Factors Affecting Implementation of Educational Media Casting As an Instructional Resource in Distance Education

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DEDICATION

This thesis is dedicated to my parents, Frank and Linn, and to my brother Paul. Their encouragement was the single greatest motivation for completion of this work. I would also like to dedicate this work to my extended family, Roger and Sandi Stewart, Don Theriault, and John and Sharon Moore. Your continued support and patience with me as I complete my academic journey has been invaluable, your friendship even more so.

ABSTRACT

This study examined the factors affecting the implementation of podcasting within a post secondary educational institution. The institution in the present investigation is a member of iTunes University and has provided faculty with the option of creating an educational media cast of content for delivery of course materials. Despite the services and support available, the inception of this technology has not been ubiquitous throughout various schools within this institution. A mixed methods approach was used to identify factors that faculty members used when making decisions to implement educational media casting. It was believed that one significant factor would be an individuals' comfort level with technology. This was measured in an online survey. The results obtained suggest that time is the most critical factor that will affect decisions on implementation of this technology.

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CHAPTER I
INTRODUCTION

The inception of MP3 formatted files has created an array of potential educational uses. The development of portable devices that store and play these files has provided educators new technologies to explore for uses in delivering instructional and resource materials to students. This new phenomenon has also been the impetus for the development of more advanced technologies such as MP4 files (video), and RSS (Really Simple Syndication) feeds that allow people to subscribe to information that is delivered to their computers or portable devices automatically.

Purpose of the study

While the use of newer technologies have been pervasive in the general population and business, the adoption of the same technologies in education has lagged behind, even in areas of education that rely heavily on technology for delivering learning materials to students; specifically distance education. Educational media casting (also known as podcasting) offers many advantages for distance educators (DiMaria-Ghalili, Ostrow & Rodney, 2005). Yet, this technology has not been fully embraced as an instructional tool. Atkins (2004) states the following regarding technological innovations and their place in higher education:

> New technologies are changing modes of learning, collaboration and expression. And widespread social and political unrest compels educational institutions to think more concertedly about their role in promoting individual and civic development. Institutional and pedagogical innovations are needed to confront these dynamics and insure that the canonical activities of universities – research, teaching and engagement – remain rich, relevant and accessible. (p.2)

This investigation aims to provide an explanation for the current use of educational media casting (podcasting) in post secondary instruction, which could be aptly be described as limited, or under-utilized. This study will examine the motivation for using media casting, and it will highlight the relevant factors that influence faculty decisions to implement web casting as an instructional tool for their courses.

Theoretical framework for the study

The theoretical framework for this current investigation will be driven by derivatives of two primary theories, self-efficacy theory and diffusion theory. Self-efficacy is the theory derived by Albert Bandura. The basic premise of this theory stems from Social Cognitive Theory. Bandura (1977) stated that "individuals can believe that a particular course of action will produce certain outcomes, but if individuals entertain serious doubts about whether they can perform the necessary activities such information does not influence their behavior" (p. 193).

The present investigation will examine self-efficacy related to computer technology use to see if this is a significant barrier for implementation of media casting. Computer self-efficacy is defined as, 'an individual's perceived ability to adopt computer technology successfully' (Igbaria & Iivari, 1995, p. 587). Computer self-efficacy has been shown to be a major factor affecting the willingness of individuals to adopt and accept new technologies (Igbaria & Iivari, 1995).

Ryan and Gross derive their (1943) diffusion theory for innovation of technology from a 1943 study at the University of Iowa (as cited in Rogers, 1995).

This study was in the area of rural sociology and examined the adopters of innovations. For the present study, Ely's (1990, 1999) model of implementation of educational technology innovations will be used. Ely's (1999) theory is unique in that it focuses on understanding the factors responsible for the successful implementation of innovations. Ely's conditions will be discussed in more detail within the literature review of this thesis.

Statement of problem

Barriers to adoption of new technologies in education have been well documented in the literature (Rogers, 2000; Spotts, 1999). In Book III of the *Republic*, Plato argued that changing from oral traditions to written forms of instruction would affect the overall learning experience of students (Plato, trans .1984). Plato's argument was that written tradition would change or taint the original meaning of what is taught. He used the example of Homer's *Odyssey*, and argued that the significance of the text would be lost in translation from oral to written form. In much the same way as Plato rebuked technological advancements current faculty members have been reluctant in embracing new technologies for instructional purposes.

This investigation will examine the factors that affect faculty in their decision to embrace media casting as an instructional tool in distance education. The faculty members investigated for the present study are teaching faculty at a western Canadian post-secondary polytechnic institute.

One current technological trend in higher education has been the development of web casted, and podcasted (media casted) course materials. The nature of these materials will be not investigated. However, the most common use of media casting has been the replication of classroom lectures into a format that is delivered over the internet. This new technology has led to the development of *iTunes University*. This service is provided by the Apple computer company, and offers post-secondary institutions a portal for delivering instructional materials to students enrolled in courses at participating universities. This service adheres to the fundamental principles of distance education and blended learning, providing learning objects anywhere, and anytime (Keegan, 2003).

The institution used in this investigation is a member of *iTunes University*. This institution has recently implemented media casting as an option for faculty to deliver instructional materials to students. The present investigation will examine the motivation of faculty to embrace this new technology. Also, this investigation will examine the barriers that cause faculty members to be reluctant in embracing this new technology. Identification of these barriers and motivators will help make future decisions about the benefits of media casting for learning. Also, it will help to determine if expenditures for media casting are providing sound returns on investment. If faculty members are reluctant to use this new technology, than investment for these technologies is not a wise decision.

Research questions

Despite the greater access to education technologies, and the growing familiarity with technology by faculty and students, there is an inadequate level of media casting in higher [distance] education. Faculty members are somewhat reluctant to embrace this new technological innovation as a means for delivering course content. Rogers (1995) suggests that there are multiple areas that influence the adoption of technology in education. These would include social system, innovation, and communications channels.

Spotts (1999) suggests that instructional technologies are not implemented due to the faculty member's individual experiences and philosophy of instruction. A faculty member's preconceptions of technological innovations might not favor the use of instructional technologies.

Spotts and Bowman (1995), in a study on desktop computing in higher education at USC, suggested that fewer than 40% of the faculty surveyed had good to expert knowledge or experience with instructional technologies, and less than 20% suggested they used these technologies weekly.

Ensminger, Surry, Porter, and Wright (2004) examined the factors that contributed to the successful implementation of technology in education, surveying predominantly higher education faculty members (50%) This includes a small portion of K-12 educators (11%). They discovered that successful implementation requires commitment from the powerbrokers of the institution. This commitment includes giving faculty release time to learn new technologies, and giving faculty

credit for using technology when reviewing their performance for tenured positions (Ebersole & Vornddam, 2003).

The research questions that will be addressed and answered in this investigation are derived from previous works described in the foregoing. The research questions for the present investigation are stated below:

> What is the relationship between faculty members' computer self-efficacy and their implementation of media casting as a technological innovation for instruction?
>
> What common factors exist among faculty members who have successfully adopted media casting as an instructional innovation, and those who have not?
>
> What common definitions or personal philosophies of instruction are held by faculty members who have successfully implemented media casting as an instructional tool?
>
> What considerations are taken into account by faculty members when implementing media casting as an instructional innovation?

Delimitations and limitations of the study

The major delimitation of this study is that a single institution is being investigated and generalizations about the implementation of technological innovations in instruction will be based on faculty from a single institution. Therefore, generalizations to other institutions cannot be made easily based on the results presented here. This is an institution of technology, which presupposes that

technology would be interwoven in all courses and areas of instructional design. Therefore, the willingness to use educational media casting might be greater than in a traditional institution. The primary limitation relates to external validity. Sampling will be limited to voluntary respondents at the institution who have used media casting or are considering using media casting. Again, limited generalizability to the population outside this institution can be made. To control internal validity, respondents will be separated into three groups: a) Those who have implemented the innovation (High Interest), b) those who are considering adoption of the innovation (Medium or Moderate Interest), and 3) those that will never implement this technological innovation (Low or No Interest).

Definition of terms

Given the nature of this topic some unique terms will be used. For many of these terms there is no consensus on a proper definition. The definitions used in this proposal are presented below, along with the resource from which the definitions were derived:

> *iPod*: Apple's iPod is a small portable music player. Users can transfer songs to their iPod with their computer, iTunes, and the iPod software (Meng, 2005).
>
> *Podcast*: The process of capturing an audio event, song, speech, or lecture and then posting (distribution) that digital file on a web site or 'blog' in a data structure called an RSS 2.0 envelope (or "feed"). This content is automatically delivered to subscribers.(Meng, 2005)

Vodcast: The term 'VOD' is derived from Video-On-Demand. It works in much the same manner as a podcast. The difference is that the content is video versus audio. (Meng, 2005)

RSS Feed: RSS stands for 'Really-Simple-Syndication'. It is the means by which files are delivered to subscribers. Content is sent to computers who have established a link with the producer of vodcasts or podcasts. (Manning, 2005)

Web cast: Web casting is similar to podcasting and vodcasting in that it can include both audio and video content. The difference is that webcasting is typically live, whereas educational media casting, podcasting and vodcasting is on-demand downloaded content from a subscription, and not live. (DiMaria-Ghalili, R. A., Ostrow, L., & Rodney, K., 2005).

Media casting: Educational media casting is a term derived at the British Columbia Institute for Technology. The definition of educational media casting is provided on the BCIT casting web site as follows:

> 'Educational media casting, or podcasting, is like a subscription to your local newspaper. If you would like to see the paper delivered to your door each week automatically instead of leaving the house to go and get it each and every week you subscribe to that paper.
>
> By casting your media the hosting website allows visitors to subscribe to media you post. When you have uploaded new media it automatically downloads it to your subscriber's personal computer or mobile device. Users can watch or listen to their subscribed media at their convenience. In an

> educational setting this makes casting a useful supplement to the classroom experience'. (BCIT, 2008)

For the purposes of this investigation the terms podcast and educational media cast are used interchangeably based on the definition similarities. Educational media casting will be the term used in this thesis. Also, when discussing podcasting with BCIT faculty members the researcher used the term educational media casting since that was likely the familiar term. Therefore, in reference to academic research the term podcast is used. In reference to the current investigation, the term educational media casting was used

Summary

This investigation will show the characteristics that are present in individuals who successfully implement media casting into their instructional practice. It will also identify the barriers to successful implementation. Media casting is a relatively new phenomenon in education and it has not been embraced to the extent that it could be. Before institutions invest into a media casting program they should be aware of the characteristics of successful implementation, as well as the barriers to implementation.

CHAPTER II
REVIEW OF LITERATURE

There are few citations in the academic literature that examine the implementation of media casting as an instructional tool. This literature review will examine the role of computer self-efficacy and how it relates to the implementation of instructional innovations. The literature that relates to pilot projects with podcasting or vodcasting will also be examined within this review of literature. The first part of this review will examine computer self-efficacy and implementation of new technologies since these two topics are inextricably linked (Thatcher & Perrewé, 2002).

Historical Overview of Self-Efficacy Theory and Diffusion Theory

Self-Efficacy Theory

The impetus for self-efficacy theory comes from Social Cognitive Theory (SCT). SCT incorporates two specific expectations: a) outcome expectations, and b) expectations related to self-efficacy (Igbaria & Iivari, 1995). The first, outcome expectations, refers to the perceived value of performing a task where individuals tend to perform said tasks if they believe it will provide a benefit (Igbaria & Iivari, 1995). The self-efficacy expectations refer to the belief individuals have in their abilities. This belief will help the individual summon the motivation, and cognitive resources to take action and meet the required demands of a particular task (Wood & Bandura, 1989). SCT claims that both expectations are determinants of behaviour and motivation for performing certain tasks. Igbaria and Iivari (1995) commented on the relationship between self-efficacy and motivation by stating the following:

> Perceived self-efficacy plays an important role in affecting motivation and behavior. The individuals' perceived abilities to attain the standards they have been pursuing have an impact on individual cognitive and behavioral reactions (i.e. motivation and performance). Those individuals who distrust their capabilities are easily discouraged by failure, whereas those who are highly assured of their efficacy for goal attainment will intensify their efforts when their performances fall short and persevere until they succeed. (Igbaria & Iivari, 1995 p. 588)

Bandura's (1997) self-efficacy theory can be summarized as a belief system that connects three primary elements: belief, behaviour, and outcome. The personal beliefs learners have about their abilities to perform a task, such as creating a media-casting presentation; will guide their efforts and actions. This will consequently have an impact on the outcome of this endeavor (Driscoll, 2005).

The present investigation will examine self-efficacy with technological applications (i.e. computers and media-casting). It is believed that the level of confidence that faculty members exhibit is directly related to their motivation to implement educational media casting. Similar examples illustrate this significance in the academic literature. These will be discussed in the next section of this review.

Diffusion Theory

Diffusion theories aim to outline a model for how innovations have been incorporated into specific situations. As mentioned above, diffusion theory can be traced back to a 1943 sociological study conducted by Ryan and Gross (as cited in Rogers, 1995). In their study, Ryan and Gross used interviews with adopters of an innovation to examine the number of factors related to implementation. Since this seminal work, other disciplines have developed diffusion theories to attempt to

explain implementation of innovations. Surry and Farquhar (1997) suggested that there is not a single definition of diffusion theory applicable to all innovations. The most significant and compelling contribution to theories of diffusion was made by Everett M. Rogers (Surry & Farquhar, 1997). Rogers' (1995) and Ely's (1990, 1999) diffusion theories of instructional technology will be presented in the next section of this literature review.

Theory and Research Specific to Implementation of Technology

Computer self-efficacy

The advancement of computer technologies in the past two decades has spurred interest in the factors that affect implementation of computers in the workplace. Thatcher and Perrewé (2002) define computer self-efficacy (CSE) as 'individuals' judgment of their capabilities to use computers in diverse situations' (Thatcher and Perrewé, 2002, p. 382). Individuals who possess high CSE are more likely to have positive opinions of information technology (IT) (Venkatesh and Davis, 1996). Compeau and Higgins (1995) suggested that CSE is not concerned with an individual's past experience, rather their perceived outlook of their computer abilities for application (Compeau & Higgins, 1995). Compeau and Higgins (1995) also stated that CSE incorporates judgments of the ability to apply skills to broader tasks. This sentiment is often echoed in more recent investigations (Thatcher & Perrewé 2002) where individuals with high CSE were more innovative with their use of technology.

