Investigating a College Computer Course Delivered in Both Online and Face-to-face Classes

by

Baolong Fu

A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy
Department of Curriculum, Teaching and Learning
Ontario Institute for Studies in Education of the University of Toronto

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Abstract

The purpose of this study is to investigate a college computer course delivered in both online and face-to-face classes. As more online courses and programs emerge, concerns about the quality and comparability of online instruction with face-to-face instruction have arisen. Questions about the relative effectiveness of each mode of instruction are important both at the stage of course development and at the stage of course delivery. Earlier comparative studies have shown that online courses were equal to face-to-face courses. These studies evaluated student services and technological infrastructure, student satisfaction, and learning outcomes. However, few studies have been conducted on computer applications at the community college level. This study seeks to fill in this gap by providing students’ perceptions of computer education for a business program at the three-year diploma level. This study has examined the learning environment and informed practice by presenting differentiation and diversity mainly due to different mode of delivery in a college computer course.
This study aims to provide a detailed understanding of the similarities and differences of college students attending online class versus face-to-face class taught by the same professor. It examines students’ perceptions of course design and delivery, their attitudes and beliefs about acquisition of computer applications, and their academic achievement as measured by the test scores. Mixed methods are employed to investigate the research questions both in depth and in breadth. In the Fall of 2009, 60 out of 89 eligible participants filled out the online questionnaire resulting in the response rate of 67% and six students participated one-on-one in-person interviews.

Results from both quantitative and qualitative studies show that there is no significant difference between the face-to-face and online students with respect to their perceptions, attitudes, motivation, and learning outcomes. The findings demonstrate that there was no evidence showing difference between online learning and face-to-face learning. The different learning modes provide students with positive learning experiences. This study provides stakeholders such as students, college administrators, and professors with a detailed and meaningful understanding of the important learning environments for the online and face-to-face classes. The implications from the findings will help to enhance, advance, and expand face-to-face and online education at both the theoretical and practical level.
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Chapter One: Introduction

1.1 Introduction

Understanding students’ perceptions is essential in designing and delivering effective courses (Struyven, Dochy, Janssens, & Gielen, 2008). An effective course consists of many factors including learner characteristics, course management, the teacher, and instructional strategies (Bollinger & Martindale, 2004). These factors also consist of a learning environment which provides opportunities for learners to engage in active and meaningful learning via means of motivation and interaction. In addition to the traditional face-to-face learning environment, online learning is rapidly becoming an alternative means to access quality education for students across multiple disciplines. There have been numerous research studies examining the effectiveness of online education with face-to-face education. However, very few studies have examined students’ perceptions and their motivation in learning computers at the community college level.

The purpose of this study is to investigate a college computer course delivered in both an online class and a face-to-face class. This study aims to provide a detailed understanding of the similarities and differences between face-to-face and online classes with respect to students’ perceptions of course design and delivery, their attitudes, beliefs, and motivation in acquisition of computer applications as well as academic achievement as measured by test scores. As a lead college instructor for over 20 years, I designed, implemented, tested and delivered four different online computer courses at the College level. The research questions grew out of relevant literature reviews along with my teaching experiences. This chapter outlines the purpose of this research, research questions, research context, researcher’s background, and plan of the thesis.
1.2 Research Context

Online education has grown fast due to advancements in Internet technology and increase demand for higher credentials. It has made learning opportunities more available for people of all backgrounds. In 2005, an estimated 6.4 million people in Canada used the Internet for education, training, and school work. In the Fall of 2008, over 4.6 million students in the U.S. were enrolled in at least one online course (which represented more than 25 percent of higher education students), a 17 percent increase from the Fall of 2007 and far exceeding the 1.2 percent overall growth of the higher education student population (Allen & Seaman, 2009). As more online courses and programs emerge, concerns about the quality, effectiveness, and comparability of online instruction with face-to-face instruction arise. Earlier comparative media studies showed that online courses were equal to face-to-face courses (Clark, 1985; Russell, 1999; Thompson, 1994). These studies were conducted by evaluating the quality and effectiveness for each delivery mode (Thompson & Irele, 2007). Quality refers to student services and technological infrastructure while effectiveness refers to student satisfaction and learning outcomes. The purpose of evaluating quality and effectiveness is to provide more satisfying learning experiences for both online and face-to-face students through expansion and innovation (Ehrmann, 2002).

One major factor to predict success is students’ perceptions of learning (Perez Cereijo, 2001). Research has shown that students’ perceptions of the learning environment (such as perceptions of learning activities and learning outcomes) are positively correlated to their subsequent learning behavior and learning outcomes (Ben-Ari & Eliassy, 2003; Fraser & Fisher, 1983; Konings, Brand-Gruwel, & van Merrienboer, 2005). Research has also demonstrated that students’ perceptions of learning impacted the effectiveness of learning (Grant & Thornton, 2007; Perez Cereijo, 2006). Thus, understanding how students perceive the learning environment is
crucial in order to understand their learning (Struyven, Dochy, Janssens, & Gielen, 2008). Consequently, this understanding provides feedback for the design, development, and delivery of effective courses, and creates a meaningful learning environment that can foster student learning and meet the needs of students.

There have been two main findings of research regarding the effects of online versus face-to-face instruction in terms of student academic achievement (Phipps & Morisot, 1999; Russell, 1999). The first finding supported the “significant phenomenon”, citing online learners’ significant increases in learning outcome over their traditional counterparts. For example, Haigh (2007) examined online and face-to-face students in four areas at the University of Wisconsin-Milwaukee School of Information Studies. These four areas were: basic communication skills and access to the Internet, motivational styles and preferences for individual versus group work, time management issues, and attitudes toward online education. “This information is particularly useful in determining whether schools are successful in recruiting an online student body well-suited for success, and in steering students toward the instructional format best suited for their particular background, work habits, and attitudes” (Haigh, 2007, p. 95). Another study showed that students attending online classes outperformed those attending face-to-face classes in nine graduate business degree courses (Ladyshewsky, 2004).

On the other hand, the second finding of research in this area concluded the “no significant phenomenon”, citing no differences in learning outcome between online and face-to-face instruction. One study compared community college student academic achievement and attrition rates in three general education courses (American History, English Composition and Mathematics for Liberal Arts). Each course was taught by the same instructor using online and face-to-face delivery modes. The study showed that there was no difference in student academic achievement measured by final grade between the two modes of delivery, but students’
demographic characteristics such as age, race, gender and previous college experience had a significant effect on student achievement (Rosenfeld, 2005).

Some studies have found that there is no significant difference between the two modes of delivery in terms of test scores and attrition rates (Van Schaik, Barker & Beckstrand, 2003). Schulman and Sims (1999) examined students enrolled in five separate courses and each course offered both an online class and a face-to-face class. Both sections of each course were taught by the same instructor. They found that students learned just as well online as they did face-to-face. Ryan (2000) compared the online and face-to-face course entitled Construction Equipment and Methods and found that there was no significant difference for final grades for the two groups and students perceived no difference in the quality of instruction. Few studies in the literature examine students’ perceptions and their motivation to learn computers at the community college level. This thesis expands the comparative studies between online and face-to-face classes for three-year diploma students taking a computer course in the College.

1.3 Purpose of the Study

This purpose of this thesis study is to describe, analyze and compare a college computer course delivered both online and face-to-face from the student perspectives. The two modes of instruction were designed, implemented and taught by the same instructor. In particular, students’ psychometric profiles, perceptions of course design and delivery, attitudes and motivation about acquisition of computer applications, and academic achievements in both modes of instruction were examined. Questions about the relative effectiveness of each mode of instruction are important both in the stage of curriculum development and in the stage of course delivery. Curriculum designers create learning tasks that stimulate active knowledge construction and the acquisition of computer application skills. Instructors adopt student-centred and learning-oriented pedagogy. As the College aims to add more online courses and even fully online
programs, this study can provide insight to support the College’s strategic plan to expand online education.

1.4 Statement of the Problem

The computer course in question is a required course for three year business diploma students in a large, urban community college of applied arts and technology in Ontario, Canada. The course offers online and face-to-face sections. The demand for online education at the School of Business in the College is high. When the registration lines open, the online sections fill up quickly, usually within the first or the second day of registration; this has happened for five years in a row with the number of online students growing from 35 to over 100. This online course has been running for the past 14 semesters. Although mandatory for face-to-face classes, no formal student feedback questionnaires have ever been conducted for the online sections. These questionnaires cover topics ranging from course design and delivery to the learning environment. Instructors get the results after the test scores are released to students so they have some sense of how students feel about the course and the instructor. However, these instructors do not get such formal feedback from online courses. With the expansion of online courses at the College, the College has proposed to design and develop evaluation for online courses. This study could provide input and feedback for the proposed evaluation.

This study employed mixed methods research directly comparing an online computer course with a face-to-face computer course. The course was designed and taught simultaneously by the same instructor. This analysis compares students’ perceptions, attitudes and academic achievements in the course. The research questions for this study are:

1. What are students’ perceptions toward course design and delivery?
2. How are these perceptions different between online and face-to-face students?
3. How does student academic achievement differ in these two delivery modes?
4. Are there significant differences in attitudes and motivation with respect to the acquisition of computer knowledge between online and face-to-face students?

1.5 Significance of the Study

The objective of this research is to provide a detailed understanding of the similarities and differences of students attending online versus face-to-face class, focusing on their perceptions of course design and delivery, their attitude, beliefs, and motivation in acquiring the computer applications, as well as their academic achievement as measured by test scores. Few studies have compared student attitudes and achievements between online and face-to-face college computer courses. This study seeks to fill this gap. The overall responses to the computer course were positive from both online and face-to-face students. Additionally, similarities and differences about responses in learning computer course were identified and elaborated via both quantitative and qualitative methods. In light of these results, this research both presents local practical suggestions and contains broader research implication.

This study provides stakeholders such as students, college administrators, and professors with a detailed and meaningful understanding of the important learning environments for online and face-to-face classes. Different learning situations or environments, both physical and virtual, require the adoption of different learning strategies to represent and formulate subject matter. First, it will inform college administrators about how well students are doing on both modes of delivery as they can implement practices and policies to enhance student learning, thereby, improve program outcomes. Second, the research will help students to make informed and firm choices regarding to which mode of delivery they will choose to attend. Lastly, teachers will be better able to develop and design pedagogically relevant and responsive curriculum using best teaching and learning practices from both the online class and face-to-face class to suit students’ needs. The results of this study has provided some teaching suggestions such as preparing
student readiness, building communities using effective technology, and employing appropriate learning activities. I will elaborate these suggestions in Chapter Five.

The findings help “develop a class of theories about both the process of learning and the means that are designed to support learning” (Cobb et al., 2003, p. 10). It is crucial to understand how students perceive computer learning environment in order to understand their learning in computer course. In comparing face-to-face and online courses, researchers have conducted studies at both university and college level for a variety of subject areas; however, nothing has been done in the literature with regard to the computer courses delivered in both face-to-face and online class at the college level. Therefore, this study seeks to understand how students from two delivery mode perceive their computer course. Findings from the quantitative data illustrate similarities and differences between online students and face-to-face students in learning computer applications whereas findings from the qualitative data elaborate and enhance the findings from the quantitative study. The integrated findings from both quantitative and qualitative data advance the understanding of a complex form of course delivery and make this knowledge more accessible and comprehensible. Only when we have a better understanding of computer course delivered in both face-to-face and online class, can we make a best use of both delivery modes.

1.6 Researcher’s Background

It is worthwhile to discuss researchers’ background as all researchers have diverse points of view and interpret social facts from different angles (Miles & Huberman, 1994). I bring my experiences, educational background, and values and beliefs into the process of collecting and analyzing data in this study. Therefore, my personal and professional influences and biases are embedded in the research project in achieving in-depth understanding of the phenomenon being investigated from personal and professional experiences (Guba & Lincoln, 1991). By introducing
myself, I hope the reader will have a better understanding about this study and the argument that I make. As there is no clear-cut relationship between my personal life and my professional life, I present them both to give as a complete picture as possible of who I am.

Ever since I was little, I always wanted to be on a stage in front of large crowds. When my parents found out about this interest of mine, they hired a private ballet teacher to teach me even though my parents were neither rich nor well-educated. They paid her in home-cooked pork meals as my tuition and hoped that one day I would be able to perform Swan Lake. I still vividly remember when I was in my first grade in my hometown and I performed at the best theater in the city with an audience of over one thousand. I was thrilled to be on the stage, and the feeling of being in front of such a large number of people made me feel very good and proud of myself. However, my dream of becoming a performing dancer died as the Chinese cultural revolution was coming to an end and the whole country had put its’ focus on mathematics, science and technology. There was a wide spread belief that if you were good at these subjects, you could go all over the world and achieve whatever you wanted.

Although I could not perform in a theatre, I found myself constantly appearing on the stage of my classrooms all the way from primary school to high school: giving small lectures in front of the class; discussing and participating in various extracurricular activities as a group leader; and making public speeches in school assemblies. All of these activities have contributed to my developmental sense of actively participating at different levels of repertoires of practice in various communities. The practice plus my excellent academic achievement prepared me to pursue teaching as my profession.

I have ten years of teaching experience in China, from primary school to universities in courses such as Math, Statistics, Accounting Applications, Computer Programming and Database Design. Furthermore, I worked as a computer programmer at an electronic information
centre for several years, participating in the five-year economic planning at the provincial level. The pedagogical and administrative responsibilities extended and expanded my horizons of understanding not only in cognitive matters but also in the non-cognitive realm.

I wanted to continue my teaching career after I landed in Peterborough, Ontario in December 1998. I started doing volunteer work to teach computer courses in a community centre. At the same time, I was sending out resumes to schools everywhere hoping to get a job in the education field. I was able to get some teaching interviews in private colleges in Toronto but sadly I was not accepted. Knowing that I needed up-to-date education from a qualified Canadian school in order to secure a job, I decided to go back to school to update my knowledge and communication skills. That is when I moved to Toronto and completed a three-year diploma in computer systems technology with honors at Centennial College, followed by a Bachelor degree in Business and Economics and a Master’s degree in Math and Statistics at York University. While pursuing these degrees, I did some part-time teaching at a private college for computer courses and accounting applications as well as working as a supply teacher for the Toronto District School Board. Finally, in January 2003, I started teaching at a large community college in Ontario.

I felt lucky to get a last-minute contract teaching position in January 2003. I remember vividly how I conducted the first class. Despite having over ten years teaching experience at the college level in China as well as some part-time teaching experiences at some small private colleges in Ontario, I still felt nervous. The course I was assigned to teach was business computer applications covering topics such as MS Word, MS Excel and MS Access. I was only given the textbook two days before the class, and there were no course outlines. I prepared for two days only for this three-hour period class and I still found myself ending the class after only one hour, having covered all I had prepared. The students were all in a three-year diploma
program in business. They seemed happy that I let them go much earlier in the first class; but I felt guilty as the College paid me for three hours but students only got one-hour of instruction. I told the students that I would stay in the lab in case they needed some individual consultations.

While I was very confident about my subject knowledge, I realized that I needed to learn and immerse myself in the organization culture. I registered in as many teaching workshops as possible and I was fully occupied by teaching and professional development activities. Two transformative workshops in my first year were the WebCT workshop and the coaching skills workshop. WebCT is a course management tool similar to Blackboard, the online learning platform used by many institutions. The most exciting thing about WebCT was that I could create or import a test bank and build tests or quizzes based on the test bank for my students so they could get immediate feedback, for example, which questions they answered correctly and which questions they answered incorrectly. The technical support staff was amazed at how fast I was able to learn to use WebCT by myself and to create online tests and to use a different method than his. What he did not know, perhaps, was how many hours I had spent trying to figure out the solution; how I have always liked to be challenged technically; and most importantly, how I have enjoyed the process of debugging and feeling proud of myself for making contributions to our student learning.

Sometimes when I deal with my students, I think the same way as if I were dealing with my 22 year-old daughter who is in university. Although the average age for my students is 22 years old, I put myself into the shoes of their parents. I remember in the summer 2007 when my daughter took a university-level calculus course, I served as her personal tutor. Although she consulted with me about all the technical difficulties she encountered, she did not perform well in the first test. She believed that the test mark did not reflect her true understanding and skills. I encouraged her to contact her professor to express her concerns. She emailed her professor and
got a prompt response. I have been impressed by her professor’s responsive and constructive feedback. I regard him as a role model and I want to learn from him.

I have always been interested in writing about my teaching experiences because it has several advantages. First, it helps me to demystify the writing-as-research process. Second, it reconfirms my relationship to the people in which I give accounts of. Third, it valorizes reflection throughout the writing process. Fourth, it gives me special lens through which I can access other researchers’ work on autoethnography; thus it deepens and expands my horizons of understanding (Wallace & Louden, 2000).

The formation and development of my professional identity as a multi-discipline teacher began well before I entered the Ontario Institute for Studies in Education. My teacher identity formation and development enabled me to move from peripheral involvement in teaching (Lave & Wenger, 1991) to planning and organizing my time around my teaching interests. I perceive the role of a community college teacher in highly favorable terms: freedom to teach without consulting with colleagues, satisfying student learning needs, and flexible teaching hours. My past, present and future are interwoven: my past shaped my present teaching and my future will be shaped by my present. “…the old and the new continually grow together to make something of living value, without either being explicitly distinguished from the other” (Gaudier, 1975, p. 273).

1.7 Plan of the Thesis

This thesis consists of five chapters, with each chapter concentrating on one major constituent of the thesis. Chapter One provides the road map for the entire thesis. I explain the research space about comparative studies between face-to-face-education and online education with respect to students’ perceptions of learning environment and their learning outcomes. Then, I show a niche in the literature: a computer course offered two delivery modes at a community
college. After that, I present problems or research questions for this thesis and describe the significance, and outline my qualifications to carry out this research.

In Chapter Two, I examine and analyze relevant, appropriate and useful literature around the themes of distance education, student satisfaction, assessment, attitude and leaning. These themes are defined by the objective of this thesis. At the same time, these themes contextualize the research by critically evaluating and connecting relevant studies. Furthermore, I illustrate the gap in these studies about student perceptions of learning computers at the community college level. In the domain of distance education, I discuss a wider range of topics including a brief history of distance education, benefits and challenges of distance education, and the effectiveness of online learning versus face-to-face learning in terms of students’ satisfaction and learning achievement.

In Chapter Three, I provide a thorough and comprehensive description about methods used and procedures applied in order to carry out this research – how to solve my research problems or answer my research questions. I also justify, explain, and elaborate the mixed methods design, sampling procedure, data collection methods, data analysis, validity in mixed methods research, and ethical issues.

In Chapter Four, I present and interpret results from both the quantitative and qualitative investigation. The quantitative result is arranged around research questions. First, I show the descriptive statistics about students’ perceptions of course management, self-efficacy and beliefs in acquisition of computer applications. Second, I examine how these perceptions differ between the face-to-face and online classes. Third, I test learning outcomes between the two delivery modes. Finally, I examine the differences in attitudes and motivation about the acquisition of computer knowledge between online and face-to-face students. In the qualitative findings, I present themes and patterns about student learning experiences with the computer course.
In Chapter Five, I discuss and interpret the research findings. I start by re-examining the research questions followed by justification of the answers. I then elaborate on the findings and connect these back to the existing literature. The implications for future research are described and extended from these findings. Suggestions and recommendations about face-to-face and online education are then presented. Finally, contributions of the research are explored at both the local practice level and the theoretical level.

1.8 Summary

This study investigates a college computer course delivered in both online and face-to-face with a focus on students’ perceptions of course design and delivery, their attitudes, beliefs, and motivation in acquisition of computer applications, as well as their academic achievement. The purpose of this study is to provide a detailed understanding of the similarities and differences of students attending online versus face-to-face class and gain insights about importance of learning environments. The result will help students to make informed and firm decisions about whether to attend online or face-to-face class. Teachers can use the results to refine their ability to develop and design pedagogically relevant and responsive curriculum to better suit students’ needs. The study will inform college administrators on how well students are doing on both modes of instructions; therefore, they could implement the practices and policies to enhance student learning and improve program outcomes. Furthermore, with high demand for online education, this study presents the relative effectiveness of each mode of learning, thereby advancing our understanding of a complex, situated form of course development and delivery.
Chapter Two: Literature Review

2.1 Introduction

This study examines the perceptions of students toward the course design and delivery, their attitudes and beliefs of acquiring the computer applications, and their academic achievement by contrasting the online class with the face-to-face class. Many studies of online education versus face-to-face education have concentrated on the learning outcomes and level of interactions (Zhan, 2008). In addition, this study concentrates on student satisfaction and epistemological attitudes and beliefs, which move beyond the scope of the traditional comparison studies of online education versus face-to-face education by gaining insight and interpreting the viewpoints of students. The majority of this chapter draws on a wide array of literature that relates to the learning environment, which connects to several aspects of the research questions. The literature review selected is based on the research questions which inquiry perceptions of course design and delivery, attitudes and motivation in acquisition of computer applications, and academic achievement between the online class and the face-to-face class. The literature review provides an overall framework of where this study fits in what is known about face-to-face and online education. It also builds a foundation and context for the research problem presented in Chapter One.

In analyzing the literature, I utilized a thematic approach with a study-by-study review nested within each theme (Creswell, 2005). In the thematic literature reviews, I identified four themes within the body of comparative studies between face-to-face and online classes: distance education, student satisfaction, assessment, and epistemological attitudes. I selected these reviews because they are related to the overarching areas of my study. I discussed the major ideas or results from previous studies in each theme. For study-by-study reviews, I provided a detailed summary of each study under its respective theme.
This chapter begins by briefly giving an introduction to distance education, with particular reference to its history of distance education, benefits and challenges, virtual learners’ characteristics, and online learning versus face-to-face learning. It then proceeds to examine student satisfaction in two areas: dimensions of student satisfaction and comparing student satisfaction between the face-to-face class and the online class. This is followed by reviewing assessment including measurement of learning outcomes and outcomes evaluation models. Finally, this chapter concludes with an examination of epistemological attitudes and beliefs in student learning.

I argue that there is a gap in the literature relative to the three overarching areas of this study (student satisfaction, learning outcomes, and student attitudes and beliefs in learning computers) for computer education at the community college level. The literature reviews are comprised largely of studies of university undergraduate and graduate students. Even with few studies at the college level, the subjects are related to non-computer courses. There also exists a gap in how to bring the three areas together in one study, as these areas are integral elements in the learning process. Online learning is expanding at the College as the enrollment has increased dramatically in the past decade. The College needs to maintain and improve the quality of online courses by creating powerful learning environment which involves instructional designers, instructors, and students. This thesis examines students’ perceptions of learning environment such as course design and delivery, student motivation, and students' academic achievement.

2.2 Distance Education

Online courses provide many college students who have work and family obligations with new opportunities to participate in post-secondary education. The history of online learning has its roots in distance education (Mercer, 2002). This section outlines brief history of the field,
the benefits and challenges of distance education, virtual learners’ characteristics, and online learning versus face-to-face learning.

2.2.1 Overview of Distance Education

Online instruction refers to the teaching process where the student is separated from the teacher physically and connected via the use of a computer with Internet access. Face-to-face instruction refers to the traditional classroom instruction where the student and the teacher interact physically in a classroom setting. Distance education (DE) involves five qualities that distinguish it from other forms of instruction (Keegan, 1996; Rekkedal & Ovist-Eriksen, 2003): (1) the quasi-permanent separation of teacher and learner, (2) the influence of an educational organization, both in planning, preparation and the provision of student support, (3) the use of computers and computer networks to unite teacher and learner and carry the content of the course, (4) the provision of two-way communication via computer networks so that the student may benefit from or even initiate dialogue (this distinguishes it from other uses of technology in education), and (5) the quasi-permanent absence of learning groups.

Distance education has been growing quickly and it has established a secure and rapidly expanding niche in order to meet various learners’ needs, especially in the post-secondary education level (Edmonds, 2005; Motteram & Forrester, 2005; Vonderwell & Zachariah, 2005; Waits & Lewis, 2003). By 2006, online enrollment had reached 2.35 million in the United States (Brown & Corkill, 2007). The American Library Association (ALA) reported that twenty ALA accredited schools in the United States and Canada offered Master of Library and Information Studies (MLIS) degree entirely online and twenty-five of the remaining thirty-six schools presented some online courses for credits toward a degree. In addition, as the cost of traditional education increases, market pressures are forcing more and more institutions to consider online offerings that do not incur the costs of dormitories, athletic programs, and so on.
2.2.2 Brief History of Distance Education

Despite the rapid growth of distance learning, distance education is not a new phenomenon. The development of distance education has been influenced by sociological events, demographics of participants, the technological advancements. By providing a brief history of distance education, one can gain a frame of reference for understanding the impact of past practices and how technical issues have impacted present distance education.

The first form of distance education is correspondence study via postal mail which was the only media available until the twentieth century (Bower & Hardy, 2004). For example, Shorthand lessons using the term distance education were advertised in the Boston Gazette on March 20th, 1728. As a matter of fact, shorthand is considered to be the first subject taught via distance learning (Emmerson, 2004). A distance study in composition via correspondence in a Swedish university in 1833 was also advertised (Holmberg, 2002). In 1856, a correspondence language school in Berlin was established (Holmberg, 2002).

At the end of the nineteenth century, correspondence courses expanded rapidly, especially in Britain and the United States. One Boston-based society provided housewives with over twenty courses in a wide range of subjects and allowed them to complete the courses at their own pace (Simonson, Smaldino, Albright, & Zvacek, 2000). Illinois Wesleyan College in 1874 and the Correspondence University of Ithaca, New York, in 1883, were among other early distance education effort. Recognizing that working adults needed a convenient way to learn advanced skills to better themselves, Thomas J. Foster, who worked in the newspaper industry, began implementing correspondence courses to help coal miners gain engineering knowledge. This effort marked the formation of the International Correspondence School in Scranton, Pennsylvania where enrollment exceeded a quarter of a million students in its first decade. In 1894, it offered courses to students in Mexico, the U.S.; and Australia; and it continues to
provide a large number of distance program today known as Education Direct (Bower & Hardy, 2004). Distance education also saw growth in Britain where private correspondence colleges were established to prepare students taking examinations for post-secondary education degrees (Verduin, Jr. & Clark, 1991). The British Open University founded in 1969 marked the contemporary development of distance education around the globe with a prestigious public recognition (Holmberg, 2002).

