulder Valley Internet Project. Furthermore, regardless of the type and the content of change to be implemented, CBAM forms an integral part of any change process (Hall & Hord, 2001; Horsley & Loucks-Horsley, 1998).

The idea that stakeholders are change agents is fundamental in educational change (Fullan & Stiegelbauer, 1991). The stakeholder as change agent is similar to the CBAM in that it is a framework that focuses on the individual, his/her ability to change, and requirements throughout the change process (Ellsworth, 2000).

Fullan and Stiegelbauer (1991) identified six stakeholder groups that were considered change agents: teachers, school administrators, students, district managers, change consultants, and the community in general. In their work, they provided



explanations and reasons for these groups being change agents, the major issues relevant to each group, and guidelines for successfully undertaking change in each of these roles (Fullan & Stiegelbauer, 1991).

Dula, Jacobsen, Ferguson, and Ross (2012) extended this concept to include a stakeholder analysis in any change effort. They sought to determine at outset, who would be most impacted by the technological change which allowed them to focus their energy and time on groups who would be most impacted (Dula et al., 2012).

In reviewing the literature on change theories, some common themes emerged such as the need for organizations to embrace and accept change and the need to address change adopters' concerns. It appeared that if change adopters' needs are addressed, however it may be done, it would lead to a smoother implementation of any technological change.

There seemed to be a divergence in interests when it came to individuals versus organizations. In terms of organizational change, the literature showed that sustained transformative change was required for the improvement of the organization, but, for the individual in the organization, change was at best cautiously accepted. How these two seemingly differing interests can be merged for continuous improvement of an organization is not well understood nor well documented.

### **Technological Change**

Technological change when implemented effectively increases an organization's efficiency, effectiveness, impact, and financial return (Accenture, 2007). In employing technology, not only are educational organizations able to gain timely accurate access to

student information, it can also be used to satisfy pressures for greater accountability and efficiency (Enomoto & Conley, 2007). While there were many reasons for educational institutions to adopt and implement technology, perhaps the most important was the financial reason. School districts, as holders of the public trust, need to adopt technology to eliminate redundant and duplicate processes and capture long-term gains in employee productivity, both of which lead to cost-savings (Accenture, 2007).

A technological change does not have to be paradigm shifting. Even if a new technology streamlines and makes more efficient an information process, which results in tangible benefits such as higher faculty satisfaction and some cost reduction, it may have served its purpose (Abdous & He, 2009). Ineffective technological implementation or the use of technology for technology sake undermines the potential for real educational advancement (Hargreaves, 2003).

Can the implementation of technological change just be viewed as a form of organizational or individual change? Although there is overlap in this regard, studies by Sullivan and Porter (2006), Abdous and He (2009), and Pirani (2005) seem to point to technological change as a process distinct from organizational and individual change. Sullivan and Porter (2006) described technological change using phrases such as the “big-bang approach” and “business process phased implementation”; Pirani (2005) used “business process taxonomy”; Abdous and He (2009) introduced “process reengineering”. These technological change implementation models do indeed work: business schools used these models as case studies of effective change implementation (Venkatesh, 2008). Can these implementation models work in educational settings?

Kezar and Eckel (2002) argued that although the content of change, factors related to change outcomes, and the conditions related to change were all well-documented, the process for implementing change is not well documented in an educational setting. Nonetheless, in surveying the literature on successful technological change implementation, terms such as “distributed leadership” (Bennet, Wise, & Woods, 2003), “leader preparation” (Sullivan & Porter, 2006), and “improved communication” (Abdous & He, 2009) were all prevalent. These same terms are also now prevalent in the education realm and connections and transferability between these settings need to be further explored and documented (Kezar & Eckel, 2002).

**Technological change and Rogers’ diffusion of innovations.** In implementing technological change, it is pertinent to understand how an innovation is adopted. One theory that is pervasive throughout the change literature is Rogers’ (2003) *Diffusion of Innovations*. Diffusion is the process “by which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 2003, p. 11). Accepting this definition, the diffusion of an innovation can then be interpreted as the social change, either planned or spontaneous, brought about by a new technology, practice, or idea.

If one accepts that the dissemination or communication of information for purposes of change is diffusion, then organizational change using diffusion will depend on the perceived attributes of the change, change agents’ efforts, degree of the felt need for change, and norms of the system (Rogers, 2003). The diffusion model centres on an idea or practice which can be summarized as the initial awareness of an idea, further

exploration of the idea, evaluation of that idea, trial of the idea, and the idea's adoption or non-adoption (Valente & Rogers, 1995).

**Diffusion of innovations.** The Diffusion of Innovations (DOI) is an innovation adoption paradigm and a model for establishing the necessary characteristics for successful change. *The Diffusion of Innovations* was first published in 1962 with the most recent update being in 2003.

Rogers (2003) argues that all innovations have an S-shaped rate of adoption (see figure 1). The shape of the S-curve varies directly to the rate of adoption or non-adoption of the innovation (Rogers, 2003). In cases of non-adoption or minimal adoption of the change, the curve sits very low on the vertical axis (total percentage of adopters) and may even begin to trend downward over time.

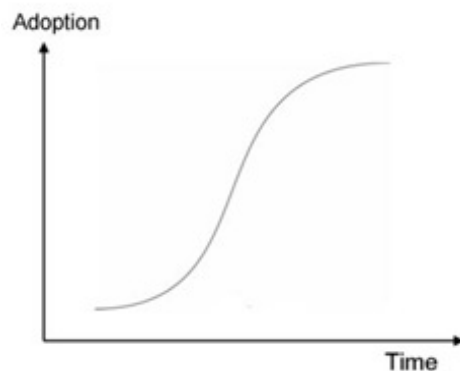


Figure 1: S-Shaped Innovation Adoption Curve. Adapted from Rogers, E. (2003).

*Diffusion of innovations, 5<sup>th</sup> ed.* New York: Free Press.

In order for a change to be successful, four variables need to be considered: the innovation itself, communications channels, time, and social systems (Rogers, 2003). It is assumed an innovation that successfully passes through each of these four stages will lead to the desired result: adoption.

***The innovation.*** In the study of an innovation, be it a new idea, practice, technology, or item, researchers tend to evaluate five characteristics related to the likelihood of adoption:

1. relative advantage: Is the innovation better than what I have now?
2. compatibility: Does the innovation conflict with my values, practices, or needs?
3. complexity: Is it too difficult to understand or use in authentic settings?
4. trialability: Can I try it out first? Can I go back to what I was doing if I do not like it?
5. visibility: Can I watch someone use it before I decide to adopt it?

In terms of advantage over whatever is current, an innovation only needs to have a perceived relative advantage. Objective advantage is not necessary. Furthermore, the unit of measure when comparing and analyzing the innovation to the status quo often are not equivalent (Rogers, 2003). Potential adopters use multiple units of analysis, often applied selectively and discriminately. An example is the comparison of the QWERTY versus the Dvorak keyboard. The Dvorak keyboard has many objective advantages over the QWERTY keyboard but has failed to be adopted.

An innovation also needs to be perceived to be in line with adopters' existing beliefs, culture, experiences, and values. Even though an innovation may have an extreme relative advantage, it may not diffuse very well if it is perceived to be somewhat incompatible to a current belief system. For example, people who belong to a certain religion will tend not to readily adopt contraception innovations even though they clearly aid in family planning.

Simplicity of an innovation greatly increases the chances of it being adopted. If an innovation is perceived to be even a little complex, its rate of adoption is greatly hindered (Rogers, 2003). Again, it is the perception of simplicity or complexity that enhances or hinders the change. As change agents and leaders, it is clear that the innovation needs to be presented in such a manner that is easily understandable, with links to previous skills and knowledge.

In considering the adoption of any innovation, potential adopters prefer that the innovation be available to be experimented with. Trialability, on a partial or instalment basis, will likely result in the innovation being adopted more quickly (Rogers, 2003). An innovation that is trialable lessens potential anxiety and uncertainty about the change.

When an innovation is eventually adopted, is the actual adoption visible to other potential adopters? Rogers (2003) argued that the more visible the innovation adoption, the steeper the S-curve or rate of adoption. In order to visibly confirm their adoption decision, people prefer to see the innovation in use (Rogers, 2003).

The innovation itself does not need to be superior to the status quo. It is the perception that the innovation is better, based on the five characteristics, that will aid in the change process (Rogers, 2003). Furthermore, an innovation that lends itself to some sort of re-invention or personalization speeds up the adoption rate (Rogers, 2003). It is the role of the change leaders to position such innovations in this light so that the innovation has a greater chance of success.

***Communication channels.*** Communication channels refer to the process in which innovation adopters and potential adopters share information (Rogers, 2003). Communication channels can be non-personal or interpersonal. The mere existence of an

innovation needs to be made known to potential adopters. Mass broadcasts are one efficient form of non-personal communications used to create awareness of an innovation; however, it is not likely to aid much in the actual diffusion of the innovation. Interpersonal communications are much more effective in persuading potential adopters to at least trial the innovation. The success of interpersonal communication was demonstrated by Frank, Zhao, Penuel, Ellefson, and Porter (2011) in their study on elementary teachers' adoption of technology. The more opportunities that existed for a teacher to discuss and share knowledge about the technology, the higher the likelihood of that technology being implemented (Frank et al., 2011).

Communication about an innovation is an obvious concept at first glance. However, it is the effective communication of an innovation that is crucial to the change process. Frequent communication between change agents and all affected parties is one of the most important aspects for the adoption of an innovation (Dula et. al, 2012)

Rogers (2003) believed that interpersonal networks were the key to acceleration of change. In order to accomplish this, he introduced the notion of opinion leadership. Opinion leaders are people who have either formal or informal interpersonal networks to aid in the innovation's diffusion. Studies by Valente and Davis (1999) and Fischer (1994) have shown that the use of opinion leaders do indeed speed up the diffusion process.

In particular, Fischer's study (1994) titled *Paul Revere's Ride*, illustrated the importance of the importance of interpersonal networks and opinion leadership. Fischer (1994) used the case of two riders, Paul Revere and William Dawes, who set out to warn that the British were coming. However, this famous warning is only associated with Paul

Revere even though William Dawes, the other rider, actually covered more territory (Fischer, 1994). Why was Paul Revere more successful? Fischer (1994) argued it was because he knew the territory better than Dawes and in order to effectively mobilize the militia, he spread his message to community opinion leaders; whereas, Dawes just randomly knocked on doors (Fischer, 1994).

Although in the above study and others previously mentioned, opinion leaders do indeed aid in the diffusion of information. However, it is also likely that opinion leaders could thwart an innovation's diffusion. An example is the already mentioned non-diffusion of the Dvorak keyboard. In this case, opinion leaders such as typing teachers and keyboard manufacturers used their interpersonal networks to block its diffusion. So for change agents and leaders, not only is it crucial to establish effective communication channels, but these channels somehow need to be assessed and screened to ensure the right message is diffused. How this can be accomplished is still unclear in the literature and requires further study.

**Time.** Individuals do not change at the same time. Time, the third variable in the diffusion process, has three main dimensions (Rogers, 2003). The first is the time it takes for an individual to make the decision to adopt or reject the innovation after becoming aware of it. The second dimension is the relative time-lapse it takes an individual to adopt an innovation when compared to others. The third dimension is the amount of time it takes for a certain percentage of the population to adopt an innovation.

The first dimension of time, in which a decision to adopt an innovation is made, can be classified into five categories: knowledge, persuasion, decision, implementation, and confirmation (Rogers, 2003). Knowledge is the stage in which the individual is



introduced to the innovation and gains some understanding of it. Persuasion refers to the formation of a favourable opinion based on this knowledge. Then a decision is made to adopt or reject the innovation, on at least a trial basis. This is followed by the implementation of the innovation and confirmation that the decision to adopt the innovation was indeed a good one.

Rogers (2003) second dimension of time pertains to innovativeness and types of adopters. Adopters were categorized based on the relative time in which they adopt an innovation. There are five categories of adopters: innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003). The individuals in each of these categories play a pivotal role in the diffusion or non-diffusion of an innovation. It should be noted that the amount of people in each of the categories follow a standardized normal distribution.

The third dimension relates to the overall amount of time it takes for a specified percentage of the population to adopt an innovation. For change agents and leaders, this is usually the most discussed and debated aspect of time due to implementation and budget considerations. According to Rogers (2003) the time for an innovation's adoption varied greatly and cannot be accurately predicted. However, Beal and Rogers (1960) suggested that there are certain metrics that can be used to predict how long the diffusion of an innovation may take once the innovators and/or the early adopters change. For example, Beal and Rogers (1960) provided evidence that people in the critical mass for an innovation's adoption, the early majority adopters, take about three times the amount of time to adopt an innovation as people in the innovator category (Beal & Rogers, 1960). Although the overall change period cannot be pre-set, it goes to reason that timeframes

may be adjustable to help diffuse the innovation. How this is done and the strategies change agents could employ is not clear.

***Social systems.*** The social structure of a system affects an innovation's diffusion rate (Rogers, 2003). Social structure refers to both the formal hierarchy and the informal interpersonal networks and communication flows. In bureaucratic organizations like a school district, individuals in higher-ranked positions feel it is their right to issue orders and directives and expect that they will be carried out (Rogers, 2003). This is not the optimal way to promote the adoption of an innovation nor facilitate positive change. Oftentimes, these directives result in the non-adoption of an innovation.

In leading any type of change, in particular a change involving an innovation, an understanding of Rogers' (2003) *Diffusion of Innovations* and the S-curve that describes the innovation's rate of adoption, would greatly aid the change process. Change leaders need to consider four variables that can make the change process more streamlined and the innovation more acceptable: the innovation itself, communications channels, time, and social systems (Rogers, 2003). It is the effective strategic leadership, positioning, and management of these variables that lead to the desired result: adoption of change.

## **Leading Change**

There has been much written on educational leadership and how educators can best lead for effective change. Educational theorists such as Fullan (2008), Leithwood, Jantzi, and Steinback (1999), Mulford (2008), and Senge (2006) have studied and proposed many leadership models. In an attempt to narrow the discussion for the

purposes of this study, this portion of the literature review focussed on leading and facilitating technological change.

In presenting the selected literature on technological leadership, the researcher distinguished between the leadership inherent in a position or office and the emerging notion of distributed leadership (Mulford, 2008). This presentation is followed by a discussion on leadership, either positional or distributed, that is required when attempting to promote a technological change and when diffusing an innovation.

**Positional leadership.** The primary task of leading change is not technical, but motivational (Evans, 1993). Indeed, there is a broad recognition in the research literature that in times of great transition and change (real or perceived), leadership becomes critically important (Fullan, 2005). Change agents who hold leadership offices need to recognize that the greatest impediments to success with technological change are often related to people rather than to technology per se (Roepcke, Agarwal, & Ferratt, 2000).

Fullan (2001) argued that there are four issues positional leaders face when leading change: first, the tendency to oversimplify change so as to mandate a solution; second, not having a clear idea of what success may look like; third, not knowing how well a particular change methodology will apply to the current situation; and fourth, uncertainty about the commitment and ability of the change agents (Fullan, 2001). Nonetheless, it is the positional leaders who must create the requisite conditions for change.

Evans (1993) purported that the five conditions necessary for successful change adoption are content of the change, willingness and capacity for change, strength of the organization, leadership, and training and support (Evans, 1993). It has been argued,

perhaps from a cynical perspective, that in successfully leading a difficult organizational change, the success of the change initiative was more a matter of institutional timing than of clever strategic ploys of consultants and change agents (Waks, 2007). Perhaps the true visionary leader is the one who creates this timing that facilitates such change or perhaps successful organizational change only occurs under certain auspicious circumstances.

The ability to think and change ahead of the curve, before that change is imperative, is a key trait required of high-performing leaders (Accenture, 2006a).