Compeau and Higgins (1995) outline three dimensions of CSE in an attempt to develop an instrument to measure computer self-efficacy in individuals. The first dimension of CSE is magnitude. Individuals with a high magnitude of CSE would be expected to perceive themselves as able to accomplish more difficult computing tasks, compared to individuals with a lower magnitude of CSE. Magnitude is essentially the measure of how much an individual can accomplish. Magnitude is difficult to gauge since it does not factor in the level of support that is offered or used by the individual as computing tasks become more challenging.

The second dimension of CSE is strength. This refers to the level of conviction one has about their abilities to perform various tasks. Thus, individuals with high CSE perceive themselves as able to accomplish more (high magnitude), and they would also display greater confidence about their ability to perform complicated tasks.

The final dimension of CSE is generalizability. This refers to the extent to which an individual's judgment about their abilities is generalized to a broader area of performance. Individuals who have high CSE might only have a high magnitude and strength within a limited area of computer usage. Individuals with higher generalizability measure might be more willing to accept failure and attempt newer technologies, such as media casting. Also, these individuals might be more creative and innovative with technology. Compeau and Higgins (1995) do not address these particular aspects in their measurement or definition of CSE.

There are many factors that influence the adoption of innovative technologies. The first obstacle is the personal belief faculty members have in their

abilities to use and incorporate these technologies effectively. Computers drive essentially any new technology; the issue of CSE is paramount. Compeau and Higgins (1995) provided a schematic of all variables that influence CSE (Figure 1).

Figure 1. The relationship of components in Computer Self-Efficacy

Self-efficacy is important since it is associated with beliefs and behavior (Bandura, 1977). Igbaria and Iivari (1995) suggested that self-efficacy is an important motivational variable, which influences individual affect, effort, and persistence. The greater the perceived value of a goal, the greater the motivation for the individual to achieve that goal. Therefore, complex tasks are often pursued in the belief that the benefits will justify the efforts in achieving these goals. This is applicable to learning complex computer skills in the hopes that there will be a benefit such as productivity.

Thatcher and Perrewé (2002) suggested that computer anxiety is a significant correlate to CSE. Computer anxiety (CA) refers to the fears about the implications of computer use, such as making mistakes or losing information. The intention of the present investigation is not to measure computer anxiety, since as Thatcher and Perrewé (2002) suggested, CA is the product of combinations of psychological variables such as neuroticism and locus of control. Rather, the present study will

seek to illustrate the various potential motivators or obstacles of implementation of media casting.

Thatcher and Perrewé (2002) reviewed the literature on self-efficacy and computer self-efficacy to develop a series of hypotheses regarding specific individual traits of CSE and CA. The following hypotheses are of particular interest for the present investigation.

The first hypothesis is intuitively obvious, that is, computer anxiety will have a negative relationship with computer self-efficacy. This is derived from Bandura's (1997) sentiment that learners' beliefs about their capabilities to organize and execute a particular action is inherently linked to their ability to actually execute a particular task (Driscoll, 2005). This investigation will gauge the level of anxiety faculty members feel about implementing or using media-casting, without examining the underlying causes of this anxiety.

The second hypothesis of interest refers to personal innovativeness. Individuals who perceive themselves as innovative will seek out new, mentally, or sensually stimulating experiences (Thatcher & Perrewé, 2002). Innovative individuals, "tend to demonstrate higher levels of self-confidence about performing new tasks or when entering new situations" (Thatcher & Perrewé, 2002 p. 385).

Diffusion Theory of Instructional Technology

Rogers' Theory of Diffusion

Roger's (1995) developed a widely used theory of diffusion, consisting of four distinct parts (Surry & Farquhar, 1997). These parts are: a) Innovative Decision

Process, b) Individual Innovativeness, c) Rate of Adoption, and d) Perceived Attributes.

The Innovative Decision Process proposes that diffusion occurs or 'evolves' over time and can be identified by five distinct phases: a) knowledge, b) persuasion, c) decision, d) implementation, and e) confirmation (Rogers, 1995). The knowledge phase refers to potential adopters' learning about a particular innovation. Persuasion is the phase where the adopter is influenced to implement an innovation based on its merits. Decision refers to the decision to accept and implement a particular innovation. Finally, confirmation is the reaffirmation or rejection of the decision to adopt the innovation. This theory of diffusion is widely cited in instructional technology literature (Sachs, 1993; Surry & Farquhar, 1997).

Individual Innovativeness is similar to the hypothesis discussed previously by Thatcher & Perrewé (2002). That is, it states that individuals who perceive themselves to be innovative will adopt an innovation earlier than those who perceive themselves to be less innovative. This theory defines innovators as those who are risk takers and pioneers who adopt an innovation early in the diffusion process (Surry & Farquhar, 1997). At the opposite end of the spectrum are Laggards, or 'Educational Luddites' who resist adoption of an innovation until later in the diffusion process, if at all. In the present investigation these are the low to no interest group (Surry & Farquhar, 1997). Figure 2 below is derived from Rogers (1995) theorized distribution of innovators and Laggards in the diffusion process.

Figure 2. Distribution of Adopters in Diffusion of Innovations

The Rate of Adoption states that innovations will be implemented in a pattern that resembles an s-shaped curve. It proposes that an innovation goes through a period of slow, gradual growth before a period of relatively rapid growth. Following the rapid growth the rate of adoption eventually stabilizes, before eventually declining. Figure 3 below is an illustration of the pattern of diffusion in this theory. It is derived from Rogers (1995).

Figure 3. Rate of Adoption Theory (Rogers, 1995)

Perceived Attributes, is an apparent match or complement to self-efficacy theory. In this theory, potential adopters evaluate an innovation based on their perceptions of five attributes (Rogers, 1995). These attributes are: a) triability, b) observability, c)

relative advantage, d) complexity, and e) compatibility. In self-efficacy an individual realizes the effort required to produce certain results, and will only attempt this effort if the end result proves to be advantageous (Driscoll, 2005). These elements are present in this theory. Adopters evaluate and perceive that the innovation: a) can be experienced on a trial basis, b) provides observable results, c) is more advantageous to other innovations or the status quo, d) is not (overly) complex, and e) is compatible with existing practices and standards (Surry & Farquhar, 1997).

Instructional Technology Diffusion Theories

Surry and Farquhar (1997) proposed that two major categories of Instructional Technology (IT) related diffusion theories exist. The first is Systemic Change Theories, and the other is Product Utilization Theories. These two categories are based on the philosophical tenets of Determinism and Instrumentalism respectively.

Applications of diffusion theory for instructional technologies can be classified into two major categories (Surry & Farquhar, 1997). The first is a macro theory that focuses on the reform and restructuring of an (educational) institution (Surry & Farquhar, 1997). The goal of this category of diffusion theory is to develop models for organizational change (i.e. school change), where technology will play a significant role. These theories have often been referred to as systemic change theories.

The second category of instructional technology diffusion research focuses on increasing the implementation and utilization of a specific instructional *product* (Surry & Farquhar, 1997). The goal of these theories is to develop a model that will

lead to a more widespread use of a particular instructional technology. These theories are often referred to as Micro-Product Utilization theories (Surry & Farquhar, 1997).

Macro and Micro theories of diffusion of instructional technology can also be classified according to the philosophical tenets of Determinism and Instrumentalism. Technological determinists view technology as an autonomous force that is not controlled by humans. Technology is imposed on institutions and is the cause of change within that institution (Surry & Farquhar, 1997). Determinists perceive the implementation of technological innovations as a series of progressive leaps, not a gradual, evolutionary process. There are two types of determinists. The first can be considered utopian determinists. They believe that technology is a positive progression that will eventually mitigate or eliminate most of the ills that afflict humanity. Utopian determinists believe technology will help society, institutions, and even instruction. The converse of utopian determinism is dystopian determinism. This is the opposite belief that technology is inherently evil, dehumanizing, and detrimental to institutions, society, and even instruction (Surry & Farquhar, 1997).

The other major philosophical belief about technology is instrumentalism. Instrumentalists believe that humans control technological innovations. The premise of this philosophy, as the name implies, is the belief that technology will act as a tool. This tool is largely under human control, and can be used in positive or negative ways depending on the intentions of the user. Instrumentalists are the adopters of technological innovations. These are individuals who focus on the needs and potential benefits of implementation of innovations. Instrumentalists would view implementation as a bottom-up phenomenon where change occurs with the

individual (Surry & Farquhar, 1997). Conversely, determinists are developers of technology. As previously stated, these theories are commonly referred to as systemic theories of diffusion. As a result change and implementation is viewed as a top-down phenomenon where technological innovations are posited onto the individuals within an organization or system (Surry & Farquhar, 1997).

The present investigation will examine implementation from a product (micro) utilization perspective. This is based on the premise of instrumentalism. That is, it will investigate a specific technological innovation, and individuals who will implement this within a particular organization. Since the institution (BCIT) does not have a mandate to force media casting onto its faculty members, the philosophical perspective cannot be from a systemic (macro) deterministic view.

Ely's Perspectives on the Implementation of Educational Technology

Diffusion of instructional technological innovations from a product utilization perspective will occur in distinct phases. Donald Ely's (1990, 1999) eight conditions for the facilitation of implementation of technological innovations is a widely used theory that highlights the conditions for implementation. Ely's main contribution to the literature has been the development of conditions that facilitate implementation (Ensminger, Surry, Porter & Wright, 2004). Ely's conditions for implementation do not focus on barriers; rather they emphasize characteristics that have been identified in successful implementation of innovation in instruction (1999). Ely's conditions for implementation are stated as: a) dissatisfaction with the status quo, b) existence of

knowledge and skills, c) availability of resources, d) availability of time, e) existence of rewards or incentives, f) participation, g) commitment, and h) leadership.

Dissatisfaction with the status quo. Ely suggests that this condition is characterized by an emotion that calls for change (Ely, 1999). This condition is often the driving force for the implementation of new technology in instruction. It is this emotion that resulted in the development of the Duke Digital Initiative (DDI) using iPods for first year course podcasting in the 2004-05 academic years (DDI, 2006). The four main goals of the Duke Digital Initiative were to promote innovative and effective teaching, to use technology to support curriculum enhancements, to expand and develop a technological infrastructure, and to share these experiences with the academic community (DDI, 2006). These goals clearly suggest that change in the status quo was the incentive for developing such a project as the DDI.

Further studies (DiMaria-Ghalili, et al., 2005; Harley et al., 2004; Traphagan, 2006) also suggest the need to make changes to the current pedagogical methods used at other institutions. In all of these studies pervasive themes have been competition and keeping up with current trends.

In much the same way as businesses compete for customers, academic institutions compete for students (Pajo & Wallace, 2001). The development and use of technology seems to be an important consideration to help lure students in (Rowe et al., 2001). Also, developing distance programs using web casting, podcasting, or media casting and internet technologies enables institutions to develop programs that will help expand their reach to potential students who might be tempted to pursue studies elsewhere (DiMaria-Ghalili, et al., 2006; Pajo & Wallace, 2001).

Within the academic literature there is a prevalent theme of envy amongst institutions. This envy is derived from the need for institutions to offer what other institutions offer. These sentiments have been the cause for a lot of institutions to develop podcasting resources, as not to be laggards, rather in an attempt to be adopters. The DDI sparked an interest in using this technology and establishing iPod programs where first year students would receive an iPod as part of their enrollment package (Cebeci & Tekdal, 2006; DDI, 2006; Meng, 2005). Since the Duke project, Purdue University and the University of Missouri have adopted similar programs.

Existence of knowledge and skills. Prerequisite skills are required for faculty and students to use this technology. This can be minimized by information technology departments, instructional innovation and assessment staff (Traphagan, 2005), instructional designers (Cebeci & Tekdal, 2006), or Information and communication technologists (Harley, 2002). All present investigations examining podcasting, or web casting, have relied on technology experts who are not teaching faculty. Faculty members are often reluctant to take advantage of new technologies, and rely on students and Information technology experts (Pajo & Wallace, 2001). Students seem to be the driving force and main consideration for this condition (Spotts, 1999). Faculty members are often times reluctant to embrace innovations that will affect their pedagogical philosophy or will require an adjustment period.

Availability of resources. This refers to the infrastructure required to make the innovation viable. In reference to media casting, this would include hardware, software, and most importantly individuals who are experts in this technology. This condition is controlled by the administration of the institution since availability of

resources is determined by a funding commitment to support this innovation (DiMaria-Ghalili, et al., 2006; Spotts, 1999). Many institutions have made considerable expenditures for the development of media casted materials (DiMaria-Ghalili, et al., 2006; Rowe et al., 2001; Traphagan, 2005). Some institutions have created studios for media cast production (BCIT). Others have furnished classrooms across their campus with cameras and recording devices to capture and distribute lecture content via podcasting (DiMaria-Ghalili, et al., 2006; Rowe et al., 2001; Traphagan, 2006).

Other implementation measures for media casting have been the development of web pages to assist students and faculty with using media casted materials (Traphagan, 2006). These sites provide information regarding access to materials (Harley, 2002; O'Neill, 2007; Rowe et al., 2001). Also, websites provide information regarding the resolution of common technical problems (Traphagan, 2006). These measures often take advantage of current technological infrastructures and require only marginal increases in funding to implement.

Availability of time. Spotts and Bowman (1995) found that fewer than 40% of faculty surveyed at a large U.S. Midwestern university had good to expert knowledge or experience with newer instructional technologies. This statistic emphasizes the main obstacle for implementation of innovation in education, that is, a large percentage of faculty members are unfamiliar with innovations in instruction (Dooley, 1999; Pajo & Wallace, 2001; Rowe et al., 2001). The barrier for implementation is often a result of not providing sufficient professional development

or release time for faculty to adequately learn newer instructional technologies (Ebersole & Vornddam, 2003; Pajo & Wallace, 2001; Wilson et al., 2000).