Advancements in technology such as radio transmission and audio recording were used to deliver courses at a distance and aimed to combat the limitations of the postal system such as time delay, lost mail, and cost. Almost two hundred American radio stations delivered distance education to the masses. In the 1950s, the Western Reserve University became the first institution to offer regular a series of television courses (Simonson, Smaldino, Albright, & Zvacek, 2000). Between 1964 and 1968, the University of Wisconsin’s Articulated Instructional Media project included all types of media for distance education: print, radio, television, audiotapes, and telephone. This led the way for future distance education courses (Emmerson, 2004).

Satellite technology in the 1960s and the fiber-optic systems of the late 1980s made it possible for two-way live transmission of educational courses (Simonson, Smaldino, Albright, & Zvacek, 2000). Such interactive distance education has been well worth the high price tags of the new technologies (Bower & Hardy, 2004). Internet has become the vehicle that provides asynchronous and synchronous activities to enhance the interaction between students and the instructor. Furthermore, students can access the World Wide Web and communicate with a wider range of people to share information.

In Canada, Queen’s University offered its first correspondence courses in 1889. The University of Saskatchewan delivered off-campus courses such as Better Farming, Homemaker
Short Courses and Canadian Youth Vocational Training Workshops. The University of Alberta presented distance education in 1920. The movement towards distance education gained strength in the 1960s in an effort to serve populations living away from urban centres and to develop new markets. Athabasca University and the Open Learning Institute (renamed the Thompson Rivers University, Open Learning - TRU-OL) were founded to exclusively offer distance learning. The trend continued during the 1980s and included the development of distance education programs at the British Colombia Institute of Technology (1985), McGill University (1987), and the Sault College of Applied Arts and Technology (1988) among others.

**2.2.3 Benefits and Challenges of Distance Education**

Online education provides an opportunity for new development and understanding in teaching and learning (Foster & Carneavale, 2007; McDonald, 2002). There are three principal forces driving online initiatives: accessibility, flexibility, and cost-effectiveness (Oliver, 1999; Zhao, 2003). Computer-mediated communication (CMC) is able to facilitate interactive, authentic, self-directed learning opportunities where social, affective and cognitive benefits of peer collaboration for critical thinking and active participation could be developed (McDonald, 2002).

In exploring students’ cognitive engagements with electronic conferencing which serves as a social and intellectual tool for achieving cognitive development, instructors use the technology to integrate online discussions and course contents intentionally in order to nurture students’ higher order-thinking skills (Zhu, 2006). One of the factors contributing to students’ high levels of cognitive engagement is how the instructor uses technology to design questions and to facilitate the online discussions. Thus, the effective application of technological pedagogical content knowledge results in generating new insights, knowledge, perspectives and understandings.
Despite many of the benefits that online education offers, it also poses many challenges. First, online students experienced a higher attrition rate than their face-to-face counterparts (Powell & Keen, 2006; Woodley, 2004) and it is hard for online students to develop the study habits and rhythms to succeed (Jones, 1996). The average completion rate for online credit courses from 1995 to 2000 was 52 percent, which is 13 percent lower than the traditional courses. One study found that the percentage of students receiving a D, F, or, W (withdrawal) was 47.6 percent for online compared to 29.5 percent for traditional courses (Wallace, 2002). Morgan and Tam (1999) found that factors related to persistence in online courses fall mainly into four categories: situational (students’ life circumstances), institutional (admission procedures and support services), dispositional (students’ attitude, confidence, and motivation), and epistemological (course content). This study grounds in students’ attitude, confidence, and motivation in learning computer applications.

Second, although distance education as an alternative instructional mode of delivering education is needed in community colleges (Carnevale & Olsen, 2003; Tang & Hung, 2002), it faces a lack of funding (Allen & Seaman, 2003; Levin & Sun, 2002). The cost of online education is the same or higher per student as compared to traditional education since the cost of technology increases the cost of online education. The technology becomes outdated very quickly as compared to a traditional classroom (Cohen, 1999). Furthermore, equipment and hardware malfunctions can be a great disadvantage to the effectiveness of distance education (Valentine, 2002). Technical difficulties can have a negative effect on the success of online courses and student satisfaction (Rivera, McAllister & Rice, 2002). This study tackles the technical issues such as accessing WebCT and SAM in both face-to-face and online class.

Third, the main criticism of distance education is that online courses lack personalized, verbal communication between the student and the teacher. “Personal attention matters. Personal
interactions matter. There is no amount of e-mail, chat-room jabber, threaded discussion, or video that can replace live, face-to-face interactions between teachers and students” (Moore et al., 2001, p. 391). The nonverbal clues such as eye contact, facial expression, and body movement influence the way the message is interpreted and decoded. This study probes the communication between the student and the teacher in both physical and virtual environment. Such communication includes the teacher answering students’ questions, giving students’ feedback about their assignments and tests, as well as general course management.

Fourth, some reviews related to distance education have criticized both the focus and research methods (Murphy & Cifuentes, 2001). More than 23 percent of studies reported in the literature were related to technology and the role of instructor rather than the role of the learner (McIssac & Gunawardena, 2004). Of these reports, about one-third of the research studies were empirical and two-thirds of the studies were theoretical (Anglin & Morrison, 2000). This study is an empirical study which examines students’ perceptions of learning computers.

2.2.4 Virtual Learners’ Characteristics

Focusing on the structure of instructional programs and dialogue among instructors and learners, the theory of transactional distance (Moore, 1993) has impacted distance education and online learning with a shift from teacher-centered instruction to learner-centered instruction (Gunawardena, 1992; Harasim, Hiltz, Teles & Turoff, 1995). Transactional distance is defined as the theory of cognitive space between instructors and learners in an educational setting (Moore, 1993). Transactional distance, not a physical distance, is a function of structure and dialogue. Structure measures an educational program’s responsiveness to learners’ individual needs and dialogue is the two-way communication between learners and the teacher. Transactional distance is minimized by improving dialogue and structure. An online environment with high interaction and a less rigid format will be more engaging to learners. It is this engagement that plays a factor
among other factors in student learning. This study investigates students’ perceptions of learning computers. Teachers could use the results to refine the curriculum to meet students’ needs.

Educators have begun to build their instructional methods based on learners’ individual differences and learning styles as a result of the paradigm shift from teacher-centered learning to student-centered learning (Abdallah, 2008). Distance education learners differ in a variety of ways: (1) demographic factors such as age, gender and ethnicity; (2) psychological factors such as personality type, learning style, and motivations; and (3) learning goals (Thompson, 1998). This study examines student motivation in learning computers. Successful distance education learners use cognitive learning strategies for processing information, planning metacognitive activities for self-regulation, and setting specific and attainable goals (Olgren, 1998). There is a need to use rigor in exploring the learner experience of distance education and to identify strategies to reduce transactional distance (Murphy & Cifuentes, 2001). This study identifies factors that best supported in learning computers in both face-to-face class and online class.

### 2.2.5 Online Learning versus Face-to-face Learning

As additional online courses and programs emerge, concerns about the quality of online education become more challenging. The Sloan Consortium (Sloan-C) outlined five pillars of quality distance education programs: learning effectiveness, access, student satisfaction, faculty satisfaction, and cost effectiveness (Moore, 2002). Online distance education programs can offer many benefits to students. For example, the use of computer-mediated communication means students must use a written form of expression to communicate with one another while articulating and developing ideas, arguing contrasting viewpoints, refining opinions, and settling disputes (Abrami & Bures, 1996). This use of written language and peer interaction allows for the possibility of increased reflection, the development of writing skills and higher quality performance, and complex problem solving skills through peer modeling and mentoring.
Studies exploring and comparing online learning with face-to-face mainly focus on learning outcomes. There have been two main research results regarding the effects of online versus face-to-face instruction in terms of student academic achievement (Phipps & Merisotis 1999; Russell 1999). The first research result supported the “significant phenomenon”, citing online learners have a significantly higher level of learning achievement over their traditional counterparts (Hacker & Sova, 1998). For example, one study showed that computer-based instruction yielded higher average scores than traditional instruction (Vasarhelyi & Graham, 1997). An investigation to evaluate the effectiveness of online instruction found that online students outscored their traditional counterparts by an average of 20 percent (McCollum, 1997).

In contrast, the second research result in this area is the “no significant phenomenon”, citing no differences in learning outcome between online and face-to-face courses. There are many empirical studies that support this claim from different disciplines: a graduate MBA course (Navarro & Shoemaker, 1999); business statistics courses (McLaren, 2004); management information systems and children’s literature courses (Patterson & Hoehlein, 2002); an introductory computer science course (Kleinman & Entin, 2002); an introductory biology course (Johnson, 2002); an introductory chemistry course (Hjorth-Gustin, 2004); graduate-level instructional design courses (Johnson, Aragon, Shaik, & Palma-Riva, 2000); and a graduate teacher education course (Warren & Holloman, 2005).

Russell (1999) reviewed 350 research reports, summaries and papers about the effectiveness of online education and said that “The good news is that these no significant difference studies provide substantial evidence that technology does not denigrate instruction” (Russell, 1999, p. xiii). Zhao et al. (2005) conducted a meta-analysis and showed no significant differences between online and face-to-face learning. These results have strengthened support for
online learning in higher education where students are considered to be learning as effectively online as they are face-to-face.

The effectiveness of online education depends on a multiplicity of factors: theoretical models of learning, the level of technology development, teacher and student attitudes towards e-learning, institutional attitudes and organizational support (Hooper, 2003; Kreijnsa, Kirschner, & Jochems, 2003). With respect to distance education effectiveness studies in science, Charnitski and Harvey (2000) showed that both online and face-to-face students developed higher-level science concepts when evaluating whether online class was as efficient as the face-to-face class with pre-service science teachers. In the area of online physics, Smith and Taylor (1995) investigated an online course that was highly structured and included multiple submissions of homework, memo reading, and daily assignments. They stated that the online course was inclusive and provided instruction to a wide range of students including high school students, high school teachers, college students and college teachers. They also viewed online education as a vehicle for computer knowledge and providing a plan for independent and responsible education. Literature also reveals several areas on teaching online biology including the use of online pre-labs (Wyatt, 2003), the use of a Virtual Learning Environment in a first-year biology course at the University of Sydney, the delivery of an upper division molecular biology laboratory (Hewlett, 2000), and offering an online biology laboratory via WebCT at San Diego Miramar College (Gee, 2002).

Studies investigating online and face-to-face courses utilize four criteria to assess the quality of learning. Criterion one has focused on the interaction between students and the instructor. Although a few studies have identified the dynamics and differences between synchronous and asynchronous discussions (Ahern & El Hindi, 2000), a number of studies focus on how students and instructor formed a learning community with emphasis on the role of
discussion moderator, the relevance and display of student emotions and feelings, and the role of
the instructor in the discussion group (Linardopulos, 2010). Criterion two concerns student
performance with focus on students’ grades which serve as basis for evaluating the differences in
student performance between the online and the face-to-face class (Peterson & Bond, 2004).
Criterion three assesses student satisfaction with courses delivered in online and face-to-face
settings in the areas of course content, assessment techniques, and attitudes and opinions
regarding student learning experience (Kidney, Cummings, & Boehm, 2007). Criterion four
evaluates faculty workload and teaching experiences with respect to online and face-to-face
environment. This study explores student satisfaction and student performance.

There are different research approaches that can be used to compare student achievement
in an online course versus a face-to-face course. One approach is to examine student grades to
see if online students were as prepared as face-to-face students for subsequent courses
(Dominguez & Ridley, 2001). The researchers identified six departments with eight disciplines
(Computer Science, Economics, Education, Government, Management, Philosophy, Psychology,
and Spanish) at the Christopher Newport University in Virginia. Final grades in the subsequent
course were compared for the students who had taken the prerequisite online to the students who
had taken the prerequisite course in a face-to-face format. They found no significant differences
in the grades of the two groups of students. Nevertheless, the researchers identified one
discipline (Management) in which students had not performed well in the subsequent course.
They provided two possible reasons for this. One was the ineffectiveness of online instruction
(course content and expectations did not align with the text based communication) and the other
was the bias in the grading of students who took online courses previously. This implied that the
pedagogy and discipline were factors to consider when comparing the effectiveness of an online
course with a face-to-face course.
Another approach is to survey alumni who had taken online courses and face-to-face courses (Wisan, Nazma, & Pscherer, 2001). The researchers found that student satisfaction had a positive relationship with the number of online courses they had taken. Students who took no more than three online courses scored face-to-face instruction higher than online instruction. However, students who took four or more online courses rated the online classes as their favorite mode of learning.

2.3 Student Satisfaction

Student satisfaction is the student’s perception of the college learning experience and the perceived value of the education received in an educational institution. There are many factors that influence student satisfaction: curricula and instructions, quality of relationships with professors, support services, resources and facilities, and student characteristics (Bollinger & Martindale, 2004). Although some researchers argue that student satisfaction surveys do not measure student learning or actual knowledge gained, student satisfaction has been utilized as one of the effective measurement tools in determining the overall quality, success, and development of the course and the program outcomes (Armstrong, Chang, & Brickman, 2007; Hanze & Berger, 2007). Understanding student satisfaction with individual courses and with the overall learning experience may provide valuable information about the learning environment at different dimensions, which I now turn to.

2.3.1 Dimensions of Student Satisfaction

In exploring the four dimensions known to impact student satisfaction, DeBourgh (2003) conducted a study to investigate graduate nursing student satisfaction with an online course. Instructor/instruction played a significant role in student satisfaction out of the four dimensions of learner attributes, instructor/instruction, technology, and course management. Other factors
that were positively correlated with student satisfaction were opportunities for participation and recognition during instruction and timely feedback (DeBourgh, 2003).

In a study tackling student satisfaction in an online MBA program, Kim et al. (2005) revealed that student satisfaction with the MBA online courses was positively correlated with the following factors: students’ feeling of having learned a lot, students’ academic confidence, prompt feedback from the instructor, and students’ perceived effectiveness of instructor’s facilitation. 93 percent of all students agreed or strongly agreed that they were satisfied with the online courses and ninety-six percent of students would highly recommend these online courses to others. Furthermore, 100 students in this study identified several benefits of online learning: flexibility, the ability to develop virtual team skills, and more opportunities for interaction with the instructor. Students also reported challenges to learning online such as difficulty in communicating with peers and the absence of real time feedback.

In reviewing factors affecting student satisfaction towards learning, Sun et al. (2008) constructed six dimensions: learners (attitude toward computers, computer anxiety, and Internet self-efficacy), instructors (response timelines and attitude toward learning), course (flexibility and quality), technology (quality and accessibility), course design (perceived usefulness and ease of use), and environment (diversity in assessment and learner perceived interaction with others). Out of these dimensions, the researchers identified seven critical variables positively correlate to student satisfaction: learner computer anxiety, instructor attitude toward learning, course flexibility, course quality, perceived usefulness, perceived ease of use, and diversity in assessment.

As for online learning satisfaction, one case study (Hong, 2002) explored students in a Master of Science program to investigate the relationship between students’ variables (prior computer experience, gender, age, scholastic aptitude, and learning styles) and instructional
variables (student-instructor interaction, student-student interaction, perception of course activities, perceptions of asynchronous Web-based conference, and amount of time spent on the course). This study found that there was no relationship between learning satisfaction and students’ variables. However, instructional variables such as student-instructor interaction and perceptions of course activities correlate to student satisfaction (Hong, 2002). In determining students’ perceptions of quality in distance education, Young and Norgard (2006) reported these important factors: online course interaction, course content and online course support. Other researchers supported this claim and they found that the contributing factors to student satisfaction in online environments included the contact between students and faculty, cooperation among students, actively learning techniques, prompt feedback, and varieties of learning activities (Fredericksen, Pickett, Pelz, Shea, & Swan, 2000; Thurmond, Wambach, Conners, & Frey, 2002).

Understanding these dimensions of student satisfaction may assist faculties and administrations in designing and developing courses and programs that provide satisfying learning experiences for students, while maintaining enrollment rates and enhancing students’ persistence. The results of the literature review suggest that faculties need to be aware of the challenges students face in both face-to-face and online environments to fine-tune the curriculum to ensure academic success. Students’ perceptions of the learning environment could positively affect their learning behavior and the quality of their learning outcomes (Ben-Ari & Eliassy, 2003; Konings, Brand-Gruwel, & van Merrienboer, 2005).

### 2.3.2 Student Satisfaction for Online Courses and Face-to-face Courses

Some studies reported conflicting results on student satisfaction in online courses versus face-to-face courses. In a graduate course in instructional design, some researchers stated that face-to-face students reported more positive responses than students taking the same course
online in the areas of satisfactions, course interactions, course structures and support (Johnson, Aragon, Shaik, & Palma-Rivas, 2000). In another study conducted on a statistics class for undergraduate nursing students, researchers found significant differences between face-to-face students and online students with respect to their perceptions of course delivery and the instructor (Summers, Waigandt, & Whittaker, 2005). Face-to-face students showed higher satisfaction rating in the following areas: class discussion, quality of questions/problems, evaluation/grading techniques, instructor’s explanations, instructor’s enthusiasm, instructor’s openness to students, and instructor’s interest in student learning.

While some researchers claimed that face-to-face students informed higher learning satisfaction, other researchers maintained that online students reported higher levels of satisfaction, learning and participation than face-to-face students in an English composition class (Finlay, Desmet, Evans, 2004). These researchers then utilized qualitative data to elaborate the quantitative findings to gain insight into why online students were more satisfied than face-to-face students:

Innovative instructors increased student satisfaction and learning; instructors who interacted with students increased their participation in classroom discussion. Instructors who created an environment in the classroom in which students had some autonomy, and in which they knew what they needed to do to succeed, also increased student satisfaction and, in the case of clear indicators of success, increased student participation. (p. 178)

Another study examining student ratings of an undergraduate wellness course offered in an online, face-to-face, and blended format found that online and blended students had higher satisfaction levels than face-to-face students over quality of instruction and course delivery (Lim, Kim, Chen, & Ryder, 2008). Also, online students and blended students demonstrated higher academic achievements than face-to-face students. Furthermore, no significant differences were found between online students and blended students with respect to their overall learning experience. These researchers suggest that future research is necessary to understand not only the
effect of online education on student satisfaction but also other factors that affect student satisfaction.

2.4 Assessment

Assessment is an ongoing process in teaching and learning. Outcomes-based assessment is used at both the program and course levels. Since this study compares students learning outcomes between the online class and the face-to-face class, the following illustrate measurement of learning outcomes and outcomes evaluation models.

2.4.1 Measurement of Learning Outcomes

Academic achievement which is measured by various outcomes is one of four important educational goals. These educational goals include academic, vocational, civic, and personal goals. “The academic function involves the development of intellectual skills and knowledge; the vocational function prepares people for work; the social function prepares people to be citizens; and the personal function emphasizes the development of the individual” (Darling-Hammond et al., 2005, p. 172). Assessment of student learning is an integral part of the learning process and it can improve instruction and promote learning if it is based on tasks or questions that align with the learning outcomes.

Two major types of assessment are formative and summative assessment. Formative assessment may involve informal methods such as oral questioning of students, oral presentations, interviews, written work products, observation, portfolios, performance tasks, and quizzes (Shepard et al., 2005). The formative assessment such as online discussion, online group work, and online quizzes are also used for the online courses. Formative assessment can be a powerful tool to increase learning and boost average students to that of top 20 percentile (Black & William, 1998).
While formative assessment enables learning, summative assessment documents achievement for the purpose of giving grades or certifying student proficiency. Summative assessment engages students in review and relearning and keeps students mentally processing of the contents that connect to subsequent study (Shepard et al., 2005). Positive effects of summative assessment, however, are also accompanied by negative effects such as lower interest and less willingness to persist as a result of using normative comparisons (Butler, 1987, 1988); undermining intrinsic interest resulting from difficult tasks (Stipek, 2002). Furthermore, the use of grades as rewards contributes to the “commoditization of learning” (Lave & Wenger, 1991, p. 112). In short, the two assessment tools (formative and summative) are used widely to improve instruction in order to maximize student learning growth. This study utilizes both formative assessment and summative assessment to measure student academic achievement.

2.4.2 Outcomes Evaluation Models

A broad hierarchical outcome model asserts that program outcomes can be categorized into four levels (Kirkpatrick, 1998). Level 1 (Reaction) measures how students react to the course. Level 2 (Learning) involves measuring changes in the skills, knowledge, or attitudes of the students as a result of the course. Level 3 (Behavior) concerns the extent to which changes in behavior have occurred as a result of the students attending the course. Level 4 (Results) measures the final results that occurred because the students attended the course.

The four-level model provides a remarkable utility for educators with an uncomplicated framework for judging the merit and worth of a course or a program. For example, it is relatively easy and cost effective to obtain outcome measurements on level 1 and level 2. Although the model rooted in the human resource training programs, it has been applied to programs in business, professional development, and health sciences (Hamblin, 1974; Kaufman, Keller, & Watkins, 1995; Molenda, Pershing, & Reigeluth, 1996; Phillips, 1994). Despite the strengths of
the model, researchers have identified three problematic features: the levels are arranged in ascending order; the levels are causally linked; and the levels are positively intercorrelated (Alliger & Janak, 1989; Bernthal, 1995; Clement, 1982; Lewicki, 1986; Rodin & Rodin, 1972).

Learner satisfaction and learner knowledge are two levels of learning outcomes commonly used to evaluate distance education courses. The intended outcomes are measurable manifestations of the program’s goals and are aimed to improve online community formation or supporting skills and knowledge development in relation to online course content. Assessment for distance education should focus on the skills and tasks that learners can demonstrate, rather than the factual recall ability (Robles & Braathen, 2002). The effective assessment is the one that maximizes student motivation and online learning. This study investigates students’ perceptions (Level 1) and academic achievement (Level 2).

2.5 Attitude and Learning

One primary research question in this study is about attitude in acquisition of computer applications and academic achievement. This necessitates a review of the literature related to attribution theory, attitude and motivation, and attitude and learning.

2.5.1 Attribution Theory

The attribution theory that originated in the late 1950s and early 1960s is concerned with how individual interpret events and how this relates to their thinking and behaviour (Wilson, Damiani & Shelton, 2002). This theory assumes that people try to determine why people do what they do. The actual causes of behavior are relevant. The more people worry about problems, the worse the problems become (Storms & McCaul, 1976; Valins & Nisbett, 1972).

When students are being asked the question why they have failed or succeeded, the answer affects their future in terms of expectations of success, emotional reactions, and persistence at achievement-related tasks (Gagne, 1993). The explanations of causes of their
academic success or failure differ for individual student (Ferla, Valcke, & Schuyten, 2008). Ability, effort, task difficulty and luck are the major causes of the academic achievement that researchers usually identify; and these causes can be classified as locus (internal or external attribute), stability and controllability (Weiner, 1986). This study inquires factors contributing to student academic success. Attributing academic success to controllable causes has been found to be positively related to cognition, metacognition, and motivation (Perry, Hladkyj, Perkrun & Pelletier, 2001; Schunk & Ertmer, 2000).

### 2.5.2 Attitude and Motivation

Students who are interested in school have higher academic achievements than those who are not interested (Weiner, 1992). Conversely, students who have high academic achievement tend to show the feelings of love and enjoyment of school (Torrance, 2004). There are three components of the traditional model of attitude: cognitive, affective, and behavioral (Karpinski & Hilton, 2001). The cognitive-affective foundation is a structural view that echoes cognitive consistency theory (Rosenberg, 1960). This theory states that student attitudes (such as motivation, positive learning values, enthusiasm, interest, and pride in success) and beliefs (such as emotional feelings and mental states) tend to be consistent with each other. For example, if a student believes that he or she is smart, he or she will be motivated to adopt the necessary attitude to reinforce this belief.

What a student believe about his or her ability affects his or her motivation (Ragland, 2008). Some students believe that the lack of ability is the reason for their academic failure. This attitude leads them to adopt failure-avoiding strategies such as setting unrealistic goals or choosing to withhold effort (Alderman, 2004). A subset of belief is self-conceptions which have an impact on attitudes for students toward mathematics (Thomas, 2000). Motivation and positive attitudes tend to be linked to achievement (Rocco, 2004).
Motivation is essential in getting students involved in their learning and in getting them to improve their level of academic performances (Coll, 1995). Motivation, self-efficacy, and self-regulated learning play critical roles in academic achievements (Semmar, 2006). When individuals feel confident about their abilities, they self-regulate their learning, sustain high motivational levels, and they are more likely to be at a greater advantage accomplishing their tasks in the academic realm. On the other hand, when they are unmotivated to take part in the learning process and doubt their competence, they are unlikely to achieve their academic goals (Griffin, 2007).

Students are motivated to learn in order to achieve either extrinsic reward such as earning credits, getting good grades and gaining abilities or intrinsic reward such as satisfying their own interests and curiosity (Bandura, 1977; Deci, 1975; Maehr, 1976; Pintrich & Schunk, 2002; Ryan & Deci, 2000). An appropriate environment can enhance the motivation to learn, foster creativity, lead students to seek challenges, and to become more confident (Maehr & Midgley, 1991). One such environment is TARGET which is grounded in a goal orientation view of motivation and a social cognitive view of learning strategies (TARGET is an acronym for “task, authority recognition, grouping, evaluation, and time”). It aims to provide an enhanced student motivational learning environment where students have choices, can make decisions, interact with others and learn from group work (Maehr & Midgley, 1991). Less learning will occur in an environment that fails to encourage students to sustain spontaneous motivation to learn (Keller, 1983). This study investigates student’s motivation in learning computer applications.