Leithwood, Jantzi, and Steinbach (1999) and Mulford (2008) used the term transformative leader to describe a leader who possesses the four abilities that enable him to change ahead of the curve. A transformative leader needs to be able to:

1. set directions: build a shared vision, foster acceptance of group goals, high performance expectations
2. develop people: provide individual support, consideration, and intellectual stimulation, provide an appropriate model to redesign the organization
3. build collaborative cultures: restructuring, productive relationships, putting the educational institution in a broader context, manage the instructional program
4. staff the program: provide instructional support, monitor activity, buffer employees from distractions.

It has been argued that having a transformative leader often inadvertently does more harm than good because he can only provide episodic leadership that can never be emulated in large numbers (Fullan, 2001). To truly lead and sustain reform depends on many leaders, not just the few who are destined to be extraordinary (Fullan, 2008).

**Distributed leadership.** Distributed leadership contributes directly to the capacity-building effort of educational change. The concept of distributed leadership stems from Sergiovanni's work of the virtues of having density in organizational leadership (Mulford, 2008). The idea behind distributed leadership is not just the acceptance of shared leadership. It involves understanding collectively the interactions among leaders and followers and the context of leadership (Mulford, 2008).

In describing distributed leadership, Bennett, Wise, and Woods (2003) list the following five dimensions:

1. seeing leadership as fluid, a result of the dynamics and interpersonal relationships
2. trust and openness as a basis of interpersonal relationships
3. a letting go by positional leaders as opposed to a delegation of tasks
4. not mandating leadership but a growing into it, a recognition of expertise
5. extending the boundaries of traditional leadership.

One of the most widely applied models of distributed leadership is teacher leadership in schools (Lieberman & Miller, 2004). Teacher leadership is a powerful force in bringing about school change as teachers have unique grass-roots knowledge of school conditions that are necessary for effective change implementation (Lieberman & Miller, 2004). When teachers feel they have a voice, they take ownership and change is more readily and adeptly accepted (Sergiovanni, 1990). Teachers who formally or informally acquire leadership positions make change happen (Lieberman & Miller, 2004).

Despite the claim that positional leadership is not the answer to leading change (Fullan, 2001), there are also concerns about distributed leadership. One of the concerns is that distributed leadership can become all things to all people (Mulford, 2008). Distributed leadership is often used interchangeably with collaborative, democratic, and team leadership (Mulford, 2008). Spillane (2006) illustrated the confusion surrounding distributed leadership by pointing out that it can be collaborative or autocratic, depending on the context.

Another concern is that distributed leadership cannot occur without the implied or explicit support of the positional leader (Mulford, 2008). Mulford (2008) cited a study that surveyed Australian schools on distributed leadership. From the study, it was discovered that the schools that were termed successful school sites did indeed have distributed leadership models: ones that were endorsed and supported by the school principal (W. Mulford, personal communication, July 2008). Leithwood, Jantzi, and Steinback's (1999) examination of teacher leadership research did not yield many positive results that indicated teacher leadership would be the wave of the future. So is it positional leadership or distributed leadership that lead schools to be successful? It would seem that neither is sufficient in its own right to bring about sustained transformational change. To have sustainable change, organizations need to create leadership density (Sergiovanni, 1990). Leadership density is recognition that the leadership burden does not rest with one person; it is the sharing of leadership functions and roles between members of an organization (Sergiovanni, 1990).

Successful sustainable educational leadership will require multiple forms of leadership as well as a complex set of relationships between the leadership contexts and a

host of other variables (Mulford, 2008). The idea that one form of leadership prevails over another misses the point that effective change leadership often depends on the context and the personalities involved. It is highly unlikely that a successful large-scale change initiative can be accomplished without variations of all types of leadership. To this end, the researcher wanted to explore which leadership models best facilitate and sustain change.

### **Learning for Change**

The literature reviewed thus far focused on change theories, change processes, and how to lead change. However, any change initiative requires learning on the part of the change adopters. In an exploratory study designed to determine the core needs and difficulties that exist toward the implementation of information and communications technologies, Park and Moser (2008) discovered that “training of faculty was the most urgent issue” (Park & Moser, 2008, p. 202). What do educational institutions need to do then to ensure that workplace learning is available for employees? What might this look like?

In providing learning experiences that support the adoption of technology that contribute to organizational learning, careful selection must be paid to how the experience is delivered and why it is delivered that way. The 21<sup>st</sup> century is a knowledge economy, a knowledge society (Hargreaves, 2003). “The knowledge society is a learning society that depends on the capacity of workers to keep learning themselves and from one another” (Hargreaves, 2003, p. 18).

Educational institutions need to instill a good foundation of technological skills in their employees but must also continue to provide opportunities to renew their technological competencies (Albright & Nworie, 2008). In persuading employees to accept continuous individual change, Accenture (2006c) identifies four dimensions that need to be considered in designing workplace learning and training:

1. the learning experience itself,
2. the networking and relationship building experience,
3. the enculturation experience, whereby the learner understands the value of the company culture and their role within it, and
4. the guest experience, meaning the quality, engagement and professionalism of the entire learning event.

The potential benefits for creating a learning environment so that new technologies are adopted are clear. Bringing about change and implementing new technologies is wonderful in and of themselves but in times of fiscal austerity “the focus on implementing change and creating a learning organization is cost-related” (Accenture, 2007, p. 4). Accenture (2006b) calculated that enterprise learning has a return on investment calculated to be \$3.53 for every dollar spent. Although there is evidence that workplace learning is beneficial and necessary for change implementation, what effective workplace learning looks like, how it is set-up, and how to communicate its value and necessity is not clearly indicated in the literature.

**Learning 2.0.** The process of learning is being transformed on a continual basis. Advancements in technology require not only adjustments to how learning is delivered but also what is delivered and for who it is intended (Atwell, Maxwell, & Romero, 2008).



Perhaps the use of new learning technologies could create the necessary conditions for continuous workplace learning.

Learning 2.0 may be this solution. Learning 2.0 is defined by Seely Brown and Adler (2008) as having the following characteristics: user-centric, participatory, facilitates exploration, encourages experimentation, and is purposefully short. It is related to the use of Web 2.0 technologies such as openness, networking, micro-content, the long-tail, and has made its way into formal educational settings (Alexander, 2008). In Learning 2.0, the learner takes full responsibility, actively participating in not only learning, but also the development of the entire experience using new technologies and customized meaningful learning of unique user-specific areas of interest. Rather than moving along a linear triangular continuum, learning is now viewed as a circular expansion from core competencies (see figure 2) (Accenture, 2009).

There are three main reasons for organizations to adopt Learning 2.0 strategies: the first is to exhibit an organization's advancements in technology, the second is the efficient delivery of material, and the third is cost-savings (Accenture, 2009). An organization can showcase not only its technological and financial acumen, it can also give employees exactly what they want to learn in the manner they want to learn it.

With this unprecedented access to information, the way the learning experience is enhanced and personalized needs to be considered. This has changed the role of the change agent. The change agent has now become the designer of learning experiences and a facilitator of the learning process (Egol, 2006). Technological change agents not only have to provide the training but also need to provide the necessary conditions for the learning that is required for change to occur.

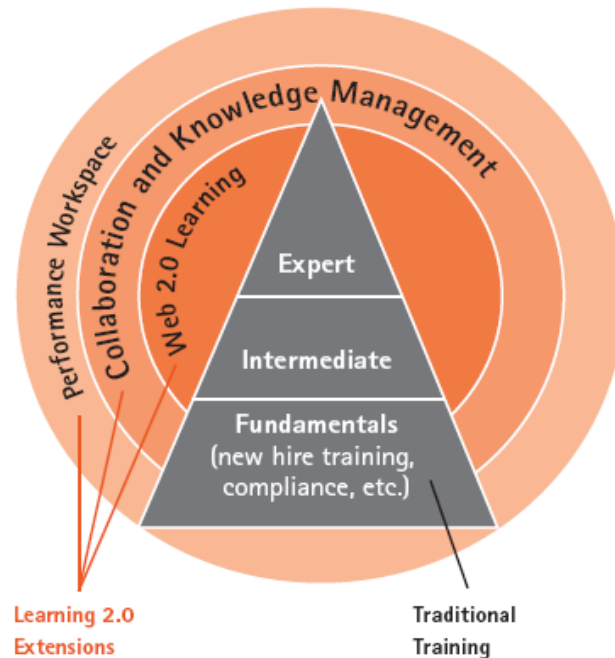


Figure 2: Learning 2.0 Extensions. From *Learning 2.0: Driving performance with new strategies, tools, and a broader mission* by Accenture, 2009. Chicago: Author. Copyright 2009 by Accenture. Reprinted with permission.

**m-learning, Web 2.0, and beyond.** Further to the idea of Learning 2.0 is the emerging trend of m-learning (Peng et al., 2009). M-learning is different from past methods of learning in that it is mobile and ubiquitous. The mobile part of this is self-explanatory but the ubiquitous portion, the idea that there is instant on-demand access to knowledge, is the powerful part of m-learning (Peng et al., 2009).

In all previous learning iterations using Web 1.0 technologies, information remained asynchronous since the one characteristic that defines Web 1.0 is non-interactivity. The static nature of Web 1.0 technologies generally allowed for the access of information via visits to web sites and provided for passive learning (Alexander, 2008). Web 2.0 incorporates the next generation of technological learning activities. Its

main ideas of openness, micro-content, social networking, and filtering are not new to education but the idea that it can be responded to near instantaneously, with such a great amount of connectivity, is causing the shift to new ways of learning (Alexander, 2008).

## **Summary**

The literature on change theory, specifically organizational, individual, and technological change, and change implementation is comprehensive in explaining theories that have been successfully used to implement a technological innovation at the organizational and individual levels. Change models such as Waks (2007) framework for change at educational institutions, Rogers' (2003) diffusion of innovations, and Hall, Wallace, and Dossett's (1973) concerns-based adoption model have aided numerous change implementers.

This is supported by educational leadership literature on the models that could be employed to successfully lead and manage change, in particular the literature on the stages of change and necessities to diffuse an innovation is well understood. Furthermore, literature on new technologies and how it affects workplace learning highlight the ideas of constant change and continued learning using new and individualized methods.

However, what is needed in order to create and lead sustained transformative organizational and individual change in public institutions is not yet clearly addressed nor well understood (Finn et al., 2006, Zorn et al., 2011). New ways and a better understanding of adopting change is necessary to facilitate change that is meaningful and transformative (Senge, 2006). Specifically, what theories and methods enable or impede

a technological implementation and how might this aid in creating sustained transformative change at a large complex public institution, like a Canadian school district, is not well documented and needs to be further explored.

### **Conceptual Framework**

The implementation of a large-scale technological solution within a public institution impacts all aspects of the organization from the installation of infrastructure, the provision of new equipment, to the training of employees. As such, all aspects of the organization are implicated within a change process. As detailed in the literature review, various aspects of change theory: organizational change, individual change, and technological change provide the conceptual framework for this dissertation. Of these, perhaps the most understudied aspect of change theory is individual change. Hargreaves (2003) contends that getting employees to change the way they do their jobs, to adopt new processes is exceptionally challenging.

Fullan (2008) contended that change at educational institutions is different from change in other organizations. Change at educational institutions are unique and require several distinctive elements: the need for mutual education of all affected parties, a collaborative approach, change agents need to provide high quality support and evidence for the change, and that there needs to be a spirit of open debate (Bromage, 2006). True integration of technology needs to involve changes that eventually redefine and transform the organization, thereby causing institutional change (Waks, 2007).

Changes at educational institutions, can be classified into two forms: first-order or second-order change (Cuban, 1992; Kezar et al., 2001). First-order changes are discrete

incremental changes that occur in an organization, for example, a school district's decision to create an online school or implement a leadership development program for aspiring administrators and supervisors. First-order changes are generally evolutionary and do not cause much turmoil within the organization. First-order changes assume that the existing goals and structures are adequate and desirable. Cuban (1992) stated "these changes are intended not to change the structure, but to maintain it as it is" (Cuban, 1992, p. 63).

Second-order changes are fundamental and multi-dimensional (Kezar et al., 2001) and by that definition, they are transformative. Second-order changes alter every part of the organization; they affect the way an organization is put together. They appear discontinuous, irrational, involve constant moving targets, and result in paradigmatic shifts (Cuban, 1992). Furthermore, Waks (2007) argued that the educational change was not just about changes at the organization level:

Fundamental organizational change means the readjustment of an existing organization to new institutional ideas and norms. It means putting an existing organization in a new working order, through functional or structural alterations, so that the organization is once again ordained within the institutional order.  
(p. 294)

In other words, Waks (2007) believed that sustained transformative change can only be achieved through second-order changes.

To summarize, this study is viewed from the conceptual framework that the organizational-wide implementation of a technological solution at an educational institution is unique and requires second-order change. This change has both innovation-driven and capacity-building elements and when implemented correctly, becomes

transformative for the organization. Furthermore, the desired institutional change will result in the re-emergence of a stronger educational institution.

## **Chapter 3**

### **Methodology and Procedures**

The purpose of this case study was to research how technological change occurs. Specifically, the research question was “What are the factors that enabled or impeded the wide-scale implementation of a student information system in a large, complex urban school district?”

This chapter discusses the methodology and procedures used by the researcher. It begins with an explanation for the research design, lists the data sources, describes the research sample, and provides information on how the data were analyzed. This is followed by an overview of information needed to conduct the study, an overview of the research design, ethical considerations, and a chapter summary.

#### **Research Design**

The study employed a qualitative research approach. Qualitative research seeks to understand how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their reality (Merriam, 2009). The researcher’s primary purpose was to discover and describe the factors that support or hinder a technological change. To this end, the researcher desired to employ the form of inquiry that would best illuminate the subject studied.

In choosing a specific research approach, characteristics of the phenomenon under study were considered. Creswell, Hanson, Plano Clark, and Morales (2007) stated that if a concept or social phenomenon needs to be better understood because little research has been done on it, then it merits a qualitative approach. Merriam (2009) stated that four

main characteristics justify using qualitative methods: focus is on process, meaning, and understanding; researcher is the primary data collection instrument; process of the study is inductive; and product of a qualitative study has a rich description. In order to validate the use of qualitative methods to illuminate this research, a checklist based on Creswell, Hanson, Plano Clark, and Morales' (2007) and Merriam's (2009) works was compiled.

Consideration was given to having a fluid design in addressing the problem and obtaining evidence. The type of the research was considered: it was a form of interpretive inquiry, viewed through the conceptual lens in which the phenomena could not be separated from its context. In addition, the fact that the research took place in a natural setting with the researcher collecting data from multiple sources, combined to validate the appropriateness of using a qualitative approach.

**Case study methodology.** This study followed the case study tradition. A case study is an in-depth study of a particular event or phenomena. Merriam (2009) stated that case study methodology is perhaps best suited for illuminating phenomena, especially when the boundaries between phenomena and context are not clearly defined. The best indicator of when case study methodology would be most appropriate is when the desire of a researcher is to gain insight, discovery, and interpretation of one phenomenon or a set of phenomena in which the possible variables in the study cannot be separated from its context (Stake, 1995; Yin, 2009). The very specific nature of a case study and the fact that it can be an over-arching methodology was the major reason it was chosen for this study. In conducting a case study, the researcher hoped to gain thorough, in-depth knowledge of a specific case. In particular, the case was the implementation of the



British Columbia Enterprise Student Information System (BCeSIS) at the Vancouver Board of Education (VBE).

Therefore, in conducting this “in-depth description and analysis of a bounded system” (Merriam, 2009, p. 40), the researcher was able “to retain the holistic and meaningful characteristics of real-life events” (Yin, 2009, p. 4) that enabled or impeded the implementation of change. To this end, this dissertation sought to explore, explain, and describe the case of how a diverse urban school district, namely the Vancouver Board of Education, brought about a large-scale technological change.