Rewards or incentives exist. Ely (1999) distinguishes between the meaning of *reward* and *incentive*. A reward is something given for performance. Implementation of innovative technologies could be more consistent if there are rewards associated with implementation. Spotts (1999) suggested that, 'until university promotion and tenure review processes recognize work with instructional technologies in developing materials, there is little immediate benefit or value for faculty members seeking tenure or promotion' (Ely, 1999 p. 97). The crux of this argument is that most universities operate on the notion of incentive, not reward. An incentive, as described by Ely (1999), is something that serves as an expectation of a reward or fear of punishment. The old adage of academia at the university level has been, 'publish or perish'. The inclusion of teaching strategies or use of innovation has never been widely accepted as sole consideration for tenure. It seems paradoxical since considerable funding has been given to implement technology (Spotts, 1999). The perceived value of implementing technology can be measured in student enrollment in courses utilizing technology (Rowe et al., 2001; Traphagan, 2006). Yet, faculty is not given any extrinsic motivation for implementing innovative technologies. Most institutions have implemented workshops and example case studies illustrating the benefits of web casting, attempting to appeal to intrinsic motivators for faculty. (Harley, 2002; Rowe et al., 2001)

Participation. Participation refers to the notion that the shared decision making and communication among all parties involved (Ely, 1999). It is apparent

that all of these conditions are inextricably linked to one another. Participation is closely related to the notion of rejecting the status quo. In order for faculty to embrace innovation and participate in implementation, there has to be some dissatisfaction with current or older innovative technologies. Also, participation could be a result of encouragement from a student body that is more willing to embrace current technological trends. Similarly, implementation could be linked to the previously discussed theme of current trends, where institutions embrace technology to expand courses and programs, also to expand their reach to students in distant areas (Pajo & Wallace, 2001). In all of the above plausible reasons for adoption of innovation, there has to be some unilateral participation from all stakeholders (Traphagan, 2006). Successful implementation is dependent upon the level of satisfaction of all parties involved in the use of this technology.

Commitment. Commitment of innovative technologies is demonstrated in firm and visible endorsement, and continuing support of the innovation (Ely, 1999). Commitment has to come from the 'top' (Harley, 2002; Rogers, 2000; Spotts, 1999). Ensminger et al. (2004) suggested that, 'top-down refers to the involvement of powerbrokers who provide a plan that includes needed resources, support, as well as follow up to ensure the technology is being used correctly' (p. 63). Institutions that do not fully support or champion a cause show faculty that they lack commitment. When these signs are evident to faculty and students it is difficult for anyone to embrace this innovation wholeheartedly.

Leadership. Ely (1999) suggested that leadership is two-pronged. First, there is the leadership or the powerbrokers of the organization. Second, consists of the

leadership of those more closely related to the day-to-day activities of the innovation being implemented. Ensminger et al. (2004) suggested that leadership refers to the level of ownership and support given to those using the innovation from the 'top'. Ensminger et al. (2004) also point out that enthusiasm of leaders affects the motivation of those using the innovation. Ebersole and Vornddam (2003) suggested that support or championing of the innovation by supervisors is a critical variable in the successful implementation of that innovation. This sentiment was mentioned in the foregoing section on commitment.

Another facet of the leadership condition for implementation as described in literature is ownership. Once there is sufficient support and commitment from the organization users of innovation take ownership of projects. This translates into more faculty initiative to use this innovation. As reported by Rowe, Harley, Pletcher, and Lawrence (2001) the increased initiative of faculty members lead to limitations on the number of programs and courses that could implement the web casting innovation. This particular problem would be more welcomed than a situation where utilization was low.

Educational media-casting research

The academic literature has relatively scant offerings on the effective implementation of web casting and podcasting (educational media casting) as an instructional innovation. Most articles refer to pilot projects offered at particular institutions. These studies will be examined, and the common characteristics will be identified and discussed.

Commonalities in media casting literature

There is no single pervasive definition of web casting or educational media casting (podcasting) within the academic literature (Kim, Mims & Holmes, 2006). There also seems to be a common misconception about the extent, scope, and characteristics of this technology. DiMaria-Ghalili, Ostrow and Rodney (2005) defined web casting as the delivery of 'synchronous broadcasting to students in their homes, places of employment, or local libraries using Web-based streaming video and synchronized multimedia presentations' (p. 12). Rowe et al. (2001) also provide a definition of web casting that emphasizes the synchronous nature of multimedia presentations delivered at a distance. Rowe et al. (2001) included the often-perceived characteristic of on-demand. That is, web casting has been defined more in terms of on-demand subscriptions to multimedia files. Thus, files are downloaded and saved on a computer or portable MP3 player. This view is likely derived from the nature of podcasts, which fall under the larger umbrella of web casting (O'Neill, 2007). O'Neill (2007) suggested that a more appropriate terminology for web casting is educational media casting. This term encompasses both synchronous and asynchronous forms of delivery. In the context of distance education, synchronous web casting contravenes the tenets of distance learning - anytime, anywhere (Bates, 2000). Rather, synchronous web casts are more analogous to closed-circuit television or interactive television where learners are required to be somewhere, at sometime. (DiMaria-Ghalili et al., 2005)

Another commonality in the issue related to defining web casting is that many institutions have developed proprietary systems for web casting and pod casting (Harley, Henke & Maher, 2004; Rowe et al., 2001). The Berkeley Internet Broadcasting System (BIBS) is an elaborate system developed for delivering web casting to students at the University of California at Berkeley. The BIBS system offers both live and on-demand web casts. However, as will be mentioned later in this section, the on-demand web casts are predominately used and this might be the cause of many misconceptions about whether web casts are synchronous or asynchronous. For the present paper, the definition of web- cast will refer to both synchronous and asynchronous delivery of multimedia content. Educational media casting and podcasting will refer to on-demand, subscription based delivery of content.

Research findings in media-casting literature

Reluctance to embrace media casting or podcasting is primarily due to the belief that it jeopardizes the integrity of education. Change has always occurred at a slow pace in education (Sugar et al., 2004). Among the most common concerns expressed by faculty is replacement (Rowe et al., 2001; Traphagan, 2006). Many do not view the innovations of technology as tools to improve current methods. These individuals would be deemed technological determinists (Surry & Farquhar, 1997). The main argument against implementation from the replacement campaign is that media casting will replace the need for face-to-face, live lectures. As a result student attendance will plummet. (Traphagan, 2006)

A case study conducted at the University of Texas at Austin on class lecture podcasting (Traphagan, 2006) showed that attendance decreased due to podcasting. In a similar study conducted at the University of California Berkeley (Rowe et al., 2001), the results showed that students are not using web casting to watch lectures remotely. The difference in these two studies might be based on the fact that the Austin study relies primarily on data obtained from the web server, matching time of access to web casts to the time of the lecture. Also, they are taking into consideration the attendance estimates of the professor. The Berkeley data is obtained by follow-up interviews with students in courses where web casting was used.

In both investigations there is a common theme. The use of web casting and podcasting dramatically increased during mid-term and final exam periods (Rowe et al., 2001; Traphagan, 2006). This supports the claim that web casting and podcasting are used as a supplementary learning tool (Rowe et al. 2001). Also, Rowe et al. (2001) found that during these times students accessed web-casted materials from courses in different sections, and courses that were not even presently offered during the current semester. This further supports the view that students viewed podcasts as a resource to supplement their learning.

To assist in reducing the lower attendance figures, Traphagan (2006) offered some suggestions. First, instructors could hold random in class quizzes that would not be available to those students who were not present in class. Second, attendance could be mandatory and would be factored into the student's mark in the course. These two measures are supposed to act as incentives for student attendance. However, these suggestions would be detrimental to implementation of this

innovation. These suggestions would most likely be rejected as they create more work for the instructor.

Based on reviewing the findings in the literature, there are solutions to the attendance problems that would not require more preparation for the instructor. First, instructional designers and instructors should focus on podcasts rather than web casts for courses that have a live lecture component. Therefore, students will not be able to remotely watch lectures. Students who want questions answered by the instructor must attend the live lecture. Second, instructional designers and instructors should design web casts as a summary of the lecture, rather than simply recording the entire lecture. Rowe et al. (2001) showed that students typically did not view the entire web-casted lecture when they accessed it. On average they only watched the first 10 minutes, and skimmed through to view sections of interest. Lastly, instructional designers and instructors should delay the posting of podcasted lectures. If lectures are given twice a week, only post the podcasts once a week after the final lecture is given. Students who are interested in learning will not appreciate playing catch-up on a constant basis.

The above suggestions would ideally work in a traditional setting. In a distance education setting, the issues of attendance are inherently absent. It is likely that distance education is more suited to podcasts where materials are delivered once they are posted, and the materials can be saved and stored on a computer or portable device.

Implementation of web casting and/or podcasting challenges faculty members in two fundamental areas. First, introducing this innovation is more akin to

student-centered learning (Read, 2007).There is an unresolved debate in academic literature which instructional philosophy is more effective: Learner-centered or instructor-centered pedagogical instruction (Smith & Ragan, 2005). Second, implementation exposes the technological literacy of faculty members (Pajo & Wallace, 2001). The latter is expressed throughout diffusion literature on technology. The proportion of 'early adopters' of innovative technologies is considerably low in education (Spotts, 1999). Thus, to overcome this obstacle, training and support mechanisms are required. This, of course, comes at additional cost since most IT departments are presently working at capacity.

Throughout the literature there are pervasive themes that exist as barriers to implementation. Pajo and Wallace (2001) summarized these barriers in the following comment:

> Factors found to be inhibiting widespread implementation included concerns over academic standards, the adverse impact on other academic work (particularly on research and writing), and the absence of adequate support. These are recurring themes that have been identified by researchers in other countries. (Pajo & Wallace, 2001, p. 4)

The advances in technology and the strategies presented within this review address many of the concerns faculty have with embracing web casting or podcasting as a method for delivering content. In each of the articles reviewed the pervasive theme was change of current methods. This changed focused more on individual change of faculty members (i.e. micro instrumentalism). There was never a simplistic interpretation of web casting that views this technology merely as a different delivery mechanism. Content has not changed, grading strategies are not changing, and the presentation of curriculum has not changed. The means by which

this content arrives at the intended audience is where the change occurs. This will enable traditional learning to offer more support for students. This technology affords distance education programs many of the advantages offered in traditional settings, while still adhering to the principle tenet of *anytime, and anywhere.*

Critique of the validity of appropriate theory and research literature

The most significant contribution from the literature that will prove to be useful for this investigation will be theories on computer self-efficacy, and the research results from pilot projects. Self-efficacy explains and predicts the expectations of implementation based on perceived worth and capabilities by the users (i.e. faculty members). Self-efficacy theory has been applied in diverse applications and is a valuable paradigm for this investigation to construct a model about implementation of media casting. Due to the diverse application of self-efficacy theory it is safe to assume that this theory is widely regarded as valid, and can be applied to this current study.

Diffusion theories provide a sequence of the implementation and acceptance of innovations. Roger's theory of diffusion is widely regarded as the most accepted theory of diffusion. However, there is not a single, unifying theory of diffusion. This has been a limiting factor in other similar studies (Ely, 1999; Ensminger et al., 2004). Particular institutions or technological innovations are examined in a vacuum and are rarely compared to other similar investigations. This might be due to the infancy of the technologies being investigated or it might be a

result of the diversity of technologies, which are unable to be compared in a meaningful way.

The present investigation has sufficient research literature to derive a model regarding the implementation of media casting. Historical theories of self-efficacy and diffusion will provide a solid framework to build upon. The relationship between self-efficacy and diffusion theory is well documented in the literature, and this investigation will measure the significance of this relationship in terms of institutionalizing media casting.

Summary of literature review

This literature review illustrates the need to investigate educational media casting, as well as attempt to provide a model for implementation of this innovation. The literature review was restricted to predominant theories of diffusion and self-efficacy that could readily be applied to the current investigation. The theories of computer self-efficacy are essential since they highlight the correlation between beliefs, motivation, and expectations. This will be a main consideration in the present investigation. If CA is found to be high in particular faculty members, the expectation based on the research literature, will predict that these members will be more reluctant to embrace this instructional strategy. Conversely, if CSE is found to be high amongst particular individuals, it is anticipated that these individuals would be early adopters, or would indicate a profound interest in implementation of educational media casting.

The diffusion theories discussed provide a benchmark for the various stages of implementation. Fortunately, the existence of educational media casting, web casting, or podcasting is relatively new. The initiative at the institution used in this study is progressive and they have adapted many of the strategies mentioned in the academic literature. This will provide a review of effective diffusion theory application.

Finally, the relevant research literature illustrated an interesting point to consider in this investigation, that is, the impact on attendance is a contentious issue. One study saw media casting as a pernicious instructional tool that has caused decline in face-to-face lectures. Conversely, another study suggested that web-casted (vodcast or podcast) lectures served as supplementary resources that were accessed more during midterm and final examination periods.

The issues raised in the literature review have helped to direct the research questions for this investigation. The motivational issues related to self-efficacy and perceived value, along with the highlighted strategies for implementation will allow this researcher to derive a model for the effective implementation of media casting as an instructional tool in distance education.

CHAPTER III
METHODOLOGY

Purpose

It is evident from the various studies on podcasting (educational media casting), and diffusion of innovations, that certain aspects of implementation are required for successful diffusion of this technology. The primary purpose of this investigation is to highlight the obstacles, potential barriers, and incentives that affect an educator's decision to incorporate this technology into their instructional practice.

Research Methods

This study was conducted using a mixed methods design to investigate the factors affecting implementation of media casting in distance education. A mixed methods model refers to the integration of qualitative and quantitative methods within a single study. Mixed methods research tends to base knowledge claims on pragmatic grounds (Creswell, 2003). This investigation examined the use and perception of educational media casting (podcasting) amongst *BCIT* faculty. It could potentially help the organization make a decision regarding the permanent implementation of educational media casting as a resource for their programs.

Quantitative methods were enriched by the open-ended responses provided by respondents in the qualitative data collection portion. This coupling provided a better overall understanding of the factors affecting implementation at *BCIT*.

Multiple perspectives of an issue can provide a more accurate representation of factors affecting a particular problem. The adage, 'the whole is greater than the sum of its parts', is evident in mixed methods research design. In quantitative

research the researcher strives to deconstruct problems into isolated variables that can be examined and analyzed. In qualitative research, the investigator examines problems more holistically.

The balance or integration between qualitative and quantitative methodology helps to focus the research questions. The strengths and weaknesses of each approach complement each other and inadequacies of particular methods are minimized (Jaeger, 1997). Issues involving internal validity can be realized and addressed more easily in a mixed methods investigation (Jaeger, 1997). However, in order for a mixed methods approach to be effective, constant evaluation of the approach needs to be done.