2.5.3 Attitude and Learning

Attitude surveys can reveal valuable information about students’ perceptions of their course experience (Lewis & Seymour, 1997). Specifically, they can provide perceptions of the components of the course. They can also focus on students’ needs, interest, and appreciation for
the course content, their confidence about learning the subject, and their beliefs about the nature of the subject matter. One indicators of the effectiveness of the learning process is attitudes as it positively correlate to academic achievement (Pearcy, 2009). Academic achievements have a significant relationship with student motivation and academic self-perceptions (Ragland, 2008). Research data from the fall semester of the 2006-2007 school year shows that self-confidence proved the strongest indicator of achievement in mathematics for students in the 10\(^{th}\) grade in a southeastern state in the U.S. (Griffin, 2007). Self-efficacy, self-regulated strategies, and motivation seem to play a vital role in the academic achievement of adult learners (Semmar, 2006).

The relationship between attitude and achievements is reciprocal (Goodykoontz, 2008). Some studies argue that academic achievement influences student attitudes. For example, an ethnographic case study on an eighth grade girl showed that a high score on an exam resulted in an increase in the positive attitude toward mathematics (Hannula, 2002). Another study using the Attitude Toward Mathematics Instrument for 7\(^{th}\) through 12\(^{th}\) graders found that “Achievement levels influenced value, motivation, and enjoyment at all grade levels” (Tapia & Marsh, 2001, p. 14).

On the other hand, other studies suggest that student attitudes affect academic achievements. A quantitative study using a structural equation model on middle school students in Cyprus found that attitude and beliefs do have some impact on academic achievements (Papanastasiou, 2002). The researcher examined data from student questionnaires (N = 1026) and tests in eighth grade mathematics. Then the researcher analyzed the relationships among variables such as student attitudes toward mathematics and their math test scores. The study demonstrated that attitudes and beliefs had a direct effect on learning outcomes. Similar findings in some developmental mathematics college courses suggest student attitudes were related to
academic achievements as measured by tests (Higbee & Thomas, 1999). 23 college students taking algebra course were asked to complete the test attitudes inventory and self-esteem inventory. The results implied that student attitudes toward math and toward themselves as learners were positively related to academic achievement. Furthermore, a study involving 218 students at a large University in the United States showed that self-ratings of overall academic ability, self-ratings of mathematics ability, and expectation of graduating with honors were significantly correlated with achievement in calculus (House, 1995).

2.6 Summary

This study examines online class versus face-to-face class at a community college on the dimensions of students’ perceptions of a computer course and their attitudes toward the acquisition of computer applications as well as their academic achievements. The literature review is relevant to current thesis study which includes but not restricted to distance education, student satisfaction, assessment, and epistemological attitudes and motivation. First, I provided an overall review of distance education, a brief history, discussing benefits and challenges, the presenting effectiveness of online learning versus face-to-face learning in terms of students’ satisfaction and learning outcomes. These aspects have laid a foundation and provided broader contexts relevant for the current study. Second, I examined factors that affect student satisfaction for both face-to-face courses and online courses. These factors include course management, instructor/instruction, interaction between the teacher and students, assessments, technology, and student characteristics.

Although these factors have been found to promote meaningful, active, engaging, and effective learning, little is known about the effect of these factors on computer courses at community college level. Both online and face-to-face education is expanding at the College. Maintaining and improving the quality of both mode of delivery by creating a powerful learning
environment which involves instructional designers, instructors, and students. This thesis takes students' perceptions of learning environment such as course design and delivery, student motivation, and students' academic achievement. There are very few studies in the literature that examine all three aspects (student satisfaction, learning outcomes, and epistemological attitudes) in one study. The gap in the literature has inspired the current study. In Chapter Three, I describe and justify the mixed research methods for this study.
Chapter Three: Methodology

The primary research questions for this study are how students’ perceptions of course design and delivery, attitude toward acquisition of computer applications, and academic achievement differ in the two delivery modes (online and face-to-face). This chapter will describe the research approach. I will first introduce the research setting, then, I will line up the research questions with a suitable sampling frame and methodology. Specifically, I will outline the mixed methods design, sampling procedure, data collection methods, data analysis strategies, validity in mixed methods research, and ethical issues.

3.1 Research Setting

My research site is a community college located in a large urban centre in Canada. There are over 14,000 full-time students at the College and over 50,000 continuing education students. The College offers more than 150 career-focused certificate, diploma, and post-graduate and degree programs such as Financial Services, Hospitality Operations Management, Construction Science and Management, Nursing and Early Childhood Education. The mission statement highlights its desire to accomplish excellence in teaching and learning and to enable students to succeed in achieving their individual, career and life goals.

Inspired by achieving excellence in teaching and applied learning, the 2005-2008 Academic Strategy at the College identified four core values: putting student learning first so as to prepare them as fully as possible to be outstanding employees and citizens; becoming a learning community where staff are highly valued, learning is constantly stimulated, accomplishments are celebrated and best practices are rewarded; championing diversity and internationalization so that our curriculum and our behavior reflect and support our diversity and our global perspective; and promoting innovation and scholarship where we foster a culture of
risk-taking, innovation and reflection that generates new knowledge and practices. These core values are about nurturing a culture of learning, engagement and accountability.

The Academic Strategy for 2005-2008 articulates the core values with students’ top priorities for academic excellence. These priorities include a quality of the learning environment that is comfortable, conducive and supportive to learning and curriculum that is clear, current and relevant. Outcomes-based learning is reflected on all of the course outlines and teaching practices with recognition and integration of student learning in and outside the classrooms, including on-line learning. Online learning is expected to be in line with the College’s mission to comply with accreditation standards (Law, Hawkes, & Murphy, 2002).

The Faculty of Business is one of five faculties that have become woven into the College. There are currently two divisions under the Centre for Business: School of Financial Services Education and School of Business. The School of Business which is my research site offers an array of challenging diploma and postgraduate certificate programs in Business Administration, Human Resources Management, and Marketing. The number of online courses for the Centre for Business has grown from six courses in the Fall of 2005 to thirteen courses in the Winter of 2011. My research participants are all full-time three-year diploma students in the Centre for Business.

In the Fall of 2004, I proposed and designed the online computer course for the three-year diploma students in management studies, marketing and human resources programs and they were deployed and delivered to the students in the Fall of 2005. Figure 1 illustrates the number of students taking computer course across the six academic years with each academic year consist of three semesters – Fall, Winter, and Spring/Summer. The enrollment number does not include those who dropped the course.
Figure 1: Enrollment Number

The computer course deals with two units: MS PowerPoint and MS Excel. Students learn to produce multimedia presentations, slides, audience handouts, presentation outlines, and speaker’s notes in PowerPoint. Students also learn to prepare basic and intermediate level Excel spreadsheets that provide information to support decision-making and problem solving in a business environment. Face-to-face and online classes follow the same course outline with different delivery system. Face-to-face students attend class three hours a week and the course is delivered through in-class demonstrations, online training components using WebCT and Skills Assessment Manager (SAM), and hands-on activities at the computer. Students are expected to allocate a significant number of outside-class hours to both the learning process and the production of application projects and assignments. The professor is available during scheduled classes and office hours to provide guidance and additional assistance as required by individual students. Online students are expected to access online training components using WebCT and SAM. Students receive personalized professor support and feedback through office hours, online
chat, e-mail, voice-mail and discussion groups. Both face-to-face and online students write tests on the campus with evaluation system including assignments, tutorials, quizzes and tests.

I have taught both face-to-face and online sections of the course for six years in the College. I had firsthand experience and witnessed the similarities and differences between the face-to-face section and the online section. I wanted to learn about student satisfaction and learning outcomes between the face-to-face and online sections.

3.2 Research Design

Mixed method research reflects a new conceptualization of the relationship between naturalistic observation and obtrusive measurement (Li, Marquart, & Zercher, 2000). Some researchers perceive different paradigms as embodying fundamentally different and incompatible assumptions and they believe that it is not possible to mix paradigms in the same study (Guba, 1990; Lincoln & Guba, 1985; Smith, 1983). Other researchers believe that paradigms themselves are socially constructed and historically situated and that they are not inviolate or sacrosanct (Greene & Caracelli, 1997). Therefore, they can be used both within and across studies toward a dialectical detection of better understandings of new and reframed perspectives and meanings (Greene & Caracelli, 1997). Quantitative studies stress the measurement and analysis of causal relationships among variables while qualitative researchers highlight the socially constructed and interpreted multiple realities (Silverman, 2005). Erzberger and Kelle (2003) argue that “Qualitative or quantitative data alone did not yield sufficient information to allow us to fully understand the social process under scrutiny. Qualitative and quantitative methods have to be combined to allow adequate explanations of the phenomena under study” (p. 474).

Greene, Caracelli and Graham (1989) developed a conceptual framework that identified five common purposes for mixed-method designs. First, triangulation seeks convergence, corroboration, and correspondence of results from the different methods to increase validity.
Methodological triangulation is enhanced when the status of the different methods is equal and the methods are implemented independently and simultaneously. Second, complementarity seeks elaboration, enhancement, illustration, and clarification of the results from one method with the results from the other method. Third, development seeks to use the results from one method to help develop or inform the other method, where development is broadly construed to include samplings, implementations, and measurement decisions. Fourth, initiation seeks the discovery of paradox and contradiction, new perspectives or frameworks, the recasting of questions or results from one method with questions or results from the other method. Fifth, expansion seeks to expend the breadth and range of inquiry by using different methods for different inquiry components. In this mixed methods study, I seek triangulation and complementarity to examine the research questions from multiple perspectives and to develop insightful and enriched understanding of students’ experiences in learning computers.

The major strength of a mixed methods approach is that the researcher can design and develop a comprehensive and complete study (Morse, 2003). Mixed methods allow researchers to collect different sets of data using quantitative and qualitative methods (Johnson and Christenson, 2004). Results from one method can help inform another method and provide different levels of analysis (Greene, Caracelli, & Graham, 1989; Tashakkori & Teddie, 1998, 2003a). The possible benefits of a mixed-method design depend on how the qualitative and quantitative data are synthesized and incorporated (Li, Marquart & Zercher, 2000). I use mixed methods in order to gain broader perspectives and a deep understanding of the different factors affecting student attitudes toward the course design and delivery as well as their academic achievement.
3.3 Sampling Procedure

Sampling can be a powerful tool for measuring characteristics and opinions of a population. Sampling procedure is classified under two main categories: probability sampling and non-probability sampling. Probability sampling is intended to generalize the research results to the entire population while non-probability sampling can provide deep and valuable information about a specific sample. The procedures used to select a sample require prior knowledge of the population. I will describe the theoretical perspective and practical population in the following section.

3.3.1 Theoretical Perspective

To maximize the credibility of mixed methods research, a sampling design that consists of sampling schemes and sample sizes is a pivotal step in addressing four challenges in mixed-methods research (Collins, Onquegbuzie, & Sutton, 2006). First, the challenge of representation can be improved by connecting sampling decisions to the research goal, research objective, rationale of the study, purpose of the study and research questions. Second, the challenge of validity can be overcome by ensuring that the inferences branch directly from the underlying sample of units. Third, the challenge of integration can be reduced by utilizing both sets of inferences in such a way that they are combined into a coherent whole. Fourth, the challenge of politics can be decreased by employing sampling designs that are realistic, efficient, practical and ethical.

3.3.2 Practical Population

A two-dimensional mixed methods sampling mode (Collins et al., 2007) is adopted. It involves a sequential design using four purposeful samples for the qualitative and quantitative components of the study. This study uses a nonequivalent control group design for students in the Fall of 2009. Two approaches (face-to-face and online) for the computer class at the three-
year college diploma level are compared. The students in both sections of the course were presented with identical content. In addition to assignments, quizzes and tests, students in the online sections were asked to submit all of the tutorials to the assignment drop box in WebCT.

The dependent variables were students’ profiles, perceptions of course design and delivery, attitude and motivation in the acquisition of computer applications, and academic achievement as measured by the test scores. The independent variable was online versus face-to-face instruction. Several major features of WebCT were used throughout the semester such as online writing and presentation, bulletin board discussion, and online testing. In addition, online computer simulated software was used by both face-to-face and online students. Students were told that they could self-select either section of the course at the beginning of the Fall of 2009. Based on the enrollment data from the Fall of 2009, there were 518 students in the face-to-face class, 36 students in the online class. These numbers do not include the students who later dropped out.

There were four samples in this study. The first sample consists of 42 students who enrolled in the face-to-face session. The second sample consists of 36 students who enrolled in the online session. The third sample consists of 3 students from the face-to-face session who were interviewed after they completed the questionnaire. The fourth sample consists of 3 students in the online session who were interviewed after they completed the questionnaire. Students in the face-to-face section attended a weekly 3-hour class. Students in the online section completed 11 modules and met on-campus for three, one-hour tests. All students had the same professor.

### 3.4 Data Collection Methods

This study employed quantitative and qualitative measures from September 2009 to December 2009. The quantitative data consists of the results of a questionnaire and students’ test
scores. The qualitative data consists of semi-structured interviews with students in the face-to-face class and the online class as well as field observations.

3.4.1 Questionnaire

The purpose of a questionnaire is to find out people’s reactions and to determine the beliefs of a population (Dunn, 2000). The questionnaire draws on a number of different sources including The Experiences of Learning and Teaching Student Survey (Kata, 2009), The Distance and Open Learning Environment Scale (Reeves, 2008), Course Quality Survey (Fydryszewski, 2009), as well as the College Student Feedback Questionnaire used by my current teaching institution. This study analyzes the students’ reactions about the computer course and their beliefs about learning computer applications. Students in the face-to-face and online classes were asked to complete a Student Feedback Questionnaire. Two main types of data were collected using the survey; demographic data of the students that are currently undertaking the course, and course specific data on the students’ experiences of learning in this course. Students’ perception of the course design and delivery, attitude and motivation in the acquisition of computer applications, and academic achievement (test scores) were compared between the face-to-face class and the online class. The questionnaire contains 48 Likert-scale items: (1) strongly agree, (2) agree, (3) somewhat agree, (4) somewhat disagree (5) disagree, and (6) strongly disagree. Open-ended questions invited narrative responses to assess the positive and/or negative factors of the course as well as any suggestions for improving the course.

3.4.2 Interview

In order to gather in-depth information on student attitudes towards the course design and delivery as well as their perception of acquisition of computer applications, a semi-structured one-on-one interview was used (Appendix E and Appendix F). The interview aimed to gather more in depth data that could be compared and contrasted between face-to-face and online
students (Fraenkel and Wallen, 2000). Topics were pre-specified and listed on the interview protocol and they were rephrased as situations dictated (Johnson & Turner, 2003). Interview questions were based on the research questions, review of the related literature and my teaching experiences. There were four categories in the interview questions: factors in choosing this course, technological services and support, beliefs and motivation for taking this course, and strengths and weaknesses of taking the course. There was an additional question toward the end to allow the interviewee to talk about any learning experiences with the course that were not covered in the four categories. The interviews lasted from thirty minutes to one hour and ten minutes.

The interviews were audio recorded and transcribed. Since the qualitative interviews are time consuming to conduct and analyze, I selected interviewees who would be most informative and helpful, keeping in mind the purpose of my research. The criteria for choosing interviewees was based on maximum variation sampling – seeking out the widest possible range of opinions and experiences about the online course and the face-to-face course. Three students from the face-to-face and three students from the online class were selected in-person interviews with me during the Fall of 2009.

3.4.3 Test Scores

Students’ test scores in both the face-to-face and online sections were collected. Both the face-to-face and online sections have similar assessment which includes three online tests using WebCT, three practical hands-on assignments, and online quizzes. The test is a performance-based task in a simulated environment on the computer and questions are randomly selected from a test bank. The tests are graded automatically right after completion of each test and the result of the test can be imported into the WebCT or Blackboard.
3.5 Data Analysis

At the beginning of the second week of the Fall of 2009 session, I started to visit the computer course taught by the Professor in the two delivery modes: face-to-face section and online section. The course is a mandatory course for three-year business diploma students. Students learn how to create multi-media PowerPoint presentations and how to manipulate data using spreadsheets. There were 13 sections with total 588 students in the Fall of 2009 session. Two out of these 13 sections with 89 students were eligible participants in this study. The research study required that the participants study the same subject delivered in two different modes (face-to-face and online) in the same semester and taught by the same professor. This requirement was to ensure minimum discrepancy between the face-to-face and online sections to increase the validity of the study.

I sent out the Information Letter (Appendix A), Teacher Consent Form (Appendix B), and Student Consent Form (Appendix C) to the participants from week 2 to week 4 in the Fall of 2009. The Information Letter outlined the purpose and significance of the study. It also informed participants that they could withdraw from the study at any time without having to give a reason. Furthermore, the Information Letter stated the action plan and benefits of participating in this study. The Teacher Consent Form and the Student Consent Form provided adequate information for the participant to make an informed decision.

I created and administered an online questionnaire (Appendix D) using Survey Monkey. The survey results were downloaded into Excel in order to further analyze the data using SPSS 17.0. As far as online security is concerned, the Survey Monkey offers SSL encryption for the survey links, survey pages and exports. SSL encryption used by banks and financial institutions ensured the safety of data transmission.
The online questionnaire was linked on the WebCT where students frequently accessed for course materials. The questionnaire was also distributed in paper form to suit a few students’ needs. Three paper questionnaires were collected by me in the classroom. Two additional questionnaires were collected by me after interviewing with students. The remaining 55 questionnaires were collected on Survey Monkey. Sixty students filled out the questionnaire and resulted in a response rate of 67 percent (60 / 89 = 67 percent).

Survey questions probed two themes emerging from the research questions. The first theme was course management and delivery. It measured such items as student opinions about course structure, course content, learning materials, assignments, and evaluation. These measures were selected not only because they cover a range of topics about course management and delivery but also because they are the key elements in promoting and maximizing student learning (Fraser & Fisher, 1983). In addition, these measures help answer the first and second research questions. The first research question concerns students’ perceptions of the course design and delivery. The second research question investigates how these perceptions differ between online and face-to-face students.

The second theme focused on self-efficacy and beliefs about the acquisition of computer applications. Items measured included mastering computer skills and concepts, understanding complex computer materials, doing well on tests, getting good marks for the course, going over the tutorials in the textbook, dealing with computer assignments, and tackling difficult learning materials. The second theme forms the basis for answering the fourth research question - are there significant differences in attitudes about the acquisition of computer knowledge between online and face-to-face students?

The questions in theme one and theme two employed a scale of 1 to 6 using (1) strongly agree, (2) agree, (3) somewhat agree, (4) somewhat disagree, (5) disagree, and (6) strongly
disagree. I chose a 1 to 6 scale because I wanted to get responses about course management and delivery as accurately as possible, and I wanted students to have an opinion that was either agreeing or disagreeing with the statements.

I downloaded the online survey results into an Excel file. In order to select a format that SPSS can understand, I chose the condensed columns and numerical cells versus expanded columns and text cells to save many repetitive operations. I then created a code book including 70 labels for the 70 variables and numbers for each of the possible responses. After I imported the data from Excel to SPSS, I then checked the variables for scores that are either overflow or underflow. There are two reasons for identifying and correcting errors. First, some errors can completely distort the analyses. For example; entering 10 when you mean to enter 100 can distort the results of statistical tests. Second, some statistical tests are sensitive to the outliers (values that are either well below or well above the other scores). These outliers can increase error variance and reduce the power of statistical tests; for instance, altering the odds of claiming statistical significant in an independent t-test. Once I cleaned my data file, I began to explore the nature of the variables.

There were three types of variables in the survey data: nominal (e.g. gender), ordinal (e.g. age) and scale (e.g. test mark). I used both descriptive and inferential statistics for these data. The descriptive statistics such as frequencies, mean, and standard deviation summarize the information to get an overall picture of respondents, whereas the inferential statistics explores the relationships among variables and compare groups. After I defined different types of variables, I began to check the internal consistency using Cronbach’s alpha coefficient. There are three categories in the Likert-scales in my survey: course management and delivery, self-efficacy and beliefs about acquisition of computer applications, and motivation in acquisition of computer applications. The Cronbach alpha values were .919, .817, and .791 respectively for these three
constructs. They were all above .7 which means that they each measure the same underlying construct. Finally, I inspected and explored the nature of the variables to ensure it was ready for conducting descriptive statistics such as frequencies, crosstabs and ratios.

The following steps were used in analyzing the mixed-method data: data reduction, transformation, comparison, and integration. The purpose of data reduction is to reduce data to manageable pieces. The qualitative data was reduced through coding different interview transcripts, preparing an analytic memo, developing a list of major themes, and preparing a theme matrix in MS Excel 2007 and MS OneNote 2007. The coding system included an emergent coding (Strauss & Corbin, 1998) and a prior coding method (Berge, 2001). The quantitative data was condensed first through MS Excel 2007 to combine corresponding columns and to modify the structure of the data so that it was suitable for import into SPSS 17.0.

The purpose of data transformation is to present data in a way such that the meaning of the data is easily understood. A Chi-Square test was employed to determine whether there was a significant difference in students’ perceptions of course design and delivery as well as their attitudes and motivation in the acquisition of computer applications between face-to-face and online class. An independent t-test was used to examine if there were differences in academic achievement between the two groups of students.

The interview data were organized around the following themes: factors in choosing online/face-to-face course, user services and support, factors best supported in learning computers, beliefs and motivation in learning computers, and strengths and weaknesses of taking online or face-to-face course. During the data analysis, patterns were emerged for each theme. The qualitative data was coded for common themes and patterns and the quantitative data was transformed into narrative paragraphs. The purpose of comparison is to verify findings, interpret inconsistencies and discover new meanings. Integration is the final step that incorporates what
has been discovered into a coherent and systematic summary. Figure 2 shows the data analytic strategies.

![Data Analytic Strategies Diagram]

*Figure 2: Data Analytic Strategies*

## 3.6 Validity in Mixed Methods Research

Validity has been sparingly addressed in mixed methods research; but it has not been widely discussed or thoroughly considered. Thus, the concept of validity has yet to be explained for mixed methods (Dellinger & Leech, 2007). Some researchers use the term inference quality which includes design quality and interpretive rigor. Design quality is defined as whether a study adheres to best practice whereas interpretive rigor refers to how well the results can be trusted (Tashakkori & Teddlie, 2003a). Other researchers recommend the term legitimation to compliment the concept of inference quality sample. Types of legitimation include sampling integration legitimation, inside-outside legitimation, sequential legitimation, conversion legitimation, commensurability legitimation, and paradigmatic mixing legitimation (Onwuegbuzie & Johnson, 2006). Still others propose using a validation framework to frame the idea of validity in the mixed methods and to provide a guide and evidence negotiating of data
meaning. This framework uses traditional concepts about validity and new ideas in mixed methods research such as inference quality and legitimation.

I employ the term legitimation in my research because it connects the word validity to the quantitative research paradigm and it has neutrality appeal in the description of validity criteria for qualitative research. In addition, the legitimation addresses a wide range of research process from research design, sampling techniques to data analysis and interpretations. Moreover, it specifically addresses the validity of qualitative and quantitative segments of a mixed methods search with multiple validities legitimation. It is to this multiple validities legitimation that I apply to my study.

Sample integration legitimation refers to the extent to which the relationship between the quantitative and qualitative sampling design yields quality meta-inferences. Similar participants are involved in both the qualitative and quantitative components of my study. The participants from both the survey and interview were taking the same course taught by the same instructor in the same academic year. Furthermore, inferences stemming from the quantitative and qualitative study were consistent as shown in Chapter Four. Thus, I could construct meta-inferences by combining together the inferences from both the quantitative and qualitative studies as indicated in Chapter Five.

Inside-Outside refers to the degree to which the researcher correctly employs and truthfully presents the insider’s view and the observer’s view to describe and explain the research phenomenon. During my thesis study, I was quite involved with the participants as I visited their classroom, interviewed them, and informally spoke with them outside the classroom. Having taught the same course for different student groups at the College for nine years, I had some understanding of how students felt about the course and the ups and downs in their learning process. I have also been involved in the curriculum development to make sure the course is up-
to-date and meets students’ different learning needs. While I have been teaching at the College, I also enrolled in two Canadian Universities to pursue my second degree in Business Economics, my Master’s degree in mathematics and now a doctoral degree in Education. Although I took most of my courses for these degrees in the face-to-face format I also took a few online courses. The combination of my teaching and learning experiences equipped me with the viewpoint of the insider – firsthand experience with both face-to-face and online education.

In addition, I asked some participants and the professor to assess my interpretations. I also consulted a scholar who holds a Ph.D. in social research, a statistician who was formally a professor and who also operated a private consulting business, and an instructor teaching academic writing at the University level. I asked them to examine the interpretations that I was making. I used the feedback they provided to refine my interpretations.

Sequential legitimation is defined as the extent to which the sequencing of the quantitative and qualitative phases matters in the research results and interpretations. If changing the sequence of quantitative and qualitative phases would result in different results and interpretations, this probably indicates that the sequencing poses a threat to legitimation. I minimized this threat by using multiple wave design (Sandelowski, 2003). In my study, the phases for the survey and interview data collection and data analysis oscillated multiple times. Therefore, the potential problem for meta-inferences was minimized by manipulating the sequence of the quantitative and qualitative phases.

Conversion legitimation concerns the extent to which the quantitizing and qualitizing yields quality meta-inferences. Researchers can obtain more and useful information by counting the themes presented in qualitative data. For example, I counted how many times in the interview the students mentioned that they need reminders for upcoming due dates. This additional information provided evidence in the summary about narrative descriptions on my interview
data. Similarly, I use narrative profile to qualitize data—constructing narrative descriptions from quantitative data. Thus, interpretable data and high inference quality resulted in the data conversion techniques.