**Case study validity and reliability.** According to Merriam (2009), case study design has the following three criteria: internal validity, external validity, and reliability. Furthermore, McMillan and Schumacher (1997) and Yin (2009) add to the criteria by extending external validity to include the concept of construct validity.

To establish internal validity or credibility, rival explanations were addressed and pattern matching, in the form of specifying an overall pattern of outcomes then analyzing the data to draw conclusions on these outcomes, was documented and included in the case study database. Furthermore, multiple data sources were used to triangulate explanations.

To establish external validity, case studies seek to establish analytic generalization rather than statistical generalization (Yin, 2009). To this end, theories on educational and technological change as well as organizational and individual change were used to establish external validity. To establish reliability, this case study was documented in detail so that repeat applications of this study may yield similar results.

In establishing construct validity, four sources of evidence were used and a chain of evidence maintained. Each of the four sources of evidence was collected in a manner consistent with established research and ethics protocols. The construct that formed the basis of this case study was that the factors that enable or hinder change such as change design, leadership, implementation and adoption techniques were specific, detectable, and measurable.

Case study as a form of qualitative inquiry needs to be separated from the conventional understanding of case study as a scenario or simulation of events. A case study is an in-depth description and analysis of a single bounded unit (Merriam, 2009). It is a valid over-arching research method that can provide inferences from real life events while retaining the goals of knowledge shared by laboratory sciences (Yin, 2009).

The case study as a research method did not fully develop as a valid form of scientific inquiry until the late 1980s when researchers such as Stake, Yin, and Merriam started to use and write about it (Merriam, 2009). Before that, the accepted wisdom was that case study may be useful in the preliminary stages of an investigation or that a case study had at best only cursory scientific value as it was based on a singular event (Flyvberg, 2006). However, to view case study in this manner is “so oversimplified as to be grossly misleading” (Flyvberg, 2006, p. 3).

Case study methodology, like all research methodologies, has its strengths and weaknesses. Perhaps the clearest presentation of the case study as a bonafide research methodology is by Flyvbjerg (2006). Flyvbjerg (2006) believed that critics of case study as a valid form of scientific inquiry misunderstand and misconstrue the idea of case study. Flyvbjerg (2006) identified five misunderstandings about case study research,

proceeded to explain why each one is misunderstood, then presented alternative viewpoints (see Table 1).

Table 1	
<i>Five Common Misunderstandings and Alternative Viewpoints of Case Study Research</i>	
<u>Misunderstanding</u>	<u>Alternative Viewpoint</u>
1. General theoretical knowledge is more valuable than concrete practical knowledge.	Context-dependent knowledge is more valuable than universals and predictive theories in the study of human affairs.
2. A single case cannot be generalized; therefore, its scientific contribution is limited.	Generalization is overvalued as a source of scientific development. The force of the single example is underestimated.
3. Case studies are most useful in the preliminary stages of research, for generating and building hypotheses and theories	The case study is useful for generating and testing hypotheses, but is not limited to these activities.
4. There is a bias towards verifying the researcher's pre-conceived notions.	Bias is no greater in case study methodology than any other research methodology.
5. The case study is difficult to summarize into general propositions or theories.	Difficulties in summarizing a case study lies not in the methodology but in the reality studied.

In presenting case study as a valid research methodology, it is not to discredit or set aside other research methodologies. In actuality, the case study is a valid research methodology because it draws from evidentiary methods validated by other methodologies. The case study allows the deployment of many valid evidentiary

methods in examining one particular event. The notion that one event or one case may not be significant can be refuted by famous case studies such as Darwin's study of the Galapagos Islands, which led in part to the development of the Theory of Evolution. The power of a single example or case is often underestimated (Flyvberg, 2006). Although the case itself is unique, the knowledge gained can be transferred to other situations.

### **Data Sources**

One of the greatest attributes of a case study is that multiple data sources are encouraged to provide a solid understanding of the case (Yin, 2009). Creswell, Hanson, Plano Clark, and Morales (2007) stated that a case study researcher should seek diverse types of data to best provide a detailed meaning and understanding of a phenomenon. In deciding which data sources to employ, the researcher considered how best to inform the case and help answer the research question. The researcher decided to employ four methods of data collection: artifacts and documents, participant-observation, in-depth interviews, and a structured survey questionnaire.

**Artifacts and documents.** The researcher's rationale for collecting and examining artifacts and documents was to provide a better understanding of the processes and history involved in this technological change. The decision to use artifacts and documents as a primary data source was based on the researcher's access to a vast array of both public and internal artifacts and documents by virtue of his being on the implementation team. The researcher believed that his access afforded the study an additional dimension that would prove valuable. Much care was taken to collect a broad

range of artifacts and documents (detailed below) that provided insight into VBE culture, operations, and context.

Physical examples of factors involved in the technological change were systematically collected throughout the course of the study. Artifact and document folders, both in electronic and print format, were established in the case study database. Each entry was stamped with date and time as well as a description of its contents. The description included the source of the artifact/document, the intended audience or recipient, the main purpose of the artifact/document, and a point-form summary of its contents. The artifacts collected and referred to are those items mainly in the public domain and include items such as Memorandums of Understanding between the VBE and BCMoE, VBE BCeSIS Implementation Plan, various BCeSIS manuals, and position papers on BCeSIS implementation. The documents were mainly internal correspondence in the form of budgets, reports, and e-mails between members of the implementation team.

The artifacts and documents guided the formation of the in-depth interview questions, survey instrument, provided background for the study, and were used for data corroboration and analysis to generate initial themes, findings, explanations, hypothesis.

**Participant-observation.** Participant-observation was selected as another evidentiary method due to opportunities related to the researcher's ability to gain access to events and groups that would normally be inaccessible. The overarching consideration was that the researcher had a unique position in the middle of the technological change and the ability to perceive reality from the viewpoint of someone inside the case study. "Such a perspective is invaluable in producing an 'accurate' portrayal of a case study

phenomenon” (Yin, 2009, p. 112). The added insight was weighed against the potential bias related to participant-observations (Yin, 2009). The trade-offs were seriously considered but in the in end, the researcher decided that the benefits outweighed the possible negative aspects of this data collection technique.

Participant-observation can provide a realistic contextual insight into a particular case (Yin, 2009). The participant-observation evidence for this study was in the form of commentary that traced the researcher’s insights and experiences from the perspective of implementing this software program from the time the researcher was first hired onto the Implementation Team in March 2008 to June 2011.

This collection of thoughts and observations were interwoven into the data analyses from the documents and artifacts, in-depth interviews, and structured survey questionnaire. The researcher observed and documented the who, what, where, how, and why an activity occurred, its context, and its conceptual framework. The researcher recorded field notes for the following types of activities: implementation team meetings and training sessions.

In weaving the researcher’s thoughts and observations, great care was taken to be as objective and detailed as possible. The researcher sought to control potential biases such as the possibility of substantiating a preconceived position or being closed to other interpretations that might be present throughout the study. The researcher employed various strategies to minimize bias such as using consistent tone and terminology to describe events, constantly self-reflecting to ensure neutrality and objectivity, and recording and documenting the events in a neutral manner.

**In-depth interviews.** In-depth interviews were chosen as another data source. Interviews are “one of the most important sources of case study information” (Yin, 2009, p. 106); they are an essential source of evidence in case studies and qualitative research (Merriam, 2009).

The in-depth interviews sought out the experience and interpretation of the implementation team members. In conducting the four in-depth interviews over the course of three sessions, these key participants were asked about “facts of a matter as well as their opinions about events” (Yin, 2009, p, 107). The interviewees were asked to inform the study by not only providing responses to questions but to provide their own insights into various occurrences. In collecting interview data, the researcher was able to directly target the case study topic. The interviewee’s responses provided depth to both explanations and inferences that would be difficult to collect otherwise. Much care was taken to avoid response bias, inaccuracies due to poor recall, or interviewees giving the researcher what they think he wanted to hear.

The interview instrument for the in-depth interviews had thirteen structured questions which used a four option Likert scale and a series of thirty-three open-ended questions, separated into four sections. To increase validity and reliability, the questions were developed using themes found in the literature, analysis of artifacts and documents, and approved by the researcher’s dissertation supervisor. The in-depth interview instrument solicited initial responses and guided the subsequent interviews. Each subsequent interview led to the refinement of the interviewees’ insights and opinions. The in-depth interview instrument is included as Appendix A.

The in-depth interviews occurred over a two-month period from the beginning of April 2011 to the beginning of June 2011. To ensure consistency, participants were asked to set aside about two hours a week over a consecutive four-week period for the three interview stages. Participants were sent informed consent forms and upon receipt of the signed documents, the in-depth interview instrument was sent to them electronically. They were asked to submit their initial responses in ten days. Upon receipt of the initial responses, a face-to-face follow-up interview was scheduled.

The face-to-face interviews occurred about seven to ten days after having received the initial responses. Interview notes from the face-to-face portion were then transcribed and sent to the interviewees for validation. A final follow-up interview with each of the participants was conducted to ensure that the transcripts accurately reflected their thoughts and opinions. The data collected from the in-depth interviews were placed in the case study database.

**Structured survey questionnaire.** A structured survey questionnaire was used as another evidentiary source. The structured survey questionnaire was designed along the lines of a formal survey. The survey was referred to in this study as a structured survey questionnaire to differentiate it from a formal survey and because of its role in the research (Yin, 2009). The structured survey questionnaire was not the primary data collection instrument; data collected were considered only one component of the evidence and was to be interpreted along with the other forms of data.

The use of a traditionally quantitative data collection instrument in a case study provided the researcher with “the ability to address a more complicated research question and to collect a richer and stronger array of evidence” (Yin, 2009, p. 63) than might be



accomplished by using only qualitative methods. The structured survey questionnaire was used to collect a breadth of data about the embedded unit of analysis within the case. It followed the sampling procedures and instrument design used in regular survey research and data collected were analyzed in a similar manner. In selecting to conduct interviews via a structured survey questionnaire, consideration was given to data that could be collected from a wide range of participants.

A fundamental consideration in developing the structured survey questionnaire was its validity. Not only does the interview instrument itself need to be valid but the interpretation of the data, as required by its proposed use that needs to be valid. In other words, the questionnaire needed to gather data that could be interpreted as to being related to technological implementation that determined its validity (AERA, APA, NCME, 1999).

To increase clarity, validity, and reliability, the structured survey questionnaire was juried and field-tested. Three members of the Implementation Team juried the structured survey questionnaire and it was field tested on ten users. Members selected to jury the structured survey questionnaire were familiar with survey validity and reliability criterion set in *Standards for educational and psychological testing* (AERA, APA, NCME, 1999).

The juried structured survey questionnaire consisted of fifty-eight structured questions that used a four-option Likert scale and three open-ended questions designed to provide opportunities for deeper responses, follow-up comments, and additional observations. The structured survey questionnaire was field-tested using ten participants. The participants took the survey and provided suggestions and improvements. The

structured survey questionnaire was adjusted and fine-tuned as a result of their feedback. The researcher also examined the initial structured survey questionnaire results for anomalies in the responses such as skipped questions and response patterns to confirm that the structured survey questionnaire worked as it was designed. The final version of the data collection instrument is included as Appendix B.

### **Research Sample**

The total number of potential research participants exceeded 2 000 employees who had direct or indirect responsibilities for student records, working at roughly 140 different job sites. The employee groups ranged from support workers to teachers, aboriginal and multicultural workers to school administrators, and case managers to superintendents. The job sites were elementary schools or annexes, secondary schools, district alternative program sites, or district administrative offices.

In selecting the participants for this study, it was decided that rather than divide the population by job description, participants would be separated into two groups: people on the BCeSIS Implementation Team and VBE employees who use BCeSIS but were not on the Implementation Team.

Along with the researcher, there were four people on the BCeSIS Implementation Team who contributed to this study by participating in in-depth interviews. Of the roughly 2 000 employees who use BCeSIS but were not on the Implementation Team, they were separated into seven groups based on usage level, level of expertise and training required, and the type of access required. Proportional stratified random sampling was used to select participants who were asked to complete a structured survey

questionnaire. A conscious decision was made to collect data that had depth (in-depth interviews) as well as breadth (structured survey questionnaire).

**Sample size for the structured survey questionnaire.** The sample size for the structured survey questionnaire was originally set at 100 people, to be chosen using stratified random sampling. The representative samples ranged from 2% to 50% (see Table 2). In selecting to use a sample size of 100 or about 5% of the overall population, three main questions were considered: first, what is the largest possible sample that would be representative of the population; second, out of this sample, how many of the actual respondents will provide complete and intelligible responses; and third, what size of the sample would be required to successfully help answer the research question.

Table 2			
<i>Proportional Sample Numbers</i>			
<u>Description</u>	<u>Approximate Size</u>	<u>Sample %</u>	<u>Participants</u>
District Super-users	10	50%	5
Administrative Users - Advanced	300	10%	30
Administrative Users - Full	100	10%	10
Administrative Users - Light	100	10%	10
Curriculum Users - Advanced	70	10%	7
Curriculum Users - Full	≥ 1100	2%	23
Curriculum Users - Light	300	5%	15
<i>Note: total participants = 100</i>			

To address the first issue of obtaining the largest possible sample and to explain the reason for selecting 5% of the population, Rowntree's classical work (1941) on income and rent is referenced. In his study, the population was broken down into five income classes and he used four sample sizes: 2%, 3.33%, 5%, and 10%. What he discovered was that there is no statistical difference between samples of 2%, 3.33%, 5% or 10% (Rowntree, 1941). To answer the remaining two questions, since 2% of the sample is sufficient for successful analysis (Rowntree, 1941), a 5% sample should provide ample complete and intelligible responses to help successfully answer the research question.

**Deployment of the structured survey questionnaire.** Upon successful completion of the juried, field-tested structured survey questionnaire, it was deployed electronically to the randomly selected stratified sample of 100 people using the VBE survey server. Depending on the user group, this was from the middle of May 2011 to the beginning of June 2011.

Selected participants were given two weeks to complete the structured survey questionnaire with a reminder going out at the one-week mark. The participants were asked to submit the survey anonymously either via the online survey data collection instrument or via internal mail. No participants chose to return the survey via internal mail.

It was anticipated that a second round of survey invitations would need to be sent out until the sample size reached the stated criteria. However, there was an unexpectedly high return rate of 83% within three days from the 100 original participants. In addition to the targeted sample, scores of other individuals, having heard about and been

forwarded the survey link, volunteered to participate in the study. A second round of survey invitations was not required.

After consulting with the researcher's dissertation advisor, it was decided that the benefits from the added data would outweigh the possibility that the sample may become disproportionately representative. In the end, 186 people submitted responses to the structured survey questionnaire and the survey closed on June 2, 2011. The data collected from the structured survey questionnaire was summarized and tabulated, then placed into the case study database.

### **Data Analysis**

In analyzing data for case studies, the paramount consideration must be the conveyance of the understanding of the case (Merriam, 2009). Therefore, all collected data were organized in the case study database, which became the resource package used for analysis.

In analyzing the data to develop the set of themes, findings, explanations, and hypotheses (TFEH), great care was taken to ensure that the data were responsive to the purpose of the research: data needed to provide answers to the research question. Furthermore, data analysis was exhaustive. All data were addressed and TFEH were refined until they were representative of the data's meaning in conceptually congruent, mutually exclusive, and exact TFEH that captured the meaning of the entire data.

The data analysis for this study proceeded in the following order: the analysis of the artifacts and documents guided by the literature was used to generate a preliminary

set of TFEH, then participant-observations, in-depth interviews, and survey responses were used to refine and further develop these TFEH.