Type of Mixed Methods Design

The research design used for this investigation was the sequential explanatory strategy. This strategy is characterized by the collection and analysis of quantitative data followed by the collection and analysis of qualitative data (Creswell, 2003). This strategy was selected since the emphasis of quantitative data precedes the collection and analysis of qualitative data. A similar strategy for the analysis of technology and instruction was followed in the Duke University study (DDI, 2006), Rowe et. al.'s (2001) investigation on the Berkeley Internet Broadcast System, Traphagan's (2006) examination of the lecture podcasting system at the University of Texas at Austin, and also in an investigation at the University of Washington (Lane & Yamashiro, 2005). In each of these investigations quantitative data was collected to examine the level of experience participants had with

technology, as well as their habitual use of technology for learning. This data helped to establish a plan for the development of podcasts (DDI, 2006).

Model and Procedures of the Study

Although quantitative and qualitative data can be collected concurrently in a mixed methods research design (Creswell, 2003), the present study attempted to separate the collection of quantitative data from the collection of qualitative data. This was determined by the access the researcher had to subjects for this investigation.

The sequential explanatory design provided an opportunity to collect quantitative data from an online survey (Appendix A & B) regarding computer or technological efficacy of users. This provided the researcher with an analysis of a variable (i.e. computer self-efficacy) that serves as a factor for implementation. The follow-up qualitative measures provided a richer picture of the meaning and interpretation of the relationship between this quantitative variable and other, qualitatively measured variables.

Research Instruments

The primary instrument used in this investigation was derived from an early work examining the computer self-efficacy of individuals (Compeau & Higgins, 1995). The instrument (Appendix A) consisted of ten questions, each having a ten-point scale. Higher scores on the scale suggest higher self-efficacy. This scale measures an individual's perceived comfort level with using a computer application.

For the purpose of this investigation, the wording was changed to reflect the creation of an educational media cast.

The first part of the online survey (Appendix B) consisted of more demographic questions that would help to separate groups of individuals for comparison purposes. These questions would enable the researcher to make comparisons based on gender, age, and years of teaching experience. None of these were primary research questions. However, there is an obvious basis for comparison amongst these groups. In the end most of these questions served more as a description of the participant population rather than a means for comparison, with the exception of questions pertaining to interest and use of educational media casting.

The qualitative instrument (Appendix C) was a series of questions that were derived from similar investigations. The questions were posed to respondents during a telephone interview. The questions presented in Appendix C served only as a guideline to direct the discussion or focus the intention of the conversation with the investigator.

Research Procedures

The present investigation used a survey measuring the self-efficacy of using media-casting technologies, interest in educational media casting, instructional experience, and the use of other related educational technologies. The survey was sent to respondents electronically so that analysis and collection of data could be organized. This instrument was derived from Compeau & Higgins' (1995) measure for computer self-efficacy (CSE) (Appendix A). The survey provided quantitative

data for the present investigation. It enabled the respondents to be grouped based on their media-casting experience and interest. The intention is to identify characteristics or predictors for implementation in three distinct interest groups: High Interest, Medium / Moderate Interest, and Low / No Interest.

There was a semi-structured, follow-up interview (Appendix C) with roughly half of the respondents willing to participate in the interview. The intention was to have 4 or 5 individuals from each of three interest groups: High Interest, Medium / Moderate Interest, and Low / No Interest. This would have provided the researcher with a richer picture of the issues and characteristics identified in the quantitative investigation. However, the actual numbers that completed the survey failed to fulfill the expected number of interviewees. The respondent statistics and results will be addressed later in the presentation of statistical analysis.

The instrument used for the present study was a survey (Appendix A), followed by an interview of predefined questions based on results of the survey, and questions stemming from other similar investigations (Appendix C). The survey was designed such that it could be broken into distinct pieces of data. First, there was a survey of demographic information from respondents. The second portion of the survey focused on instructional experience, and area of content expertise. The third section sought to find out more about the technological experience and interest in using educational technology of faculty members. The final section aimed at learning about the level of interest in educational media casting, and the perceived level of technological comfort faculty members had with using technologies such as those involved with educational media casting. This section is based on the 10 factors

associated with computer self-efficacy identified by Compeau and Higgins (1995). The design was based on a similar, earlier study conducted by Traphagan (2006).

Qualitative data for this investigation was obtained from telephone interviews. A random sample of individuals who had completed the online survey and consented to a telephone interview was conducted. Respondents were contacted using *Skype*, a Voice over Internet Protocol (VoIP) software tool that allows individuals to make telephone calls through the internet. Responses from the interviews were captured using *Garage Band*. Recording software for the Macintosh computer. These recordings were transcribed into a Word document.

Research Sample and Recruitment

All faculty members of BCIT were eligible for participation in this investigation. Since educational media casting by definition is an e-learning technology, any faculty member interested in this technology for instructional purposes, or any who had an opinion to offer, was eligible for participation. There was a preliminary canvas for strictly e-learning faculty members. However, the initial response rate was extremely low. This was mainly due to the fact that many of the strictly e-learning faculty members have limited contact with BCIT during periods when they are not teaching. This made it difficult to solicit enough participants for this research investigation.

With the assistance of the Learning and Teaching Centre posters were placed strategically around the various campuses to solicit respondents for this investigation, and a similar investigation being conducted by the Learning and

Teaching Centre. To entice faculty to participate, the Learning and Teaching Centre held a draw for an iPod. Faculty members completed an online survey. One of the questions asked was about their willingness to participate in a telephone interview. If the individuals consented, they included their contact information. Consenting individuals were first contacted by email to schedule a suitable time for a telephone interview by the researcher.

Data Collection

Quantitative Data Collection

Quantitative data for the present investigation was obtained from an online survey. An online license for a survey tool (*QuestionPro*) was purchased to distribute and collect the results of completed surveys. The survey consisted of some basic demographic (open-ended) questions. However, the survey consisted of mainly ordinal scale questions, or Likert scale questions, where respondents rated several variables. These variables were emphasized and highlighted in similar investigations found in the academic literature.

In addition to the above questions, a scale derived from the earlier work of Compeau and Higgins (1995) was incorporated into the survey (See Appendix A). The scale was based on rating the proficiency or comfort individuals had on creating a media cast presentation with varying levels of support. Each question was based on a ten-point scale. There were ten questions in total. A higher score suggested higher computer self-efficacy or more comfort using educational media casting technology. Conversely, a lower score suggested a lower level of computer self-efficacy.

Qualitative Data Collection

Qualitative data was collected from respondents whom indicated on the online survey that they were willing to participate in a telephone interview. There were 64 respondents to the online survey. Roughly half of these individuals consented to the telephone interview. A sample of thirteen individuals was taken from those that consented to the interview. Although some had consented, some did not provide information for the researcher on where to contact them for participation. As a result these individuals were not considered for participation. The sample was designed to have individuals from the three groups; high interest, medium / moderate interest, and low / no interest. In the end, due to scheduling conflicts nine individuals completed the interview portion of this data collection.

Data Analysis and Validity Procedures

Analysis of Quantitative Data

Survey respondents were classified as High Interest (i.e. those who have implemented media casting), Medium / Moderate Interest (i.e. those who have not implemented media casting, but are interested in the potential uses), or Low / No Interest (i.e. those who have no interest in implementing media casting). The instrument aimed to group individuals into one of the above classifications. A cluster analysis was then conducted from the responses provided by individuals within each of the assigned groups. The intent was to isolate the specific variables or barriers that were predominant between each interest group for comparison purposes.

A cluster analysis is a method that measures the extent or magnitude of similarity of a particular variable (Field, 2005). The cluster analysis statistic works on the premise of Euclidean distance. Therefore, responses that are a shorter 'distance' from one another are more similar. Thus, the statistic provides an analysis of clusters around specific variables to measure the significance of responses, or similarity of responses. The array of similarities is arranged in a linkage diagram, called a dendrogram. The dendrogram clusters the responses based on similarity. Thus, in each of the groups (high interest, medium / moderate interest, and no / low interest) the responses to each variable will be clustered according to similarity. It is hypothesized that within each group there will be similarities that are innately different. This will allow for generalizations within the groups selected by the researcher.

The results of the cluster analysis, however, did not provide the fidelity required to make a significant analysis. Therefore, in order to highlight the contribution of individual variables to the overall sentiment derived from the quantitative instrument, a follow up PLUM ordinal regression analysis was then conducted. The variables in the survey were measured using a Likert (ordinal) scale. These responses served as the data to be analyzed for this investigation. The ordinal regression analysis is used with ordinal dependent (response) variables, where the independent variables may be categorical factors or continuous covariates. Performing a PLUM regression analysis provided greater sensitivity to the ordinal variables emphasized by the three interest groups in this investigation.

A test of parallel lines can be derived from the PLUM ordinal regression analysis to determine if there is any significance amongst the variables between groups. If the test of parallel lines does not determine that there is any difference amongst groups, and the variables are influencing the groups equally, the lines will remain parallel. In this situation another statistical test measuring each variable's contribution to the overall results individually can be employed. This is Spearman's Rho. For the present investigation Spearman's Rho was used because the test of parallel lines suggested that there was no difference amongst the interest groups. The null hypothesis was accepted.

Validity Procedures for Quantitative Data

The preliminary statistical procedure selected for this investigation, a cluster analysis, suggested that a more sensitive test (PLUM ordinal regression analysis) was required to extract a meaningful result. The subsequent test emphasized the results of the cluster analysis suggesting that more research in this area would be required to provide a more meaningful result, or to highlight underlying variables that might contribute to the results obtained. To attempt to isolate variables that were causing the greatest contribution to the overall results (i.e., the use of educational media casting), a Spearman's Rho test was performed to measure the significance of the individual variables. Again, a similar result was obtained.

Analysis of Qualitative Data

Qualitative data for the present investigation resulted from telephone interviews with a random sample of participants who consented following the completion of an online survey. Data was collected using Skype (VoIP) and recorded using Garage Band. The entire conversations were transcribed into a Word document. The investigator read the transcripts over and highlighted key words or phrases that most closely resembled definitions found within academic literature. Since there is the potential for synonyms in responses, the investigator had to make decisions on where responses were best categorized when coding. The results obtained for the present investigation would be mitigated with an additional reviewer. This is the limitation in only using a qualitative method.

The results of the coding were analyzed using simple summary statistical procedures such as proportions and frequencies of responses. The intent was to confirm the results of the earlier quantitative measures, and to highlight in greater fidelity the specific issues faculty members had with implementing media casting as an instructional tool. There were not a sufficient number of respondents to conduct more meaningful statistical analysis such as correlation coefficients measuring similarities between the interest groups.

Reliability Procedures for Qualitative Data

The reliability procedure used for this section was a relatively simple check to see how well the results confirmed the results of the quantitative instrument. Since a single individual was responsible for the interpretation of the open coding, it was

impossible to test inter-rater reliability. In studies with more than one investigator a Cohen's Kappa test for inter-rater reliability is employed. This was not an option for this investigation. Fortunately, the results of the qualitative analysis confirmed, or mirrored the results obtained from the quantitative portion of this investigation. This in itself helped to validate the methodology of the current investigation.

Summary

The purpose of this investigation is to highlight some of the factors responsible for the limited use of a particular technological innovation in distance learning. Educational media casting is potentially a beneficial tool that would provide distance learning more powerful instructional tools, while still adhering to the principles of distance learning. Media casting is inherently related to ubiquitous learning or mobile learning. While these technologies are still not widely accepted, investigation as to why there is a reluctance to adopt such technologies is needed. Many studies have found evidence to support the notion that self-efficacy and adoption of innovations are correlated (Compeau & Higgins, 1995). The literature in the area of implementation or diffusion commonly suggests that further research is needed to explore the relationship between self-efficacy and the use of technology in instruction (Surry & Farquhar, 1997).

CHAPTER IV
RESULTS

Introduction of Results

The results of the present investigation supported many of the anticipated results. The first step was to obtain data and perform a cluster analysis to identify the variables that appeared to be prevalent amongst three interest groups. Unfortunately, the results of the cluster analysis did not sufficiently differentiate the responses of the three interest groups. Therefore, a more complex statistical procedure, a PLUM ordinal regression analysis, was employed to help increase the fidelity of the statistical analysis. This analysis proved to highlight the main finding from the cluster analysis, but it also highlighted the contribution of individual variables to the overall dependent variable of educational media casting use. These results, along with the results of the qualitative analysis will be presented in the following sections.

Instruments

The quantitative instrument was a simple survey consisting of 32 questions, representing potentially 83 variables. However, this is misleading since, for the PLUM ordinal regression analysis, each response option is considered a variable. For example, rating something on a 5-point scale represents five distinct variables, not a single variable.

The survey could be broken into distinct parts. The first part of the survey was designed to collect demographic data regarding the school which the faculty member was affiliated with, as well as their age, gender, and years of experience as an instructor. The intention was to provide a description of the participants in this

investigation. The results from this portion were not used to group faculty members for comparison purposes in the analysis of the research questions.

The second portion of the survey was designed to investigate the familiarity faculty members had with various types of technologies. Also, to survey the types of educational technologies currently employed by these members. In addition to examining the various types of technologies that these members used, this section also asked questions regarding the use of podcasts, and their interest in educational media casting as an instructional tool. Questions related to perceived value of educational media casting were also given during this section of the survey.

The final section focused mainly on perceived level of support at *BCIT*, and perceived computer self-efficacy of faculty members. These two issues are inherently linked since many of the questions on the computer self-efficacy scale are related to using technology with varying degrees of support.

With the exception of the computer self-efficacy scale, the survey was designed to limit the responses to values between 1 and 5 in a Likert scale-type design. There are two reasons for this. First, it would make the subsequent cluster analysis easier to interpret if there were standardized values for the 83 variables in the survey. Second, the survey program was limited in the ability to offer more flexible response options.

The qualitative instrument was a series of questions aimed at finding a common theme that might suggest potential barriers for implementation. The questions were designed to gain an understanding of the level of knowledge about educational media casting, as well as determine the level of interest in educational

media casting. Faculty members were also asked to put forth suggestions that might help to encourage their peers to implement this technology. These suggestions proved to be valuable feedback that might help to develop services for effective implementation of this technology.