Commensurability legitimation describes the extent to which meta-inferences result in a mixed worldview using the cognitive processes of integration and switching. This legitimation requires researchers to switch from a qualitative lens to a quantitative lens and vice versa, going back and forth for several iterations during which a third viewpoint is created. This view is informed by the organic combination of both quantitative and qualitative results. In Chapter Five, I merge the result from the survey and the interview to revisit my research questions and provide as a complete picture as possible with respect to the students’ perceptions of course design and delivery as well as their learning experiences. The findings from this thesis are based on mixed methods research and interpretations from quantitative and qualitative studies resulting in strong meta-inferences.

Paradigmatic mixing legitimation evaluates the extent to which the researcher’s epistemological, ontological, axiological, methodological, and rhetorical viewpoints, which lie beneath the quantitative and qualitative approaches are effectively united or blended into a functional package. Some researchers consider it vague to combine quantitative and qualitative approaches because of competing dualisms: objectivist versus subjectivist; single reality versus multiple realities; value free versus value bound; deductive versus inductive logic; formal versus informal writing style. Hence, it is not possible to mix paradigms in the same study (Guba, 1990; Lincoln & Guba, 1985; Smith, 1983). Others researchers believe paradigms themselves are not inviolate or sacrosanct as they are socially constructed and historically situated; therefore, they can be combined toward a dialectical detection of better understandings of new and reframed
perspectives and meanings (Greene & Caracelli, 1997). The techniques I employed for paradigmatic mixing are presented below.

Recognizing multiple methods such as survey, interview, classroom observations, and analysis of curricula documentations, I used different levels of data analysis – descriptive statistics, inferential statistics, and case study analysis. I also applied the integration technique to incorporate theme summaries from the qualitative data and the narrative paragraphs from the quantitative data. During the process of data analysis, I was aware of the subjective and objective types of reality and the interaction between the two, i.e., interview and survey. I made these techniques explicit with respect to interpreting the data, making recommendations, and how I judged my own thesis study. Finally, I have used both impersonal and personal voices throughout the entire thesis. Thus, the epistemological, ontological, axiological, methodological, and rhetorical beliefs that underlie the quantitative and qualitative approaches are treated as being complementary and compatible. Therefore, the paradigmatic mixing legitimation is enhanced in the thesis.

3.7 Ethical Issues

Any educational research inquiry “requires complex and careful ethical treatment” (Wallace & Louden, 2000, p. 155). Ellis (2007) delineates three dimensions of ethics. The first is procedural ethics which is mandated by the Institutional Review Board (IRB) to ensure respect for human dignity; balance and distribution of harms and benefits; free and informed consent; and rights to privacy and confidentiality. My thesis went through two IRBs – one at the University of Toronto where I am pursuing my PhD, and the other at the College where I conducted the research. I obtained ethics approval dated June 2, 2009 from University of Toronto. The ethics approval was approved from the College on June 29, 2009. The ethics review was renewed two times from both institutions in 2010 and 2011 respectively.
The second dimension of ethics is practice or situational ethics which deals with the arbitrary, subtle and ethically important instant where researchers have little control over events. In these unpredictable situations, professional associations’ codes of ethical practice may serve as guidelines; however, these codes are inherently ambiguous and indeterminate (Goodwin, Pope, Mort, & Smith, 2003).

The third is relational ethics which recognizes and values the relationship between researchers and those being researched and among multiple researchers. Ethical decisions should be guided by the objective of nurturing and maintaining human relationships. The participants in this study were informed that they had no obligation to participate. They were also informed that they could withdraw at any time and the data pertaining to them would be destroyed immediately. The only person who collected the raw data was me and the raw data remained confidential. To protect the confidentiality of the participants, I used respondent IDs in the survey and pseudonyms in the processed interview data. Only my supervisor and I had access to the raw data. All raw data including the survey, the audio recordings, notes about classroom observations, and student assignments were secured in a locked facility. I also used double passwords (one for the computer and the other for the document) in my computer for electronic files. Participants were told that they could request the findings or final thesis.

3.8 Summary

Chapter Three has presented the research methodology and research design for this study. The research setting and the rationale for a mixed methods study were presented. A description of sampling procedure is included, along with the population and sample selection criteria. The procedures for collecting data, as well as the techniques for analyzing these data are analyzed and discussed in details. Validity in mixed methods research was extensively explored and ethical issues were discussed. In short, the methodology stated in this chapter presents
instruments through which the research results were generated in the following chapter. Chapter Four presents the research results and findings.
Chapter Four: Results and Findings

4.1 Introduction

This study investigates students’ perceptions of course design and delivery and detects how these perceptions are different between online and face-to-face classes. Furthermore, the study compares attitudes in acquisition of computer applications and learning outcomes in these two delivery modes. The research questions are: 1) What are students’ perceptions toward course design and delivery? 2) How are these perceptions different between online and face-to-face students? 3) How does student academic achievement differ in these two delivery modes? 4) Are there significant differences about attitudes and motivation for the acquisition of computer knowledge between online and face-to-face students?

This chapter outlines the results of the quantitative and qualitative studies conducted in the Fall of 2009 for the computer course. The participants were enrolled in their first year of a three-year business program at a community college. The following sections present demographic profiles of the participants; descriptive statistics on student perceptions of course management, self-efficacy, and motivation in acquisition of computer applications; and comparison of online and face-to-face students in terms of these perceptions and learning outcomes.

4.2 Results from Quantitative Studies

4.2.1 Demographic Profiles of the Participants

Overall Demographic Profiles

The demographic survey questions served three purposes. First, they ensured adequate representation in the sample to meet the minimum statistical requirements. I chose Pearson Chi-Square test to answer the research question about difference in perceptions between online and face-to-face students. There are two types of Chi-Square test involved in categorical data. The
Chi-Square test for goodness of fit explores the proportion of cases that fall into different categories. The Chi-Square test for independence determines whether two categorical variables are related. I chose the Chi-Square test for independence to explore how perceptions are different between online and face-to-face students. One of the assumptions of Chi-Square for independence is that the expected cell frequencies should be 5 or greater. All my research data satisfied this criterion. The results of the demographic survey questions could provide insights information about differences and similarities between face-to-face students and online students. Working with the results of the demographic profiles allowed me to ensure that the face-to-face students and the online students came from a similar student population and were comparable across conditions. The following paragraphs present the results of the demographic profiles of all participants.

There were 12 females (32%), 24 males (65.0%), and 1 LGBT (3%) in the face-to-face class. The number of male students was double the number of female students. However, gender composition in the online class was more balanced: 11 females (48%) and 12 males (52%) in the online class. The Pearson Chi-Square test value is 1.879 (with degree of freedom = 2) indicating there is no significant difference in gender between the face-to-face class and the online class. Figure 3 shows the number of students based on gender who filled out the online survey from both the face-to-face and online classes.

Concerning the variable age, the Chi-Square test confirms that there is no statistically significant difference between the mode of delivery and the age group (Pearson Chi-Square = 2.477, df = 3). Over 88% of students in this research study are younger than 24 years old. For the face-to-face class, 14 students (38%) were younger than 20 years old; 19 students (51%) were between the ages of 20 years old and 24 years old; 3 students (8%) were between 25 and 29; and one student (3%) was over 30. For the online class, 13 students (57%) that were younger than 20
years old; 9 students (39%) were between the age of 20 years old and 24 years old; one student (4%) was between 25 and 29; and nobody was over 30 years old.

Figure 3: Gender

All students in this research study were taking business administration programs with specializations in marketing, management studies, human resources, or other programs such as accounting and financial services. Statistically, there is no significant difference between mode of delivery (face-to-face class and online class) and program of study (Chi-Square = 2.482, df = 3). The face-to-face class consisted of 10 marketing students (27%), 12 management studies students (32%), 4 human resources students (11%), and 11 students (30%) in other programs (accounting or financial services). Compared to the face-to-face class, the online class had
relatively more students in marketing (10 students or 44%), 4 students (17%) from management studies, 3 students (13%) from human resources, and 6 students from other programs.

The participants came from the Centre for Business which experienced a large increase in fulltime enrollment between 2005/06 and 2009/10. Enrollment consistently exceeded forecasts in the Centre for Business which had 40% of the College’s total international student populations in 2009/10. The online survey results showed that 27 students (45%) were English as a Second Language learners (ESL), whereas 33 students (55%) were English native speakers. The statistical analysis reveals that there was no significant difference between of mode delivery and the student’s first language. Figure 4 shows the number of students in each delivery mode broken down by down by whether the first language.

Figure 4: Language
Although there is no statistically significant difference between mode of delivery and gender, age, program of study, and English language, there is a statistically significant difference between mode of delivery and number of courses taken (Chi-Square = 12.701, df = 3). Students in the face-to-face class tended to take more courses than those in the online class. Aggregated information obtained from interviews with students showed that students enrolled in the online class have taken more part-time jobs than those students who were attending the face-to-face class. This suggests that online students distribute their time and effort differently than face-to-face students. Qualitative analysis might shed light on this later. However, the similar demographic profiles for both the face-to-face and online classes do not influence the research results. In summary, there were no significant differences between face-to-face student and online student for the questions about gender, age, program, and first language except the number of courses taken. Table 1 presents the Chi-Square value, the degrees of freedom (df), and the significance value.

Table 1

*Chi-Square Test for Demographic Variables*

<table>
<thead>
<tr>
<th>Categorical Variables</th>
<th>Pearson Chi-Square Value</th>
<th>Degree of Freedom (df)</th>
<th>Asymptomatic Significance (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>1.897</td>
<td>2</td>
<td>.391</td>
</tr>
<tr>
<td>Age</td>
<td>2.477</td>
<td>3</td>
<td>.480</td>
</tr>
<tr>
<td>Program</td>
<td>2.482</td>
<td>3</td>
<td>.479</td>
</tr>
<tr>
<td>First language</td>
<td>.120</td>
<td>1</td>
<td>.729</td>
</tr>
<tr>
<td>Number of classes</td>
<td>12.701</td>
<td>3</td>
<td>.005</td>
</tr>
</tbody>
</table>
4.2.2 Course Design and Delivery

The statistical analysis includes the descriptive statistics and the inferential statistics. The purpose of descriptive statistics is to summarize and assimilate the information from the survey data. The inferential statistics employ the Chi-Square test to claim significant difference or no significant difference between the face-to-face and online classes. The following presents the statistical analysis about course management and delivery based on the survey results for all participants. This is followed by the similarities and differences between face-to-face class and online class with respect to course design and delivery.

Overall Survey Results

The first research question tackles student’s perceptions toward course design and delivery. Survey questions probed nine areas in course design and delivery: course structure, course outline, examples and applications, textbook and supplemental materials, assignments, evaluation tools, assessments, motivation, and learning activities. The selected areas were guided by the key elements in the curriculum and they were based on the mandated college-wide student feedback questionnaire, over 20 years of personal experience teaching computer courses, and the related research literature. Respondents were asked to rate each of the nine items on a 1 to 6 scale, where (1) is “Strongly Agree”, (2) is “Agree”, (3) is “Somewhat Agree”, (4) is “Somewhat Disagree”, (5) is “Disagree”, and (6) is “Strongly Disagree”. In Table 2, the measures for the variables are summarized to indicate statistics such as number of responses (N), minimum, maximum, mean, and standard deviation.

All the mean values were less than 2 except for the eighth statement about motivation which was slightly greater than 2. These results suggested that students were very satisfied with course design and delivery as measured by the nine statements in Table 2. There were two
statements (statement 3 and statement 7) with no negative responses – all of the respondents selected strongly agree (1), agree (2), and somewhat agree (3). Participants agreed that the course included examples and applications which were relevant to their study. They also strongly agreed that the course assessments matched the course content and stated learning objectives.

The result from the question about overall course satisfaction is contrary to the result from the individual statements as listed in Table 2. The mean value for overall course satisfaction is 2.67 and the standard deviation is 1.259. The average mean of the total nine individual statements is 1.858 and the average standard deviation is 0.929. One would expect that the overall course satisfaction would be congruent with the nine individual statements concerning course design and delivery. Subsequent interviews with students revealed that some students were not satisfied with services and facilities around the College and they appear to have associated this dissatisfaction with overall course quality. For example, the online course utilized WebCT as a course management tool. There were technical difficulties with WebCT and these frustrated some students as they could not access all the teaching and learning materials. It was these experiences that may have caused the discrepancy in perceived course satisfaction.

**Similarities and Differences**

The overall responses for the course design and delivery were positive. Now I turn to the similarities and differences between face-to-face students and online students. Chi-Square tests were employed to answer the second research question about different perceptions between the online students and the face-to-face students. The Chi-Square test for independence indicated that some items presented a significant difference between mode of delivery and perception while other items showed no significant difference between mode of delivery and perception. The following part presents details of the nine survey items about course management and delivery using the Pearson Chi-Square tests.
Table 2
*Nine Items Pertaining to Course Design and Delivery*

<table>
<thead>
<tr>
<th>Course Design and Delivery</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The course structure and materials are well organized</td>
<td>54</td>
<td>1</td>
<td>6</td>
<td>1.91</td>
<td>.996</td>
</tr>
<tr>
<td>2. The course outline accurately described course content, objectives and evaluation methods</td>
<td>54</td>
<td>1</td>
<td>6</td>
<td>1.85</td>
<td>.920</td>
</tr>
<tr>
<td>3. The course includes examples and applications which are relevant to this area of study</td>
<td>54</td>
<td>1</td>
<td>3</td>
<td>1.72</td>
<td>.712</td>
</tr>
<tr>
<td>4. Texts and supplemental materials are informative and relevant to the course</td>
<td>53</td>
<td>1</td>
<td>5</td>
<td>1.66</td>
<td>.732</td>
</tr>
<tr>
<td>5. Assignments contribute to my learning of the course material</td>
<td>54</td>
<td>1</td>
<td>4</td>
<td>1.81</td>
<td>.870</td>
</tr>
<tr>
<td>6. Instruments of evaluation (e.g. tests, assignments, quizzes) are fair and appropriate</td>
<td>54</td>
<td>1</td>
<td>6</td>
<td>1.94</td>
<td>.979</td>
</tr>
<tr>
<td>7. The course assessments are in agreement with the course content and learning objective</td>
<td>54</td>
<td>1</td>
<td>3</td>
<td>1.78</td>
<td>.744</td>
</tr>
<tr>
<td>8. This course has motivated me to increase my knowledge and competence in this area of study</td>
<td>52</td>
<td>1</td>
<td>6</td>
<td>2.15</td>
<td>1.304</td>
</tr>
<tr>
<td>9. The learning activities are relevant to the stated course outcomes</td>
<td>51</td>
<td>1</td>
<td>5</td>
<td>1.90</td>
<td>1.100</td>
</tr>
</tbody>
</table>
The first item stated that the course structure and materials were well organized. The mean response was 1.91 (N = 54) indicating that the average respondent agreed with this statement (Strong Agree =1, Agree = 2). 87.6% (N = 32) of the participants in the face-to-face class either strongly agreed or agreed with the statement, while 72.7% (N = 22) of the online class stated they strongly agreed or agreed. More than half of the participants (56.3%, N = 32) in the face-to-face class strongly agreed with this statement while only 9.1% (N = 22) of the participants in the online class strongly agreed with the statement. 31.3% of the participants (N = 32) in the face-to-face class agreed with this statement and 63.6% of the participants (N = 22) in the online class agreed with the statement. No participants chose the Somewhat Disagree category. Less than 4.5% of the participants in both face-to-face class and online class showed either Disagree or Strongly Disagree with the statement. The Pearson Chi-Square test indicated a significant difference in responses between face-to-face and online participants. Figure 5 displays the number of responses in each category for both face-to-face and online classes.

I conducted Pearson Chi-Square Tests to see if there was a significant difference in the participants’ responses about course structure and materials between face-to-face student and online students. The Chi-Square value is 14.616 (df = 4), with an associated significance level of .006. To be significant, the significance value needs to be 0.05 or smaller. In this case, the value of 0.006 is much less than the alpha value of 0.05 so I conclude that the result is significant. This means that there is a significant difference between mode of delivery and perception of course structure and materials. This may suggest that online students find the course delivery is less organized. I will explore this finding in the qualitative section. Table 3 presents the results of the Chi-Square Tests.
Figure 5: Response about Course Structure and Material (Question 1)

Table 3

Chi-Square Test for Course Structure and Materials

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymptomatic. Significance (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>14.616⁸</td>
<td>4</td>
<td>.006</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>16.808</td>
<td>4</td>
<td>.002</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>4.998</td>
<td>1</td>
<td>.025</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>54</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The second statement was about whether the course outline accurately described course content, objectives and evaluation methods. The mean value of the survey result is 1.85
illustrating that the average respondents agree with this statement. 93.8% (N = 32) of the participants in the face-to-face class either strongly agreed or agreed with the statement while the same number for the online class was 86.3% (N =22). Only 3.1% (N = 32) in face-to-face class disagreed with the statement and 4.5% (N = 22) in the online class disagreed with the statement. Figure 6 shows the survey results about course outline in count. The Pearson Chi-Square test (Chi-Square value = 8.816, df = 4, Asymp.Sig. = 0.66, N = 54) confirms that there is no significant difference between mode of delivery and perception of course content, objectives and evaluation methods. The no difference result is consistent with the fact that the two modes of delivery adopted identical course content, objectives and evaluation methods.

Figure 6: Response about Course Outline (Question 2)
The third statement stated that the course included examples and applications that were relevant to the area of study. Participants were asked to rate the statement in the same scale of 1 to 6 where 1 represents Strongly Agree and 6 represents Strongly Disagree. No participants selected Somewhat Disagree, Disagree, or Strongly Disagree. The mean value of the responses is 1.72 indicating that the average responses agreed with the statement. For the face-to-face participants, the percentages were 46.9% (N = 32) strongly agree, 50% (N =32) agree, and 3.1% (N= 32) somewhat agree. For participants from the online class, the percentages were 36.4% (N =22) strongly agree, 31.8% (N = 22) agree, and 31.8% somewhat agree.

Figure 7: Response about Course Examples and Applications (Question 3)
These percentages showed that the responses from the online class were evenly distributed among strongly agree, agree, and somewhat agree while the response from the face-to-face class was more focused on the strongly agree and agree. Pearson Chi-Square Test (Chi-Square value = 8.595, df = 2, Asymp.Sig. = 0.014, N = 54) shows that there is a significant difference between mode of delivery and perception of course examples and applications. Figure 7 shows the number of counts from both the face-to-face class and the online class in responding to course examples and applications.

Figure 7: Number of counts from both the face-to-face class and the online class in responding to course examples and applications.

Figure 8: Response about Texts and Supplemental Materials (Question 4)
The fourth statement maintained that texts and supplemental materials were informative and relevant to the course. The mean value was 1.66 based on a 1 to 6 scale where 1 stands for strongly agree and 6 stands for strongly disagree. No participants selected “somewhat disagree” or “strongly disagree”. Participants from the online class chose only “strongly agree” and “agree”. These results indicated that students felt positively about the statement on texts and supplemental materials. The Pearson Chi-Square Tests (Chi-Square value = 5.485, df = 3, Asymp.Sig. = 0.140, N = 53) showed that there is no significant difference between mode of delivery and perception of texts and supplemental materials. This is congruent with the fact that both the online and face-to-face classes (taught by the same instructor) used the same textbook and web training material. Figure 8 shows the number of responses from both face-to-face and online students in rating the statement about texts and supplemental materials.

The fifth statement stated that assignments contributed to the learning of course material. The mean value of responses was 1.81 (recall that 1 = Strongly Agree, 2 = Agree, 3 = Somewhat Agree, 4= Somewhat Disagree, 5 = Disagree, 6 = Strongly Disagree) with no respondents choosing “disagree” or “strongly disagree”. The responses from both the face-to-face class and the online class were similar. For the face-to-face class (N = 32), 50% of the participants strongly agreed with the statement, 28.1% of the participants agreed, 18.8% of participants somewhat agreed, and 3.1% of participants somewhat disagree. For the online class (N = 22), 40.9% of participants strongly agreed with the statement, 27.3% of participants agreed, 31.8% of participants somewhat agreed. The Pearson Chi-Square Tests (Chi-Square value = 1.848, df = 3, Asymp.Sig. = 0.604, N = 54) indicated no significant difference between mode of delivery and perception of assignments. This result matches the fact that both the face-to-face class and the online class were given the same set of assignments and graded by the same instructor. Figure 9
shows the number of responses from both the face-to-face class and the online class to the statement about assignments.

**Figure 9: Response about Assignments (Question 5)**

The sixth statement stated that instruments of evaluation (e.g. tests, assignments, quizzes) were fair and appropriate. The mean value of responses was 1.94 indicating that average participants agreed with the statement about instruments of evaluation. There were 32 participants from the face-to-face class and 22 participants from the online class. The percentage within mode of delivery was similar for each scale. 78.1% of the participants from the face-to-face class strongly agreed or agreed with the statement while 72.8% of the participants from the online class strongly agreed or agreed. No participants chose “disagree”. 6.2% of the participants...
from the face-to-face class somewhat disagreed or strongly disagreed with the statement while none of the participants from the online class chose “somewhat disagree” or “strongly disagree”. Overall, most participants provided very positive responses about instruments of evaluation. The Pearson Chi-Square Tests (Chi-Square value = 2.309, df = 4, Asymp.Sig. = 0.679, N = 54) indicated no significant difference between mode of delivery and perception of the instruments of evaluation. Figure 10 shows the count for each scale from both the face-to-face class and the online class with respect to instruments of evaluation.

Figure 10: Response about Instrument of Evaluation (Question 6)

The seventh statement stated that course assessments were in agreement with the course content and learning objectives. This statement was similar to the sixth statement as they both tackled assessment; however, they did so in different angles: one focused on the fairness of
evaluation methods and the other linked evaluation to the course outline. The statistics result also presented comparable responses for these two statements. The mean value for the seventh statement was 1.78 indicating very positive responses for average respondents. As a matter of fact, no respondents chose “somewhat disagree”, “disagree”, or “strongly disagree”. 84.4% of the participants from the face-to-face class either strongly agreed or agreed with the statement. 77.3% of the participants from the online class either strongly agreed or agreed with the statement. The Pearson Chi-Square Tests (Chi-Square value = .530, df = 2, Asymp.Sig. = 0.767, N = 54) indicated no significant difference between mode of delivery and perception of assessments in connection with course outline. Figure 11 shows the number of responses from both the face-to-face class and the online class about assessments.

*Figure 11: Response about Assessment (Question 7)*
The eighth statement stated that the course motivated the students to increase their knowledge and competence in the area of study. The mean value of responses was 2.15 indicating that the average respondents agreed with this statement. In addition, the percentage from each scale showed that the responses were similar from both classes. Figure 12 shows the number of responses for each scale. The Pearson Chi-Square Tests (Chi-Square value = 6.573, df = 5, Asymp.Sig. = 0.254, N = 52) indicated no significant difference between mode of delivery and perception of course motivation.

![Bar chart showing response about course motivation](image)

**Figure 12: Response about Course Motivation (Question 8)**

The last statement stated that the learning activities in the course were relevant to the stated course outcomes. The mean value of the responses was 1.9 indicating that the average
respondents agreed with the statement. At least 86% of the respondents from both the face-to-face and online classes either strongly agreed or agreed with the statement. The negative responses were less than 14% in both classes. The Pearson Chi-Square Tests (Chi-Square value = .261, df = 4, Asymp.Sig. = 0.515, N = 51) indicated no significant difference between mode of delivery and perception of learning activities. Figure 13 shows the number of responses to the statement about learning activities from both classes.

Figure 13: Response about Learning Activities (Question 9)

I have described the survey results from nine statements about course management and delivery. Overall the responses agreed with the statements indicating that participants from both
the face-to-face and the online classes were satisfied with the course. Two statements about
course structure and examples (items 1 and 3) showed a statistically significant difference
between mode of delivery and perceptions of course structure and examples. Face-to-face
participants showed more confidence than their online counterparts. I will elaborate on this result
in sections 4.4, 5.2, and 5.3. The rest of the seven statements showed no significant difference
between mode of delivery and perceptions of course design and delivery.

In addition to the nine statements, participants were also asked to rate the course on a
scale consisting of the following options: outstanding, very good, good, satisfactory, somehow
satisfactory, and unsatisfactory. Participants from the face-to-face class rated the course more
favorably than those from the online class. Figure 14 shows the number of responses from both
classes about overall course design and delivery. The Pearson Chi-Square Tests (Chi-Square
value = 14.414, df = 5, Asymp.Sig. = 0.013, N = 54) indicated a significant difference between
mode of delivery and perception of the course in general.
4.2.3 Benefits and Challenges of Different Delivery Modes

Students’ perceptions of benefits and challenges of different delivery modes provide another angle from which course design and delivery can be evaluated. Therefore, the benefits and challenges of different delivery modes echo my first research question about students’ perceptions of course design and delivery. I will describe the overall survey results about the benefits and challenges of online courses and face-to-face courses. Then, I will split the responses based on mode of delivery (face-to-face and online).

Overall Survey Results

There were four multiple choice questions in the online survey investigating the benefits and challenges of online courses and face-to-face courses. The list of potential answers was based on the literature review and my teaching experiences. If a desired answer was not on the
list, respondents had the choice of filling out a single textbox to provide their own response. This ensured that all of possible answers about the greatest benefit and the greatest challenge are addressed.

The first question asked what the greatest benefit of online courses was. The answer list included: accessibility, flexibility, student centered, encouraging collaboration, and other. If respondents chose other, they were asked to specify in a textbox. The second question asked the greatest benefit of face-to-face courses. The corresponding answer list included: personal attention from the instructor, in-person interactions with the instructor and other students, getting the work done in class, seeking help immediately, and other. The answer list for the third question, greatest drawback of online courses in the third question, included: isolation, lack of face-to-face interaction, lack of technological skills for students, and other. The fourth question asked about the greatest drawback of face-to-face courses and had the following list: inflexibility (restricted class time and location), the instruction does not fit my learning style, I am a fast learner and the class pace is slow, I am a slow learner and the class pace is fast, and other.