Artifacts and documents related to the planning and implementation of the technological change were collected throughout the study. These artifacts and documents were provided an initial cursory analysis with the filing of each entry. These artifacts and documents were then later inductively and comparatively analyzed to determine factors that enabled or impeded the successful adoption of the technology by interpretation and reflection to develop initial TFEH (Merriam, 2009; Richards, 2005). From the analysis of the artifacts and documents and supported from the knowledge gained from the literature review, the initial TFEH were developed and formed the basis for further analytical induction.

Notes and commentary from participant-observation was then used to further refine the initial TFEH of the study. They were used for both content and events to derive the propositions for pattern matching and the establishment of internal validity. This source of data addressed and explained inconsistencies in the TFEH.

The transcribed data from the in-depth interviews were analyzed in three phases: discovery, discovery and verification, and testing and confirmation (Merriam, 2009). Both content and events were analyzed. The inductive analysis process used in this study was a hybrid model that blended the processes articulated by McMillan and Schumacher (1997) and Strauss and Corbin (1998). The process began with a reading of the entire interview transcript to get a sense of what the interviewees were saying and their intended meanings. The interviews were then reviewed again with the researcher determining which of the initial TFEH categories the responses belonged to. The third part of this

process, individual responses were re-examined to determine how they relate to other evidence gathered in each category and sub-category of the TFEH. Finally, the interview data were viewed together with the other collected data to generate a set of TFEH that incorporated of the data. In this dissertation, the inductive analytical process used was iterative and continuous.

For the structured survey questionnaire portion, data were tabulated and the mode, mean, and range were calculated. The purpose of calculating these descriptive statistics was to provide a quantitative representation of the breadth of views and opinions of the participants for comparison to the artifact/document analysis, participant-observation, and in-depth interview portions of the data. The survey data were also used to further develop, refine, and triangulate themes, findings, explanations, and hypotheses.

**Triangulation.** Data triangulation was used to cross-validate the TFEH. The researcher compared the different data sources to determine and refine the recurring patterns. A point was made to look for discrepant data and to incorporate these variances into the TFEH. The data sources each added a dimension to the developing TFEH and contributed the findings of the study. Along with data triangulation, the researcher incorporated iterative reflection when refining the TFEH. The researcher repeatedly rethought and refined how the data contributed to the TFEH. This added dimension to triangulation is similar in style to crystallization (McMillan & Schumacher, 1997; Richardson, 2000).

## **Research Design Overview**

This particular study followed a qualitative research approach to investigate how large-scale technological change occurs. Specifically, it was a case study supported by four sources of data. Artifacts and documents of the implementation of BCeSIS were systematically collected throughout the course of this study. Participant-observations were recorded. In-depth interviews were conducted with members of the Implementation Team. A structured survey questionnaire was sent to 100 participants to solicit their opinions on the research problem. Data collected from artifacts and documents, in-depth interviews, and the structured survey questionnaire were analyzed and interwoven with the researcher's commentary as a participant-observer to generate themes, findings, explanations, and hypothesis for the research problem.

## **Overview of Information Needed**

This case study focused on the implementation of BCeSIS at the VBE. Information required in seeking to understand how technological change occurs were gathered and explored. The information needed to answer the research question were separated into four areas: contextual, demographic, perceptual, and theoretical.

**Contextual information.** Contextual information refers to information that provided background to the culture, environment, history, and setting for this study. It was contained in institutional and organizational artifacts and documents. An extensive review of these artifacts and documents was conducted. This was supplemented with the researchers own knowledge of the VBE obtained through nearly two decades of employment.



**Demographic information.** Demographic information describes who the participants were in this study and aids in the interpretation of their responses. Participants for the in-depth interviews were asked to submit a detailed resume that provided personal information such as job history, education level, career aspirations, and VBE history. Although this provided valuable background information for the interpretation data, pseudonyms were used to provide a degree of anonymity. Participants in the structured survey questionnaire remained anonymous; however, their level and type of use, amount of training received, and required level of competency were documented and used in the stratified random sample. Such demographic information was used to help explain what may be underlying an individual's perceptions, as well as similarities and differences among responses.

**Perceptual information.** Perceptual information refers to the participants' perceptions related to this case study. In-depth interviews were conducted with members of the Implementation Team to document their perceptions on the adoption of this technological change. Furthermore, the researcher's participant-observation insights and experiences were interwoven throughout the collection and analyses of the data.

**Theoretical information.** Theoretical information in the form of a literature review was required to provide theories related to the research question, conceptual framework, and methodological approach. The theoretical information aided in the development of the data collection and analyses procedures used in this study. Furthermore, they provided support for the recommendations and conclusions.

## **Ethical Considerations**

For the purposes of this study, the researcher attempted to identify the factors that impeded or enabled a large-scale technological change at the VBE. Participation in this study was strictly voluntary. All participants were adults employed by the VBE and the researcher was not in a position of power with any of the participants; nor does the researcher hold a high-ranking position in which participants may feel threatened or obligated by requests for their opinions. It was known to participants that the researcher did not have the authority to act on any findings derived from data collected for this study.

The research study received approval from the University of Calgary's Conjoint Faculties Research and Ethics Board and the Vancouver Board of Education's Research and Ethics Committee. Throughout the study, informed consent remained a priority. The researcher took measures to secure the storage of data and in all instances unless explicitly granted permission, identifying characteristics were removed. Observing participants' rights and interests were of primary importance in regards to the reporting and presentation of the findings.

## **Summary**

This chapter provided a detailed description of the study's methodology and procedures. Qualitative case study methodology was employed to determine the factors that enabled and impeded the wide-scale implementation of a student information system. The participant sample consisted of 190 individuals, of which four were part of the Implementation Team and participated in in-depth interviews. The remaining 186

participants completed the structured survey questionnaire. This study collected evidence from four sources: artifact and documents, participant-observation, in-depth interviews, and a structured survey questionnaire. Themes, findings, explanations, and hypotheses sourced from the literature, artifact/document reviews, and participant-observation provided the initial framework for analysis. The final TFEH were influenced and refined by the in-depth interviews and structured survey questionnaire.

## **Chapter 4**

### **Findings and Results**

The purpose of this study was to provide insight into how technological change occurs using a recent change initiative in the setting of a large Canadian public school district. To better understand the change process, this study focused on the factors that enabled or impeded the wide-scale implementation of the British Columbia enterprise Student Information System (BCeSIS) at the Vancouver Board of Education (VBE).

The chapter presents key findings obtained through four in-depth interviews with members of the change implementation team, a survey of 186 VBE BCeSIS users, participant-observation commentary from the researcher, and an analysis of artifacts and documents related to the implementation of BCeSIS at the VBE.

Six major findings emerged from the study. The first four factors listed below enabled the implementation of BCeSIS. The last two findings hindered the implementation of BCeSIS:

1. An independent implementation team
2. Distributed leadership
3. Pilot/phased implementation schedule
4. Customized training system
5. Technological infrastructure and readiness
6. Comprehensive/cohesive messaging and communications.

In presenting the six findings, the chapter will proceed as follows: first, the background, context, and setting of case study derived from artifact and document analyses are presented to provide the reader with a chronology and feel of the nature of

the technological change. This is followed by a detailed discussion of each of the research findings with explanations, particulars, and support. Finally, the findings and results are summarized.

### **Chronology of Events**

In the late 1990s, British Columbia public school districts, the British Columbia Ministry of Education (BCMoE), and the province's independent schools decided to undertake an initiative to streamline student information. At that time, there were over 40 different student information systems, very few of which were designed to easily share records and allow cross-searches of databases. The BCMoE conducted a search process with representatives from various school districts and independent schools and decided on a comprehensive student information system from a Canadian software company called aal Associates. This software was a web-based database system that integrated all education related functions such as attendance, reporting, timetabling, and record keeping. At that time, variations of this student information system were used in North Carolina and Oregon State. As of 2012, the system has also been adopted by Yukon Territory, Newfoundland and Labrador, Washington State, and certain education organizations in Ontario, the United Arab Emirates, and Malaysia.

The provincial implementation of this system, rebranded BCeSIS in British Columbia, began in 2001. It was a phased implementation. School districts could opt in whenever they wanted and were ready. To aid and encourage the implementation of BCeSIS, the BCMoE contracted Fujitsu Consulting, a software management firm, as the

change facilitators and provided financial incentives by funding the entire system's operating costs until June 2010. After which, the cost was set at \$10 per student per year.

Being the most diverse and second largest school district in British Columbia, the VBE decided to wait until the system had been in operation for a length of time before adopting it. The early adopters were mostly small school districts that wanted to take advantage of the extra ministry funding.

In 2005, on advice from the VBE Director of Information Technology and input from various stakeholder groups, the VBE agreed that it was time to implement BCeSIS. Subsequently, the VBE approved and signed a memorandum of understanding with Fujitsu and the BCMoE in December 2005. The VBE Director of Information Technology began work on the VBE BCeSIS Implementation Plan in 2006. Using information supplied by Fujitsu, the implementation plan, based mainly on large-scale software implementation practices, was approved by the district senior management team in 2006. There were three main components to the VBE BCeSIS Implementation Plan: technical, infrastructure, and equipment requirements, implementation phases and steps, and training and adoption methods. The implementation of BCeSIS at the VBE was set to begin during the 2007-2008 school year.

According to the VBE BCeSIS Implementation Plan, the implementation team would be comprised of both members from the VBE Information Technology (IT) department and people seconded from throughout the district. The initial implementation team consisted of the following IT department members: the director of information technology, an information technology project manager for hardware and systems, an information technology project manager for software, and an assistant project

administrator/vice-principal. There would be four full-time and four part-time secondments to the team. The initial two full-time positions would be a project administrator selected from the existing pool of school/district principals or vice-principals, and a consultant, selected from the teachers in the district. These two full-time positions would be established first, joined by two more full-time personnel in the form of software trainers about six months later. The part-time positions would consist of representatives from each of the stakeholder groups: elementary school administrators, secondary school administrators, elementary office staff, and secondary office staff.

In the spring of 2007, the first two full-time positions were filled by postings. The consultant position was unchallenged and went to the only applicant, a secondary school teacher. The supervisory position had numerous applicants. Three candidates were shortlisted. The successful applicant became the project administrator; however, the two unsuccessful applicants were offered the part-time secondment positions for their respective employee groups: the elementary school administrators and the secondary school administrators. The initial implementation team was completed with the part-time secondments of one secondary and one elementary school office support personnel.

In September 2007, the first members of the BCeSIS Implementation Team began work on the project. They followed the plan set forth by the Director of Information Technology. The VBE BCeSIS Implementation plan called for phased-in implementation of BCeSIS: the initial implementation of about one-third of the VBE schools/sites, followed by the rest of the schools/sites. The steps involved in the implementation of BCeSIS were data clean-up, conversion of legacy systems data, followed by adoption of the software program by school/site users.

Since the VBE is grouped into 18 “Family of Schools” units, the initial implementation would include five of these families; these five families of schools would be called the lead schools. A family of schools consists of a secondary school, its elementary feeder schools, and all alternate and special programs administered through those schools. In selecting the lead schools, political sensitivities were observed and great care was taken to select school families that would represent a cross-section of the district. The first five school families selected were spread out across the city, two being from the west side of Vancouver, two from the eastside, and one from downtown Vancouver, a high-density area.

The timeline for the implementation of BCeSIS for the five lead families of schools was for data clean-up to occur during the 2007-2008 school year, data conversion in the summer of 2008, followed by school/site personnel adoption during the 2008-2009 school year. The timeline for the second phase of schools was for data clean-up to occur during the 2008-2009 school year, data conversion in the summer of 2009, followed by school/site personnel adoption during the 2009-2010 school year. This timeline is summarized in Table 3.

However, towards the end of 2007, two significant things occurred. First, the VBE Director of Information Technology announced her retirement to be effective at the beginning of 2008. Second, the initial implementation team realized that the adoption of BCeSIS at the VBE was more complex and involved than specified by the VBE BCeSIS Implementation Plan. No school district nor Fujitsu had previously encountered challenges and complexities of adopting this system that even one of the VBE family of schools faced.



Table 3

*BCeSIS Implementation Timeline*

<u>Lead Schools:</u>	
Data Clean-Up	from September 2007 to June 2008
Data Conversion	July 2008
School/Site Adoption	from August 2008 to June 2009
<u>Phase II Schools:</u>	
Data Clean-Up	from September 2008 to June 2009
Data Conversion	July 2009
School/Site Adoption	from August 2009 to June 2010

While the search for a new VBE IT Director was ongoing, an IT manager, formerly a teacher, was appointed acting VBE IT Director and given responsibility for BCeSIS implementation. It was also this time that the remaining two full-time secondments for training and adult education specialist positions were filled. This is when the researcher joined the implementation team.

After acting in this position for four months but failing to secure the job permanently, the Acting IT Director decided to retire, leaving the BCeSIS project leaderless. In hiring the new IT director, the VBE went outside of the district and hired an information technology manager who did not hold educator credentials. This created problems for the BCeSIS project. Most important among them is that there exists a VBE requirement that only educators (people holding BC teaching certification) could act in a

supervisory capacity towards others who are also educators (i.e. the project administrators, teacher-consultant, and district trainers). Since this new person could not supervise most of the implementation team, overall responsibility for BCeSIS was given to one of the associate superintendents. Subsequently, the associate superintendent passed on most of the responsibility to the project administrator. This elevation in position and responsibility created friction with the three other administrators and the project managers on the team. It further added to the challenges of an increasingly complex implementation.

As the implementation team was aiding in the clean-up of data in the legacy systems and gearing up for the data conversion into BCeSIS, it became clear that a minor item such as standardizing the data entry format for dates entered into BCeSIS was going to affect all divisions and business units of the VBE. For example, it was not enough just to send a memo around informing everyone of the new date format that needed to be used (although this was attempted at first) but information sessions and presentations with affected departments and divisions needed to be arranged to explain the reasons and sell the benefits of the new system. In short, each department and division required face-time and personal assurances that this new system was not going to make their jobs more difficult and that it was a necessary technological change.

Furthermore, as the implementation progressed, the representative model adopted in the VBE BCeSIS Implementation Plan of having a person from each of the affected employee groups was not working well. Given that BCeSIS is a complicated multi-faceted database program and the VBE is a very diverse organization, four to six months of immersion was required in order to learn the program, its nuances, and how it could be

best applied to the VBE schools. This long period for immersion placed the part-time implementation team members, who could not devote their entire working day to BCeSIS, at a huge disadvantage.

The BCeSIS Administrator asked the VBE district management team to consider the amalgamation of the part-time positions. In June 2008, the administrator received approval to amalgamate the elementary and secondary school office support positions into one full-time position. The decision to amalgamate the part-time administrator positions was deferred. As of July 2008, the BCeSIS Implementation Team consisted of five full-time members: the project administrator, one consultant, one school office resource/technical support person, two district systems trainers, and three part-time members (one assistant project supervisor, one elementary school administrator, and one secondary school administrator). Former implementation team members from the IT department, aside from the assistant project supervisor who was formerly an elementary school vice-principal, were withdrawn by the new IT director and would provide cursory BCeSIS support when necessary.

Over the course of the 2008-2009 school, a series of unexpected events occurred: one of the part-time members fell off his roof which resulted in a serious injury, another part-time member decided to retire, and the third part-time member decided to leave the team. Finally, in June of 2009, the VBE approved the elimination of those part-time positions. However, rather than add one or two dedicated full-time vice-principal level positions, the VBE decided to add two temporary part-time BCeSIS office support positions. These two employees joined the five remaining members of the implementation team in August 2009.

The implementation steps for the five lead school families closely followed the steps set out in the VBE BCeSIS Implementation Plan. Initial results were mixed as to the effectiveness of the Fujitsu ascribed model: data clean-up took nearly an entire school year, data conversion almost did not happen, and the “train the trainer” model for learning the software appeared to cause more problems than it solved. It became clear in the spring of 2009 that for the next 13 school families, the implementation process would need to be revamped if the VBE BCeSIS implementation timeline was to be observed.