Participants

The survey achieved a 60% completion rate, with 64 individual faculty members completing the online survey. Nineteen surveys were incomplete or missing data for the CSE scale and were not included for analysis purposes. Therefore, the analysis involving CSE measures is comprised of only 45 respondents. Respondents were categorized into interest groups based on how they answered questions pertaining to interest and use of educational media casting. These questions were posed to the respondents in the first part of the survey.

The highest number of respondents came from the Health Sciences (26%). The survey was predominantly completed by full-time faculty members (over 78%). There were more surveys completed by male faculty members (64%) than female faculty (36%), and the average age of all respondents was 41.

In total, about half of the participants in the survey (30) consented to a telephone interview. Upon contacting those individuals the number dropped to 13 individuals who were willing to take time to answer questions in an interview format. Due to some logistical errors and scheduling conflicts, 9 individuals fully participated in the interview. There were 5 male interviewees and 4 female

interviewees. A representative of each of the schools at BCIT was interviewed in this sample.

Descriptive Statistics

This section will present the descriptive statistics that were used in the further analysis of this research to provide a more defined description of the participants and the results from the survey.

Much of the academic literature, and the intuitive nature of people, suggest that younger faculty members are more likely going to be early adopters of new instructional technologies. As stated above, the average age of faculty members surveyed was 41 years, with a range between 39 years of age and 64 years of age. Figure 4 below shows the proportion of individuals who fall into the various instructional experience categories. Based on years of experience teaching.

Figure 4. Proportion of faculty members in various teaching experience (years) categories

Creativity is a variable that is difficult to measure. However, similar research in the diffusion of technology suggested that the creativity of individuals would be a determining factor in the implementation of technology for instruction (Dooley, 1999). To overcome the inherent obstacles of measuring creativity, the survey contained a question where faculty members indicated their perceived level of creativity. The results of this question produced the following outcome, and are displayed in Figure 5 below.

Figure 5. Faculty responses to perceived level of creativity question from survey

From those interviewed 18% are currently using educational media casting, 9% have used educational media casting in the past (but are not currently using it),

46% are interested in using this technology for their instruction, and 27% are not interested.

Another variable that would likely be a contributing factor to implementation of educational media casting is the familiarity or use of other technologies. It is unlikely that individuals who do not currently employ other technologies would use something as novel as educational media casting. The statistics for the use of instructional technologies is presented in Figure 6 below.

Figure 6. Frequency of technological tools being used for instructional purposes by BCIT faculty

Results from the Computer Self-Efficacy Scale

It was believed in the onset of this investigation that unfamiliar technology would be the largest obstacle to overcome in the institutionalization of educational media casting. To affirm or challenge this notion, a measure of an individual's

perceived comfort level with the technology required to create a media cast was given. The instrument asked 10 questions, using a 10-point rating system. The questions aimed to learn about comfort level, and how much support would be required to create a media cast presentation. The higher the score, the higher the individuals comfort with technology. This would suggest that these individuals would require little support, and were willing to attempt using this technology for instructional purposes.

The mean score on the computer self-efficacy scale for all respondents was 61 out of 100. The range in values was 71 (Low 10 to High 81). This suggests that there is a wide range of comfort levels with technology, but on average most faculty members are above average in their perceived level of comfort. The average results for each question on the computer self-efficacy scale are presented in table 1 below.

Table 1. Mean score from computer self-efficacy scale for all survey respondents.

I could create an educational media cast:	High Interest Group (N = 14)	Medium / Moderate Interest Group (N = 20)	Low / No Interest Group (N = 11)	Overall Mean
... if there was no one around to tell me what to do as I go.	2.8	4.14	4.19	3.53
... if I had never used media casting software before.	3.15	4.4	3.91	3.72
... if I had only the software manuals for reference.	4.8	4.94	4.8	4.41
... if I had seen someone else do it before trying it myself.	6.05	6.27	5.1	5.89
... if I could call someone for help if I got stuck.	6.85	6.8	6.1	6.64
... if someone else had helped me get started.	7.1	7.14	6.5	6.96
... if I had a lot of time to complete the presentation.	7.5	7.54	7	7.4
... if I had a help facility (online help database) for assistance.	5.95	6.2	6.1	6.09
... if someone showed me how to do it first.	7.75	8	7.1	7.68
... if I had used similar software before to create other presentations.	7.7	7.7	7.2	7.62

Note. The maximum value to rate each of the individual categories is 10. The minimum value is 1.

Table 2 below summarizes the single factor Analysis of Variance comparing the three interest groups in this investigation. It is clear from these results that the null hypothesis should be accepted. This suggests that there is no statistical significance in CSE scores amongst the respondents in the three interest groups outlined in this investigation.

Table 2. Single Factor Analysis of Variance Results Comparing Interest Groups

Quantitative Statistical Results

Cluster analysis

The quantitative component of this investigation contained the survey discussed in the foregoing sections of this thesis. The original intention was to analyse the quantitative variables using a cluster analysis that would produce a hierarchical dendogram. The hierarchical dendogram categorizes responses based on similarity. Responses that are more closely related would produce a cluster. For the present investigation the clusters would represent influence factors identified by faculty in the survey. It was hypothesized that the three interest groups: High

Interest, Medium / Moderate Interest, and Low / No Interest would have unique 'clusters' based on their interest level. Averages of the ordinal variables from the survey amongst the three interest groups are presented in Figure 7 below.

Figure 7. Comparison of means of ordinal variables amongst the three interest groups

Figure 7 above highlights the discrepancies, or lack of discrepancies amongst High Interest (Series 1), Medium / Moderate Interest (Series 2), and Low / No Interest (Series 3). It is evident from visual inspection that there are no distinct clusters arising from the survey. There are some more significant differences amongst the ordinal variables of support, and time as mentioned in the foregoing.

Time and use of podcasting (experience) are the most critical variables for implementation of educational media casting. For the purpose of this investigation faculty members were asked an open-ended question regarding how much additional time they would expend to implement this technology. The average amount of time faculty was willing to add to their normal preparation of course material was 6%. This amount suggests that faculty members are not willing to incorporate a technology that is time consuming or difficult to use.

PLUM analysis

Since the cluster analysis did not produce a significant response, a second quantitative statistical measure was employed. A PLUM (**P**o**l**ytomous **U**niversal **M**odel) ordinal regression procedure was used to examine the relationship between variables in the survey. The PLUM ordinal regression enables the researcher to identify the significance of individual variables contributing to the overall result obtained. The parallel lines test obtained from the PLUM analysis (Table 3) suggests that there is no significant difference amongst the variables analyzed. Similar to the ANOVA result obtained above.

Table 3. PLUM Ordinal Regression results indicating lines are parallel, thus the null hypothesis must be accepted.

It is evident from both the ANOVA and the Test of Parallel Lines that the comfort level with using technology such as educational media casting is not the factor responsible for the current rate of adoption. Other factors such as pedagogical philosophy, and perceived value of educational media casting might be more plausible explanations.

Qualitative Statistical Results

Analysis of the Interviews

The qualitative results provide a richer picture of the issues related to implementation and adoption of educational media casting. There were 9 completed interviews for the analysis of qualitative data. There was at least one representative from each of the schools at BCIT who completed the interview.

The interview questions were designed to emphasize points made in the academic literature regarding the successful implementation or diffusion of instructional technologies (Ely 1990, 1999). The first barrier to adoption is typically the misunderstanding of what a technology is, or what it can do for instructional purposes. Educational media casting is clouded with many definitions and misconceptions based on the misnomer or association with the iPod. Faculty members were asked to define educational media casting (a term for podcasting derived at BCIT). The responses were recorded and coded. Respondents' definitions were classified based on the criteria for three different groups; technical, non-technical, and inaccurate or wrong. There was also a group for no definition, or no reasonable attempt at providing a definition.

The technical definition involved mentioning one or more correct technical aspects of an educational media cast presentation or file. First, it is subscription based. It involves either audio, and/or audio visual files delivered over the internet. The process is asynchronous (versus a synchronous webcast), and uses MP3 and/or MP4 file formats. If mention of an RSS feed was provided the definition automatically received 'technical' status.

The non-technical definitions were essentially correct without mentioning specific technical terminology. The concept of media casting was essentially provided. That is, it is a subscription based mechanism of file delivery where various forms of audio and/or audio visual files can be distributed online. An excerpt from an interview transcript is provided below. This individual provided a non-technical definition of educational media casting, describing it as: 'A combination of voice and other multimedia that is uploaded to a server, and is …um, people can subscribe to on a regular basis through iTunes U'. Another stated: 'One thing about podcasting is um, I want, I want to refrain from being a talking head, you know?' This statement suggests the individual sees limitations with this technology. Perhaps from not being familiar with a correct definition or potential uses.

The above definition did not explicitly state the file formats or the use of an RSS feed. It was a very detailed, and correct definition suggesting that the individual had a better than average understanding of what educational media casting entailed.

About one third of those interviewed provided an incorrect definition of educational media casting. Their incorrect definition typically came from the

misconception that educational media casting required an *Apple iPod* in order for this technology to be used, and in order for it to function properly.

The summary statistics for the definition of educational media casting is provided in Figure 8 below. These results suggest that most of the faculty members interviewed had a better than average definition of educational media casting. It is anticipated that participation in this investigation was likely a result of faculty understanding this technology, or wanting to learn more about it through participating.

Figure 8. Proportion of definitions of educational media casting provided during open-ended interview.

Philosophy of Instruction

Another consideration from the academic literature was based on the premise that certain technologies are not implemented due to the pedagogical philosophy of the instructor (Lane & Yamashiro, 2006). If a technology affects the normal

instructional style or design that an instructor has become accustomed to, than they are more unlikely to adopt this technology. Educational media casting would appear to be a tool designed for lecturer-centered instruction. However, within the academic literature there are many creative suggestions that would enable this technology to be used effectively in a learner-centered setting also. Faculty members were asked to define their instructional philosophy, or describe their method of instruction. None of the respondents named a specific pedagogical philosophy or tenet by name. They merely reflected on specific characteristics of their personal style.

Figure 9. Personal description of instructional philosophy

There were several incidents reported in the coding of the responses to this question. Several instructors said that they used various teaching methods and styles based on the subject matter that they teach. This is a technical institution, so many of these courses and instructors employ experiential learning methods through labs and

problem-based or case-based activities. There were also a large number of instructors who suggested that they used independent learning exercises where students were self-taught.

Bases on their responses, the researcher placed the interviewees into one of the four categories listed in Figure 9. In some cases the placement was fairly obvious. For example, one respondent stated, 'It would be a cross between social constructiveness theories of learning, which would be one, as well as there's research in expert performance. What it looks like is there's no lecture that lasts more than 20 minutes'. Yet, another respondent stated: 'I am very much about personal growth. I think that you are learning should enable you to develop awareness and knowledge. When it comes to teaching I want to always to be able provide a learning environment that offers students room for personal growth. That's what we do here at BCIT. We seek personal growth in students'.

Only one respondent broached the subject of distance education when discussing philosophical perspectives and using this technology. He stated:

> 'I think that distance education is difficult at the best of times and if you want to put in podcasting, you know, I think the intent is to give the students a feeling like they're actually with an instructor and I want to make that in such a way that they just don't feel like there's a talking head presenting from, you know, I've always thought that the best type of distance education, podcasting or, videostreaming and stuff, actually simulates a classroom environment'.

The above comment implies that this technology is intended to act, yet again, as a means to make distance learning more closely related to traditional learning.

Specific Considerations for Implementation

Faculty members were asked, 'What considerations towards students do you make when implementing technology?' The most predominant response was accessibility, but the respondents also talked about language barriers, learning styles, and diversity of the student population. If students cannot access content like podcasts, than the instructors felt that there is no point in implementing this technology. The results of this question are presented in Figure 10 below.

Figure 10. Frequency of incidents of issues related to students that affect decisions to implement technology

The above results show that BCIT faculty members do place a lot of consideration toward students when making decisions about the use of technology. There is concern for accessibility, benefits to learning, learning styles, and even the technological abilities of students. The one issue that is missing from these responses

is the consideration of value. It is one thing for faculty members to consider the benefits, but this is the benefit the instructor holds. This does not reflect the benefits, or values that students place on educational media casting.

Ely (1990 & 1999) and Rogers (1995) suggested that implementation and diffusion would be successful if there were appropriate support measures. Much of the emphasis for support refers to administration supporting implementations of technology through financial support. This is not realistically the final phase in support that is required for the successful implementation of technology. There needs to be technical support, instructional (design) support, and support for faculty members who are using or want to use educational media casting. Support does not stop with financial backing. The perceived level of support faculty members feel is important. Faculty members are unlikely to undertake implementation of something new if they will not receive assistance when problems or technical issues arise.

When asked to identify where support was found at *BCIT* for the implementation of technologies such as educational media casting, 66% said that individual support was possible through the Learning and Teaching Centre. Faculty members also suggested that they received support from their affiliated school (17%), and their department (17%). No respondent felt that they received direct support from the institution (*BCIT*).

These results suggest that services offered by the Learning and Teaching Centre are essential for the successful implementation of instructional technologies. Faculty members seek assistance from the LTC on a regular basis for instructional

technology related matters. Faculty were asked to rate the level of support that they received from the LTC. The results are presented in Figure 11 below.

Figure 11. Perceived level of support or rating of support services at BCIT

The level of support is broad and ranging. This is dependent upon the individual expectations of what the role of the Learning and Teaching Centre has. Some faculty might have higher expectations of this department, and when these are not met (because they do not fit the purpose of the LTC) than the level of support might be deemed bad, or insufficient. The 'bad' reviews here were based on the availability of people and the time it took to see someone who could help. It had nothing to do with the type of support or quality. These 'bad' reviews could be alleviated if there were more personnel to help faculty.

The qualitative results provided a clearer picture about the personal beliefs faculty members had regarding educational media casting. The interview was designed to highlight some of the issues that similar investigations of podcasting had identified. The results suggest that faculty at *BCIT* are well aware of educational

media casting, and the possible uses of this technology. Faculty members have considered several variables when making decisions about using technologies. The one factor that has yet to be considered is the value students have for various technologies like educational media casting. Finally, *BCIT* faculty members feel that there are some support mechanisms to assist them in implementing educational media casting. However, based on the responses, this support is largely individual, and would only come from an individual interest in wanting to pursue the use of this technology for educational purposes.