Descriptive statistics frequencies are used because the benefits and challenges were treated as categorical variables. To make it easier to compare different categories, I also report relative frequencies or percentages. In answering what is the greatest benefit of online courses, more than half (57.4%) of the participants chose flexibility, 16.7% of the participants considered student centered learning, 11.1% of the participants selected accessibility, another 11.1% of the participants believed encouraging collaboration, and 3.7% of the participants chose other, which included answers such as avoiding face-to-face interaction, independent learner, and cost of commute. Figure 15 summarizes the survey results of the greatest benefit of online courses in frequencies and percentages.
Figure 15: Benefits of Online Courses

On the question probing the greatest benefit of face-to-face courses, 51.9% (N = 28) of the participants stated seeking help immediately, 29.6% (N = 16) of participants reported in-person interactions with the instructor and other students, 9.3% (N = 5) chose personal attention from the instructor, 7.4% (N = 4) of the participants stated getting the work done in the class, and one participant (1.9% ) selected other while further elaborating, “learning English while study subject matter”. Figure 16 shows the results of the greatest benefit of face-to-face courses.
Figure 16: Benefits of Face-to-face Courses

The survey results for the greatest drawback of online courses is shown in Figure 17. 61.1% (N = 33) of respondents reported lack of face-to-face interaction, 20.4% (N = 11) of the participants stated lack of technological skills, 13% (N = 7) of the participants pointed to isolation, and 5.6% (N = 3) of the participants listed other drawbacks of online courses such as compatibility issues at home and not getting help when needed.
Figure 17: Drawbacks of Online Courses

In responding the question about the greatest drawback of face-to-face courses, the responses were more evenly spread out. 33.3% (N = 18) of the respondents reported the class pace was slow, 31.5% (N = 17) of participants selected inflexibility, 13% (N = 7) of the participants responded that the class pace was fast, and 13% (N = 7) of the participants selected other with answers such as “disrespected and rude students”, “unclear instruction”, “too many students”, “attending class at 8 AM”, and “noisy classroom”. Figure 18 shows the result of the greatest drawback of face-to-face courses.
I have outlined the survey results about the benefits and challenges of face-to-face courses and online courses. I will now break down the survey results for the two groups – face-to-face and online to analyze the similarities and differences of their responses to questions about benefits and challenges of face-to-face courses and online courses. I will present the survey results in the order of benefits of online course, benefits of face-to-face course, challenges of online course, and challenges of face-to-face course.

Recall that participants were asked to choose an item from a list including accessibility, flexibility, student centered, and encouraging collaboration to identify the greatest benefit of online courses. Participants were also given an opportunity to provide extra benefits not in the list. Breaking down the survey data into face-to-face class and online class, 68.2% of the participants from the online class chose flexibility as the greatest benefit of online courses while 50% of the participants from the face-to-face class selected the flexibility. 13.6% of the online participants believed that student centered was the greatest benefit while 18.8% of the face-to-face participants picked student centered. 13.6% of the online participants selected accessibility.
as the greatest benefit while the number was 9.4% for face-to-face participants. Few participants chose “encouraging collaboration” as the greatest benefit – 6.3% of the participants from face-to-face class and nobody from the online class. The Pearson Chi-Square Tests (Chi-Square value = 3.984, df = 4, Asymp.Sig. = 0.408, N = 54) indicated no significant difference between mode of delivery and the students’ perceptions of the greatest benefit of online courses. Figure 19 presents the number of respondents for both the face-to-face class and the online class with respect to the greatest benefit of online courses.

![Figure 19: Response about Benefits of Online Courses](image)

Participants were also given a list of the greatest benefit of face-to-face courses including personal attention from the instructor, in-person interactions with the instructor and other
students, getting the work done in the class, seeking help immediately, and other benefits. If participants chose “other”, they were asked to specify in the text box provided. While 65.6% (N = 32) of participants from the face-to-face class chose seeking help immediately as a greatest benefit of face-to-face courses, 45.5% (N= 22) of participants from the online class selected in-person interactions with the instructor and other students. Only 3.1% (N= 32) of participants from the face-to-face class chose other benefits while no participants from the online class selected other benefits. The Pearson Chi-Square Tests (Chi-Square value = 7.609, df = 4, Asymp.Sig. = 0.107, N = 54) indicated no significant difference between mode of delivery and students’ perceptions of the greatest benefit of face-to-face courses. Figure 20 breaks down the number of respondents in choosing the greatest benefit of face-to-face courses.

![Figure 20: Response about Benefits of Face-to-face Courses](image-url)

Figure 20: Response about Benefits of Face-to-face Courses
For the survey question about the greatest drawback of online courses, participants were asked to choose from a list that included isolation, lack of face-to-face interactions, lack of technological skills, and other drawbacks. More participants from the online class chose “isolation” and:”lack of face-to-face interactions” than participants from the face-to-face class. On the other hand, participants from the face-to-face class were more likely to select “lack of technological skills” and “other”. The Pearson Chi-Square Tests (Chi-Square value = 10.177, df = 3, Asymp.Sig. = 0.017, N = 54) indicated significant difference between mode of delivery and students’ perceptions of the greatest drawback of online courses. Figure 21 shows the number of respondents from both the face-to-face class and the online class choosing the greatest drawback of online courses.

![Image](image.png)

Figure 21: Response about Drawbacks of Online Courses
Participants were given a list of drawbacks of face-to-face courses to choose from. This list included inflexibility, not fitting my learning style, slow class pace, fast class pace, and other drawbacks. For participants from the face-to-face class, 34.4% (N = 32) of the participants chose inflexibility as the greatest drawback of face-to-face courses, 31.3% of the participants selected slow class pace, and 12.5% of the participants thought that the instruction did not fit their learning style, 12.5% of the participants chose other drawbacks including noisy classroom, some students’ not respecting the teacher, and inefficient use of classroom time by both the instructor and students. 9.4% of the participants believed that the class pace was too fast. For participants from the online class, 36.4% (N = 22) of the participants chose slow class pace, 27.3% of the participants selected inflexibility, 18.2% of the participants believed the class pace was too fast, 13.6% of the participants chose “other drawbacks” including commuting to campus, high student-teacher ratio, teacher taking time to do administrative tasks. Finally, 4.5% of the participants thought that the instructional mode did not fit their learning style. The Pearson Chi-Square Tests (Chi-Square value = 1.995, df = 4, Asymp.Sig. = 0.737, N = 54) indicated no significant difference between mode of delivery and students’ perceptions of the greatest drawback of face-to-face courses. Figure 22 shows the number of respondents in choosing the greatest drawback of face-to-face courses.

In sum, the Pearson Chi-Square tests indicated no statistically significant difference between mode of delivery and students’ perceptions of the greatest benefit of online courses, the greatest benefit of face-to-face courses, and the greatest drawback of face-to-face courses. However, there was a statistically significant difference between mode of delivery and students’ perceptions of the greatest drawback of online courses. While most participants from both the face-to-face and online classes agreed that the greatest drawback of online courses is a lack of
face-to-face interaction, there were quite different percentages for isolation and lack of technological skills.

Figure 22: Response about Drawbacks of Face-to-face Courses

4.2.4 Self-efficacy and Beliefs about Learning Computers

Overall Survey Results

In answering the last research question (are there significant differences in attitudes and belief about learning computer applications between online and face-to-face students?), it is important to present the overall responses from both groups of students. This general reply lays the foundation for the comparison between online and face-to-face students.

There are 17 items pertaining to self-efficacy and beliefs about the acquisition of computer applications. These questions are listed in Table 4. The selected questions were guided by the literature review and my teaching experiences. Respondents were asked to rate each of the
17 items on a 1 to 6 scale, where (1) is “Strongly Agree”, (2) is “Agree”, (3) is “Somewhat Agree”, (4) is “Somewhat Disagree”, (5) is “Disagree”, and (6) is “Strongly Disagree”. The 17 items included mastering the skills of the course, understanding basic and complex concepts, doing well on the test, subject difficulty, time spent on practicing, successful students, going over tutorials, figuring out difficult concepts, learning process, and checking assignments. In Table 4, the measures for the variables are summarized to indicate statistics such as number of responses (N), minimum, maximum, mean, and standard deviation.

Overall, most mean values were less than 3 indicating that most respondents chose “strongly agree”, “agree”, or “somewhat agree”. The average mean was 1.98 showing “agree” was the preferred choose. The statistics results in Table 4 show that the items relating to the course work received favorable responses from “strongly agree” to “somewhat agree”. This includes item 1 (“I am certain I can master the skills being taught in this class”), item 2 (“I am confident I can understand the basic concepts taught in this course”), item 6 (“I believe that I will learn this subject very well”), item 7 (“If you practice 3-5 hours a week on this subject outside the classroom, you will achieve at least a B for your final mark”), item 14 (“usually you can figure out difficult concepts if you eliminate all outside distractions and really concentrate”), and item 16 (“I check my assignments before I turn them in”). These responses illustrate that participants were feeling confident about their ability in acquisition of computer applications, whereas the general concern about learning was spread out as indicated in the standard deviation column in Table 4. The bigger the standard deviation, the more spread out the responses indicating that participants have both positive and negative responses about learning in general.
# Table 4

**Self-efficacy and Beliefs**

<table>
<thead>
<tr>
<th>Self-efficacy and Beliefs</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am certain I can master the skills being taught in this class</td>
<td>53</td>
<td>1</td>
<td>3</td>
<td>1.68</td>
<td>.754</td>
</tr>
<tr>
<td>2. I am confident I can understand the basic concepts taught in this course</td>
<td>53</td>
<td>1</td>
<td>3</td>
<td>1.45</td>
<td>.607</td>
</tr>
<tr>
<td>3. I am certain I can understand the most difficult and complex material presented in the reading for this course</td>
<td>53</td>
<td>1</td>
<td>5</td>
<td>2.11</td>
<td>1.013</td>
</tr>
<tr>
<td>4. I have no doubts about my capability to do well on tests</td>
<td>52</td>
<td>1</td>
<td>3</td>
<td>1.81</td>
<td>.817</td>
</tr>
<tr>
<td>5. Computer applications are difficult subject to learn</td>
<td>53</td>
<td>1</td>
<td>6</td>
<td>2.92</td>
<td>1.412</td>
</tr>
<tr>
<td>6. I believe that I will learn this subject very well</td>
<td>52</td>
<td>1</td>
<td>3</td>
<td>2.00</td>
<td>.863</td>
</tr>
<tr>
<td>7. If you practice 3-5 hours a week on this subject outside the classroom, you will achieve at least B for your final mark</td>
<td>53</td>
<td>1</td>
<td>3</td>
<td>1.53</td>
<td>.668</td>
</tr>
<tr>
<td>8. Successful students understand things quickly</td>
<td>53</td>
<td>1</td>
<td>6</td>
<td>2.28</td>
<td>1.133</td>
</tr>
<tr>
<td>9. The most successful people have discovered how to improve their ability to learn</td>
<td>53</td>
<td>1</td>
<td>4</td>
<td>1.83</td>
<td>.700</td>
</tr>
<tr>
<td>10. Going over the tutorials in the textbook help me understand the skills and knowledge</td>
<td>53</td>
<td>1</td>
<td>6</td>
<td>1.96</td>
<td>1.037</td>
</tr>
<tr>
<td>11. If I find the time to re-do the tutorials in the textbook, I get a lot more out of it the second time</td>
<td>53</td>
<td>1</td>
<td>6</td>
<td>2.28</td>
<td>1.133</td>
</tr>
<tr>
<td>12. Genius is 10% ability and 90% hard work</td>
<td>50</td>
<td>1</td>
<td>6</td>
<td>2.10</td>
<td>1.216</td>
</tr>
<tr>
<td>13. If a person can’t understand something within a short amount of time, they should keep on trying</td>
<td>53</td>
<td>1</td>
<td>4</td>
<td>1.72</td>
<td>.818</td>
</tr>
<tr>
<td>14. Usually you can figure out difficult concepts if you eliminate all outside distractions and really concentrate</td>
<td>53</td>
<td>1</td>
<td>3</td>
<td>1.83</td>
<td>.778</td>
</tr>
</tbody>
</table>
15. Learning is a slow process of building up knowledge  53  1  6  2.28  1.215
16. I check my assignments before I turn them in  53  1  3  1.66  0.649
17. I am capable of getting a letter grade B in this course  53  1  6  2.23  1.368

**Similarities and Differences**

The survey results from both the face-to-face and online classes were divided into five groups based on the responses from the participants. The first group consisted of statements where participants chose only positive responses: Strongly Agree, Agree, and Somewhat Agree. These statements tackled topics including mastering the skills, understanding basic concepts, doing well on tests, learning subject well, practicing more outside the classroom, figuring out difficult concepts, handling assignments, and the importance of getting a good grade. The average response from the face-to-face class choosing “Strongly Agree” or “Agree” was 80.6% and the average response from the online class was 70.5%. Fewer participants chose “somewhat agree” for both the face-to-face class and the online class. Table 5 presents survey results for each statement. The Pearson Chi-Square tests indicated no statistical difference for all the statements except for one: “I believe I will learn this subject very well”. The Pearson Chi-Square tests on this statement (Chi-Square value = 8.705, df = 2, Asymp. Sig. = 0.013, N = 52) indicated a statistically significant difference between mode of delivery and participants’ perception of learning the subject. For the face-to-face participants, 43.3% strongly agreed with the statement, 36.7% agreed, and 20% somewhat agreed. On the other hand, 27.3% of the participants from the online class strongly agreed, 13.6% agreed, and 59.15% somewhat agreed. This statement relates to the third research question which looks at how student academic achievement differs in these two delivery modes.
### Table 5

**Positive Response about Self-efficacy and Beliefs**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mode of Delivery</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Somewhat agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am certain I can master the skills being taught in this class.</td>
<td>Face-to-face</td>
<td>16</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>51.6%</td>
<td>32.3%</td>
<td>16.1%</td>
</tr>
<tr>
<td></td>
<td>Online</td>
<td>10</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>45.5%</td>
<td>36.4%</td>
<td>18.2%</td>
</tr>
<tr>
<td>I am confident I can understand the basic concepts taught in this course</td>
<td>Face-to-face</td>
<td>17</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>54.8%</td>
<td>35.5%</td>
<td>9.7%</td>
</tr>
<tr>
<td></td>
<td>Online</td>
<td>15</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>68.2%</td>
<td>31.8%</td>
<td>0.0%</td>
</tr>
<tr>
<td>I have no doubts about my capability to do well on tests</td>
<td>Face-to-face</td>
<td>14</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>46.7%</td>
<td>30.0%</td>
<td>23.3%</td>
</tr>
<tr>
<td></td>
<td>Online</td>
<td>9</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40.9%</td>
<td>31.8%</td>
<td>27.3%</td>
</tr>
<tr>
<td>I believe that I will learn this subject very well</td>
<td>Face-to-face</td>
<td>13</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>43.3%</td>
<td>36.7%</td>
<td>20.0%</td>
</tr>
<tr>
<td></td>
<td>Online</td>
<td>6</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>27.3%</td>
<td>13.6%</td>
<td>59.1%</td>
</tr>
<tr>
<td>If you practice 3-5 hours a week on this subject outside the classroom, you will achieve at least B for your final mark</td>
<td>Face-to-face</td>
<td>17</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>54.8%</td>
<td>32.3%</td>
<td>12.9%</td>
</tr>
<tr>
<td></td>
<td>Online</td>
<td>13</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>59.1%</td>
<td>36.4%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Usually you can figure out difficult concepts if you eliminate all outside distractions and really concentrate</td>
<td>Face-to-face</td>
<td>10</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32.3%</td>
<td>38.7%</td>
<td>29.0%</td>
</tr>
<tr>
<td></td>
<td>Online</td>
<td>11</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50.0%</td>
<td>36.4%</td>
<td>13.6%</td>
</tr>
<tr>
<td>I check my assignments before I turn them in</td>
<td>Face-to-face</td>
<td>13</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41.9%</td>
<td>45.2%</td>
<td>12.9%</td>
</tr>
<tr>
<td></td>
<td>Online</td>
<td>10</td>
<td>11</td>
<td>1</td>
</tr>
</tbody>
</table>
It is important to get good grades in school

<table>
<thead>
<tr>
<th></th>
<th>Face-to-face</th>
<th></th>
<th>Online</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>64.5%</td>
<td>25.8%</td>
<td>18.2%</td>
</tr>
<tr>
<td></td>
<td>45.5%</td>
<td>50.0%</td>
<td>81.8%</td>
</tr>
<tr>
<td></td>
<td>4.5%</td>
<td>9.7%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Interview data revealed that face-to-face students exposed themselves to the live learning environment. This exposure enables face-to-face students to actively engage in the learning process. On the other hand, online students did not have this live interaction.

The second group consisted of two statements where participants chose “Strongly Agree”, “Agree”, “Somewhat Agree”, and “Somewhat Disagree”. The first statement of this group stated that the most successful people have discovered how to improve their ability to learn. The survey result for “Strongly Agree” or “Agree” was almost the same for participants from both the face-to-face class and the online class (87.1% and 86.3%, respectively). The Pearson Chi-Square Tests (Chi-Square value = 0.889, df = 3, Asymp.Sig. = 0.828, N = 53) indicated no significant difference between mode of delivery and students’ perceptions of the ability to learn. The second statement of the group stated “If a person cannot understand something within a short amount of time, they should keep on trying”. At least 86% of the participants from both the face-to-face and online classes strongly agreed or agreed with this statement. 9.7% of the participants from the face-to-face class chose somewhat agreed and 13.6% of the participants from the online class selected somewhat disagreed. The Pearson Chi-Square Tests (Chi-Square value = 0.889, df = 3, Asymp.Sig. = 0.828, N = 53) indicated no significant difference between mode of delivery and students’ perceptions of the ability to learn. Table 6 presents survey results for each statement.
Table 6
Response about Improving Learning

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mode of Delivery</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Somewhat disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The most successful people have discovered how to improve their ability to learn</td>
<td>Face-to-face</td>
<td>10</td>
<td>17</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32.3%</td>
<td>54.8%</td>
<td>9.7%</td>
<td>3.2%</td>
</tr>
<tr>
<td></td>
<td>Online</td>
<td>7</td>
<td>12</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>31.8%</td>
<td>54.5%</td>
<td>13.6%</td>
<td>.0%</td>
</tr>
<tr>
<td>If a person can’t understand something within a short amount of time, they should keep on trying</td>
<td>Face-to-face</td>
<td>13</td>
<td>15</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41.9%</td>
<td>48.4%</td>
<td>9.7%</td>
<td>.0%</td>
</tr>
<tr>
<td></td>
<td>Online</td>
<td>11</td>
<td>8</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50.0%</td>
<td>36.4%</td>
<td>.0%</td>
<td>13.6%</td>
</tr>
</tbody>
</table>

The third group consisted of two statements where participants chose all of the six scales except “Disagree”. The first statement stated “Successful students understand things quickly”. More participants from the face-to-face class chose “Strongly Agree” or “Agree” than from the online class (67.8% versus 45.5%). However, the Pearson Chi-Square Tests (Chi-Square value = 6.664, df = 4, Asymp.Sig. = 0.155, N = 53) indicated no significant difference between mode of delivery and students’ perceptions of understanding things quickly. The second statement stated “Learning is a slow process of building up knowledge”. At least 59.1% of the participants from both the face-to-face and online classes strongly agreed or agreed with this statement. The Pearson Chi-Square Tests (Chi-Square value = 4.765, df = 4, Asymp.Sig. = 0.312, N = 53) indicated no significant difference between mode of delivery and students’ perceptions of the learning process. Table 7 presents survey results for each statement therein.

Table 7:
Response about Learning

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mode of Delivery</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Somewhat disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Successful students understand things quickly</td>
<td>Face-to-face</td>
<td>10</td>
<td>11</td>
<td>8</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32.3%</td>
<td>35.5%</td>
<td>25.8%</td>
<td>3.2%</td>
<td>3.2%</td>
</tr>
<tr>
<td></td>
<td>Online</td>
<td>6</td>
<td>4</td>
<td>7</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>36.4%</td>
<td>.0%</td>
<td>13.6%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Learning is a slow process of building up knowledge

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mode of Delivery</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer applications are difficult subject to learn</td>
<td>Face-to-face</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25.8%</td>
<td>22.6%</td>
<td>19.4%</td>
<td>19.4%</td>
<td>12.9%</td>
<td>.0%</td>
</tr>
<tr>
<td></td>
<td>Online</td>
<td>5</td>
<td>8</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>13.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22.7%</td>
<td>36.4%</td>
<td>22.7%</td>
<td>4.5%</td>
<td>13.6%</td>
<td></td>
</tr>
</tbody>
</table>

The fourth group consisted of four statements where participants chose all of the six scale options from strongly agree to strongly disagree. Table 8 shows detailed survey results. The first statement stated “Computer applications are difficult subject to learn”. 67.8% of the participants from the face-to-face class strongly agreed, agreed, or somewhat agreed with this statement and 32.2% of the participants somewhat disagreed or disagreed. 50% of the participants from the online class selected “strongly agree”, “agree”, or “somewhat agree” and 50% of the participants chose “somewhat disagree”, “disagree”, or “strongly disagree”. The Pearson Chi-Square tests (Chi-Square value = 8.817, df = 5, Asymp.Sig. = 0.117, N = 53) indicated no statistically significant difference between mode of delivery and participants’ perception of computer applications.

**Table 8**

*Response about Computer Course*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mode of Delivery</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer applications are difficult subject to learn</td>
<td>Face-to-face</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25.8%</td>
<td>22.6%</td>
<td>19.4%</td>
<td>19.4%</td>
<td>12.9%</td>
<td>.0%</td>
</tr>
<tr>
<td></td>
<td>Online</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>9</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13.6%</td>
<td>18.2%</td>
<td>18.2%</td>
<td>40.9%</td>
<td>.0%</td>
<td>9.1%</td>
</tr>
<tr>
<td>Going over the tutorials in the text book help me understand the skills and knowledge</td>
<td>Face-to-face</td>
<td>12</td>
<td>10</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>38.7%</td>
<td>32.3%</td>
<td>19.4%</td>
<td>3.2%</td>
<td>3.2%</td>
<td>3.2%</td>
</tr>
<tr>
<td></td>
<td>Online</td>
<td>7</td>
<td>13</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>31.8%</td>
<td>59.1%</td>
<td>9.1%</td>
<td>.0%</td>
<td>.0%</td>
<td>.0%</td>
</tr>
<tr>
<td>If I find the</td>
<td>Face-to-face</td>
<td>7</td>
<td>12</td>
<td>7</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mode of Delivery</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>If I find the</td>
<td></td>
<td>7</td>
<td>12</td>
<td>7</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>
The second statement in this group stated “Going over the tutorials in the textbook help me understand the skills and knowledge”. Over 71% of the participants from the face-to-face class selected “strongly agree” or “agree” while the number for the online class was 91.9%. This indicated that the online participants valued more hands-on exercises on the computer. However, Pearson Chi-Square tests (Chi-Square value = 5.333, df = 5, Asymp.Sig. = 0.377, N = 53) indicated no statistically significant difference between mode of delivery and participants’ perception of going over the tutorials in the course.

The third statement stated “If I find the time to re-do the tutorials in the textbook, I get a lot more out of it the second time”. More than 61% of the participants from both the face-to-face class and the online class strongly agreed or agreed with this statement. The Pearson Chi-Square tests (Chi-Square value = 4.261, df = 5, Asymp.Sig. = 0.512, N = 53) indicated no statistically significant difference between mode of delivery and participants’ perception of redoing the tutorials.

The fourth statement stated “Genius is 10% ability and 90% hard work”. For the face-to-face class, 29% of the participants strongly agreed with the statement, 38.7% of the participants agreed, and 19.4% of the participants somewhat agreed. On the other hand, 57.9% of the
participants from the online class strongly agreed, 10.5% of the participants agreed and 26.3% of the participants somewhat agreed. The Pearson Chi-Square tests (Chi-Square value = 8.015, df = 5, Asymp.Sig. = 0.155, N = 50) indicated no statistically significant difference between mode of delivery and participants’ perception of genius.

The fifth group contained one statement that did not belong to any of the previous groups. The statement stated “I am capable of getting a letter grade B in this course”. Participants from the face-to-face class were more favorable with this statement than participants from the online class. In addition, there were no negative responses from participants taking the face-to-face class whereas 27.3% of the participants from the online class chose disagreed or strongly disagreed. The Pearson Chi-Square tests (Chi-Square value = 16.105, df = 4, Asymp.Sig. = 0.003, N = 53) indicated a statistically significant difference between mode of delivery and participants’ perception of their ability to get a good grade. I will explore this finding later using the qualitative results. Table 9 shows details of the survey results about getting a letter grade B in the course.

Table 9

Response about Course Grade

<table>
<thead>
<tr>
<th>I am capable of getting a letter grade B in this course</th>
<th>Mode of Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Face-to-face</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>% within Mode of Delivery</td>
</tr>
<tr>
<td>Agree</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>% within Mode of Delivery</td>
</tr>
<tr>
<td>Somewhat agree</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>% within Mode of Delivery</td>
</tr>
<tr>
<td>Disagree</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>% within Mode of Delivery</td>
</tr>
</tbody>
</table>
In sum, this section presented the survey results about self-efficacy and beliefs in relation to the acquisition of computer applications from both the face-to-face and online classes. The results have helped inform the answer to the second research question about how perceptions differ between face-to-face students and online students. These 17 statements about self-efficacy and beliefs were divided into five groups based on participants’ responses for the purposes of analysis. Two statements indicated a statistically significant difference between the face-to-face class and the online class. Group one (statement 1, 2, 4, 6, 7, 14, 16, and 18 in Table 5) consisted of responses with strongly agree, agree, or somewhat agree. At least 70% of the participants were either strongly agreed or agreed except one statement (I believe that I will learn this subject very well). This statement indicated a statistically significant difference between the face-to-face class and the online class. 80% of the participants from the face-to-face class either strongly agreed or agreed while 40% of the participants from the online class either strongly agreed or agreed.