In August 2009, the project administrator made the decision to abandon many aspects of the VBE BCeSIS Implementation Plan. The timeline for district-wide implementation was the one non-negotiable item. During the 2009-2010 school year, the VBE BCeSIS Implementation Team consisting of five full-time members and two part-time members re-aligned the five lead families of schools with newly developed best practices of VBE BCeSIS and successfully implemented BCeSIS in the 13 remaining family of schools.

## **Findings**

Listed below are the six findings that this researcher believes enabled and hindered the successful implementation of BCeSIS at the VBE. These findings are arranged in rank order with the most important factors that enabled the change first, and the most hindering of factors being findings five and six.

The findings were derived in the following manner. First, a broad preliminary set of themes and explanations guided by the conceptual framework and literature as articulated from Chapter 2, supported by the analysis of artifacts and documents were

developed. These initial themes and explanations were extremely broad and cut across the entire data spectrum.

Second, data collected from participant-observations, in-depth interviews, and the structured survey questionnaire were tallied and coded. These groups of data were kept independent of each other and inductively analyzed in three phases: discovery, discovery and verification, followed by testing and confirmation. Pattern matching was then used to cross-compare the data.

Third, a re-analysis of the data further advanced and honed the broad themes and explanations into tighter, more specific groupings. These were then further analyzed and distilled until clear thematic units emerged. It should be noted that all the data were addressed and sorted into mutually exclusive, equally substantial thematic groups.

Finally, the thematic groups were analyzed again with the purpose of capturing the meaning of the entire data group into an exact phrase. These phrases became the six findings of the study that addressed the research question.

In determining the findings of the study, effort and care were taken to exhaust all feasible interpretations of the data. Although other interpretations may be possible, the researcher believes the findings presented below are the most plausible, mutually exclusive explanation and interpretation of the data collected. Select data from the structured survey questionnaire is organized in Table 4 to aid in the presentation of the findings.

Table 4

*Select Responses from The Structured Survey Questionnaire*

<u>Statement/Response</u>	<u>n</u>	<u>% of Respondents</u>
The single most important factor was the actions of the implementation team.	140	82%
The BCeSIS Implementation Team was effective in helping me adopt BCeSIS.	142	86%
The BCeSIS Implementation Team did the best job possible given the circumstances.	129	92%
The leadership exhibited by the implementation team was effective.	139	77%
BCeSIS training was useful and purposeful.	138	84%
BCeSIS training increased my perception of the VBE.	135	74%
The implementation team was responsive to my concerns.	140	82%
Collaboration with my colleagues, as part of BCeSIS training, helped me adopt BCeSIS.	136	80%
The single most important factored that hindered my adoption of BCeSIS was poor technology.	52	45%

### **Finding 1: An Independent Implementation Team**

The main finding of this study was that an independent change implementation team was required to enable a technological change. This study found that it is the implementation team’s independence, the freedom to change direction, and adapt to the environment, that was necessary for enabling a technological change.

Change initiatives in large complex school districts will always have an implementation plan and team associated with it. Regardless of how well thought out or

detailed such a plan may be, the reality of the implementation situation as experienced is often different and more complex from what is described. Therefore, the need for an adaptable and nimble, essentially an independent change implementation team, is paramount.

This finding is highly noteworthy in terms of the overall participants: all four in-depth interviewees and 82% of all survey participants (n= 140) responded that the single most important factor in the implementation of BCeSIS at the VBE was the actions of the change implementation team. Furthermore, 86% (n = 142) of all survey respondents agreed that the VBE BCeSIS Implementation Team was effective in helping them adopt BCeSIS.

The formation of an independent implementation team at the VBE came about through a series of unexpected events. It was not described in the VBE BCeSIS Implementation Plan nor was it a foreseeable by-product. To better explain how an independent change implementation team was crucial, this discussion begins with an analysis of the implementation team parameters and how the team gained independence, followed by a discussion on the traits that make an independent implementation team, then how the independence was used to facilitate the implementation of BCeSIS.

Initially, the composition of the implementation team was prescribed: political sensitivities and the VBE practice of having affected employee groups represented in change initiatives were observed. This created difficulties on several levels. First, a team member's loyalties can become divided. S/he may be loyal to the implementation project; however, understanding that she was on the team to ensure the interests of a particular group, can cause friction when those loyalties do not coincide. Second, the

employee representing a particular group may not be the best change agent, nor take responsibility, or even show interest in BCeSIS items that may only peripherally affect his/her employee group. This hindered the understanding of how a comprehensive system operates and how it can be best applied to the VBE. Finally, the notion of having representative part-time members, although politically satisfying, may not create the necessary conditions for the development of a knowledgeable and adaptable implementation team member.

With the retirement of the VBE Director of Information Technology, the conflicts that arose in replacing that person, and the impending mass change of 75% of the district senior management positions (the retirements of the superintendent, three associate superintendents, and the secretary-treasurer, as well as the departure of another associate superintendent) over the course of BCeSIS implementation, the ensuing leadership vacuum created the perfect conditions for the emergence of an independent implementation team.

This is not to state that the implementation team went rogue but through the team's trials, tribulations, and as a study participant indicated, the "passive and complacent leadership" (Rafael) shown by the district senior management team. The implementation developed its independence due to the many vacant leadership positions. Those positions that were filled were by people too new to the district to provide leadership beyond moral support. "There was a lack of vision, direction, and ownership from senior management" (Rafael).

This finding does not imply that the members of the implementation team need to be extraordinary people or change implementation experts. As the unanticipated series of



events unfolded during this implementation, the very ordinary people on the team reluctantly took on more leadership, ownership, and responsibility for the project. “We knew that [with the challenges we faced] we had to grow into the implementation of this product – and over time we did” (Leonardo).

The senior leadership vacuum was also the major reason the implementation team abandoned much of what was set out in the VBE Implementation Plan. The VBE Implementation Plan called for the senior managers in consultation with the IT department, to direct how, who, and when BCeSIS would be implemented. Without senior managers directing people and without the IT department taking a supportive role, when things did not work well, the team did not have the clout to enforce it. “Role responsibilities changed over the three year term of the project” (Leonardo). The implementation team had to take alternate approaches to pacify and win-over the resisters to change. For example, the implementation team introduced “monthly Records Clerk meetings – this gives the most opportunity to understand the field’s needs and provided guidance during the business cycle” (Donatello).

In developing into an independent change implementation team, three notable responsibilities emerged: the abandonment of the responsibility for a specific function or role on the team, the ability to re-think, make adjustments, and/or abandon things when they did not work, and the ability to make district-wide decisions without seeking approval or permission.

The VBE BCeSIS Implementation Team began with specialized roles but as the implementation progressed, the team members realized that there was no one else who had the knowledge or experience that the team could rely on to solve problems or turn to

for advice. For example, at a particular training session put on by Fujitsu that this researcher attended, one of their software and process trainers made a remark during a problem solving session: “Really? You have that many special education students at that one high school? That’s more than the entire school district of Victoria, BC!” The lack of knowledge and experience with implementation at diverse and complex school districts forced the VBE implementation team to evolve and redefine the responsibilities of each team member.

Without anyone else the team could depend on, the team became self-reliant. With this self-reliance, came the blurring of roles. “As the implementation team developed, we all became specialists *in a variety of areas*” (Mikey). Here is an example of how this worked: when a problem or situation arose, the team member who initially received it became the person responsible for it, regardless of title or position on the team. This person would come up with a solution, analyze and discuss it with one or more team members, then broadcast the solution as if it were from the entire team. The remaining team members accepted that this was the best possible solution and adopted it as the team’s and hence, the district’s response.

The desire to re-think, make adjustments, change the ways things were done when they did not work was necessary in enabling this implementation. The implementation team adopted a “do whatever it takes” (Mikey) attitude to get BCeSIS implemented. An example of this was the abandonment of the “train-the-trainer” model prescribed in the VBE Implementation Plan and the preferred training methodology put forth by Fujitsu.

In preparation for the adoption by the lead school/site teachers, several “train-the-trainer” sessions were held for carefully selected secondary school-based teacher trainers.

These people were given close to a week of release time and were led step-by-step through a small aspect of the program so they could return to their schools and train their staff.

After what was thought to be well-received training sessions, the disaster of this training revealed itself during the 2008-2009 school year's first term report cards. There were numerous problems and in many schools, the report period was extended. It seemed that the crucial parts of the program and flexibility of the system were not passed on by the school-based trainers. Realizing that BCeSIS is a complex system and that teachers themselves had a wide-range of mark reporting habits, the implementation team fixed whatever problems that existed but for the next phase of implementation, it abandoned the "train-the-trainer" model and developed its own training regimen.

With the lack of leadership and direction from senior management, the ability to make district-wide decisions without seeking approval or permission was necessary for the implementation to proceed. A good illustration of this is the remark made by a member of the implementation team when asked about the standardization of office practices.

A lot of office practices have to be standardized. I [referring to a previous appointment as a secondary school records clerk] became more involved in standardizing office practices, and procedures. Additionally, I have to monitor the [entire VBE's] student data quality and [became responsible] for district reports for data collection. (Donatello)

This implementation team member was referring to the evolution of his/her role in this technological change. This person was hired as a trainer and support person to school office staff but became the person who set district standards and VBE best practices due to his/her knowledge of the system. All implementation team members accepted the

team member's expertise and had confidence in that whatever was set forth was indeed the best standard and/or solution for the VBE.

As the team discovered that it had little interference from district senior managers in setting district-wide standards, it took the responsibility very seriously. "We learned to 'think ahead' so that when an anticipated problem might be faced, we had an answer, or had given the situation considerable thought. This aspect of our operations provided the District with leadership" (Leonardo). As the implementation progressed, the implementation team as a whole became "ambitious. I [a VBE district trainer] believe that in many [other school] districts, teachers would not even be exposed to Gradebook [teachers' marks program]; whereas, we individually trained every single VBE secondary school teacher in Vancouver on how to use it." The team not only help set district standards but district direction as well.

In coming to the conclusion that the independence of the implementation team was of the utmost importance, the finding that 92% (n =129) of the survey respondents agree that "the BCeSIS Implementation Team did the best job possible given the circumstances" indicates that VBE staff supported the accomplishments of the BCeSIS team. Through analysis of the data, it was evident that had BCeSIS implementation proceeded as described in the VBE BCeSIS Implementation Plan, there may have been not only great resistance but also several employee groups who might have refused to implement it.

## **Finding 2: Distributed Leadership**

A finding arrived at from the study was that having distributed leadership in the change process is the second most important change enabler. One of the virtues of distributed leadership is having density in organizational leadership (Mulford, 2008) and to have sustainable change, organizations need to have leadership density (Sergiovanni, 1990).

Distributed leadership in this case was exhibited on several levels: the shared leadership for district responsibilities between senior management and the implementation team, the leadership within the implementation team, and the leadership relationship between the implementation team and BCeSIS users.

This finding is important in terms of the overall participants: all four of the in-depth interviewees and 77% (n = 139) of all survey participants responded that “the leadership exhibited by the implementation team was effective” in aiding the implementation of BCeSIS.

It was not stated in the VBE BCeSIS Implementation Plan that distributed leadership was the desired leadership style. The plan did not expressly state nor imply any kind of leadership other than which positions exist and what some of those responsibilities might be. Nonetheless, over the course of the implementation of BCeSIS, it emerged that distributed leadership was one of the most important change enablers as evidenced from the survey results above.

The VBE senior management team shared district leadership responsibilities with the BCeSIS Implementation Team. As previously mentioned this came about through a series of unforeseen circumstances. It is unknown whether they would have allowed the

implementation team as much latitude if the unique series of events had not unfolded as such, the sharing of leadership although initially leaving the team directionless, forced the implementation team to grow, adapt, and finally accept this new role.

It should be noted that initially all of the in-depth interviewees when asked about the leadership of the district senior management team, provided non-committal or partially negative responses. “I do not think I can reply to this, as we rarely met with SMT [senior management team], the only thing I can comfortably say is that they seemed to be at an arm’s length from the project” (Mikey). Donatello added “I have no comment on this . . . I don’t find the management knows exactly what [they] are doing and the difficulties that we are facing. Not receiving much support from them”. Rafael was more cynical: “True leadership was lacking although when financial/budgetary items appeared, there would be a sudden influx of direction.”

However, in subsequent follow-up interviews, it was borne out that all the in-depth interviewees agreed that regardless of how it came to be, the senior management team granted the BCeSIS Implementation Team great leeway in implementing the product and responsibility by lacking interest and reluctance to provide leadership in implementation matters.

The support for the implementation of BCeSIS by the SMT was largely financial – not much else. Had the SMT fully-supported the implementation plan (which they approved!) I suspect there would have been a recognition of the need for more of our knowledgeable team to continue to support the basic features of BCeSIS, as well as implement new modules and features.

(Leonardo)

This sharing of responsibilities led to the setting of district directions and policies by people who knew the product best. “It was like the running of a government by

technocrats as opposed to politicians” (Rafael). This leadership style, at least in the change implementation stage, enabled the VBE to adopt BCeSIS more quickly and smoothly than it might have had the leadership style been otherwise.

As a group we exhibited sound leadership – in many ways. Through our frequent and regular meetings of the whole ‘team’ and our very frequent impromptu meetings amongst ourselves, or with others in the field, we defined leadership by addressing District needs for training, by identifying many, many weaknesses in District data collection routines and processes, and by responding in thoughtful and appropriate ways to questions or problems presented to various members of the team.

The Implementation Team also showed leadership outside the confines of this District – in a number of ways – for which we did receive our due recognition [referring to the team’s role as change consultants to Yukon and New Foundland].  
(Leonardo)

The one type of distributed leadership that greatly enabled the implementation of BCeSIS was the creation of distributed leadership within the implementation team.

“[The leadership on the team was] distributed, supportive and flexible. Leonardo let us speak our minds and opinions on all matters in our weekly meetings. Our group was very horizontal and built on expertise and not hierarchy” (Mikey). Again, this was not explicitly stated in any plan. Through the trials and tribulations experienced during the first year of the implementation and “the strong leadership from the project administrator” (Donatello), the team members developed a mutual trust and respect that laid the framework for distributed leadership. The sharing of leadership became fundamental to overcoming the many obstacles and heavy resistance encountered by the implementation team.

Once I had proven my ability, my supervisor had total confidence in my decision making and [my ability to] work independently. It is a great exhibition of leadership to give capable subordinates the freedom to work on their own and not to micro-manage them. (Donatello)

As the implementation team became comfortable with and benefited from the idea of distributed and shared leadership, the team extended it to trainees as well. The implementation team at first met with much resistance from two particular groups of employees. The initial training sessions with these groups at the beginning of the implementation degraded to the point of heckling, people becoming visibly upset, and walking out of the sessions. There were various reasons for this resistance. Regardless, the team decided to take the approach of asking these groups to co-lead and plan the subsequent training sessions. “[This team] member made sure that ownership of ideas and tasks rested with the group’s members, not our team’s members” (Leonardo).

Once these groups took on a leadership role, they saw the “need to change and the importance of their cooperation and understanding” (Donatello). Furthermore, in openly sharing the leadership for the implementation, criticism from these groups nearly ground to a halt and slowly they became the biggest supporters of the implementation team.

### **Finding 3: Pilot/Phased Implementation Schedule**

Rogers (2003) states in his classical work, *Diffusion of Innovations*, that in order for an innovation to be successfully adopted, a trial period is crucial to allow people time to become familiar with the idea of change and to provide opportunities for the innovators and early adopters to demonstrate its worthiness. It is concluded from this study that a trial or pilot/phased implementation was indeed important in enabling the technological change, however, not for the reasons described by Rogers. It is concluded that a pilot/phased implementation was important for the enablement of the technological



change because it led to the development of the implementation team and the refinement of the implementation processes.