Identified Barriers to Implementation

During the interview portion of data collection several issues were raised that had not been mentioned in the literature, or had not been an issue that was researched in any great detail. In most research investigations the barriers to adoption and the characteristics of successful diffusion had been examined, compared, and contrasted. Individuals were not explicitly asked what they thought the barriers to adoption might be.

One of the purposes of conducting an interview was to gain a more descriptive analysis of the issues related to implementation of educational media casting. The survey instrument designed for the quantitative analysis portion would not provide finer details. It merely provided an opportunity for respondents to pick the 'best' choice that described their perceived beliefs or feelings. When faculty members were asked a more open question about the barriers of implementing

educational media casting, the responses were wide and varying. The results are presented below in Figure 12.

Figure 12. Identified barriers to implementation of educational media casting

The most obvious barrier is time. This was a barrier identified in the quantitative portion of this investigation. In the interviews it became apparent that time does not merely mean the preparation time of content that will be delivered. Faculty members seemed to be more concerned about the preparation time to setup the equipment required for educational media casting. If there is little time before a scheduled lecture to get the equipment setup and working properly for recording the lectures, than faculty are more likely to abandon the use of this technology.

This is an issue with a lot of different technologies, not just educational media casting. In many institutions, as with BCIT, there are relatively few classrooms equipped with these technologies. Getting to a lecture on time is a particular challenge for a lot of faculty members. Adding the preparation time that it

would take to setup the software, and recording devices makes the process more challenging. Faculty members also mentioned the fact that they rely on previous lectures in the same classroom to finish on time. This also adds to the dilemma and pressure to get the class or lecture started.

It is due to the reasons such as those mentioned above, that Loftus and O'Neill (2008) suggested that the best practice for educational media casting is not to capture the entire lecture. Educational media casting can be more effective for students and faculty if it is done as a supplement to lecture materials, not a recapitulation of a lecture in a digital format. Again, this is what students wanted or valued, and faculty need to be aware of what students want, as well as the best practices for using various educational technologies.

Technological comfort is again another barrier that faculty members mentioned in the interviews, but was not a major barrier reported in the survey results. Most faculty members interviewed felt comfortable with using technology personally. However, when discussing the abilities or comfort level of colleagues they felt that many were not comfortable with using technology, or were not confident enough to use the technology required for educational media casting.

Personal interest and awareness of various technologies or the capabilities of various technologies is a paired relationship. If an individual is not interested in using educational media casting, they are unlikely to seek out various uses of this technology. They are also unlikely to seek out new forms of technologies that could be employed in their instructional practice.

Support has been a major crux of implementation of any novel technology. This is a difficult issue to address. Everyone has different expectations on the level of support that they should receive. Still others find different forms of support sufficient, while others require more handheld service. The main issue that faculty members had with the support services at BCIT is awareness of what services are being offered. This could be training or faculty development sessions, or it could mean what the LTC would do for the development of educational media casts. There was confusion as to the extent of support services. For example, will the LTC build learning objects for faculty? Or is the LTC there to guide faculty in the development of learning objects? These are questions that faculty members still do not have the explicit answers to, regardless of any information available on the LTC's website. Some of those interviewed did even know that such a website existed.

The last barrier highlights some misconceptions of educational media casting at BCIT, as well as the services provided. That is, cost. For faculty members at BCIT there is no cost in developing an educational media cast presentation. The LTC does provide faculty members with all of the required materials to create an educational media cast. The distribution is done through an agreement with iTunes U. The capture and recording of content to be delivered is done with very inexpensive software, and in some cases free, open-source software such as *Audacity*. *Audacity* is the free open-source software used by Duke University to create audio podcasts.

The cost barrier shows that some faculty members are not aware of what services are offered by the LTC. They are also under the assumption that educational

media casting requires some specific hardware and software like an Apple, iPod, and Garage Band.

Suggestions for Improving Implementation

Faculty members or the 'frontline' individuals who are expected to implement various technologies are often times the best resources to learn from. These are the individuals who can tell the powerbrokers or administration what it will take in order for successful implementation to occur. Within reason, the expectations provided can be useful in designing better support services, or more cost effective plans for implementation. There is nothing more disconcerting than having tools that are being under-utilized when these tools have enormous potential.

Faculty members who participated in this investigation were asked to offer suggestions that would help to increase the use and implementation of educational media casting at BCIT. Their responses are presented in Figure 13 below.

Figure 13. The frequency of incidents of incentives suggested during interviews with BCIT faculty members

Some of these incentives are currently being implemented by BCIT. Release time is a common incentive offered to faculty members at many institutions. Typically faculty members apply for time to learn various skills that can be used to enhance their instructional practice. This type of incentive is welcomed by most, and is the most widely suggested incentive. One respondent commented that there is a problem with release time. This typically means that a replacement instructor will assume the normal teaching role while the regular faculty member is off learning. This presents a dilemma in that significant preparation must be made for the replacement faculty member. Also, in some cases the regular faculty member is reluctant to relinquish their role for an extended period of time.

Extrinsic rewards refer to awards or more public recognition for successful implementation of educational media casting. One respondent suggested that a gallery or faculty portfolio be created to provide recognition, but also to serve as a promotional vehicle for other faculty members to see what can be done with various technologies.

At the same level as public recognition are support services. Respondents again expressed a need for support services. This might entail more individualized services, or very specific services required for the development of educational media casts. It is one thing to capture or record the content, and another issue entirely to edit and create a quality learning object. The latter part is where faculty members become overwhelmed. There needs to be a support mechanism or standardization of editing content for delivery. The least suggested incentives were recognition for tenure and financial incentives. These incentives are not realistic, and are unlikely to occur. Those that suggested these incentives knew that the likelihood of this particular reward was futile at best.

Summary of Results

The results obtained from this investigation have provided a distinctly different picture than anticipated at the onset of this investigation. Past research into the implementation of educational technologies suggested that implementation would be hindered by the self-efficacy of members in an organization. This is clearly not the case with the results obtained here. The majority of those participating in this study have better than average computer self-efficacy rating. Those individuals who

participated in the interview portion also claimed to have no fear or confidence issues related to using technology for instructional purposes (See Figure 14).

Figure 14. Interviewee classification of personal CSE

About two thirds of those interviewed were able to give a complete definition of educational media casting (and / or podcasting). The fact that many of them were familiar with the proprietary term 'educational media casting' leads one to believe that many faculty members are aware of the benefits and uses of this technology.

A cluster analysis did not provide distinct similarities in three groups that were anticipated in this study. This suggests that the implementation barrier or problem is common amongst all groups. It is quite conceivable that many faculty members are just not interested in this technology. However, all factors measured here suggest that there are more people interested than not. The challenge that is difficult to overcome is getting faculty members to try educational media casting.

Once it has been attempted, individuals will be able to determine for themselves if this is a useful pedagogical tool. It is apparent that students want this resource. If faculty members are concerned about the student population wants, than a more concerted effort should be made to try and implement this instructional technology.

CHAPTER V
DISCUSSION AND CONCLUSION

Introduction

The impetus for this research was to identify barriers to a common problem. Developers of instructional technologies are often puzzled by the rate at which innovations are adopted in education. Technologies have been developed to make instructional practice more efficient, and have offered the potential to be more creative. In spite of the lack of bewilderment amongst faculty members, there are relatively few early adopters. Educational media casting has yet to flourish in the same manner that other technologies have.

This section will provide answers to the research questions posed at the onset of this investigation. The answers will be presented below in the order that they were posed.

i) What is the relationship between faculty members' computer self-efficacy and their implementation of media casting as a technological innovation for instruction?

Both interest and use of educational media casting have a negative correlation with computer self-efficacy. The negative correlation between interest in educational media casting and computer self-efficacy score might be a result of individuals with exceptional computer self-efficacy wanting to incorporate more challenging technologies into their instruction. It could also be due to the perceived value media casting could offer certain courses. The other result highlighted here is that there is little correlation between computer self-efficacy and value. This could suggest that additional support services, or anything that could help to increase

comfort with technology, could also increase the value faculty members have for implementing and using technology. This could be applicable to any technology used in instruction, not merely educational media casting.

The quantitative statistical results did not yield any conclusive outcomes that would enable this research investigation to generalize about the nature of specific barriers to adoption. The results obtained did suggest what is needed to identify specific barriers for adoption. Amongst the three interest groups there are similar concerns that have affected the diffusion of educational media casting. There are no unique barriers pervasive within these groups. The qualitative results presented in the next section will highlight some concerns faculty members have about the use and implementation of educational media casting. These results coupled with those mentioned in the preceding section will provide a richer picture of the diffusion dilemma.

It was postulated, based on research of a similar nature (Thatcher & Perrewé, 2002), that computer self-efficacy would be the main barrier that could be identified as a cause for the rate of adoption and implementation of educational media casting. Early adopters would likely be those that possessed higher scores on a self-efficacy scale (Compeau & Higgins, 1995). Similarly, Geoghegan (1994) identified the following characteristics of early adopters that were measurable in the scale, and from other questions posed in the instrument used; i) technology focused, (ii) proponents of revolutionary change, (iii) visionary users, (iv) project oriented, (v) willing to take risks, (vi) willing to experiment, (vii) individually self-sufficient.

The results obtained from the computer self-efficacy scale did not classify early adopters, laggards, and luddites into discrete categories as was anticipated at the onset of this investigation. The scale was a measure out of 100, where high score suggest high computer self-efficacy. This means individuals scoring high would feel comfortable with using technology independently, with little support, to create an educational media cast presentation. The results of the entire population surveyed (M = 61, Range = 71) suggest that the faculty at this institution are quite comfortable with technology, and competent in their abilities to use and implement new instructional technologies.

This result highlights an important point in this investigation. First, the barrier to adoption that is so often referred to in diffusion studies (Rogers, 1995), that of comfort with technology, is not apparent in the present investigation. There must be other factors that exist that influence the adoption and implementation of educational media casting. The following question was posed in order to identify these specific factors that have influenced the rate of adoption.

ii) What common factors exist among faculty members who have successfully adopted educational media casting as an instructional innovation, and those who have not?

Ely (1990, 1999) suggested that successful adoption or diffusion of instructional technologies had the following characteristics: i) Dissatisfaction with the status quo, (ii) existence of knowledge and skills, (iii) availability of resources, (iv) availability of time, (v) existence of rewards or incentives, (vi) participation, (vii) commitment, and (viii) leadership.

The results of the present research do suggest that some of these criteria are being met for successful implementation of educational media casting. However, it is obvious that not all of these conditions are present in the present body of research for this thesis. Each of these points will be described and related to the results obtained for this investigation.

Dissatisfaction with the status quo. Bates (2000) suggested that the decision to use technology for instructional purposes might be due to the *technological imperative*. This is the notion that technology is implemented often because there is a need to implement it for instructional purposes. This need is based on the premise that adoption suggests that the faculty member is 'current' or 'up-to-speed' with trends. Similarly, failing to implement and use technology might suggest that faculty members are dated, or stilted in their instructional practice. With regard to educational media casting, over 45% of those interviewed (the largest response group) strongly disagreed with the notion that they felt pressure to implement this instructional technology because their colleagues or peers were using it.

In the present investigation there was no sense given that faculty members felt an imminent threat to use technology, or they would be viewed as dated. Several faculty members interviewed did suggest that they felt this technology should be employed because there was a considerable expenditure by the institution. By not using this technology, it was a waste of financial resources.

The condition, dissatisfaction, implies that there is an impending need to make a significant change. It suggests that the current 'method' of delivering courses will be abandoned for a newer, more up-to-date method. This sentiment was not

evident in either the survey or interview results. The sentiment that was expressed in several interviews was the belief that educational media casting should be employed to add additional benefits for students. According to several people interviewed, educational media casting would enable students who are burdened with long commute times, and busy schedules outside of class to obtain course content during times when getting to class was not an option.

Existence of knowledge and skills. The decision to implement and adopt newer educational technologies would be dependent upon the prior knowledge and use of other instructional technologies. This is an intuitive principle, since the absence of prior knowledge of similar technologies would mean that there would be a radical departure of the status quo to the adoption of a newer technology.

Faculty members for the present investigation were asked to identify the technologies they were currently using or have used for their online instruction, or distributed learning components of courses. The results are presented in the Table 4 below.

Technology	Number	Percent
Email	47	34.06%
Instant Messaging	5	3.62%
PowerPoint	50	36.23%
Audio, Video, Animation clips	36	26.09%

Table 4. Current instructional technologies used by faculty members in their personal practice (N = 64)

These results highlight an important point to consider. First, many of the technologies employed for instructional purposes are designed to deliver content in various ways. It is highly unlikely that these have been designed in a manner to enable interactivity amongst the instructor and student. This is evident in the fact that the instant messaging software is used relatively sparingly compared to PowerPoint, or email. PowerPoint can be used as an interactive tool for learning objects, and this could have been addressed. Regardless of this, the overall result suggests that proximity of time is not a major consideration for the use of technology. In other words, media casting is not being excluded because it is not a real-time or synchronous tool. Most of the tools being used are also asynchronous in nature

Apart from the individual faculty member using this technology, this condition also refers to the availability of support services that could assist in the successful implementation of the particular technology. Almost 86% (85.94%) of the respondents indicated that they would likely or very likely contact technical support to assist when problems arise with instructional technologies.

Based on the results of this investigation, there are adequate support services, knowledge and skills to assist in the implementation of educational media casting. Faculty members have used or are currently using comparable technology for their courses. This suggests that there are other barriers to implementation. There does not seem to be a resistance to using technology for instruction. Faculty members are comfortable with using technology, and they would seek support when they had problems with using technology. This characteristic is intrinsically linked to the next condition.

Availability of Resources. The obvious characteristic to successful implementation is the presence of resources necessary for implementation. The term resource here implies more than the hardware or software elements required for implementation. More and more institutions are designing support services to meet the challenges of implementing newer instructional technologies (UBC Medicine, 2005). In a similar vein, BCIT has developed instructional support services in a Learning and Teaching Centre. Unfortunately, the response from faculty members has been mixed with regard to accessing the services and assistance of this department. The major concerns will be presented below.

First, many faculty members interviewed expressed the same sentiment. That is, they believe that the LTC is a useful and valuable resource. However, they suggested that the LTC was over burdened or overwhelmed with helping faculty members. As a result some people indicated that they were reluctant to seek help for the LTC because they would not be given the amount of time or consideration they required. This was never presented as an issue with the type of service they would receive. The explanations or responses were usually prefaced with an understanding of the amount of work the LTC was presented with by such a large institution.