Group two (statements 9 and 13 in Table 6) included responses of strongly agree, agree, somewhat agree, or somewhat disagree. At least 86% of the participants from both the face-to-face and online classes chose either strongly agreed or agreed. Group three (statements 8 and 15 in Table 7) had all the responses except “disagree”. 94% of the participants from the face-to-face class selected positive responses (strongly agree, agree or somewhat agree) and 78% of the participants from the online class chose positive responses. Group four (statements 5, 10, 11, and 12 in Table 8) had all six possible responses and no statistically significant differences were found. Group five (statement 17) had one statement that indicated a statistically significant difference. There were no negative responses (disagree or strongly disagree) from the face-to-face class; however, 27% of the participants from the online class disagreed or strongly
disagreed. This concludes the survey results about self-efficacy and beliefs about the acquisition of computer applications. I turn now to the survey results about motivation in learning computer applications.

4.2.5 Motivation about the Acquisition of Computer Applications

The fourth research question addresses student attitude, belief, and motivation. The previous section addressed student attitude and belief in learning computer applications. This section will present the survey results about motivation in the acquisition of computer applications.

Overall Survey Results

There were 10 survey questions about motivation in learning computer applications as is shown in Table 10. Participants were asked to rate these questions on a 1 to 6 scale, where (1) is “Strongly Agree”, (2) is “Agree”, (3) is “Somewhat Agree”, (4) is “Somewhat Disagree”, (5) is “Disagree”, and (6) is “Strongly Disagree”. The overall responses were positive with 2.5 as the mean value and 2.11 as the median value. This indicated that participants were motivated to learn computer applications. Except for questions 8 and question 9, the lower the value is, the more positive the response. Question 8 (I hate learning computer applications) and Question 9 (I think that learning computer applications is dull) are the reverse with a higher value indicating a positive response.

Besides the 10 questions in the Likert scales, participants were asked to rate the relative value of the instructor, classmates, course work, and attitudes/beliefs. Participants rated them in the following order: most important, very important, important, and somewhat important. When I analyzed the survey results, I assigned a numeric value 1 to the most important, numeric value 2 to the very important, numeric value 3 to the important, and numeric value 4 to the somewhat important. Survey results showed that respondents placed the
most value on attitude/belief (mean = 1.51, sd = 0.731) and they put the least value on the instructor (mean = 2.84, sd = 1.007). They rated classmates (mean = 1.8, sd = 0.800) and course work (mean = 1.92, sd = 0.975) almost equally important. These results indicated that students felt that attitudes and beliefs were more important in the learning process than classmates and the instructor.

In addition to factors such as the instructor, classmates, course work, and attitudes/beliefs, technology also played a part in students’ responses toward the course. In this computer course, students learned technologies used in the business world such as PowerPoint and MS Excel. Students used technology intensively in the course. They used the course management tool WebCT and the simulated online training and assessment manager SAM. In order to use these technologies, students needed to acquire skills such as downloading and installing plug-ins to view multimedia files. The survey results about technology proficiency are as follows.

Table 10

Motivation

<table>
<thead>
<tr>
<th>Motivation</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am self-motivated to do my schoolwork</td>
<td>51</td>
<td>1</td>
<td>3</td>
<td>1.45</td>
<td>.730</td>
</tr>
<tr>
<td>2. I want to do my best in school</td>
<td>50</td>
<td>1</td>
<td>6</td>
<td>2.00</td>
<td>1.077</td>
</tr>
<tr>
<td>3. Learning computer applications is really great</td>
<td>51</td>
<td>1</td>
<td>6</td>
<td>2.14</td>
<td>1.265</td>
</tr>
<tr>
<td>4. I really enjoy learning computer applications</td>
<td>51</td>
<td>1</td>
<td>4</td>
<td>1.90</td>
<td>.831</td>
</tr>
<tr>
<td>5. Computer applications is an important part of my program</td>
<td>53</td>
<td>1</td>
<td>5</td>
<td>2.08</td>
<td>1.197</td>
</tr>
</tbody>
</table>
6. I plan to learn as much as computer applications as possible  
   51 1 6 2.27 1.415

7. I love learning computer applications  
   52 1 6 4.29 1.677

8. I hate computer applications  
   51 1 6 4.27 1.650

9. I think that learning computer applications is dull  
   51 1 6 2.61 1.282

10. In general, I enjoy doing case study, assignments or projects in this course  
    53 1 5 2.06 1.028

There were two questions about technology proficiency: technology proficiency for face-to-face learning and technology proficiency for online learning. Participants were asked to rate their technology proficiency on the scale of excellent, good, average, and below average. The majority of participants (88.23%, N = 51) responded that they were excellent or good at using computers for face-to-face learning. Only a few participants (5.88%, N = 51) felt they were average or below average when they considered using computers for face-to-face learning. Figure 23 displays the results.
Figure 23: Technology Proficiency for Face-to-face Learning

The second question asked participants about technology proficiency in using computers for online learning. The survey results for this question were similar to those of question 1 (using computers for face-to-face learning): 88.14% of the respondents (N = 51) responded that their technological proficiency was excellent or good. 9.8% of the respondents selected “average” and 1.96% of the respondents selected “below average”. Figure 24 displays the result for the second question.
When asked about the importance of face-to-face education, almost half of the participants (47.06%, N = 51) responded that face-to-face education was very important for their academic success and 37.25% of the participants agreed that face-to-face education was important. The combination of these two responses (very important and important) was 84.31% indicating that a majority of the participants highly value face-to-face education. Responding to the corresponding question about online education, 15.69% of the participants replied that online education was very important for their academic success and 72.55% of the participants confirmed that online education was important. The combination of these two responses was 88.24% indicating that a majority of the participants highly value online education. In sum, participants indicated that both face-to-face education and online education were important.

Figure 24: Technology Proficiency for Online Learning
Figure 25 shows the survey result on the importance of face-to-face education and online education.

![Figure 25: Importance of Face-to-face Education and Online Education](image)

**Similarities and Differences**

In breaking down the responses about motivation (Table 10) between the face-to-face class and the online class, there was no statistically significant difference among all of the statements. This finding partially answered the second research question about how students’ perceptions differ between the face-to-face and online classes. The detailed responses for each statement in the form of count and percentage are presented in Table 11. The number of participants in this table was 51 (N = 51) and blank cells indicate that there was no response.
Table 11

Response about Learning Computer Applications

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am self-motivated to do my schoolwork</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face-to-face</td>
<td>17</td>
<td>8</td>
<td>4</td>
<td>58.6%</td>
<td>27.6%</td>
<td>13.8%</td>
</tr>
<tr>
<td>Online</td>
<td>18</td>
<td>1</td>
<td>3</td>
<td>81.8%</td>
<td>4.5%</td>
<td>13.6%</td>
</tr>
<tr>
<td>I want to do my best in school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face-to-face</td>
<td>12</td>
<td>10</td>
<td>6</td>
<td>41.4%</td>
<td>34.5%</td>
<td>20.7%</td>
</tr>
<tr>
<td>Online</td>
<td>8</td>
<td>7</td>
<td>4</td>
<td>36.4%</td>
<td>31.8%</td>
<td>18.2%</td>
</tr>
<tr>
<td>Learning computer applications is really great</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face-to-face</td>
<td>10</td>
<td>8</td>
<td>9</td>
<td>34.5%</td>
<td>27.6%</td>
<td>31.0%</td>
</tr>
<tr>
<td>Online</td>
<td>11</td>
<td>4</td>
<td>4</td>
<td>50.0%</td>
<td>18.2%</td>
<td>18.2%</td>
</tr>
<tr>
<td>I really enjoy learning computer applications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face-to-face</td>
<td>10</td>
<td>11</td>
<td>7</td>
<td>34.5%</td>
<td>37.9%</td>
<td>24.1%</td>
</tr>
<tr>
<td>Online</td>
<td>9</td>
<td>8</td>
<td>5</td>
<td>40.9%</td>
<td>36.4%</td>
<td>22.7%</td>
</tr>
<tr>
<td>Computer applications is an important part of my program</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face-to-face</td>
<td>9</td>
<td>11</td>
<td>5</td>
<td>31.0%</td>
<td>37.9%</td>
<td>17.2%</td>
</tr>
<tr>
<td>Online</td>
<td>10</td>
<td>9</td>
<td>1</td>
<td>45.5%</td>
<td>40.9%</td>
<td>4.5%</td>
</tr>
<tr>
<td>I plan to learn as much as computer applications as possible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face-to-face</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Face-to-face</td>
<td>Online</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------</td>
<td>--------</td>
<td>-----</td>
<td>-----</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>31.0%</td>
<td>27.6%</td>
<td>24.1%</td>
<td>10.3%</td>
</tr>
<tr>
<td>I love learning</td>
<td>(total)</td>
<td></td>
<td>10</td>
<td>7</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>computer applications</td>
<td></td>
<td></td>
<td>45.5%</td>
<td>31.8%</td>
<td>4.5%</td>
<td>9.1%</td>
</tr>
<tr>
<td></td>
<td>Face-to-face</td>
<td>Online</td>
<td>3.4%</td>
<td>3.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I hate computer</td>
<td></td>
<td></td>
<td>10.3%</td>
<td>20.7%</td>
<td>20.7%</td>
<td>6.9%</td>
</tr>
<tr>
<td>applications</td>
<td></td>
<td></td>
<td>10.3%</td>
<td>20.7%</td>
<td>13.8%</td>
<td>10.3%</td>
</tr>
<tr>
<td>I think that learning</td>
<td></td>
<td></td>
<td>4.5%</td>
<td>9.1%</td>
<td>13.6%</td>
<td>27.3%</td>
</tr>
<tr>
<td>computer applications</td>
<td></td>
<td></td>
<td>27.3%</td>
<td>36.4%</td>
<td>9.1%</td>
<td></td>
</tr>
<tr>
<td>is dull</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Face-to-face</td>
<td>Online</td>
<td>17.2%</td>
<td>27.6%</td>
<td>27.6%</td>
<td>13.8%</td>
</tr>
<tr>
<td>In general, I enjoy</td>
<td></td>
<td></td>
<td>6</td>
<td>8</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>doing case study,</td>
<td></td>
<td></td>
<td>27.3%</td>
<td>27.3%</td>
<td>36.4%</td>
<td>9.1%</td>
</tr>
<tr>
<td>assignments or</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>projects in this</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>course</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Face-to-face</td>
<td>Online</td>
<td>37.9%</td>
<td>27.6%</td>
<td>27.6%</td>
<td>6.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>12</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>27.3%</td>
<td>54.5%</td>
<td>9.1%</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

In response to survey statements about motivation to do the school work and trying to do their best in school, at least 96.6% of the participants from the face-to-face class strongly agreed or agreed with these statements while 86.4% of the participants from the online class strongly agreed or agreed with the statements. 62.1% of the participants from the face-to-face class strongly agreed or agreed that “Learning computer applications is really great” while the number for the online participants was 68.2%. There were less negative responses (Somewhat disagree,
disagree, strongly disagree) for participants from the face-to-face class than those from the online class (6.8% versus 13.6%). There were similar responses from the face-to-face and the online class about enjoying learning computer applications and its importance to their programs. However, participants from the online class sounded stronger than their counterparts in planning to learn as much about the computer applications as possible.

The survey results about two statements (“I love learning computer applications” and “I hate learning computer applications”) presented contradictions in both the face-to-face and the online groups. The mean value for both statements was very close (4.29 and 4.27 respectively). Recall that 1 represents strongly agree and 6 represents strongly disagree. So, the mean values 4.29 and 4.27 are located somewhere between somewhat disagree and disagree. The mean value 4.29 from the statement “I love computer applications” shows that the average participants did not love learning computer applications. On the other hand, the mean value 4.27 from the statement “I hate computer applications” indicates that the average responses love learning computer applications. Here comes the contradiction – the average participants both love and hate learning computer applications. This ambiguity might be caused by the fact that only one statement was negatively worded while the rest of the statements were positively worded.

Although 44.8% of the participants from the face-to-face class strongly agreed or agreed that “Learning computer applications is dull”, 65.5% of the participants from the same sample strongly agreed or agreed that they enjoyed doing case study, assignments or projects in the course. Similarly, 54.6% of the participants from the online class strongly agreed or agreed that “Learning computer is dull” and 81.8% of the participants strongly agreed or agreed that they enjoyed the course. Therefore, for both the face-to-face and the online participants, at least 65% enjoyed learning computer applications in the course despite the fact that about half of them thought that “Learning computer applications is dull”. Similar to the contradiction in the
statements of love and hate of learning computer applications, here we see another paradox between the responses from the two statements (“learning computer applications is dull” and “I enjoy doing case study, assignments or projects in this course”).

**4.2.6 Learning Outcomes**

I used the independent-samples t-test to compare the mean scores of the face-to-face class and the online class. The t-test result answers the third research question: are there significant differences in academic achievement between online and face-to-face students? Mode of delivery (online versus face-to-face) serves as categorical independent variable and test score including test 1, test 2, and final exam as a dependent variable. Students from both the face-to-face class and the online class were taught by the same instructor who employed the same instrument for all the tests and the final exam. The instrument is the Skill Assessment Manager (SAM) provided by Thomson Nelson Education.

SAM is a web-based online training and testing tool that provides students with a simulated environment where they can observe, practice, and apply the skills and knowledge for MS Office PowerPoint and MS Excel. The simulated environment features audio and video where students can stop or pause at any time or repeat the task many times. Furthermore, SAM also provides project-based hands-on exercises in the real MS Applications where students download the file and instructions from the SAM, complete the required steps and upload their finished products to be marked and graded by the SAM. The instructor can just download students’ submissions and transfer their grade to WebCT.

There are two units in the computer course. The first unit deals with MS PowerPoint where students are asked to create a multi–media PowerPoint presentation using a design template, apply transition and animation schemes, insert picture, and add hyperlinks and sound effects. In the second unit, students learn to prepare basic and intermediate level Excel
spreadsheets that provide information to support decision-making and problem solving in a business environment. The second subject covers the topics of creating a worksheet with an embedded chart; building formulas, functions, and web queries; analyzing what-if scenarios; working with financial functions, data tables, and amortization schedules; creating, sorting, and querying a list; and working with multiple worksheets and workbooks. Students learn these two units in 15 weeks.

There are two tests and one final exam in the computer course. Test 1 covers MS PowerPoint. The face-to-face class writes test 1 in week 5 at their regularly scheduled classroom time supervised by the instructor. The online class writes test 1 in the testing centre at the college where students can write the test during one specific week – from Monday to Friday. The test is supervised by facilitators who oversee all the online tests requested by online instructors. Test 2 and the final exam were scheduled in weeks 10 and 14 respectively and both covered MS Excel 2007. Two different versions of test 1 test 2, and final exam with comparable level were adopted from the same testing bank supplied by Thomson Nelson Publisher.

The format of all of the tests was performance-based assessment where students were asked to complete tasks with three attempts in a simulated environment on SAM. The test results were automatically generated by the SAM and the instructor can export the test results to Excel, PDF, Word, and CSV. The instructor also sent the test results to me. I then imported the test results from Excel to SPSS 17.0 for analysis to help answer my third research question: is there a significant difference in students’ test scores between the online class and the face-to-face class?

I use the independent-samples t-test to compare the mean scores between the online class and the face-to-face class. The assumptions for independent-samples t-test are that the dependent variable has scale qualities and scores are independent of one another. My dependent variables are test 1, test 2, and final exam, which are continuous ranging from 0 to 100. Mode of delivery
(the online class and the face-to-face class) is the categorical and independent variable. Therefore, the data satisfy the assumptions. Table 12 presents the mean test scores.

**Table 12**

*Test Scores*

<table>
<thead>
<tr>
<th>Mode of Delivery</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Final Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-face class</td>
<td>78 (N = 32)</td>
<td>74 (N = 32)</td>
<td>78 (N = 32)</td>
</tr>
<tr>
<td>Online class</td>
<td>78 (N = 24)</td>
<td>77 (N = 19)</td>
<td>72 (N = 20)</td>
</tr>
</tbody>
</table>

Table 13 shows the descriptive statistics for the test 1 results from the online class and the face-to-face class. The mean is 78 for both the online class (N = 24) and the face-to-face class (N = 32). The standard deviations are 15.025 and 13.99 respectively. To employ the independent samples t-test, researchers assume that the variances of two populations are the same. This is conducted by using Levene’s Test for Equality of Variances which uses the F value and P value as shown in Table 14. The “Sig.” value (P value) generated by Levene’s test shows if a difference exists for test 1 between the online and face-to-face classes. If the P value is greater than 0.05, one uses the data under the row heading “Equal variances assumed”. Otherwise, one uses the data that begins “Equal variances not assumed”. Since the significance level (2-tailed) is 0.995 which is greater than 0.05, I conclude that there is no significant difference for test 1 between the online class and the face-to-face class.

**Table 13**

*Descriptive Statistics for Test 1*

<table>
<thead>
<tr>
<th>Mode of Delivery</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1 Face-to-face</td>
<td>32</td>
<td>78.03</td>
<td>13.990</td>
<td>2.473</td>
</tr>
<tr>
<td>Mode of Delivery</td>
<td>N</td>
<td>Mean</td>
<td>Std. Deviation</td>
<td>Std. Error Mean</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----</td>
<td>-------</td>
<td>----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Test 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face-to-face</td>
<td>32</td>
<td>78.03</td>
<td>13.990</td>
<td>2.473</td>
</tr>
<tr>
<td>Online</td>
<td>24</td>
<td>78.00</td>
<td>15.025</td>
<td>3.067</td>
</tr>
</tbody>
</table>

Table 14

Independent t-test for Test 1

<table>
<thead>
<tr>
<th>Mode of Delivery</th>
<th>Levene’s Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>Test 1</td>
<td>.000</td>
<td>.993</td>
</tr>
<tr>
<td></td>
<td>.008</td>
<td>47.679</td>
</tr>
</tbody>
</table>

Test 2 covered the first three chapters of MS Excel 2007. It dealt with creating a worksheet and embedded chart; using formulas, functions, and web queries; and financial projection with what-if analysis. Test 2 was performance-based assessment on the SAM and the test score was automatically generated once the student submitted the test. Table 15 showed the descriptive statistics from test 2 for both the face-to-face class and the online class. 32 students from the face-to-face class wrote test 2 with a mean test score of 73.88 and standard deviation 15.197. 19 students from the online class produced a mean score of 76.74 with standard deviation of 23. 928. Is the difference of 2.86 (76.74 – 73.88 = 2.86) significant in a statistical sense?
Table 15

Descriptive Statistics for Test 2

<table>
<thead>
<tr>
<th>Mode of Delivery</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 2</td>
<td>32</td>
<td>73.88</td>
<td>15.197</td>
<td>2.686</td>
</tr>
<tr>
<td>Online</td>
<td>19</td>
<td>76.74</td>
<td>23.928</td>
<td>5.489</td>
</tr>
</tbody>
</table>

Table 16 from the independent samples t-test will determine if the results are significantly different. First, I look at the “Sig.” value in the table under the Levene’s Test for Equality of Variance. The value .321 is greater than .05 indicating that the variances of the distributions for face-to-face test 2 and online test 2 are equal. The value (.603) in the Sig. (2-tailed) is greater than 0.05 indicating there is no significant difference between face-to-face test 2 and online test 2 under the heading Equal variances assumed.

Statistical tests showed that there were no significant differences in test 1 and test 2. This indicated that online class was as good as face-to-face class. Table 17 shows the

Table 16

Independent t-test for Test 2

<table>
<thead>
<tr>
<th></th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>Test 2</td>
<td>Equal variances assumed</td>
<td>1.007</td>
</tr>
<tr>
<td></td>
<td>Equal variances not assumed</td>
<td>-.468</td>
</tr>
</tbody>
</table>

descriptive statistics for the final exam which covered all of the six chapters on Excel 2007 with a focus on the last three chapters. These final chapters dealt with financial functions,
manipulating a table, and working with multiple worksheets and workbooks. The face-to-face class (N = 32) produced a mean score of 78 with a standard deviation of 13.99 while the online class had the mean score of 72.5 with a standard deviation of 19.163.

Table 17

*Descriptive Statistics for Final Exam*

<table>
<thead>
<tr>
<th>Mode of Delivery</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Exam</td>
<td>32</td>
<td>78.03</td>
<td>13.990</td>
<td>2.473</td>
</tr>
<tr>
<td>Online</td>
<td>20</td>
<td>72.50</td>
<td>19.163</td>
<td>4.285</td>
</tr>
</tbody>
</table>

Table 18 shows the result of an independent samples t-test. The “Sig.” value is .103 which is greater than 0.05 indicating that the variances of distribution for the face-to-face and online classes are equal. Therefore, I use the “Sig (2-tailed)” value in the row with heading “Equal variances assumed”. Since this value is .235 which is greater than 0.05, I conclude that there is no significant difference between the face-to-face class and the online class with regard to the final exam.

Table 18

*Independent t-test for Final Exam*

<table>
<thead>
<tr>
<th></th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>Final Exam</td>
<td>Equal variances assumed</td>
<td>2.760</td>
</tr>
<tr>
<td></td>
<td>Equal variances not assumed</td>
<td>1.118</td>
</tr>
</tbody>
</table>
To summarize, the learning outcomes section presented the results of independent samples t-tests for test 1, test 2, and final exam from both the face-to-face and online classes. These results show that there are no statistically significant differences between learning outcomes as measured by test scores and mode of delivery. These results help answer the third research question about academic achievement differences between face-to-face and online class. The next section will use qualitative data to verify findings, interpret inconsistencies, discovery new meanings, and reach an enriched understanding of my research questions. The qualitative data includes structured one-on-one interviews, classroom observations, and informal conversations with students and the instructor, and the assignments.

4.3 **Findings from Qualitative Interviews**

While the results from the quantitative data depicted a general picture of students’ perceptions of course design and delivery and identified no significant difference between online and face-to-face students in relation to these perceptions and students’ test scores, the qualitative data provided a different approach in understanding student learning experiences and made sense of the multiple realities of both online and face-to-face classes. The purpose of the interviews was to provide detailed information and give a deep understanding on student learning experiences. The interview data were organized around the following themes: factors in choosing online/face-to-face course, user services and support, factors (course content, teacher/teaching, tests, learning activities) best supported in learning computers, beliefs and motivation in learning computers, and strengths and weaknesses of taking online or face-to-face courses. During the data analysis, patterns emerged for each theme. Pseudonyms are used in the qualitative data analysis. The following section presents the findings from six interviews, classroom observations, and student’ assignments. These results are arranged to correspond with the interview protocols.
4.3.1 Interviewee’s Profiles

The six interview participants enrolled in the School of Business in the Fall of 2009. The following pages describe three participants from the online class and three participants from the face-to-face class. These six students were selected because they had diverse backgrounds reflecting the diversity of the College population. The participants’ profiles illuminated their feelings, thoughts, and experiences toward the computer course and help readers better explain their firsthand, in-depth perceptions and explanations of their learning environment. The following presents three online participants (Susan, Hanna, and Phyllis) followed by three face-to-face participants (Bill, Patricia, and Shirley).

Susan was a first year human resources student and she identified herself as a Chinese Canadian. She had enrolled in the College directly from high school. Being English as a second language speaker, she was pretty excited about this interview. Throughout the 47 minute session, she did not make eye contact with me once. She described her shyness as one of the reasons why she took the online course. She was not comfortable socializing with other students and had few friends. She preferred to take the online class so that she could do the course work on her own and had more freedom and choice regarding when and how to complete the term work.

Hanna was a first year international student in the Human Resources program. She was from South America and was happy that she had made many friends at the campus. She had been in Canada for three years and she liked the College a lot. Due to the extremely high tuition fee for international students, she strived to learn hard at the College and she hoped to transfer to a university after graduation. She highly valued computer skills as she believed that they were essential skills for many workplaces. She expressed a desire to stay in Canada after graduation and hopes to bring her parents to Canada from South America.
Phyllis was a first year marketing student taking six courses while working a part-time job as a cashier at a large retail chain. Growing up with a single parent in Toronto, she started to work part-time when she was in the 10th grade. After high school, she worked for minimum wages for two years and came to realize that she did not want to continue to do those dead end jobs anymore. She expressed strong dislike towards math, but she found the course very interesting except when it had to deal with mathematical calculations in MS Excel. Unlike Hanna who wanted further education after the College, Phyllis just wanted to graduate from the College and find a full-time job.

Bill was in his first year at the College taking a three-year diploma program in business administration. He was planning to apply to the University of Toronto, but he thought that was still far down the road. He briefly attended Queen’s University and Ryerson University but later dropped out. He thought that he needed more hands-on learning. He worked at a large retail store warehouse to help pay his tuition. He was in and out of the hospital many times due to an unspecified health issue, which was the reason he could not attend every single class. However, he tried to come to the class as many times as he could because he loved computers and had been attached to them since he was a little boy. He had a lot of computer knowledge, which he thought was a plus. He always enjoyed computers and that was the reason why he did not mind taking this class.

Patricia immigrated to Canada with her parents from Russia. She was a first year marketing student who came to the College straight from high school. She felt that the class at the College was very big compared to her high school classes; but she thought that it was fine because this meant that she could also meet more people. Patricia used to take programming design and web design courses. She had some elementary knowledge of Visual Basic and she felt very comfortable using technology. One thing she learned from her prior computer skills that
could be applied to other fields was that when dealing with computer problems, one should be taking a step-by-step approach rather than jumping around. She felt that this learning strategy helped her a lot at the College.