The lead schools helped us with the implementation of BCeSIS – definitely. [They] provided feedback on the successes and the need for implementation changes for the phase 2 schools. We gained very valuable feedback at both the elementary and secondary levels by having the lead schools begin the processes of moving a large District to a new, single system. (Leonardo)

At the time of the VBE's adoption of BCeSIS, no one in the province had experienced or as discovered later, had the necessary knowledge as to how this change process would proceed. In having a phased/pilot implementation, the implementation team was able to use the lead schools to gain experience, develop best practices, and better facilitate the implementation of the remaining schools.

The implementation of the Lead Schools helped with the implementation as they facilitated the change process. As this was the largest district in the province [at that point in time] in implementing BCeSIS there was no precedent set on how to roll-out an application on such a large scale. It provided us with an opportunity to involve stakeholders in the implementation and to be respectful and sensitive to staff practices in the field. Also, if there were problems with our approach then we were able to modify the approach easily without disrupting the entire district. (Rafael)

Upon questioning of the in-depth interviewees as to whether the lead schools helped facilitate the implementation of BCeSIS by setting an example and helping diffuse the innovation as described in the literature, all respondents replied "No". One interviewee responded jokingly: "Yes, by spreading rumours and scaring the second phase [schools]. [Now in a serious manner] I think the lead schools taught the implementation team many lessons, so in that manner they helped the implementation" (Mikey).

When further asked about whether the selection of lead schools added to the implementation's momentum and whether different lead schools might have made a difference, three of the four in-depth interviewees responded that it would not have made a difference. The following quotes captured their perspective on this issue:

No matter which schools take the lead, there will most likely be problems along with the successes. For that reason alone I would maintain that our selection of lead schools was as good as this District could probably achieve. (Leonardo)

No, there should not have been different Lead Schools as it wasn't so much up to us that were implementing but it was a number of stakeholders such as the administrators and their staff who had agreed to take the risk upon being the first schools to start the implementation. Once the schools had agreed to implement it was then approved by the District Management Team so it really didn't matter what I thought should have been the lead schools. (Rafael)

I [suppose we could have used] receptivity of staff to change and [get] buy in from all stakeholders [instead of just the administrators, in selecting the lead schools]. (Mikey)

Only one interviewee believed that a different choice of schools might have resulted in a quicker uptake of BCeSIS:

I believe it is better to pick schools which have stronger support staff in terms of computer knowledge and student data management. It is because they will pick up the new functionality of the system faster and they in return can support the second phase schools as well. (Donatello)

#### **Finding 4: Customized Training System**

The VBE BCeSIS Implementation Plan, based on previous software deployments, stated that VBE personnel would be “exposed” to BCeSIS using the “train-the-trainer”

model. This method although “cost-effective and good in theory” (Leonardo), does not transmit knowledge very well in a large complex public school district. The researcher concluded that a customized training system needs to be established to effectively enable the technological change.

The key word in this finding is customized. The data showed that not only did the training need to be customized for the entire district, it needed to be customized for individual groups and sub-groups. Furthermore, in developing the customized training, it hoped that it would build enough capacity to provide continued support once the implementation phase was over.

All four of the interviewees agreed that the revised training regimen developed by the VBE BCeSIS implementation team was effective in enabling the adoption of BCeSIS. This finding is supported by 84% (n = 138) of survey respondents who stated that the “training was useful and purposeful”, 70% (n = 137) who agreed that “BCeSIS training enabled me to effectively adopt BCeSIS”, and 74% (n = 135) who reported that “training increased my perception of BCeSIS”.

Three of the four in-depth interviewees responded that for the VBE to successfully adopt BCeSIS, training had to be adapted to the specific needs of the schools and/or school personnel. The other interviewee agreed that the training practices were effective but fretted about the approach. “This ad hoc approach, although effective and may have felt good . . . but certainly was not following good [corporate] training practices” (Rafael).

The customized training model that emerged was multi-faceted and did not follow any particular format except for a “do whatever it takes” (Mikey) mentality. The model

varied from employee group to employee group and could be summed up as listening to what each group/school wanted and adapting training and resources to meet the needs of that group/school. “The training evolved over time along with the skills and approaches taken by the trainers” (Rafael). This is illustrated by 82% (n = 140) of the survey respondents who reported that the BCeSIS Implementation Team “was responsive to my concerns”.

I believe every member of the team is given the freedom to show their style of training and communicating with the trainees. Having a weekly meeting to review and discuss progress and planning of training [shared with] the team a complete picture [and what works] of the implementation. (Mikey)

In developing this customized training and support system, the members of the implementation team’s only consideration was in doing whatever was necessary to get BCeSIS implemented: for example, “at the district [level], it is more one-on-one training; it is based on the needs of the individual and department” (Donatello). As previously mentioned, this could involve anything including the sharing of leadership and responsibility for the implementation.

With one employee group, the implementation team realized there existed a “need to be social” (Leonardo) amongst the group members. The implementation team then went about organizing the training sessions in the following manner. The training sessions would always begin with a “soft start”, meaning that just prior to the beginning of the training, a continental breakfast or a light snack would be brought into the training facility. The trainees would get some food and have conversations with each other. These conversations usually involved their experiences with BCeSIS. This would continue for 20 to 30 minutes whereby the “official” training session would begin. By

providing a structured socialization and problem-solving/problem-sharing time, the trainees' anxiety and resistance levels were reduced and thus were better able to accept and synthesize the training material. Evidence that this unique approach was successful can also be found in that 80% (n = 136) of survey respondents stated that "collaboration with my colleagues, as part of the BCeSIS training sessions, helped me adopt BCeSIS". Furthermore, it is believed that these collaboration sessions aided in the creation of support networks that could be tapped once the implementation team was disbanded.

Another example of the need for customized training involved the secondary school teachers in the second phase of schools. The teachers from the phase one schools were trained using the "train-the-trainer" model as specified in the Implementation Plan. Hearing concerns from their colleagues in the lead schools, the teachers at the second phase of schools developed resistance and had strong concerns about the ability of BCeSIS to meet their class record keeping and reporting needs.

These concerns were brought forth to the teacher's union and the teachers' union raised these concerns with district senior management. The associate superintendent responsible for BCeSIS approached the two district systems trainers and said, "You'll make this go away, right?" The implementation team understood the program well and was confident that not only would it meet the record keeping needs of all secondary teachers but it would actually improve many processes.

In addressing the concerns of this group, the implementation team decided to provide direct training, mostly in small group situations, from one of the district systems trainers, who were also secondary school teachers. The district systems trainers trained

over 800 of their colleagues over a six-week period. In the end, this type of customized training delighted the secondary teachers, their union, and senior management.

In another instance, the implementation team discovered that several employee groups had never met together before. The team realized the need to establish regular meetings for these groups, not just for training but to create a support network that would persist after the implementation team had disbanded. One trainer established “monthly Records Clerk meetings – this gives them the most opportunity to understand the fields’ needs and providing timely training and guidance during each [school] business cycle” (Donatello).

It should be noted that the customized training program came about through necessity rather than being part of a well-scripted plan. After the implementation team took ownership of the project, anything that could work better than as described in the implementation plan was tried. It is about knowing who is being trained and adapting the best possible scenario to that training. This finding also provided further support to the first finding that an independent change implementation team is crucial for the success of a technological innovation.

### **Finding 5: Technological Infrastructure and Readiness**

The researcher concluded that the main factor that impeded the implementation of BCeSIS at the VBE was a poor level of technological infrastructure and readiness. This finding is supported by all four in-depth interviewees who stated that the lack of technological readiness hindered the implementation of BCeSIS. Of the survey respondents who provided anecdotal responses to the question: “what is the one single

factor that hindered your implementation of BCeSIS”, 45% (n = 52) cited the poor technology associated with BCeSIS. The discussion of this finding will proceed by providing the context of this finding, followed by a presentation of the evidence that supports it.

With the signing of the Memorandum of Understanding in 2005, the VBE assured that the minimum technological requirements for BCeSIS would be met before implementation began in 2007-2008. In 2006, the VBE conducted an IT infrastructure review. This review took six months, longer than expected, and did not provide a complete picture of the IT components in the district. Fortunately, after numerous meetings with Fujitsu and realizing that a further IT review was not going to yield clearer results, the VBE agreed to supply each teaching space with a brand new computer that could operate BCeSIS.

Having already met with some resistance to the anticipated change, the VBE thought that the “carrot of new hardware” (Leonardo) would mitigate some of those concerns. Unfortunately, having the new computers only highlighted “the disrepair of existing equipment and infrastructure, along with the dysfunctional nature of the IT division” (Leonardo). One implementation team member remarked incredulously: “[I became the one] documenting the deficiencies of our [VBE] network and identifying the gaps to IT services. [referring to his role as a teacher-consultant for BCeSIS as opposed to someone in the IT division]” (Rafael). The new computers shifted the technological problems from that of individual accessibility to one of district IT dysfunction. “[They] drew attention to the overall low levels of ability and access in terms of technology in the district” (Mikey).

The finding that the lack of technological infrastructure and readiness hindered the implementation of BCeSIS can be separated into two parts. The first part is the general infrastructure of the VBE. Second, it is the foreseeable problems that surfaced due to this lack of infrastructure readiness that hindered the implementation of BCeSIS.

It was agreed by all interviewees (three strongly) that the provision of new computers had a positive impact on the implementation of BCeSIS. “One cannot ask people to do a job without appropriate tools” (Rafael). However, it is the new computers that led many VBE employees to lay blame to BCeSIS for the lack of infrastructure in the district. During the initial stages of implementation when there was still much confusion about BCeSIS, if the VBE network went down, since people had new computers and they could not be the issue, either BCeSIS caused the problem, or that BCeSIS itself was down. Even though the BCeSIS Implementation Team attempted to help users differentiate between the VBE network going down and programs such as BCeSIS that need connectivity to operate, the end users were sceptical and ambivalent about such distinctions.

The VBE knew that BCeSIS was a web-based program and that having reliable Internet connectivity would be crucial to it functioning reliably. However, once the new computers connected to the VBE network, things went astray. “The major complaint from the users is the slow performance of the system which is a direct impact by the poor infrastructure and internet connectivity” (Donatello).

The VBE IT department miscalculated the amount of bandwidth that would be required during peak periods such as the end of September when BCMoE funding submissions were due and during reporting periods where there is a heavy demand to



calculate marks and print report cards. “The [was a] lack of preparation and resources on the part of the IT department to ensure there was adequate infrastructure and capacity for all users” (Rafael). It should be noted that during some of these peak times, not only was the VBE infrastructure inadequate, the Provincial Educational Learning Network (PLNet, which is the Internet backbone of the entire BC public education system) exhibited problems as well. One time PLNet went down and left schools across Metro Vancouver without BCeSIS access for close to three days.

Having decided on a web-based program, the VBE could have ensured that not only would there be sufficient infrastructure capacity but that there be additional capacity that could be added during peak periods. Regardless of the reason this did not happen, it was the one major factor that hindered the implementation of BCeSIS.

#### **Finding 6: Comprehensive/Cohesive Messaging and Communications Plan**

The researcher concluded that another factor that hindered the implementation of BCeSIS at the VBE was the lack of a comprehensive/cohesive messaging and communications plan. This finding was cited by two interviewees as the one factor that most hindered BCeSIS implementation and by two other interviewees who stated that it negatively influenced the implementation.

A communications plan was supposed to a part of The Implementation Plan. This critical part of the plan never got the attention it deserved because a former senior executive who was responsible . . . retired without producing the communications plan. Unfortunately not a lot of the work and knowledge of BCeSIS was ever conveyed to the various union members who would have a stake in working with this new product. (Leonardo)

From the evidence, it was found that the failure to have a comprehensive/cohesive messaging and communications plan can be attributed to three things: communications on BCeSIS put forth by the BCMoE and Fujitsu, lack of a VBE BCeSIS communications strategy, and the inability to counter the rumour and innuendo spread by special interest groups.

The desire to streamline student data across the province using a single common data system was welcomed by every special interest group when the idea was formed in the 1990s. It is unfortunate that as BCeSIS implementation progressed over time, it became a political issue.

As previously discussed, after making the decision to implement BCeSIS, the BCMoE retained the services of Fujitsu Consulting. Fujitsu in turn, hired several new staff members, who were either former superintendents or administrators, to help navigate the BC school system. This group of people advised Fujitsu, and in turn the BCMoE, to allow school districts to approach the implementation as they saw fit. This “implement when ready” approach although initially welcomed, was eventually criticized by several special interest groups as directionless and haphazard, especially since Fujitsu’s advisors were from “management”, not from the teacher or support staff ranks.

Certain decisions, although neutral on the surface, presented these groups with much ammunition to attack BCeSIS. An example of one of these decisions was in promoting the name of the system. The “e” in BCeSIS refers to “enterprise”, to describe the comprehensive nature of the system. Fujitsu put forth an advertising campaign that provided a detailed explanation as to why the “e” was “enterprise”. This seeming informative communication resulted in criticism of the priorities of the BCMoE in

implementing BCeSIS. Special interest groups questioned the wisdom in spending money when most people did not really care what the “e” really stood for. The interviewees believed that the mishandling of this and similar communications lost the message that was supposed to be presented, namely that this is a complex integrated student information system.

Another example was the use by the BCMoE and Fujitsu of the following by-line: “BCeSIS: Supporting Student Achievement”. Until it was dropped in 2008, this by-line was displayed on title pages of most BCeSIS publications. The British Columbia Teachers’ Federation (BCTF) questioned how a computer system could support student achievement (I. Lanzinger, personal communication, May 2008) and convinced many of its members that BCeSIS would be a “big brother” program used by the government to monitor and track students, thereby monitoring and tracking teachers. The BCTF encouraged teachers to avoid using BCeSIS and duly report to the BCTF through their local association any problems associated with it. Perhaps the monitoring of teachers through the monitoring of students was a part of the BCMoE agenda; nevertheless, from the interviewees’ standpoint, these political statements added unnecessary scrutiny and pressure to the implementation of BCeSIS.

The Vancouver Elementary School Teachers’ Association (VESTA), supported by the British Columbia Teachers’ Federation (BCTF) and the Canadian Union of Public Employees (CUPE) produced damaging attacks on BCeSIS (G. Hansman, personal communication, October 2008). Since the implementation of BCeSIS became a political issue, the BCTF has collected information on shortfalls and failures of this system. They used this information to attack the government and supplied it to VESTA to question the

implementation of BCeSIS at the VBE. “[The BCTF had a] misguided perception that the Ministry was mandating the district to implement BCeSIS, the BCTF passed a motion which objected to the implementation of BCeSIS across the province” (Leonardo).

VESTA in turn, convinced CUPE that their members would lose jobs because of this system. In November 2008, the implementation of BCeSIS at the VBE came to a grinding halt. VESTA and CUPE withdrew from participating in the implementation; however, after much negotiation with VBE senior management, CUPE relented but VESTA directed its members in the phase two schools not to use the electronic portion of BCeSIS. Most elementary school teachers at the phase two schools wound up only adopting BCeSIS in print format.

It should be noted that the Vancouver secondary teachers are also part of the BCTF but are a separate local from VESTA. The secondary teachers’ union did not have major issues with BCeSIS (Vancouver Secondary Teachers’ Association Executive Council, personal communication, November 2008). The reason for this may be that 60% of the full-time members of the implementation team were from that union; furthermore, one of the implementation team members was also a member of the governing executive council of that union.