Another concern that faculty members had expressed during their interviews was related to awareness. Several faculty members were unaware of the services of the LTC. It was apparent that many faculty members were aware that such an entity existed. However, the role and function of such an entity was unknown. The lack of awareness can be a result of several factors. First, there are many faculty members that do not teach on a full-time basis, or have little to no contact with the campus in a

physical sense. If the faculty member is teaching remotely, or away from where services are located they might be more reluctant to access the LTC.

Second, the individual schools and departments are culpable in not making faculty members aware of the services and support offered at their institution. It should be a customary practice to promote the services that are available to faculty. This should be done so that the design and development of services can be created such that it supports the institution better.

Finally, the individual faculty members are not excluded from blame. Faculty members should make themselves familiar with the support services that they have available. This can be done through the normal course of networking with colleagues, or through investigation of the institutions' websites.

The LTC has taken considerable measures to self-promote their services, and offer faculty development sessions on top of the customary support. One complaint that did arise relating to this was the number of sessions that were given. BCIT is a large campus that is spread out geographically in a large urban setting. It is difficult for faculty members to get to a particular location for support and training sessions. The practical response to this would be that if the LTC has publicized the times and locations of these sessions, those who are interested in attending will make the effort to be at these sessions.

Availability of Time. Time is the most critical barrier identified in the quantitative analysis of the present investigation. As mentioned in the foregoing section of the present paper, there are different elements of time that were identified.

Intuitively, there is a considerable expenditure of time to adopt, implement, and use a new technology proficiently enough for instructional purposes. In the interviews conducted for this study, essentially all faculty members were committed professionals who were more than willing to invest time in learning the requirements and skills for educational media casting. Therefore, the consideration for time was not the initial investment that would be required for implementation. The survey results suggested a little more frugal expenditure of time investment. The survey results suggested that faculty members, on average, were willing to invest an additional 6% more time to learn how to use educational media casting. This appears to be a minimal expenditure, but it has to take the present preparation time into consideration. Therefore, 6% could be a considerable amount of time, and it could be more than an adequate amount of time required for learning how to use educational media casting.

A common theme that was pervasive in all interviews related to the vastness of the campus at BCIT. Faculty member had expressed concerns about getting to their scheduled classes on time. As a result, many had suggested that the time it took to get to class, and go through the normal setup of a class was a burden enough. Adding another task (i.e. media cast setup) to this already problematic scenario was not welcomed. In nearly all interviews where people indicated they were not interested in implementation due to time constraints, it was due to the setup time immediately before classes or lectures. There are several issues related to this sentiment.

First, there is an apparent misconception about the use of educational media casting. Faculty members, who suggested that setup time and getting to the lecture hall or classroom on time was a limiting factor for implementation, clearly have a limited view of educational media casting. That is, they see this as merely a tool to capture lectures for archival purposes. They do not see the value in using educational media casting as a supplementary tool that can be created outside of the classroom setting. This highlights a common misunderstanding of this technology.

Another issue that was commonly raised, related to time constraints, was based on the notion of trust. Many interviewees were not very trusting of this technology. Arriving to the location of a class or lecture last-minute, then having to setup media casting equipment and software was a risky proposition. What if the technology failed? Where would support come from? Again, this is a misconception of where this technology can be employed.

Existence of rewards and incentives. There are incentives in place for implementing educational or instructional technologies at BCIT. The main incentive that is offered to faculty members is release time. Ironically, when asked what types of incentives would be most useful or most effective, interviewees and survey respondents suggested release time. Despite the desire for release time there are inherent problems with being granted release time. One faculty member who was interviewed suggested that release time is beneficial, but at a cost. First, those who have been granted release time will be required to leave their normal teaching duties in the hands of another faculty member. This comes at a cost of having to provide materials for the replacement faculty member. That would require additional

preparation time. Also, leaving a course to another faculty member means that control of the course has been passed to another individual who might not cover the course material in the same manner. This was troubling for some. Considerable time is spent in developing courses and course content. If this is passed to another individual, regardless of this person's level of competence, the faculty member on leave has no idea what they will come back to upon the completion of their release time.

One suggestion provided during an interview with a newer faculty member was that of promotion. This faculty member suggested that the institution take a marketing approach to implementation. This could be done through a gallery highlighting the effective use of various technologies. Also, having awards for the effective use of various technologies would be an intrinsic motivator for implementation.

Monetary awards and incentives were not recommended or suggested by faculty members. The closest form of monetary incentive is release time. There was a sense from some faculty members that this technology should be used because there has been a considerable expenditure by the institution. This is more of an intrinsic motivator, or a motivator based on the technological imperative: 'We've got it, so we better use it'.

Participation. The current level of participation is lower than what BCIT had hoped. This was a primary reason why this investigation was welcomed. To help understand the barriers which affect the participation of faculty members.

Participation really encompasses more of an attitude of the users involved. The present investigation did not explicitly ask students their attitudes about educational media casting, and their use of educational media casts. The author of the present study did participate in a study that did examine these variables. The results that are relevant to this section were presented earlier in this report. To summarize, it was found that students were more likely to use educational media casts as a supplementary resource. These resources were most useful as an examination review. Also, students tended to watch or listen to these educational media casts on their personal computer, rather than a mobile device like an iPod or a smart phone.

The fact that students are using educational media casts is only one part of the participation element required for effective implementation. Faculty members need to sustain use of educational media casting once implemented. If the use of educational media casting is abandoned due to perceived lack of use, or some technical malfunction, the entire educational media casting endeavor for a course could collapse. Students will soon learn that they too can abandon this and other implementations. To avoid the potential for unsuccessful implementation it is imperative that faculty members heed to the best practices, and participate in any training sessions that are offered.

Institutional participation is another element that falls under this category. Institutions show their level of participation through support and promotion. Establishing the appropriate infrastructure is the primary level of participation. However, to ensure that implementation is successful the institution should also use

this technology, and showcase its use amongst early adopters at the institution. The latter is rarely done. In many institutions, the support and promotion of instructional technologies falls upon the department responsible for providing instructional support services. As suggested by an interview participant; the institution could do a better job of promoting the various uses of instructional technologies such as educational media casting.

Commitment. Some faculty members had alluded to the technological imperative (i.e. use it, because it is available) during their interviews. The mere notion that technology is *available* reflects a commitment by the institution. The institutionalization of educational media casting can only be successful, if the technological infrastructure is present. This would be the most basic, fundamental tenet of commitment.

Beyond the basic commitment of provision of technological infrastructure, BCIT has provided extensive support services in the form of personnel, and online resource materials for their faculty members. The Learning and Teaching Centre describes their services on their webpage as the following:

> Our services include consultation, project management, instructional design, media design and production, technical support, and administrative support on a wide range of projects. You'll find that we have the skills to serve your needs whether the job is designing and developing educational materials, putting together a publication or presentation, or just offering sound advice. (BCIT ~ LTC).

It is apparent that the institution has made a firm commitment for the use and integration of educational technologies. Educational media casting is a newer technology, and therefore it must be showcased. Many faculty members are unaware of the potential benefits of educational media casting. There are obvious concerns

that this is not an appropriate technology for all areas of instruction. However, there should be more use of the services provided to see how and where educational media casting can be used.

In the present investigation, as with many similar investigations, faculty members often times do not implement technologies because they are unfamiliar with the support services offered at their institutions. There appears to be a problem with understanding the level of support that will be provided. In some instances departments like the Learning and Teaching Centre will merely assist with the development of learning materials. In other situations similar departments will take on the task of development of learning materials. It should be the responsibility of the individual faculty member to find out what services are offered for assistance with educational and instructional technologies.

Leadership. Ely (1999) defined leadership as a two-pronged phenomenon. The first part of this is the leadership provided by the powerbrokers of the institution. The second derives from the more day-to-day leadership.

As mentioned in the discussion on commitment, institutional commitment is essential for successful implementation. Ebersole and Vornddam (2003) suggested that support or championing of the innovation by supervisors is a critical variable in the successful implementation of that innovation. In this regard BCIT has strong leadership. There are a few suggestions that could enhance the presence of educational media casting. Department heads, or chairs could promote the use of educational media casting to their faculty. There is a problem with this approach as a promotion from a superior could be misconstrued as a mandate to use or implement

educational media casting. A more plausible approach would be to highlight the use of educational media casting, rather than push it onto faculty as a necessary piece of educational technology.

The leadership of powerbrokers is essential in faculty members' decisions to implement technology. The leadership to create services, support, and promote innovations has been effective in other similar investigations (Rowe et al., 2001). Effective leadership translates into the sense of increased ownership of content amongst faculty members (Rowe et al., 2001). It is this sense of ownership that sustains implementation, and encourages colleagues to try the innovation themselves.

iii) What common definitions or personal philosophies of instruction are held by faculty members who have successfully implemented media casting as an instructional tool?

The impetus for this question was similar to the investigation of the computer self-efficacy amongst faculty members. The belief was that faculty members who had implemented educational media casting would have similar beliefs or philosophies regarding teaching and instruction. Similarly, those who were more reluctant to implement educational media casting would also have similar perspectives on education and instruction.

Nearly all of those who participated in the interviews suggested that they adopted the learner-centered philosophy of instruction (See Figure 21 below). When asked what their personal philosophy of instruction was, none of the respondents provided the name of a philosophical perspective. They essentially all commented

that they were learner-centered or that their emphasis was on the student and the students learning experience.

There was no distinct consensus of philosophical perspective amongst the early adopters and those not interested in educational media casting. It was apparent that all faculty members were concerned with their students. All faculty members intimated that they were dealing with a diverse student population and this required a more learner-centered approach than might not be found in a more traditional academic institution like a university.

The use of educational media casting amongst the respondents was not related to their personal view of education or the philosophy of instruction. This suggests that there are barriers outside of philosophical perspective that influence one's decision to adopt educational media casting. There was a considerable range in the values people had for educational media casting. Despite espousing the tenets of a learner-centric philosophy, only one out of the nine interviewed had expressed an interest in using educational media casting for student created content. This suggests that this technology would still largely be employed as a one-way delivery tool for content. Web 2.0 technologies and the capability of using educational media casting as a means to deliver student created content, or to hold class discussions and forums has not enticed faculty members.

There might be a strong belief amongst some of the faculty members that their courses do not lend themselves to the use of educational media casting due to the content. Although this was not explicitly stated in any interview, several faculty members did express some concerns over the challenges of using educational media

casting for their course content. This was not an issue of philosophy, rather the faculty members saw that there might be obstacles given the pedagogical nature of the courses that they are teaching and designing. One example was a course in forestry. There are obvious barriers to implementation of technology when students are out in the field for practicum exercises. In this situation the use is not impossible; rather it is impractical.

iv) What considerations are taken into account by faculty members when implementing educational media casting as an instructional innovation?

Answers to the above question are based on responses from a relatively scant sample of early adopters, and laggards. Despite this, many of the sentiments offered in the academic literature were provided by participants in this investigation.

A sentiment that was echoed many times during the interviews and during literature reviews for this investigation was the benefits educational media casting (pod casting) offered students. The obvious benefits were to employ educational media casting to enhance the learning experience. The term *enhance* is a relative term. There is no definition of enhance provided. It does seem to imply that it refers to augmentation, or supplementation of lectures or course materials. This seemed to be the main consideration for the use of educational media casting in the literature, and in the interviews conducted for the present research.

The notion of enhance fits with the recommended best practices for this technology (Rowe et al., 2001; Duke Digital Initiative, 2006). In considering the students, educational media casting was employed to streamline information and make learning more efficient for students. Educational media casting was employed

to provide review sessions for students. Frequently asked questions, and common trouble areas in courses were clarified in educational media casted sessions. This made it possible for students who were unable to get to tutorial sessions, to still get critical information about the content in the course.

Similarly, early adopters recognized the difficulties students had with organization due to responsibilities apart from school. Educational media casts were employed as a means to provide a schedule update regarding class assignments, readings, and examinations. In this manner, educational media casts were used as reminders for students to stay on top of their learning and expectations.

The best practices for educational media casting (pod casting) do not typically include capture and distribution of entire lectures (Rowe et al. 2001; Traphagan, 2006). Traphagan (2006) found that students who were given the entire lecture in the form of an educational media cast-like format typically skimmed the lectures for perceived relevant information. In the process some pertinent information was overlooked. It was also found that lectures that were recorded and distributed online were often accessed considerably more during times of review (Lane & Yamashiro, 2006). This would again lead to students seeking a more abridged edition of lectures for study purposes.

For these reasons it is recommended that educational media casts are used as reviews and summaries of content. Media casts should highlight trouble areas or common problem areas that students typically have with content. This is the approach that faculty members seem to employ in using educational media casting as an enhancement at BCIT.

Two of the nine faculty members interviewed took a different approach to the use of educational media casting. They argued that it was often times impossible for some of their students to get to class. The vastness of the campus, outside responsibilities, and even weather conditions (citing recent example of a school closure) made it difficult for students to keep up with the course material. Capturing lectures in their entirety was a considerable benefit for the students who were unable to make it to class. It was even used for a situation when one respondent could not make it to class himself. Weather had closed the school, and to keep his course schedule he created an educational media cast of his lecture. This further highlights the potential and flexibility of educational media casting.

To conclude, the considerations that are made for students typically revolve around time and efficiency. Educational media casting is not consciously employed to serve the different learning styles or to provide content in multiple modalities. These are inherent benefits of educational media casting, but they are not the impetus for using educational media casting. The main considerations revolve around efficiency, accessibility, and organization.

Review and Discussion of Research Results

It is clearly evident based on the discrepancy between adopters and available resources and services that there needs to be more work done to institutionalize educational media casting. It is also apparent that there is not one single barrier or hurdle that faculty and administration have to overcome for this institutionalization

to occur. This discussion will review current findings of similar investigations, and analyze the results of the present investigation.

Pedagogical practices and educational philosophies are traditionally conservative by nature. Most of the teaching and instructional design practices that faculty members abide by have not undergone a radical change in quite some time, if ever. Introduction of an instructional technology that potentially challenges the notion that the instructor or student have to be physically present for learning to occur was a considerable hurdle for e-Learning and distance education. Podcasting and educational media casting appear to further distance student from teacher. The majority of respondents in this investigation were neutral on this issue (25%).