Shirley was in the second semester of her first year majoring in a three-year marketing program. She had a full-time job to support her education. She was returning to the College after 10 years of working and she felt that she had a lot of things that she needed to recall and practice from her high school days. She felt that it was really difficult to juggle between work and study at the same time. However, she was dedicated and committed to both her work and her studies. She was very confident that she would get a promotion in her workplace once she got the diploma from the College. She valued the time at the College and was proud of herself that she was paying all the tuition by herself – unlike some of the others students that get their parents to pay their tuition. Therefore, she had strong objections toward students who did not take their studies seriously and or did not respect professors.

4.3.2 Factors in Choosing the Face-to-face or the Online Course

From the interview question, factors in choosing either the online or face-to-face computer course, the dominant response from the face-to-face participants was that they did not know that there was an option for an online class. Bill presented two reasons for choosing the face-to-face course. First, the course was a mandatory course for him. Secondly, he thought that he was put into this class automatically and he did not know about the online class. He thought that he had to enroll in the face-to-face course as it was part of the program and he had to go with the curriculum. He expressed that he would have gone for the online class if he had known about the option. Patricia knew there was an online class, but she did not know that she could take it. She thought that she had to take the face-to-face class if it was a mandatory course, and that the online class was only for electives. Shirley did not even consider the online class. She thought
that the face-to-face class was the perfect format for her. “Because it is a computer course, I would not understand it by myself. You have to show me how to do things. I just love face-to-face class” (Interview, November 10, 2009). She gave an example of how the professor showed her the copy and paste function in Excel right in front of her and she was able to understand what she had to do right away. She preferred to communicate with people face-to-face and she did not like to interact with computers alone.

The three participants from the face-to-face class (Bill, Patricia, and Shirley) thought that they had no other option but to take the face-to-face class. This was an unexpected answer as the online class had already been running at the College for four years in a row (from the Fall of 2005 to the Fall of 2009). From this, one can see that the administration should do something to get the word out to all the students that the online class is available for everyone regardless if it is a mandatory or elective class. Only when students understand all their options, can they make informed and firm decisions about the mode of delivery most suitable their needs.

Unlike the face-to-face students who thought that they had no options available in choosing the mode of delivery, online students (Susan, Hanna, and Phyllis) were more informed and had clear reasons as to why they chose the online class. These reasons included personal shyness, flexibility, and convenience. Susan stated that she chose the online class because she did not like the social interaction that came with a face-to-face class where she would have to communicate with other people regarding group work. It was hard for her as she did not know other students very well, and she was shy and not very social. Susan described one incident where she felt forced to do group work in a face-to-face course that she took last year. She expressed her frustration with working with others – she often did not participate in group brainstorming even though she had some ideas and strategies in mind. Standing before the entire class and giving presentations was one of the most challenging tasks for her. The online class,
she thought, would limit her social interactions with others. Also, she liked to do the course work on her own time because it gave her more freedom and more choices.

Hanna was attending other classes from Tuesdays to Fridays and she wanted to have an extra day off so that she could have the flexibility to do other things at home. By not having a tight schedule, she thought that learning from home was a good fit for her. She did not worry about attendance as it was an online class. Phyllis’ decision to take the online class was mostly based on convenience. She said, “I can do whenever I like after other classes. It is not fix time. So, the convenience is probably the best. Also, I know little about MS Excel and I can do it at home” (Interview, November 5, 2009).

4.3.3 User Services and Support

When analyzing the theme of user services and technical support, the three participants from the online class (Susan, Hanna, and Phyllis) had reported more problems and concerns than the three participants from the face-to-face class (Bill, Patricia, and Shirley), this was especially true at the start of the class. Susan did not like the fact that WebCT and SAM were sometimes very slow but other than that, she was generally satisfied with them both. Fortunately, Susan was able to find a way around the slowness. She explained how she would simply exit and re-start the program and the courseware would be back to its normal speed again. When she needed help completing her work, she would try to ask her sister first but sometimes her sister did not know the answer either as she did not specialize in computers. When that happened, she would ask her friends enrolled in the same online class as her. At other times, she would ask her professor for help through the WebCT mail or chat room. Comparing SAM with the textbook, she expressed that she liked SAM more as it presented a summary of the textbook content and it also provided different modes of learning: observation, practice, and application, which helped her more when studying. She felt that the textbook was boring and the only time she looked at it was when she
had problems with SAM. When that was the case, she often just skimmed through the textbook contents quickly first until she found the relevant section related to her problem. In addition to reading the textbook, she also did hands-on exercises in the textbook to make sure that she fully understood the concepts.

Hanna had a lot of problems with WebCT for the first two weeks. She was having trouble logging onto WebCT with her user name and password and had to reset both to get it to work. However, once she got into WebCT, she thought that the courseware was not difficult to navigate at all and did not require any help completing her work.

Phyllis reported that she also had problems logging in at first and sometimes had difficulties browsing WebCT and SAM. Phyllis was not very tech-savvy and often had to resort to asking her brother for help with accessibility issues. Although SAM was slow or at times would freeze the computer screen at school, she said that it worked well at home.

Unlike the participants from the online class (Susan, Hanna, and Phyllis) who had a lot of trouble accessing the courseware, participants from the face-to-face class (Bill, Patricia, and Shirley) had few problems with the technology. It is also interesting to note that, when all the students were stuck on a problem, the students from the face-to-face class would often only ask the professor for help while the students from the online class went to a wide range of sources such as siblings, friends, classmates, as well as the professor for help. In the following, the experiences of the three participants from the face-to-face class are analyzed.

Bill had a strong background in computers even before he enrolled in the College. When asked if he ever needed help completing his work, he replied that he did not have any problems at all. Instead, his classmates always turned to him for help. During my classroom observation, I also noticed that Bill helped other students when they were doing the SAM training.
Similar to Bill, Patricia came to the College with adequate computer knowledge. She felt that she already knew the contents of the course, just that she had not used them for a while. For her, the course was more of a review. She stated that she had no trouble using the technology and she did not need help in completing her work.

Shirley did not have any problems with the technology either at school or at home. Shirley was very familiar with the user support and services used in the course. She thought that things worked very well with both the WebCT and SAM. She did not experience any slowness or freezing. Shirley was also very impressed by the index feature found inside the textbook because it allowed her to find any particular concept that she needed very fast. She considered the index feature the “golden section” of the textbook and found it very helpful.

4.3.4 Factors Best Supported in Learning Computers

This section tackles factors such as course content, teacher/teaching, and learning activities in learning computer course. Participants were asked to choose one of these factors that they thought is best supported in their learning. I analyzed responses from online students Suan, Hanna, and Phyllis first and then the responses from face-to-face students Bill, Patricia, and Shirley. Susan maintained that she had learned a lot from the online class – utilizing resources both within the online class and outside the online class. From the online class, she learned MS PowerPoint and spreadsheet skills on the web-based training platform SAM. She used SAM to study the course work intensively as it provided her with demonstrations and hands-on exercises with audio and video components. When asked to comment on the factors best supported in online learning, Susan would rate the professor as number one:

The professor always posted things like frequent updates. The contents, he always made sure he posted on time; and the course online is very structured as it has exact instructions. He posted stuff ahead of the time and the agenda to follow. I guess the professor is very good at updating and he is always good at answering your questions like right away. (Interview, November 6, 2009)
Susan stated that the term tests were hard – there were questions on the tests that she did not recognize from the online training sessions. She was not sure how she was supposed to answer them correctly on the test if they were never introduced in the online training. When she discussed this problem with other students in the same online class, she found that many other students were also annoyed by questions not covered in the training sessions. Susan felt that the online environment gave her a lot of freedom and independence and she was able to study at her own pace. At the same time, she also felt that the online class was quite lonely and she did not have people to talk to. Furthermore, there was no reinforcement imposed on the students to make sure that everything was done on time. This sentiment resonates with the survey responses on the disadvantages of online class (section 4.2 above). When describing her performance in the online course, she stated that she completed all the assignments, quizzes, and tests. She also read everything in the textbook. Sometimes she did hands-on exercises to confirm that she got all the correct ideas and skills.

When dealing with difficult concepts, she often looked through the Help function embedded in MS PowerPoint and MS Excel. She also utilized search engine websites such as Google to find solutions to her problems. When asked about how she learned some of the specific financial functions in MS Excel, she said that she usually followed the examples first, and then tried to change the formulas around in the examples to figure out how different parameters work in the function. By playing around with the functions, she was able to understand how everything worked. She was very proud of herself for getting excellent marks on the first term test as a result of all her effort and hard work.

Hanna attributed her academic success to doing all the assignments and quizzes at home. She always read the textbook carefully and did hands-on exercises at the end of each chapter.
She thought MS PowerPoint was easy to learn and she was able to comfortably follow the online training on the SAM. Due to the fact that she did not have any prior knowledge about MS Excel, she felt a little intimidated about the concepts and skills such as absolute cell reference and final calculations. These challenges motivated her even more to look in the textbook not just once but several times. She was also grateful for the professor’s online help. He replied to her questions promptly and he often explained to her again in detail the materials that she thought were difficult if she did not get it at the first time. Hanna also felt less isolated by participating in the discussion board or online chat with the professor and other students. Overall she felt that the online course ran smoothly for her without much technical difficulty. She checked everything on the course website including announcements, assignments, quizzes, and the WebCT discussion board at least twice a week to make sure that she did not miss any important due dates. She wanted to try her best in the class and did not want to lose a single mark. The online training software SAM was very straightforward to her with clear explanations of how to use MS PowerPoint and MS Excel. She felt that she could have participated more in the online class if the professor had given the students reminders every week. She was always afraid of forgetting important information as she was juggling several other courses and responsibilities at the same time.

Phyllis believed that the learning activities in the course played a critical role in contributing to her learning success. She felt that she had gained almost all of the skills and knowledge through doing the online training and hands-on exercises on the computer. By doing all the tutorials, she was able to get an idea of what was going on and it helped her to do well in the assignments as well. She went through all the tutorials in sequence. She also did each review assignment at the end of every tutorial. In addition to the learning activities, she also thought that the contents and the professor were also important. She explained how the professor was there to
support her by replying to her e-mails promptly, holding discussion board conversations and online chat. Phyllis liked how the assignments were very flexible and she had the option to choose what topics to do her assignments on. For example, she was given the choices of either introducing her hobbies or discussing a national park to demonstrate her skills and abilities using MS PowerPoint.

When asked about what factors best supported him in his learning, Bill thought that the programs used in the class itself at some level helped him a lot. He appreciated how the new mouse-over mechanism in MS Office 2007 worked – it shows you the function when you put your mouse on the cell in the spreadsheet. He also felt that the professor and the learning activities helped him out as well. He thought that the professor was very interesting and enthusiastic about the course. This in turn made him want to participate more in the face-to-face class. He believed that this also applied to every other class because an interesting professor would stimulate more class participation. Moreover, he believed that if the learning activities were relevant to the students, it would further foster student learning. Otherwise, it would discourage student learning:

The SAM – the online thing, the practice questions, those helps to understand the basics. But sometimes some questions on the SAM are not practical to what students are learning. One or two questions on the test are not on the SAM practices. So, sometimes it is hard for students to engage. (Interview, November 16, 2009)

Bill ascribed his performance in the face-to-face course to both his abilities and effort. He believed that putting effort in what you are doing is always important. He said that students could not achieve anything if they did not put effort into their study. He presented an example of how he put effort into completing his MS PowerPoint assignment on a national park. He basically used all the knowledge he had and gave as much information as he could. However, he did not
want to seem like a person that knows it all so he tried to not to give too much information to
make it more presentable.

Probing on what factors such as ability, effort, task difficulty, and luck played a big role
in her performance in this face-to-face course, Patricia maintained that she did not believe in luck
at all and that her abilities and effort helped her to do well in the course. When answering
multiple-choice questions, she said that at first she thought that she could just guess the answer
but she would never get it right. She also thought the task difficulty was a major factor:

When the assignment is easy, you can get good mark and you don’t need to put much
more effort. When the task is more difficult, you are going to put more effort in order to
get a good grade. (Interview, November 4, 2009)

She rated the professor as the number one factor in supporting her learning. She stated that he
provided students with online training and examples. He also assigned grades for these activities
so that students would have more incentive to practice the training and examples. She liked the
methods the professor used in class to help students with the assignment – he would briefly
explain to the students how they should go about doing the assignment. She believed that the role
of the professor was to explain the concepts and demonstrate the skills to students so that the
students have preconceptions and tools needed to practice the problems themselves. She felt very
confident and she had clear directions and techniques to complete her assignment after the
professor gave the students hints.

When inquiring about the factors that best supported her learning in this face-to-face
course, Shirley maintained that the learning activities and the professor were the most important
factors. She felt that the learning activities from the textbook were clear, concise, and well
structured. She loved the index and the table of contents features found in the textbook because it
provided her with a quick way to search and access specific information. She thought that the
index feature was a very powerful tool and had saved her a lot of time. The professor also played
an important role in supporting her learning as he often pointed out the most important sections within each chapter to guide all the students into the right direction. She enjoyed the professor/student relationship and thought that the professor was very helpful, but she thought he did not receive the respect that he deserved. Shirley also benefited from the online training courseware SAM, where she was able to practice as many questions as she pleased and received immediate feedback on how well she did. Shirley expressed that this face-to-face course was a good fit for her needs and preferences. She found that the three hour in-class learning experience was fulfilling. She has learned both basic and complicated skills. She felt that the way the textbook and SAM were written was very clear and easy to understand. She appreciated the fact that the professor did not only give out marks based on the contents of the assignments but also considered how much effort the student had put in. She had received a perfect mark for one of the assignments although she was positive that she made few mistakes.

4.3.5 Beliefs and Motivation in Learning Computers

When describing her motivation to learn the computer tools in the online class, Hanna stated that future job opportunities motivated her to learn about MS Excel. She viewed this software application as a widely spread computer tool in the workplace valued by many employers. As for MS Word and MS PowerPoint, she pointed out that she needed them because her other business courses required these skills and knowledge. She mentioned that she had to do a lot of group work in other courses and most of them involved giving presentations in front of the class using MS PowerPoint. As a result, she thought that all the software skills learned in the course were very important and could be applied in the real world as well.

Phyllis maintained that she was not so motivated in the course as she was just an average student. However, she hoped to do more assignments and tutorials to improve her learning.
When I asked her what could be done to get her to participate more in the online class, she responded:

Probably more updates, I would like to say. To like let me know what is coming up. What is something due I have to work on it. More fun assignments, something you like, maybe. (Interview, November 5, 2009)

Bill ascribed his motivation to his interest in computers at a very young age. Ever since he was small, he was fascinated with computers and computer applications. He was very curious about how everything worked and was always asking different questions about computers and tried different ways to solve his questions by himself. He believed that taking the course allowed him to further advance his interests and skills in computers. Another motivation was that he liked helping others and found it rewarding. As a result, he was even more motivated to make sure that he knew as much as he could about everything in the course so he could help other students when they needed help. He stated that helping other students also made him feel happy about himself.

Patricia used to take programming design and web design courses. She learned some basic knowledge on Visual Basic. She felt very comfortable using technology and she already knew some of the contents presented in the course. She felt that the course was just a review for her to refresh her memory. When prompted, she admitted that she did learn some new functions such as PMT and Goal-seek that she had not used before.

Describing her motivation to use computer tools in the face-to-face course, Shirley expressed a desire to learn the technology, which she consider a basic tool in a workplace:

Because I am in business and I need to use technology and everyone uses technology. I want to learn more. This course taught me a lot. But in high school, I always tried to avoid the computer as much as possible. I was always afraid of it. But the textbook is really good - it explains everything, and everything has direction. It gives you details step-by-step. (Interview, November 10, 2009)
She maintained that she had a new appreciation for computers. She admitted that she used to think computers were complicated. However, after she studied MS PowerPoint in the course, she found it very interesting to add tables, sound, and images to PowerPoint presentations. Although she was a full-time student, she also held a full-time job and she was glad that she was able to apply some of what she learned in the class to her workplace.

### 4.3.6 Strengths and Weakness of the Course

Online student Susan thought that one of the strengths of the course was that it provided her with flexibility. She had a very busy schedule and had to attend school four days a week for the other courses that she was taking and she believed that the online class gave her more time to do other things. In addition, she thought that the course was very easy for her and was a great course to take to boost her GPA as she already had prior knowledge of the software (MS PowerPoint and MS Excel) used in the course. She also mentioned no group work as another strength. She said that she did not have to depend on anyone else to get a good grade in the course and she did not have to face the anxiety of presenting in front of the class. She did not want to talk to people too much and wanted to do the course work all by herself. She felt that freedom and independence were the two things that most appealed to her about the online class and she was happy that she could do the course work on her own. She stated,

The [online course] gave me opportunity to do better and to be more focus. In my other courses, I had to worry about finding a group. I do not really have friends and I really don’t talk to people in class. I am very shy. So, this online is more independent. It is more independent on yourself. It is straight forward – just do it and get it done. Other courses, you have to direct your focus worrying about making friends, being social, like finding a group. You worried about more things than just getting your work done. There is more focus for face-to-face class…if you were in face-to-face class, you have to have more social interactions, you have to have more group works. It is stressful just to find groups. The work itself might not stressful, just to find the group. Make sure I show up on time and punctual. If you do not show up, that is your own problem. Everything is specific and punctual. It is stressful in the way of the punctuality and attendance, and everything. Just the group work, the social interactions are stressful. (Interview, November 6, 2009)
One of the weaknesses that Susan mentioned was the organization of announcements on the WebCT. She suggested that the announcements be clearer, shorter, more valid, and concise. She gave an example of how one time the professor announced the wrong deadline for an assignment. She felt that she could have done a lot better on the assignment if the professor had given the correct deadline. Moreover, she liked how the professor gave out a summary of the weekly learning activities for the first two weeks but stopped for some reason. She would have loved to see the weekly summaries continue to get an idea of what had been done and should be done soon. Considering the fact that she was also taking five other courses, she felt that the summaries would have helped her to be more organized and kept her on track. Overall, she wished that the professor was more consistent.

Online student Hanna maintained that taking the online class was beneficial for busy students like her because they could find their own time to do the course work. She believed that the course would help students if they did not have time to go to class each week. She expressed that the appealing point for her to take the online course was that she learned how to be more independent. Unlike the face-to-face class where the professor would tell you all the details about course content and upcoming deadlines, she had to figure out all the difficult concepts by herself and constantly remind herself about all the due dates for assignments and tests. This fostered her independent study and time management skills. Another strength was that she felt that the online course gave her higher self-esteem and made her more confident because it motivated her to develop cognitive skills and she became eager to do more difficult and challenging tasks. She would feel a great sense of accomplishment every time she successfully completed the work because she had to do it all by herself.

To improve her leaning, Hanna suggested that one of the things the professor could have done was to compile some of the commonly asked questions about the course and post them on
the WebCT. These could have included configuration of the online training software SAM, how to check reports after finishing the training and some important dates for tests and assignments. Additionally, she would have appreciated it if the professor gave a reminder for any upcoming due dates as she felt that it was kind of hard for her to remember all of the deadlines (a suggestion also mentioned by Susan). Moreover, she felt that the professor could have considered assigning more challenging and difficult problems as bonus assignments for those students who wanted to improve their grade. Additionally, the professor could have designed more specific practical projects that related to real life scenarios. She explained that using MS Excel to figure out her future OSAP payment plan would have been more efficient than using a financial calculator as she could not remember the sequences of keystrokes on the calculator.

When discussing the strengths and weaknesses of this online course, online student Phyllis stated she that one of the strengths of the online class was that she was able to do the course work on her own and from the comfort of her own home. She felt that she had more freedom and control over when and how to do the work. She was proud of herself for the fact that she was able to do all the required tasks in the course very well and thought that the most rewarding experience was going over the more difficult tasks, as it showed her strong abilities. When asked about how she learned from the online class, she indicated:

I am a visual learner - more like see it rather than reading it. Reading is kind of hard for me because I read the instructions and I do not see it. I need to see how things get done. SAM website showed this to me. Maybe more examples from SAM. (Interview, November 5, 2009)

Phyllis’s response suggests that she liked the online training website SAM which provided her with audio and video components for demonstrations. This feature benefits visual learners like Phyllis. Additionally, SAM offered interactive features where students have the choice to interact with the computer in a simulated MS PowerPoint or MS Excel environment.
Phyllis felt that this online course was convenient for her schedule as she was taking six courses while working as a cashier. Being a visual learner, she appreciated the functionality provided by the online training website SAM. One of the things she did not like about taking the online course was that she felt that the professor was not exactly there and it was kind of hard as she could not ask the professor questions in person. Furthermore, she had to do everything by herself and she was totally dependent on herself. Finally, she felt that sometimes she was confused, as she was not sure what she was supposed to do. Contrasting to face-to-face class, she maintained that the online class was more difficult, as it was not as personal as the face-to-face class. She wished that the online class provided more updates, longer due dates and more interesting assignments.

In discussing the benefits of taking the face-to-face course, Bill said that one of the things that he liked about the course was that the professor was always there to help. He further elaborated that students were able to ask questions immediately and engage with the professor to solve problems. He thought that the physical presence of the professor was the biggest advantage for the face-to-face course. The most rewarding experience for him was meeting new people to see how competent they were and how comfortable they were with using computers. When asked to compare the quality of the online program with similar the face-to-face program, he stated:

As much as I enjoy online programs, because I generally like to do it myself. I think it is better to have face-to-face because you always can ask somebody. You always have somebody there to help you - no matter what it is. I prefer online, that is just for me. To compare, I would say that face-to-face is better – because you can still be in class and do the online thing. But you have the benefit of somebody out there to help you. (Interview, November 16, 2009)

Bill felt that the face-to-face class was great and the experience was very satisfying. Due to his prior knowledge of technology computers, he was comfortable going into the course. He
appreciated that the professor was always there to help and he believed that the professor was an important factor in encouraging students to participate more in the class. As far as the disadvantages of taking the course in the face-to-face format, Bill stated that it was time consuming to commute to the campus to attend the class. He felt that for the online course, students could do the course work online at home and therefore they did not have to travel.

For Patricia, one of the benefits of taking the face-to-face course was the amount of help she received from her professor. She felt that the professor was always available to help. If there was a problem, students were able to ask him right away. Contrasting to the online class, she commented:

Sometimes, you got sick, if you have a family emergency, you can always go to your professor and you can talk to him. If you are taking online, nobody will care. If you missed it, it is too bad. You have nowhere to go. It is just different experiences. I just personally think, face-to-face is better because you do not need to learn everything by yourself. You can practice and ask questions right away. If you take online and you are completing some tasks, you think it is the right way but it is not necessary true. There is somebody to guide you in the face-to-face. (Interview, November 4, 2009)

Patricia further claimed that she was never a huge fan of online classes. She stated that she needed to see the people she was taking the class with. Moreover, she did not want to spend any more time on the computer than needed – the computer screen was too bright for her eyes and she had to wear glasses. She expressed that she enjoyed the face-to-face class. She liked the way the professor handled the class and the students. She said the professor often used visual aids to teach new contents. He constantly checked in with students to make sure that they understood the concepts and skills. After that, he often assigned various in-class exercises for students to hand in at the end of the class. She felt that the professor was a nice guy and he was nice to everyone. One thing she did not like about the face-to-face was that she had to attend class every week and she had to be in the classroom on time at 8 a.m. Overall, she felt the face-to-face class was more effective than the online class.
When discussing the strengths of the face-to-face class, Shirley expressed that the course was a great fit for her, as she considered herself not so good with technology and needed the professor to be physically there to aid her through the course. Unlike most of the other students, she was older and therefore was not as up-to-date on computers as the other students. She thought the three hour in-class learning experience was great and she was able to get real time feedback from the professor whenever she needed it. Another strength of the face-to-face class she thought was that it was easier to share information and techniques with other students to foster creative learning.

When asked about what could be done to improve her learning in the face-to-face course, she indicated that she would encourage more lectures in the regular classroom with no computers rather than in the computer lab. She observed that some students were always on social networking sites such as Facebook, MSN chat, or online gaming while the professor was giving a lecture. She thought there was too much freedom for the students to access the Internet. She suggested that the students should have had limited access to the Internet so that they could focus on the course work. She thought that these students did not respect the professor and they were sometimes rude. By having the lectures in a regular classroom, it would block students’ access to the Internet. After the lecture, the class could return to the computer lab to do the hands-on training. She also felt that forming a learning community would further improve student learning. She gave an example of a time when she volunteered to show her MS Excel worksheet in front of the class. She had hoped to see other students also coming forward to share their worksheets but nobody joined her. She felt very isolated and she was disappointed that some of the students just did not care about participation in the class.
4.4 Integration of Quantitative and Qualitative Results

In addressing students’ perceptions of the course and their learning experiences, I used quantitative and qualitative methods. While the quantitative explorations reveals the extent of agreement with course design and delivery, the qualitative approach allowed me to find out the why and how there exist statistically significant differences between the mode of delivery and the perceptions of the course design and delivery and students’ self-efficacy and motivation in learning computer applications. Specifically, I used qualitative data to elaborate and enhance the research findings from the quantitative data analysis with regard to the significant differences. In general, face-to-face students felt differently in six statements, which I turn to now.

“The course structure and materials are well organized”

Face-to-face students could visually see and feel how the teacher organized the class and delivered the lesson. They also loved the interactive part of the class. They felt that they did not just sit at the computer. They were motivated by interaction via the teacher and their classmates, as Shirley pointed out:

When you have face-to-face class, you are motivated. You have teacher and students to interact on. My teacher is my first computer teacher. He is good. He is a good teacher. He always tells us what we need to do at the beginning of the class and he also does a review of the previous lesson. If I have difficulty, I can ask my teacher immediately. He emailed me back pretty fast. (Interview, November 10, 2009)

Patricia also appreciated the way the teacher executed the lesson. She briefly stated how a typical three-hour lesson was arranged:

The teacher prepares his stuff. He then starts his lesson plan and he also gives us his printed copy of the lesson plan. He usually does the virtual stuff. He tells us what is due today and what we need to do. Then, he teaches us new stuff. He gives us assignment. When we finish our assignment, we print it out and hand it in. We have to show him the formulas when we hand it in. (Interview, November 4, 2009).