The BCTF not only stressed the high cost and poor functionality of such a system but had actually sent a member of their governing executive council around BC and Yukon to persuade teachers to resist adopting BCeSIS. As a result, BCeSIS received a lot of negative publicity. Since districts took different approaches to BCeSIS implementation, the experiences of one district could not be directly compared to another. Neither the BCMoE nor the VBE were effective in drawing attention to this

omitted fact. “Wherever possible information in advance was supplied and examples of how the application worked and could be used were demonstrated” (Mikey).

Another example of rumour and innuendo impeding BCeSIS implementation was the claim by VESTA that CUPE jobs would be lost due to BCeSIS (VESTA and CUPE, personal communication, December 2008). As previously mentioned, CUPE instructed its members to withdraw from its implementation pending assurances from the VBE that this was not the case. It is only after the VBE CUPE members, not the VBE, explained the complexities of the system to CUPE leadership that CUPE agreed to proceed with its implementation. Furthermore, VBE CUPE members asked their union to seek concessions from the VBE due to increased responsibilities. There was no truth that any job would be lost due to BCeSIS. However, the VBE was not able to effectively counter this rumour.

## **Summary**

This chapter presented the six findings that enabled or impeded the technological change at the VBE. The four findings that enabled innovation adoption were: the change implementation team needed to be given freedom and independence in how it goes about implementing the change, distributed leadership and leadership density were crucial in the change process, a trial or pilot/phased implementation be used, and a customized training system be developed. Two findings impeded the implementation of BCeSIS: the lack of proper and adequate information technology infrastructure and the lack of a cohesive/comprehensive communications and messaging strategy.

The six findings of this study were gathered from evidence provided by the in-depth interviews, triangulated using the data collected from the survey, participant-observations, documents and artifacts. The voices and opinions of the participants permeated the discussion and presented the findings in their own context.

## **Chapter 5**

### **Discussion**

This research was a qualitative case study of the implementation of an enterprise (province-wide) student information system at the Vancouver Board of Education. Data were collected from four sources informed the study. The research question: “What are the factors that enabled or impeded the wide-scale implementation of a student information system in a large, complex urban school district?” was largely satisfied by the findings presented in Chapter 4. The study determined that four factors enable a technological change and two that hinder it.

In presenting an integrated picture of the findings and creating a holistic understanding of the study’s results, this layered synthesis will proceed with discussions in the following manner:

1. How well the research question was answered by the findings,
2. How these findings related to the literature,
3. How the findings related to the researcher’s initial assumptions,
4. A comprehensive chapter summary.

#### **The Research Question Answered**

The research question was phrased in a manner that sought to determine from the data, specific factors that helped or hindered a technological change initiative. To this end, the research did indeed provide insight into specific factors that enabled or impeded change. The study resulted in the identification of four factors that enabled a technological change: an independent implementation team, distributed leadership,

pilot/phased implementation schedule, and a customized training system. Also two factors that hindered change: the lack of technological infrastructure and readiness and the lack of comprehensive/cohesive messaging and communications.

### **The Findings as Related to The Literature Reviewed**

The findings of this study were both consistent with and confirming of the literature reviewed. However, in two instances it is believed that this study extended, brought more importance to, and made concrete existing concepts that were previously assumed or overlooked in the literature. In presenting how these findings related to current thinking, each finding is discussed in light of the empirical studies reviewed with comments on how a particular finding affirmed and/or extended the literature.

**An independent change implementation team.** The first finding of this study, that an independent change implementation team was crucial for success, is not explicitly stated in the literature. The researcher believes that this finding is important as there appears to be an assumption in the change management literature that change implementers have sufficient independence and authority to effectively address change concerns. In other words, either an internal implementation team will have sufficient positional leaders to automatically assume independence or that any change implementation would be authorized by an organization's most senior leaders and have sufficient ability and authority necessary to bring about that change. This finding determined that leadership must be assigned to the change. Those involved in leading a change need to be granted explicit independence and authority to carry out any change initiative.



This finding extends Hall, Wallace, and Dossett's (1973) Concerns-Based Adoption Model which states that the change agent needs to have access to a variety of resources to aid in the change process. Change implementers need to be able to address effectively and in timely manner, individual concerns as they arise. Furthermore, Zaltman and Duncan (1973), Prochaska, Norcosse, and DiClemente (1994), and Ellsworth (2000) stated that in planning for change, the change implementers need to be able to address resistance to and conditions hindering change. This assumed that the change implementers have sufficient authority to do so. This researcher concluded that this assumption needs to be made concrete so that change implementers have both the explicit and implicit ability to successfully lead the change in an efficient manner, possibly unique to that organization.

**Distributed leadership.** The finding that distributed leadership enabled the implementation of a change initiative was well documented in the literature. This finding confirms Sergiovanni's (1990) work of the virtues of having leadership density. It is interesting to note that distributed leadership was not the prescribed model at the outset of the implementation but became the default model due to a series of unexpected events (see Chronology of Events in Chapter 3).

Regardless of how distributed leadership came about, it was very effective in implementing BCeSIS. Senior managers shared leadership for this implementation with members of the implementation team, the vast majority of which were teachers. This confirms Lieberman and Miller's (2004) study that teacher leadership could be a powerful force for effective change implementation as teachers have unique grass-roots knowledge. This shared leadership allowed for quick actionable responses to problems

as they arose, allowing the team to take ownership more readily and adeptly (Sergiovanni, 1990).

With additional leadership roles that evolved with the implementation team, the team itself developed distributed leadership. Due to the complex and broad implementation mandate, distributed leadership became a much-valued framework. The team leader was the one who set this in motion. He used his position to encourage the development of dynamic interpersonal relationships and trust amongst the team members. He allowed for the extension of each team member's positional boundaries, which developed into leadership by knowledge and expertise rather than by position. This finding confirms Bennett, Wise, and Woods' (2003) work that sees leadership as a series of interpersonal relationships that are fluid, based on trust and openness, and which recognizes expertise. Furthermore, this lends credence to Mulford's (2008) argument that distributed leadership occurs only with the support, either implicit or explicit, of a positional leader.

The implementation team tapped into the grass-roots knowledge of BCeSIS users. The implementation empowered users to lead and refine change adopting practices. This not only led to the more effective implementation of BCeSIS but had the unintended consequence of creating a much needed support structure once the implementation team was dissolved. This finding is consistent with Fullan (2008) that sustained reform requires many leaders and with Sergiovanni's (1990) work that to achieve sustainable change, organizations need many leaders.

**Pilot/Phased implementation schedule.** The finding that a pilot/phased implementation schedule enabled a technological change is consistent with Rogers (2003)

seminal work, which stated that the successful adoption of any innovation requires a graduated uptake. The benefits of a staggered adoption of any change clearly had its advantages. However, unlike Rogers (2003) and Frank, Zhao, Penuel, Ellefson, and Porter (2011), who stated that a phased implementation would allow early adopters to help diffuse the innovation, it was concluded that the main benefit from a pilot/phased implementation was to develop the capabilities of the implementation team. The pilot/phased implementation referred to in this study is perhaps best thought of as a prototype implementation. A pilot/phased implementation generally implies that a trial would be followed by full implementation. A prototype implementation as this implementation can be thought of was a trial followed by the revision, redesign, and re-launch of the change initiative.

For this implementation, the choice of pilot schools was based on geographic, demographic, and political considerations. From the evidence in this study, very little thought was given to selecting the right schools or people to help diffuse BCeSIS. As a result, the implementation team worked with early change adopters who varied from the eager to outright hostile. This initial experience allowed the implementation team to develop and grow into a cohesive unit which greatly enhanced the implementation experience and effectiveness for the second phase of schools.

The lessons learned from the pilot schools provided the implementation team with such insight that a completely refined implementation model was utilized for the remaining schools. After the second wave of schools finished implementation, the team returned to the first phase of schools and in many cases, re-implemented BCeSIS with the newly established and refined best practices.

**Customized training system.** The finding that a customized training system facilitated innovation adoption extends the literature on technological and organizational change. For change initiatives, it is accepted that some type of training was required for change adoption and studies by Roepke, Agarwal, and Ferrat (2000) and Abdous and He (2009) even recommended specific training models. Furthermore, Hall, Wallace, and Dossett (1973) provided change facilitators with a template called the Concerns-Based Adoption Model, designed to facilitate innovation adoption through addressing the learning needs of individuals.

Fullan (2005) stated that organizations need to establish a culture of learning. Perhaps the creation of a customized training system is analogous to this. Based on this finding, organizations should seek to create a customized training system not only to enable change but to sustain transformative change.

Where this study extends beyond what is known in the literature is that the development of a customized training regiment, specific to the innovation and the organization is on par with change enabling concepts such as effective leadership. Accenture (2009) stated there are three main reasons for organizations to adopt advanced learning strategies such as a customized training system: the first is to exhibit an organization's advancements in addressing technological change, the second is the efficient delivery of material, and the third is cost-savings. From the analysis of the data, this study concludes that a fourth reason should be added to the literature in this area: the efficient and effective management of technological change.

**Technological infrastructure and readiness.** The finding that the lack of technological infrastructure and readiness hindered the implementation of BCeSIS was

not only a foreseeable and avoidable issue but is consistent with the change literature on belief systems. Rogers (2003) stated that if an innovation is not compatible with the current belief system there will be great hurdles in diffusing the innovation.

The belief system that was called into question was that the VBE, and by extension the province of BC, had sufficient technological infrastructure and readiness to implement BCeSIS. BCeSIS itself is not a computationally intensive program. It requires reliable Internet connectivity and a workstation with sufficient capabilities to interact with the central database.

In addressing technological infrastructure and readiness, the implementation team were provided with assurances that there was sufficient capacity built into VBE's technological infrastructure for this change initiative. Furthermore, the implementation team, in an attempt to pre-empt possible end-user technology issues, provided each user with a new computer equipped with adequate resources to operate BCeSIS. Unfortunately, the new computers had the unintended consequence of highlighting the antiquated state of computers in VBE schools and the insufficient capacity of the VBE network.

Rather than increasing change adoption rates and alleviating the technology readiness issue, the provision of new computers provided end users with the false impression that VBE technological infrastructure and readiness were sufficient for this initiative, and when it did not, some users questioned the underlying agenda of BCeSIS. When technological infrastructure problems arose and complicated the implementation of BCeSIS, users developed negativity towards the innovation itself rather than the root cause. This conflict with their belief system, which was furthered by the partial

enhancement of technological resources, was a hindrance to the adoption of the innovation.

**Comprehensive/Cohesive messaging and communications.** The finding that the lack of comprehensive/cohesive messaging and communications hindered the implementation of BCeSIS is consistent with the current change literature. Rogers (2003) stated that effective communications channels are one of the variables that needs to be considered for innovation adoption.

Without a comprehensive/cohesive communication strategy, the interpersonal networks of individuals took over. These networks did indeed work as Rogers (2003) stated they would but the communications in this case hindered the adoption of BCeSIS. Rumours and misinformation abounded as powerful interpersonal networks were used for political purposes to spread misinformation about BCeSIS. Individuals shared their experiences with others. This in and of itself would not be an issue; however, the ad hoc manner in which the VBE and the province of BC provided current, transparent, and accurate information about BCeSIS created unnecessary anxiety and negativity around the change initiative. This led many change adopters to develop negativity, hostility, and resistance to adopting BCeSIS.

A comprehensive/cohesive strategy that could communicate definitively and authoritatively the change initiative would have addressed many concerns. This would have allowed the implementation team to focus more on the implementation process as opposed to performing damage control.

## **The Researcher's Initial Assumptions**

The researcher had three initial assumptions at the beginning of the study: technological change was inevitable at the VBE, change would be met with resistance, and a wholesale change of current practices would be required for change to be effectively implemented.

The first assumption was that technological change was inevitable at the VBE. However, as indicated by the fifth finding of the study: the lack of technological infrastructure and readiness hindered change. It was found in the study that the VBE appeared to believe the technological infrastructure was sufficient for change and innovation.

The findings in this study illustrated that the lack of technological infrastructure and readiness led to unnecessary obstacles in change adoption. The VBE inevitably had to upgrade its infrastructure and readiness in order to adopt BCeSIS. This study brought clarity and new knowledge about the state of technology at the VBE. It showed that VBE's technological infrastructure was indeed in a poor state, extending and bringing clarity to the assumption that technological change was inevitable.

The second assumption, that change would be met with resistance, held true as evidenced in the fourth and sixth findings of the study: the development of a customized training system and the need for a comprehensive/cohesive communications strategy. However, the depth and kind of resistance were not anticipated and not consistent with this assumption.

The development of a customized training system was spurned in part by the lack of comprehensive/cohesive communications. The customized training program evolved

to include the diffusing of rumours and the countering of resistance brought about by the lack of cohesive communications. The finding that developing a customized training system and utilizing a transparent communications strategy could address the resistance encountered, challenged this assumption. Furthermore, this study provided knowledge in addressing the assumption by providing explicit mechanisms to mitigate the notion that resistance to change is inevitable.

The third assumption, that for this particular technology implementation to be effectively adopted at the VBE, the change initiative would require a change of current practices. This assumption was illustrated by findings one and four: the creation of an independent implementation team and the development of a customized training system. Rather than develop its own method of implementing change, the VBE traditionally followed change practices used by other organizations.

The findings of this study showed that the most effective change enablers are organization specific. In concluding that this technological implementation differed from past VBE practices, clarity was brought to the assumption that a change of practice was needed for successful technology adoption. It extended the assumption that in order for an organization to continually improve, to be effective and relevant, an organization needs to be constantly refined and refocused.

## **Summary**

This chapter discussed the findings and how they answer the research question, fit into the literature reviewed, and how they relate to the researcher's initial assumptions. The discussion revealed that the innovation adoption process is akin to developing the



capacity of both the organization and individuals within it. It presented an integrated, holistic, and multileveled synthesis. The researcher remains open to the possibility that others may have different interpretations and reached different conclusions, but to this end, this study was about how this researcher made sense of and understood this case.

## **Chapter 6**

### **Conclusions and Recommendations**

The purpose of this qualitative case study was to explore the factors that enabled or impeded a specific technological change. The final chapter presents the conclusions and recommendations of the research. The conclusions follow the research question and are presented in order of the findings. They proceed in two parts: conclusions that enable technological change followed by those that impede technological change.

The recommendations section progresses in the following order: recommendations for educational organizations, recommendations for change implementers, and recommendations for further study.

#### **Conclusions on Technological Change Enablers**

The first major finding of this research study was that an independent implementation team with the authority and expertise to adapt to an evolving landscape enabled the implementation of a technological change. The implementation of change at complex public institutions such as school districts has challenges that range from lack of infrastructure to a robust teacher communication network. These and other challenges need to be anticipated and addressed.

It was concluded that a change implementation plan in these organizations should be of an iterative design. Change implementation strategies and plans are usually linear. However, from this study it is concluded that the iterative learning loop of change that is sensitive to emerging conditions and issues has the most likelihood of succeeding in a school district. It can be concluded that any change implementation strategy will need to

have a structure or framework in place that effectively addresses problems and issues as they arise to ensure that the technological change initiative moves forward.

In drawing this conclusion, it is not to state that a change implementation plan, based on past experiences and sound decisions, is unnecessary. Indeed, it is crucial to have a well thought-out change model that provides a framework and strategies for change. This conclusion is to recognize that conditions are constantly shifting and complications are a given. It is to emphasize that any change strategy needs as a salient tactic, a built-in mechanism to address effectively, flexibly, and authoritatively unforeseen circumstances as they arise. The change implementation plan needs to be heuristic: to grow as the implementation evolves and be of an iterative design that includes prototyping and refinement as part of the change strategy.

The second finding of the study was that having a distributed leadership model enabled successful change implementation. The technological change process is multifaceted and complex. The conclusion that can be drawn is that it would be very difficult solely for one person to successfully lead change; for a change initiative to succeed, it would be best to have a team of people leading the implementation.