Early in the inception of educational media casting or podcasting many critics were focusing on the issue of student attendance, and the potential decline of traditional lecture style learning environments (Read, 2007; Young, 2008). If lectures were going to be recorded than distributed, what incentive was there to come to class? The initial criticism to this claim was that students who did not attend lectures could not ask questions. However, this argument was less meaningful when classes adopted a more distributed approach to learning whereby discussion boards and course management systems enabled questions from absent students to be answered.

The initial criticisms and arguments that came to life as a result of educational media casting were very valid, and had a lot of merit. The intention of bringing these issues to light was to stymie the movement towards this instructional technology. However, the result was the development of more strategies that would preserve the traditional lecture-centered instruction. Many early adopters developed

strategies for ensuring that students still managed to attend classes. Outlined below are some of the simple, but effective ways of using podcasting, but not jeopardizing the attendance levels in class.

The first suggestion has been to make classes more interactive. There are two main reasons for this. First, a recorded lecture of interactive discussions will ensure that students must be active participants in class. To learn content you must be present in class to participate. The second reason is that content could be delivered via educational media casting or podcasting before the lecture. This content could be discussed or implemented in the lecture itself. An example of this is strategy is occurring in medical education. Anatomical content which has remained very static over centuries can be delivered to students in the form of a podcast or educational media cast. The regularly scheduled lectures are being substituted with more laboratory hours or activities to enrich the learning experience. This is essentially reworking the traditional teaching schedule giving more time to knowledge application. In this manner attendance is mandatory, and educational media casting has not harmed the learning process. It has enriched it further.

The second recommendation for keeping attendance levels high in class is to give regular in-class quizzes, or some form of assessment. This is an obvious solution, but is not a very practical solution. Realistically no faculty member is going to devise a strategy that increases their workload. The promise of educational media casting was that it would help to make instruction more efficient. Adding more evaluation time to an instructors schedule is typically an unwelcome solution. Not to

mention the fact that nothing would do more to affect enrollment in a course if students were aware that there was a regularly scheduled quiz.

A third suggestion for maintaining attendance levels is to turn the lecture capturing tools off while talking about upcoming tests or examinations. This could be seen as a reward for students who came to the live lecture. Providing students with such incentives for coming to class is not enriching the learning experience in any way. Students in this scenario are not being asked to take responsibility for their learning. At some point students will come to expect rewards for coming to class. What will happen when this does not materialize? The expectation of an incentive is a difficult issue to resolve.

A fourth strategy has been widely utilized, and has proven to be effective (Traphagan, 2006). This is the strategy of delaying the distribution of the recorded or podcasted lecture. Traphagan (2006) suggested that delaying the release of course content was an incentive that encouraged students to come to class. If students were unable to attend class, they could not get their questions answered. They had to wait for a fixed period of time before they could have access to the course material. This strategy takes advantage of the element of time. At some point students will realize that time is running out, and that the workload of a number of different courses is increasing. In order to stay on top of the course content, they must come to class, and ask questions when they need clarification. In this instance, the educational media cast is reserved as a reference resource. As a result, Traphagan (2006) found that podcasts of course materials were most commonly accessed during examination

periods. There was no significant decrease in attendance, and this was attributed to the students wanting to be present to ask questions of their professor during lectures.

The final suggestion is, if class attendance is falling considerably, the instructor consider discontinuing the production of educational media casts. This is akin to the lecturer who remains silent while students are talking during class. This strategy will likely be successful, but when the time comes to cancel the practice of distributing course materials via educational media casting, a few students who depend on them, and who have diligently attended classes may be adversely affected.

Recommendations Based on Results

The interview process for this investigation enlightened this researcher on the beliefs and misconceptions about using educational media casting. Faculty members who were interviewed for this study were not overly concerned about attendance issues. This might be due to several factors. First, the campus of BCIT is spread out, and getting to class can be a challenge. Second, many programs and courses are populated with students of a non-traditional age. These students might have commitments outside of classes that interrupt their ability to attend classes regularly. Finally, a lot of programs are not offered in a traditional class setting. Providing educational media casts provides instructors the opportunity to deliver content to students who are in a co-op course, or practicum setting. Again, this enables the instructor to enrich the learning experience.

Earlier in this presentation it was stated that most pedagogical philosophies were conservative, and that educational media casting challenges the premise of

traditional learning environments. In the interviews it was apparent that faculty members who considered themselves to be 'learner-centered' were in favor of using educational media casting.

Using educational media casting for the sake of using technology is not a wise practice. Faculty members are becoming aware of the various uses of this technology in their fields of expertise. In order to sustain the adoption of educational media casting some best practices should be employed based on the results of this investigation, and other similar studies.

Time has been an overarching theme in this entire research. A faculty member's time is often the major consideration. We assume that too much of education is dependent upon the faculty member. Part of this also translates into the notion that students will (begrudgingly) accept whatever technology is imposed upon them. Recording entire lectures is one of these instances. At first glance this appears to be a tremendous benefit for the student. The belief is that this would act as a resource, rather than the primary vehicle for delivering content. As mentioned in the foregoing, there have been issues and solutions for problems related to attendance. There are other concerns related to recording and distributing lectures.

Earp (ISIS Podcast 2007) suggested that students would begin to resent the use of educational media casting as a resource that provided lectures in their entirety. First, students who use this as a supplement to attending lectures will begin to feel that class time and responsibilities are increasing beyond what the student had anticipated with enrollment. For example, if students were registered for a course that consisted of 4 lecture hours a week, and these were presented again, or if

additional lecture content were delivered via media casting. This would no longer be a 4 hour commitment for lecture content. This is an additional 4 hours or more devoted to content the students already have. This would be in addition to the regular commitment students make towards studying, readings, labs and assignments.

To avoid this dilemma it is recommended that educational media casts be used as summaries for lectures or a series of lectures. These summaries could highlight salient points that were made during the sessions. These could also be difficult concepts or topics that students traditionally have problems with. Studies by Rowe et al. (2001) and Traphagan (2006) emphasize the point that when students are provided with the entire lecture content in a podcasted format, they will fast forward to specific points in the lecture to review key concepts. Faculty members might be reluctant to use this abbreviated version of media casting because it appears that students are being spoon-fed the essential content of a course. However, using media casting as an opportunity to answer commonly asked questions would be a welcomed tool for instructors who are repeatedly answering the same question.

For various reasons, faculty members should adopt a policy or strategy to distribute media-casted material. As outlined in the foregoing of this section, withholding course materials has inherent benefits for maintaining attendance levels. Conversely, educational media casts could be developed as a prelude to lectures. This strategy would enable lectures to become more interactive and engaging. Students would use face-to-face meetings to ask questions, apply knowledge and skills.

There are other issues that affect the distribution of content and timing of release of content. Educational media casting would be an effective mode of delivery in a purely distance environment. This issue with using this technology in distance education often reverts back to the primary tenants of distance education. That is, there is a fundamental difference in the instructional design strategy and philosophy of quality distance education. Merely using technology to replace a face-to-face lecture does nothing to enhance learning, or make distance learning effective. The benefit of educational media casting is that it affords the student with the potential to review material as often as they would like. It is also portable enabling true distance and mobile learning to occur. From the instructional standpoint this offers the instructor more options for using class time as a means to apply knowledge or resolve trouble areas for students. It essentially will enable lectures to become more interactive and engaging for students.

Identified Benefits of Educational Media Casting Based on Results

For the most part faculty members are aware of some of the potential benefits afforded by this technology. In essentially all interviews conducted there was reference made to students who are English as a second language students. The creation of educational media casted content would enable these students to review the material over as often as required. This is the most obvious benefit, and is often mentioned in the academic literature as such (Nagel, 2008). One other not so obvious benefit for these students is the opportunity to work on skills like pronunciation. A critical part of learning a new language is not only learning the meaning, but also the

use of language. These skills often come from use within a social setting, or within the context of natural use.

Only one faculty member interviewed made reference to student created content. There are tremendous potential benefits to students in the creation of content via educational media casting. Students have the opportunity to present material to their peers and instructors in a medium different than traditional text-based format. This is a significant benefit for students in a distance learning environment. This affords students with different learning styles the opportunity to be more active participants in a distance learning setting. As a result of this many learning management systems are incorporating voice boards, or podcasting features into their programs. Both student and faculty created podcasts have enriched courses. An example of such a learning management system is WIMBA. The WIMBA suite enables students to ask questions, and post responses to online discussion boards via a podcast or voice board tool (WIMBA, 2008).

One potential benefit that has been mentioned in various research articles relates to the issue of mobile learning. It is believed that the development of educational media casts, particularly audio podcasts, would enable people to use the dead time of their days (i.e. commuting time) as an opportunity to learn or review content via an audio file. Clark (2000) found that Canadians, on average, spend 53 minutes a day commuting for educational purposes. This commuting time could be transformed into a learning opportunity if content were available in a form such as an MP3 file. Many had envisioned car-pooling classrooms where executives or students would be able to listen to lectures or seminar sessions while they were in transit. The

reality is quite different. Loftus and O'Neill (2008) found that of respondents (students) who use podcasts currently, 77.3% watch them on their computer/laptop and only 20.7% watch from a mobile device. Despite the benefits that early adopters and promoters of this technology had envisioned, the reality is that most still prefer to use their desktop computers to view educational media casts. This might be due to the availability of other resources such as the internet. It might also be due to the fact that it is likely easier to concentrate and focus on content while not being distracted by other elements.

The overall benefit of educational media cast is that it provides students with another avenue to learn material. They are able to retrieve content on demand and use it as often as they would like or need. Students with language barriers, or who are having a difficult time with difficult concepts would obviously be the major beneficiaries of this resource.

Faculty member benefits also result from using this instructional tool. Faculty members are able to provide single answers to commonly asked questions. They are able to supplement material for courses in a 'just-in-time' manner. Courses could become more dynamic as content could be updated more frequently and efficiently. Faculty members could also employ this resource to engage students more, and make the learning experience more interactive. Student created content or the use of student created media casts in response to questions or discussions is likely going to increase in frequency. This benefit will make learning more collaborative, and less instructor-centered.

Suggestions for Further Research

This investigation did not yield the diversity that was anticipated amongst the three groups identified in the academic literature: Early adopters, laggards, and luddites. Perhaps further investigation needs to be conducted using a more sensitive instrument, or a more diverse population of faculty members to see what common barriers exist amongst these groups.

More research needs to be conducted on the effectiveness of complete lecture capture versus the recommendations presented in this research. That is, providing brief summaries of lectures and highlighting or chunking content into smaller, more meaningful presentations following lectures. Perhaps part of the reluctance amongst faculty members stems from the overwhelming, and often contradictory, data that exists. Educational media casts that are complete recordings of lectures are being promoted heavily by commercial enterprises that offer systems and services to record and distribute lectures. The results here are based on a proprietary system that uses a free service from Apple Computers. There is no vested interest in promoting the recommendations presented here. However, there should be more stringent comparison of complete versus augmented educational media casting (Nagel, 2008). This could help to enlighten a seemingly bewildered academic population make decisions regarding the implementation of this technology.

Web 2.0 technologies are becoming more prevalent in academic settings. Distributed learning environments and e-Learning environments have more collaborative tools available for use than ever before. A major part of these newer collaborative tools will be student created content in the form of educational media

casts. WIMBA has already incorporated a podcaster tool into the *Collaboration Suite*. These tools will challenge the personal philosophies of instruction that faculty members have. Despite nearly all interview participants espousing a learner-centric philosophy, only one interview participant expressed an interest in using educational media casting as a means for students to communicate with the instructor or one another. The philosophy of instruction and the adoption of collaborative e-learning tools will be a major area of investigation that will highlight potential barriers for adoption and implementation.

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APPENDIX A; Measurement of Media-Casting Self-Efficacy[1]

PART B

Given your understanding and confidence with the use of technology. Select the best option and the degree to which you believe you could construct a media-cast presentation.

I COULD COMPLETE A MEDIA-CAST PRESENTATION …

APPENDIX B - Demographics Questionnaire

PART A

On the scale provided below rate your level of interest in Educational Media-Casting:

1	2	3	4
None	Low	Moderate	High

Using the scale below how would you classify your use of Educational Media-Casting?

1	2	3	4
Never	Low	Moderate	Extensive

How would you classify your use of BCIT support services for instructional technologies?

1	2	3	4
Never	Low	Moderate	Extensive

How would you rate your level of creativity in general?

1	2	3	4
Not creative	Low Creativity	Moderate Creativity	High Creativity

How would you rate the usefulness of Educational Media-Casting?

1	2	3	4
Not very useful	Somewhat useful	Moderately useful	Highly usefu

How helpful is it for you to learn about Educational Media-Casting experiences from your colleagues?

1	2	3	4
Not very helpful	Somewhat helpful	Moderately helpful	Highly helpful

Educational Media-Casting involves a considerable amount of 'change' in instructional practices. How would you rate your willingness to change in order to implement Educational Media-Casting into your instructional practice?

1	2	3	4
Never	Low	Moderate	Extensive

Educational Media-Casting will take some time to implement into your instruction. Indicate how much **more** time you would be willing to spend on designing your instruction in order to implement this technology (as a percent ~ i.e. 5%, 10%, 15%, 20%, 25%)_____

Would you be willing to learn how to effectively create media casts for your course if you were allotted release time from your department?

Yes No

APPENDIX C - Personal Interview Questions

PART C

What is your definition of educational media casting?

What is your personal philosophy of education or instruction?

Are you currently using any educational technologies in your instruction? (Please describe)

When planning to use educational technologies. How much consideration do you give towards students?

What are these considerations? (i.e., access, time to learn, experience, etc.)

What is your main consideration for implementing technologies into your instruction?

Do you feel that BCIT has sufficient support services for assisting your implementation of instructional technologies into your course?

What do you feel is the main barrier that affects your decision to use technology in instruction?

What benefits, if any, do you think educational media casting provides instructors and students?

What problems will or could result from using educational media casting?

Do you have any solutions to these problems?

What type of incentives or benefits does *BCIT* offer instructors for implementing technologies like educational media casting?

How comfortable are you with learning and using new technologies?

Have other faculty member's experiences influenced your decisions to use new technologies in your courses?

Based on your experiences. What measures could be taken by *BCIT* to help increase the use of educational media casting by faculty?