Having organizational leadership density, based on expertise and knowledge, is essential for bringing and sustaining transformative change. Distributed leadership is often difficult to attain in traditionally hierarchical organizations such as school districts. Institutions such as school districts need to think about and acknowledge that talent and ability do not just reside with those in positions of authority. An organization needs to identify and use leaders throughout the organization.

In relating this conclusion to the one above, an effective change strategy would need to recognize that leadership is required at all levels and parts of the change process. Organizations need to seek out change leaders based on talent and ability. Although there should be one person who heads up the implementation, all change implementers must be capable and willing to assume leadership as the need arises.

The third finding of the study was that any change initiative should be piloted first and then phased in. The word pilot implies that after an initial trial period, things are just scaled up. In developing this conclusion and to provide clarity, the word prototyped may be used instead of the word piloted. By stating that a prototype implementation model be used, associates this to the iterative design model drawn from the first conclusion.

By conducting a graduated and iterative implementation, evidence could be collected to guide the change implementers in effectively and efficiently implementing change. The conclusion to be drawn from this finding is that there will be a constant refining and improvement of the change experience. The upgraded change experience enhanced by lessons learned from the first phase of change adopters should better facilitate the adoption of change.

The fourth finding was that a customized training system needs to be developed. For maximum efficacy, any change initiative or change strategy needs to be home-grown. The conclusion that can be drawn from this finding is that any change or change strategy is best received and perhaps even embraced when it is perceived to be organic to an organization.

The change and change adopting experience should be seen to be driven by an organization's desire to better itself. It needs to build employee capacity and be

consistent with the current learning culture and beliefs of the individuals and hence the organization. When change implementers can align and relate strategies to change adopters' values and learning needs, the implementation of change becomes much smoother, perhaps even self-sustaining.

### **Conclusions on Technological Change Impediments**

The fifth finding of the study was that the lack of technological infrastructure and readiness impeded change. Without a sufficient foundation to base the implementation of technology, there would be a high likelihood of frustration and even a possible derailment of the change initiative. The conclusion that can be drawn from this finding is that before any change initiative is attempted, great lengths should be taken to verify and ensure that pre-requisite conditions are satisfied. In verifying and perhaps even setting the preconditions for change, change implementers are just removing an unnecessary disruption to an already challenging process.

The sixth finding of the study was that the lack of a comprehensive/cohesive communications plan hindered technological change. Regardless of how well intended or technologically superior an innovation is, if it is not presented in a transparent and well-intentioned manner, it is highly unlikely that the change initiative will be well received. This is not to say that even with a perfectly presented implementation plan, success is guaranteed, just that transparency and a real opportunity for dialogue is needed to give the implementation a chance of success. To enhance the chances for success of a change initiative, all information about it must be clearly laid out and opportunities presented for consultation and feedback from affected parties.

This conclusion requires that an organization and its leaders be clear about the intent of the change initiative as well as the benefits to both the individual and the organization. The organization needs to be able to swiftly address concerns so that any attempt to thwart the change initiative does not gain momentum. Indeed, it can even be hoped that successful communications may lead to the embracing of change.

### **Recommendations**

The researcher offers recommendations based on the findings, analysis, and conclusions of the study. Given there are many factors that affect the technological implementation of an innovation, the recommendations provided here should be viewed in light of their suitability, on a case by case basis, to an organization. The recommendations are for educational organizations, change implementers, and for further research.

**Recommendations for educational organizations.** In providing recommendations for educational organizations, the researcher recognizes that each organization has its own unique history of technological change. Experiences vary widely and some of the following recommendations may already be in practice.

1. A change implementation plan should be a framework document rather than a blueprint for the change initiative. The change implementation plan should clearly identify expectations and explicitly recognize the authority, responsibility, and adaptability of the change implementers to address all aspects of the change initiative.

2. The implementation plan should be endorsed and closely monitored by the senior leaders of the organization.
3. The organization should seek to develop the capacity of all those involved in a change initiative, to encourage and enhance every employee's knowledge and expertise.

In presenting these recommendations, the researcher believes that educational organizations can benefit from the conclusions drawn from this research. In particular, the notion of a framework document that guides rather than dictates a change initiative should be seriously considered. In addition, the organization, perhaps as part of its succession planning should consider, encourage, and develop the capacity of as many employees as possible.

**Recommendations for change implementers.** Regardless of how well laid out or developed a change implementation plan may be, the reality of the situation is that unexpected situations will arise. Therefore, change implementers should consider the following:

1. Change implementers should review on an ongoing basis how well the implementation is going and what improvements could be made.
2. Take sufficient time and effort to address concerns, issues, and questions from change adopters. If necessary, adjust the implementation strategy to alleviate concerns and mitigate future issues.
3. Develop expertise of at least two implementation team members in each area so that there are differing perspectives and approaches to the same issues.

The researcher believes that constant reflection and readjustments to the

implementation process will make the job of implementing a new technology smoother. Furthermore, as the study found that leadership density was an important factor in implementing change, the researcher recommends that change agents ensure density in each area of the change process or product.

**Recommendations for further research.** The researcher recommends that further studies be conducted to develop a larger database of technological change initiatives in the Canadian public institutional context. Consideration should be given to examining the following:

1. A multi-case study using the same criteria could be conducted at other school jurisdictions to assess the extent that the same or similar findings would be uncovered.
2. A cross-case analysis of successful technological change implementation initiatives in other public institutions should be conducted in an attempt to draw generalizable conclusions.
3. An action research or design-based research study that builds on the findings that prototyping change may be a useful way to think about and approach change implementation within a complex organization.
4. A study that explores the extent that distributed leadership does or does not contribute to successful change implementation.

The recommendations presented here suggest that more change implementation studies need to be done in a Canadian context. The researcher recommends that further studies on the notion of prototyping change as an effective model to complement the notion of piloting change and recommends further studies to determine the efficacy of



this approach. Finally, this study concluded that distributed leadership contributed to successful change implementation but recommends further study to confirm whether this is an emerging theme in change leadership.

## **Conclusion**

The research study documented and described the journey one school district went through to implement a new technology. It showed the many facets and complexities of change implementation at a public educational organization. The willingness of the numerous participants to share their experiences demonstrates the commitment, dedication, and desire of public school employees to constantly improve the organization. The study offers a framework for planning and designing future change initiatives. It reveals issues that could negatively impact change implementation as well as gaps that if addressed could potentially facilitate change adoption.

In conducting the research and writing the dissertation, the researcher now truly appreciates Stake's (1995) statement that qualitative case study is a highly personal endeavour. This journey, sometimes a struggle, has just opened more doors than it closed.

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Appendix A  
In-Depth Interview Instrument

Dear Participant,

Thank you for agreeing to participate in this research project. This initial interview will take about 30 minutes of your time.

A significant technological change has taken place with the VBE's implementation of BCeSIS. This interview seeks to understand the factors you believe enabled and impeded the implementation of a student information system in a large, complex urban school district. It is for academic purposes only.

Please reflect back upon your experiences with the implementation of BCeSIS. For the first portion, please choose the response that most accurately reflects your level of agreement with each statement. For the second part, please provide candid responses to the open-ended questions. Feel free to add comments to each of the statements/questions.

Name: \_\_\_\_\_

Position on the Implementation Team: \_\_\_\_\_

### Guided Response Questions

	Statement	Not Applicable	Strongly Disagree	Disagree	Agree	Strongly Agree
1	It was the right time for the VBE to implement BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	I am satisfied with my work on the BCeSIS Implementation Team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	I believe that the BCeSIS Implementation Team successfully implemented BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	I had autonomy in how I approached the implementation of BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	The implementation of BCeSIS was more complex than what was originally planned by the VBE.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	I received support from VBE senior management for the implementation of BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	It would have made a significant difference in how I approached my job if I received more support from VBE senior management.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	I received recognition from VBE senior management for the work I put into implementing BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	I felt the number of people/positions on the BCeSIS Implementation Team was sufficient.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10	The VBE provided the BCeSIS Implementation Team with enough time to successfully implement BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11	The VBE provided the BCeSIS Implementation Team with enough resources to successfully implement BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12	The implementation of BCeSIS brought about a change in practices at the VBE.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13	The VBE did the best job possible implementing BCeSIS under the current circumstances.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Open-ended Questions

### Position, Role, and Responsibilities

1. Given your position on the Implementation Team, how did you see your role and responsibilities?
2. Did your role/responsibilities change over the course of the implementation? How?
3. Why do you think your role/responsibilities changed over the course of the implementation?

### Implementation

4. How would you describe the approach taken by the VBE in implementing BCeSIS?
5. There was a “phased” implementation strategy: Phase I (Lead Schools), Phase II – rest of the schools. How were the Phase I (Lead Schools) chosen? Why?
6. Do you think the Lead Schools helped or hindered the implementation of BCeSIS? Why?
7. Please provide your thoughts on the success of this model.
8. In hindsight, do you think there should have been different lead schools? Why?
9. The Implementation Team positions changed (additions/deletions of certain positions) throughout the implementation process.
  - a. Why do you think this occurred?
  - b. What improvement(s) would you make in the composition of the Implementation Team?
  - c. Please provide additional comments on the Implementation Team.
10. Special interest groups (VESTA, CUPE) had concerns/objections with the Implementation of BCeSIS.
  - a. Why do you think they had grave concerns/objections?
  - b. What was done/could have been done to alleviate these concerns/objections.

### Change Leadership

11. How would you describe your leadership while you were on the BCeSIS Implementation Team?
12. Do you think your leadership was a result of your position on the Implementation Team? Why?
13. How would you describe the leadership exhibited by your immediate supervisor?
14. How would you describe the leadership exhibited by the Implementation Team as a whole?
15. How would you describe the leadership exhibited by VBE senior management?

### Change Management and Strategies

16. Of the many things you did to aid in the implementation of BCeSIS, which three things do you think had the greatest effect (on supporting the VBE's transition to BCeSIS)?
  - i.
  - ii.
  - iii.
17. What was your greatest challenge in this implementation?
18. How did you overcome this challenge?
19. What was your greatest success in this implementation? Why?
20. The provision of new hardware (computers, monitors, Internet connection) was part of the implementation plan. Do you think this had a positive impact on the implementation of BCeSIS? Why?
21. How effective was the use of focus groups? Why?
22. Would you have used the focus groups differently? Why?
23. How would you describe the training model at the district level?
24. Do you think the training model at the district level was effective? Why?
25. What would you change about the training model at the district level?

- 26. How would you describe the training model at the school level?
- 27. Do you think the training model at the school level was effective? Why?
- 28. What would you change about the training model at the school level?
- 29. Were there other strategies that you might have tried?

Main Factors

30. What three factors do you believe best facilitated the implementation of BCeSIS? Please elaborate on why you think these were the three most influential factors.

- i. Factor 1: \_\_\_\_\_  
Why?
- ii. Factor 2: \_\_\_\_\_  
Why?
- iii. Factor 3: \_\_\_\_\_  
Why?

31. What are the three factors do you believe most hindered the implementation of BCeSIS. Please elaborate on why you think these were the three most influential factors.

- i. Factor 1: \_\_\_\_\_  
Why?
- ii. Factor 2: \_\_\_\_\_  
Why?
- iii. Factor 3: \_\_\_\_\_  
Why?

32. If you could go back to the beginning, what are two things that you would have done differently? Why?

- i. Item 1: \_\_\_\_\_  
Why?
- ii. Item 2: \_\_\_\_\_  
Why?

33. Additional Comments:



## Appendix B

### Structured Survey Questionnaire

Dear Participant,

Thank you for agreeing to participate in this research project. This survey will take 20 to 30 minutes of your time.

A significant technological change has taken place with the VBE's implementation of BCeSIS. This survey seeks to understand the factors that enabled and impeded the implementation of a student information system in a large, complex urban school district. It is for academic purposes only.

Directions

Please reflect back upon your experiences with the implementation of BCeSIS. Your candid thoughts and reflections are greatly appreciated. Please choose the response that most accurately reflects your level of agreement with each statement.

	<b>General</b>	<b>Not Applicable</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
1	I use BCeSIS on a daily basis.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	I am able to use BCeSIS for the required purposes of doing my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	I have adjusted my practice as a direct result of BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	I feel comfortable using BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	I am satisfied with BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	I felt pressured by the VBE and/or my supervisor to adopt BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	BCeSIS was a hard program to learn.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	I thought BCeSIS was a passing fad.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	I am/was resistant to adopting BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10	I avoid using BCeSIS when possible.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11	Overall, I have successfully adopted BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<b>BCeSIS Implementation</b>	<b>Not Applicable</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
12	It was the right time for the VBE to implement BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13	I had enough time to learn/implement BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14	I could have implemented BCeSIS on my own.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15	My immediate supervisor was supportive of my learning/implementation of BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16	The BCeSIS Implementation Team was effective in helping me adopt BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17	I felt the number of people/positions on the BCeSIS Implementation Team was sufficient to help me effectively adopt BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18	The people on the BCeSIS Implementation Team had a positive impact on my adoption of BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19	Leadership provided by the BCeSIS Implementation Team was effective.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20	The BCeSIS Implementation Team was <u>not</u> responsive to my concerns.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21	The BCeSIS Implementation Team helped reduce the pressure I felt while implementing BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22	The BCeSIS Implementation Team put in place initiatives that helped ease the implementation process.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23	The BCeSIS Implementation Team put in place effective communications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24	The implementation of BCeSIS changed the practices of the VBE.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25	The Implementation Team increased my perception of BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26	The Implementation Team increased my perception of the VBE.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<b>BCeSIS Training</b>	<b>Not Applicable</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
27	I was provided with the opportunity to attend BCeSIS training sessions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28	The BCeSIS training practices were different from past VBE practices.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29	BCeSIS training enabled me to effectively adopt BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30	The number of training sessions was appropriate for me to learn BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
31	The training was conducted in an efficient and purposeful manner.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
32	The training increased my anxiety in adopting BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
33	BCeSIS training occurred at the appropriate times in the school year.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
34	The training was useful and professional.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
35	I learned things from the training sessions that I could <u>not</u> have learned on my own/from colleagues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
36	The training techniques were unique/different from previous VBE training sessions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37	Collaboration with my colleagues, as part of the BCeSIS training sessions, helped me adopt BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38	I enjoyed the training sessions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
39	The BCeSIS Trainers were effective.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
40	The training increased my perception of BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
41	The training <u>decreased</u> my perception of the VBE.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
42	Overall, the training was effective.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	<b>BCeSIS Technical and User Support</b>	<b>Not Applicable</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
43	I was aware there was Technical and User support for BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
44	I knew how to access BCeSIS Technical and User Support.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
45	I accessed BCeSIS Technical and User Support.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
46	The amount of Technical and User Support provided was adequate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
47	The type of Technical and User Support was adequate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
48	The people who provided Technical and User Support were knowledgeable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
49	Technical and User Support addressed questions I had about BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
50	The support structure increased my perception of BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
51	The support structure increased my perception of the VBE.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
52	Overall, BCeSIS support provided during the implementation phase was adequate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<b>Additional Factors</b>	<b>Not Applicable</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
53	The new computers provided by the VBE helped me implement BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
54	The use of Focus Groups to provide input into the implementation and training was effective.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
55	I received a sufficient amount of BCeSIS documentation (such as Quick Reference Guides, mini-manuals, and instructions).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
56	There was recognition for the work I put into implementing BCeSIS.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
57	The BCeSIS Implementation Team did the best job possible give the circumstances.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

58. What is the one single factor that facilitated your implementation of BCeSIS (if not contained in your responses listed above)?

59. What is the one single factor that hindered your implementation of BCeSIS (if not contained in your responses listed above)?

60. Additional Comments:

**Thank You for Participating!**