Face-to-face students experienced unique features of physical interaction in the classroom, they took part in course delivery with the teacher synchronously, and they observed
the process of the lesson plan. These gave them with a chance to view the course structure and material more favorably than online students. Online students might easily slack off on the course even though the course structure and content were posted on WebCT. Susan stated that she knew the course content and materials were on the WebCT, but she tended to put them off:

I know on the WebCT, my teacher had PowerPoint, discussion board and chat. I am so busy with other things and other courses. I don’t have time and I don’t remember. I will check with my teacher to see if they are worth mark. If they are worth marks, I will show up. (Interview, November 6, 2009)

Phyllis pointed out that the organization of the course material could be clearer and more accurate. She stated that the teacher posted the deadline after the due date. This caused confusions for students. The teacher later announced that he was sorry about the wrong deadline. Phyllis further elaborated that she could have handed in a better assignment had she known the correct deadline. Therefore, she thought that the organization of the course could have caused negative feelings about the course in general. She further expressed that the teacher should have summarized the weekly activity (recall that the teacher only did summaries for the first two weeks). She also felt that the announcements were too detailed and the teacher sometimes forgot to update the course:

I just go to chat room before I come here[for interview] today. He did not announce the date has been put off. There is no link for me to do the test. I have already study for it. So, I have to re-study it for next week. I just hope the posted information is valid, and reliable. (Interview, November 5, 2009)

From the interview analysis for both face-to-face and online students, it seems that the face-to-face students enjoyed the interaction in the classroom and participated actively in the learning activities while online students lacked these features. Some online students had negative views about the organization of the course, announcements, and deadlines on the WebCT. These could have contributed to less favorable impression on the course structure and design for the online students.
“The course includes examples and applications which are relevant to this area of study”.

Face-to-face students commented that the teacher provided online training and examples. They believed that it helped when the teacher also assigned some grades in these activities. They thought that they learned something from training and then they experienced it through the examples. For example, Shirley felt it was very useful to connect the assignments to the tutorials in the textbook:

We have assignment to do; we go over the tutorials in the textbook. Sometimes I do the tutorials after class. Without the textbook, I don’t know how some people do the work. The textbook give you detailed step-by-step approach to go over the steps. For excel, he gave us an example of what to do, then we have to do our own stuff. For assignments, they are helpful as well. Each assignment is worth 10%. (Shirley, November 10, 2009)

Some face-to-face students expressed that the most important factor was the examples and applications. They thought they would be able to get an idea of what was going on in the class and in the assignment if they were following the examples and applications. They also believed that they benefitted from the tutorials as examples from the textbook. They also felt that it was easier to do the tutorials as learning activities by doing sequences for all the tutorials. As for the learning environment, Patricia stated:

If I rated them in the following order in the most important one: activities, teacher, content, tests and overall environment. From the activities, you have learned hands-on skills. My teacher is very friendly, although he is a professor. He is very approachable and helpful. For the content, yeah, the MS Word and MS PowerPoint are very useful in the real world. Many companies and organizations are using MS Word and MS PowerPoint. I am glad I am taking this course. (Interview, November 4, 2009)

While face-to-face students appreciated the important role of the examples and applications played in their learning, online students seemed to lack the lived experiences with examples and applications. Online student Phyllis expressed that she did not even know where she could find the Excel project at first. She thought it came from the SAM, but actually it was from the textbook. After she found it, she was not sure what it was about. Another online student
Susan stated that the teacher should also post examples like he did in the classroom so that the online students could get benefits of the real life examples.

“Overall, the course is (outstanding, very good, good, satisfactory, somehow satisfactory, and unsatisfactory)”.

The overall impression of the course was affected by many factors including the teacher, the course content, and the students’ individual characteristics. Face-to-face student Bill attributed his satisfaction to the teacher factor and the interaction with him:

There is a professor there. If you have questions about something, you can raise your hand, you can engage with professor try to solve the questions – biggest advantages in face-to-face class. Somebody is there to help you – versus the online you are generally do it just by yourself. Understanding what you are doing, make friends, face-to-face interactions are the most rewarding experience for me. (Interview, November 16, 2009)

Patricia mentioned the course content and learning activities in the textbook:

I follow instructions in the textbook. The explanation is very good. The activities are good. The assignment is from the textbook. If I don’t understand something, I can go to the textbook. The Textbook gave me detailed step-by-step instructions. Interview, November 4, 2009)

Online students felt that the teacher was not there exactly. It was hard to use email to contact him as he was not there right away and they could not ask him in person. As a result, they thought the online course was more difficult as it was not as personal as the face-to-face class. Almost everyone interviewed from the online class expressed they felt uneasy at the beginning of the semester. Susan stated:

I sort of scared in the beginning, I was afraid of getting behind. At beginning, I forgot I had this computer course. I scared maybe I forgot the course. I never had to present and nobody had to remind me verbally with all the deadlines. I sort of scared about forgot the course. (Interview, November 6, 2009)

Hanna shared her nervousness about the online course:

I am trying to get acquainted with this online course and am feeling very overwhelmed and panicked. If I follow the weekly instructions under the learning plan, I will be okay, right? I just feel like there are tons of files, folders and links and I am terrified I will miss something. I also, I am going through the week 1 activities listed and I am trying to
download the data files on the WebCT, but I am getting all these pop up boxes asking me to zip or unzip, and so I am very confused as to what I am doing and what I am downloading. (Interview, November 11, 2009)

In addition to anxiety, Phyllis touched upon another issue for the online class:

Too much freedom and independent, to some extent. If you don’t’ have to show up for everything, it is laziness. Sometimes I put things off. There are no schedule - unlike in the face-to-face class which has a schedule. [In face-to-face class] This is what has to happen in that day. This is what you should doing now and this has to be done very soon. For online class, the teacher posted weekly learning activities, but no reminder. I guess, too much freedom putting things off. (Interview, November 5, 2009)

“What do you think are the greatest drawback of online courses (isolation, lack of face-to-face interactions, lack of technological skills for students, other)”. 

Online students felt strongly about the lack of face-to-face interactions and isolation in the online class. Online student Hanna felt very isolated and she had the illusion that she was the only one taking the online class. She felt better after the professor opened a discussion board and online chat. She was also concerned with the lack of face-to-face interaction and she had to remind herself from time to time: “Did I do this? Did I do that? It is very challenging to remember what has to be done”. Phyllis echoed: “I would like to see more updates. Let me know what is coming up. What is something due soon I have to work on it”. The fact that the online students experienced firsthand isolation and lack of face-to-face interaction illustrated that they were more likely to pick these factors as the drawbacks of online courses. As far as the lack of technological skills was concerned, no qualitative data was available to explain why 31.3% of face-to-face students chose this option while only 4.5% online students picked this one. Further follow up is needed to find out possible answers to this question.

“I believe that I will learn this subject very well”.

Flexibility may be seen as one of the advantages of the online class, but it also might mean that the online students can procrastinate more easily. Hanna stated, “If you forgot
something, it will take you a greater time to do it. If you forget to do assignment this week, you
have to make up the next week with the extra time”. Phyllis thought that she was the only student
in the online class as she did not perceive the existence of other students. Susan provided future
students with this advice to boost their confidence in learning in the online course:

Online students have to learn how to be motivated and to practice how to finish our own
work online. Unlike in the face-to-face class where the professor will tell you all the
deadlines, you have to remind yourself everyday about the deadline in the online
course. On the other hand, the professor might provide more updates and more fun
assignments. (Interview, November 6, 2009).

The reason the online students felt less positive about learning this computer subject
might be due to a combination of factors such as the tendency to put things off, loneliness, and
lack of the motivation in the online environment.

“I am capable of getting a letter grade B in this course”.

Face-to-face students got a certain percentage of their final grade mark each week by
completing in-class activities. They also had time to discuss their assignments and had the
opportunity to finish them in class. They felt that the teacher was easy on the marking. One
student remarked: “as long as you complete the work and meet the criteria, you can get a letter
grade of A for all the assignments and the online training which are worth forty percent of the
final mark”. The other sixty percent of the mark came from three tests with twenty percent for
each test. Most of the test questions were similar to the training on the SAM. Therefore, students
were confident about the tests after completing the training. Bill commented, “If they want to
learn, they go to the face-to-face course. It is hard to be a slack off”.

Online students had the same evaluation system with forty percent assignments including
the online training and sixty percent from tests. They felt less confident in getting a good grade,
probably because it was not to their advantage for the forty percent assignments – they tended to
slack off and put things off until the last minute. Online students also felt that they did not have
enough questions on the training. Hanna stated, “The test questions did not appear on the training. There is no other ways to know how to do these tasks. Maybe more questions on the SAM to make sure they cover everything so that we do not look for resources elsewhere”. In short, online students lack some of the opportunities that face-to-face students had to earn in-class marks. This may mean that they were less confident than face-to-face students in getting a good letter grade.

4.5 Summary

This chapter presented the results of both the quantitative and qualitative data analysis. The study was conducted in the Fall of 2009 in a community college involving three-year business diploma students taking a computer course. Participants consisted of sixty students filling out the online survey and six students performing in-person interviews. Overall, the survey data showed that there was no significant difference between mode of delivery and students’ perceptions of course design and delivery, self-efficacy and beliefs about learning computer applications, and their academic achievement. However, there were significant differences in some specific areas such as: course organization, examples and applications, belief about learning computers, getting a good letter grade and overall satisfaction with the course.

The interview data helped me to interpret and supplement the reasons for these differences. In addition, the interviews also revealed a number of themes that students believed were important in determining the quality of their computer learning experience for both face-to-face and online classes. These themes include: user services and support, factors best supported in learning the computer course, belief and motivation in learning computers, and strengths and weaknesses of taking face-to-face or online courses. The next chapter discusses the findings from the study, the implications for further research, suggestions and considerations for teaching and learning computers.
Chapter Five: Discussion

5.1 Introduction

This study investigated students’ perceptions of course design and delivery. It also examined how these perceptions were different between online and face-to-face classes. Furthermore, this study analyzed how student academic achievement differed in two delivery modes. Finally, the study probed attitudes in acquisition of computer applications between online and face-to-face classes. Few research has been conducted to investigate student learning experiences with computer course at the college level. This study has helped to fill in this gap. Utilizing both quantitative data collected from online surveys and qualitative data collected from interviews, I analyzed and described the results in Chapter Four. This chapter presents findings and integrates the findings into the current literature. It also provides implications for practice and suggestions for further research. But first, I will revisit the research questions.

5.2 Research Questions

The purpose of this study was to investigate college computer courses delivered in both a face-to-face and online format to better understand students’ perceptions of the course design and delivery as well as student academic achievement. These research questions are:

1. What are students’ perceptions toward course design and delivery?
2. How are these perceptions different between online and face-to-face students?
3. How does student academic achievement differ in these two delivery modes?
4. Are there significant differences in attitudes about the acquisition of computer knowledge between online and face-to-face students?
5.2.1 Research Question One: What Are Students’ Perceptions toward Course Design and Delivery?

An analysis of student perceptions of course design and delivery produced very positive responses. Measurements of course design and delivery included course structure, course outline, course content, learning materials, learning activities, assignments, and assessments. The measurement was based on a scale of 1 to 6 with 1 being “Strongly Agree” and 6 being “Strongly Disagree”.

The results of students’ responses from the 10 statements about course design and delivery were categorized into three groups. The first group consisted of all the positive answers, which included statements 3 and 7 about examples and applications, and assessments. The second group contained items that did not have any Disagree and Strongly Disagree responses. Statements 4, 5, 8, and 9 about texts and supplemental materials, assignments, motivation, and learning activities belonged to this group. The last group consisted of statements resulted in all six of the possible responses, and included statements 1, 2, 6, and 10 about course structure, course outline, instrument of evaluation, and overall course management and delivery. The following section combines the results from the open-ended responses and interviews. The open-ended responses allow for elaboration on Likert-scale responses while the interviews provide context, background, and a personal touch to the responses.

Examples, Applications, and Assessments

All interviewed students stated that the examples and applications in the computer applications course were relevant and specific to this area of study. Students expressed that the professor would give examples related to their assignments. They felt they had a model to follow for their assignments, thus they enjoyed completing their assignments. They also appreciated the fact that the professor posted student assignments or projects from the previous term as examples. These examples gave students a concrete idea of the expectations of high
quality work. In addition to the examples from the professor and other students, students also appreciated the examples from the textbook. They believed these examples were connected to their life which they could easily relate to, for example, calculating college cost and financial support, designing and creating a weight-loss plan, saving for a dream home, or building a monthly loan payment calculator.

In addition to the very positive responses about examples in the course, students also gave optimistic feedback on the applications offered in the course. They reported that these applications made learning skills more meaningful and they understood why they were learning what they were learning. Furthermore, they felt that the application-based pedagogy utilized step-by-step, screen-by-screen instructions with more practical content. This feature was not only reflected in the classroom instruction but also presented in the textbook.

Students expressed comfort level with the web-based assessment forms – diagnostic, formative, and summative. The diagnostic form, which came with a pre-test on the SAM, presented students with strengths and weaknesses with regard to the knowledge and skills they needed to grasp. Students expressed that they liked two things from the pre-test: one was that the test result did not count toward their final mark and the other was that they could use the result of the pre-test to target their training. Students also reported that they were satisfied with the multiple attempts for the quizzes, a form of formative assessment, and that only the highest mark would be recorded. For the summative assessment as measured by their final grade, the follow up interviews showed that students were content with their final grade.

Texts and supplemental materials, assignments, motivation, and learning activities

Responses from students did not contain strong negative reaction to the texts and supplemental materials, assignments, motivation, or learning activities in the course. Students had no complaint about the textbook except for its cost. They felt that the textbook is helpful
and informative. Students from the interviews informed that they used the textbook and supplemental materials interchangeably. Some students expressed that the textbook was really great and they learned a lot from it. Results from students’ response also showed that they used the textbook at quite different frequencies. Almost half the students reported that they read over two-thirds of the textbook while some students stated that they only used less than half of the textbook. A few students admitted they never used the textbook – they just relied on the online training SAM and the supplemental materials from the professor.

While attributing their learning to the textbook and supplemental materials, students revealed that assignments contributed a lot to their learning. They reported that they liked the content of the assignments as they related to themselves or something else they cared about. For example, their first assignment was to create a PowerPoint presentation to introduce themselves or to introduce a national park of their choice. Although most students felt the assignment was appropriate for them, some students did not share this view. These students felt that the assignment was pretty easy and they wanted a more challenging one – something they had to work very hard on to achieve.

With regard to the motivation for learning in the course, the average participants responded that the course had motivated them to increase their knowledge and competence in the computer applications. Some students stated that creating a PowerPoint presentation and managing data in Excel were basic essential skills in the knowledge based workplace. They believed this was one of the push factors for them to learn well in the course. Other students mentioned that, in other courses, they have to present in front of the class, so they wanted to learn the skills to create an impressive presentation. Still other students revealed that they could use the skills from Excel to solve financial math problems in their math class. These skills included present value, future value, monthly payment schedule, and goal seek. They felt these
skills were much easier to learn and to retain using Excel than using a financial calculator which often involved second functions and multiple settings. One student shared an example from her OSAP loan payment plan. She commented that it took her 30 minutes to complete three payments with the financial calculator but only three minutes using Excel. Based from this experience, she stated she really enjoyed leaning Excel in the course.

In sum, students responded that the learning activities in the form of assignments, online training, in-class exercises, and examples were relevant to the stated course outcomes. In fact, students rated learning activities as the number one factor they felt best supported in the course among other factors in descending order: teacher, content, tests, and overall environment. Students reported that they learned a lot from these activities. They felt it would be more beneficial if the professor paid attention to the following suggestions: design assignments that were more interesting and fun, create online training that covers all the course content so that they did not need to search the Internet for extra training, promote more collaboration for in-class exercises, and build more different types of examples.

**Course structure, course outline, instruments of evaluation, and overall course management and delivery**

Students agreed that the course was well organized. They expressed that the course outline accurately described course content, objective, and evaluation methods. They also stated that the instruments of evaluation were fair and appropriate. Overall, they felt the course management and delivery was very good. Students reported that they liked the slow start of the semester. They spent week one on the login procedure for the online training software SAM. In week two, they familiarized themselves with getting around the three different features on the SAM: observation, practice, and application. Most of the term’s work was posted on the SAM - including online training and three tests. Students revealed that they learned MS PowerPoint
quickly in week three and week four and they felt very comfortable with its features and functionality. However, about half of the students felt information overload with MS Excel after week five. They reported that they needed to read one chapter that contained almost 80 pages for just one week—a heavy workload for them.

While some students had positive views about the course outline, other students felt there was too much information to remember and they sometimes forgot some things; they even sometimes forgot the test dates. A few students admitted that they did not read the course outline at all. Email messages to the professor showed that some students asked questions that were clearly stated on the course outline. These questions were about the textbook, the date to write the test, and the methods to submit assignments. Almost all the interviewees mentioned that it would be helpful for the professor to put up a reminder on a weekly basis, although all the deadlines were clearly stated on the course outline.

In responding to the instruments of evaluation, students reported that they were glad to notice that there were no multiple-choice questions on the quizzes or tests. The assessments were in the form of performance-based evaluation with three attempts for each task. Students also expressed satisfaction with the immediate feedback they got from the quizzes and tests. They knew their test scores right after they submitted their answers and they knew which questions they answered correctly and which answers were wrong. Students expressed two concerns about the evaluation. One was that they thought they answered correctly on the task but the computer marked it wrong. The other concern was that they did not recognize some test questions. They wondered how they were supposed to learn if they were not given the chance to practice the questions on the training.

Overall, students stated that the course management and delivery was good or satisfactory (mean = 2.67, sd = 1.259, with 1 being outstanding and 6 being unsatisfactory).
Students acknowledged the role of the professor and the learning activities including assignments, training, tests, and examples in their learning process. They tended to read less from the textbook but they needed to retain more computer skills. They also expressed the desire to apply these skills in different scenarios. This concludes student perceptions of course design and delivery. I now turn to student perceptions of benefits and drawbacks of the two modes of delivery.

When asked to identify the factors that best supported learning in the course, both online and face-to-face students described the professor as one of the most critical components among content, professor, tests, assignments, and overall learning environment. Students mentioned that a good professor possess the following qualities: interesting, organized, setting clear expectations of students, giving prompt and constructive feedback, understanding student’s need, and being patient. In addition, students’ comments from both the open-ended questionnaire and interviews revealed that regular contact with the professor kept them on task, increased their perceived sense of learning, and improved their feelings of a learning community.

This sentiment of identifying the professor as the critical component of the course resonated with existing research about the role of the instructor. Ehrlich (2002) stated that the role of the instructor is “tried to social interaction and include recognition, greeting students, soliciting comments, prompting, opening discussions, and setting norms and agendas” (p. 52). Some researchers adopt Moore’s transactional distance (1993) to explain the interplay among course design and delivery, the instructor, and the learner. For example, Morgan and McKenzie (2003) found that the instructor’ regular contact with students via WebCT increased students’ satisfaction with the course. In another instance, Lowell (2004) and Stein et al. (2005) maintain
that the interaction between the instructor and the student increase student satisfaction with perceived knowledge gain.

In responding to the open-ended question about the greatest drawback of online courses, in general, participants reported that there was less interaction between students and the professor in online courses. Data from the interviews appears to show that the lack of face-to-face interaction was the strongest drawback. This result reflects a finding in the literature that online students missed the social presence (Aragon, 2003; Swan & Shih, 2005). Interview data revealed that students wanted to meet with the professor at the very beginning of the term to clarify the course expectations and technical requirements. Despite the course outline clearly stating the course objectives, delivery method, and weekly learning activities, students still wished to discuss with the professor for matters such as the way the course was running, choice of Internet browsers, software versions, going over the basics of the course, and the possibility of obtaining used textbooks. Some students were also eager to meet with the professor at the end of the term to see if they could do anything to boost their mark.

Another frequently reported drawback of online courses was a lack of technological skills. Students responded that they could not find immediate help when they were stuck on the technology. Although they could email the professor about the issue or post it on the discussion board, they might not get the response within their time expectations. These results manifested a finding from Ehrlich’s work (2002). In her study investing 25 graduate students in the Human Development program at Northeastern Illinois University, Ehrlich identified four elements of learner-centered interactivity: learner-to-interface, learner-to-content, learner-to-learner, and learner-to-instructor. My study illustrated the need for interactions as indicated in Ehrlich’s studies. She stated that the students in her studies still “wanted to meet at the beginning of the
course to meet each other and the instructor, and again at the end to share their completed projects” (p. 50).

Most participants reported that their experiences with user services and support were satisfactory. A majority of participants had basic computer skills before they took the course. A few participants admitted they had no knowledge about computers and they were afraid of learning about computers. However, all participants felt that they had improved their computer skills after taking the course. A majority of participants also reported that they had no technical difficulties with the courseware: WebCT and SAM. They found the courseware was easy to navigate. These results were consistent with previous research about the perceived usefulness and ease of use of courseware (Sun, Tsai, Finger, Chen, & Yeh, 2008).

In general, participants responded that they were engaged in the course and that they had put effort into the class by actively participating in the learning process. They felt that they had learned a lot and this result is in agreement with the research of Kim, Liu, and Bonk (2005). These researchers reported that a student satisfaction in a course is correlated strongly with a student’s engagement in the learning process, feeling of having learned a lot, and academic confidence.

Students from both online and face-to-face classes reported that they were satisfied with the communication and interactions with the professor. Some students felt that they liked the student professor relationship – the professor was always there to help (either online or face-to-face). This result is consistent with the literature on student satisfaction (Mitchell, Gadbury-Amyot, Bray, & Simmer-Beck, 2007). Students also reported that they appreciated the professor’s timely responses to their emails and support on their online discussion board, which made them feel more connected. This result reflects the research literature about factors
contributing to the satisfaction of student learning expectations (DeBourgh, 2003; Kim, Liu & Bonk, 2005; Sun, Tsai, Finger, Chen & Yeh, 2008).

5.2.2 Research Question Two: How Are These Perceptions Different between Online and Face-to-face Students?

There were no significant differences between face-to-face participants’ mean scores and online participants mean scores with respect to course management and delivery on eight items (out of ten). These included course outline, texts and supplemental materials, assignments, evaluation instruments, assessments, motivation, learning activities, and overall course management and delivery. Online and face-to-face participants reported that they were highly satisfied with the course in these areas. Nevertheless, two of the ten items were found to have significant differences between the face-to-face participants and online participants; specifically, course management and delivery. I now turn to these differences.

There was a significant difference in the scores on the perception of course structure and materials between the online and face-to-face classes. Responses from participants in the face-to-face class appeared to be more positive than the responses from participants who attended the class online. Participants from the face-to-face class stated strongly that the course structure and materials were well organized while the responses from the online class showed that they only agreed or somewhat agreed with this statement. Interviews from face-to-face participants suggested that they liked the way the professor set up the class – an introduction followed by a short example then hands-on exercises. They felt that they were kept busy in class and learned new things during the three hour period.

Another significant difference concerned the examples and applications used in the course. Participants from the face-to-face class were more favorable than their online counterparts. The statement said that the course included examples and applications that were
relevant to their study. The interviews revealed that the face-to-face class had opportunities to share their own examples in front of the class. For example, some students shared their student loan payment plan using Excel and others shared their personal stories using PowerPoint presentations. Online students did not have such opportunities to share their work. Although the professor also posted samples of students’ work from previous terms on the WebCT for the online class, it seems that it was not appreciated to the same extent as the live examples shared in the face-to-face class.

These findings suggest that it is important for faculty and administrators to recognize the differences in learning experiences between online students and face-to-face students. Faculty and administrators need to keep in mind the differences when they refine curriculum and define practices and policies in the program. This could improve the possibility that the College provides learning experiences that meet the needs of all learners.

In addition to the questions about course design and delivery, questions on the benefits and challenges of the two delivery modes were also examined. There were no significant differences between the online class and the face-to-face class with regard to benefits and drawbacks. The results of the open-ended questions and interviews showed that participants liked the flexibility and student-centered learning of the online course. They also indicated that these benefits were the main contributing factors to their satisfaction in online learning. These results are in conjunction with existing research on the greatest benefit of online courses, listed here in order: flexibility, accessibility, student-centeredness, and encouragement of collaboration (Benbunan-Fich & Hiltz, 2003; Kim, Liu, & Bonk, 2005; Schrum & Hong, 2002; Sun, Tsai, Finger, Chen, & Yeh 2008). Similarly, there were no significant differences between the online class and the face-to-face class with regard to the drawbacks of the online course. The majority of students from both classes selected the following items as the drawbacks of online learning:
lack of face-to-face interaction, lack of technological skills, and isolation. Most participants selected “seeking help immediately” and “in-person interactions” as the benefits of face-to-face classes while they listed inflexibility as the major drawback of a face-to-face class.

5.2.3 Research Question Three: How Does Student Academic Achievement Differ in These Two Delivery Modes?

Student academic achievement was defined by the two test scores and the final exam. The test questions for both the face-to-face class and the online class came from the same test bank in the Skills Assessment Manager (SAM), the online training and testing platform. This ensured that the fair comparison between the face-to-face and the online class was valid and reliable. Test 1 involved MS PowerPoint while test 2 and the final exam dealt with MS Excel. The format of these evaluations was performance-based online testing where students were asked to complete several tasks in a simulated environment. Students received their grade immediately after they submitted the test. They also got feedback with regard to which questions they answered correctly and which ones they got wrong.

An independent-samples t-test was conducted to compare the test scores for the face-to-face class and the online class. There were no significant differences in test scores between the face-to-face class and the online class. The results of this study agree with previous research that also found no significant differences between face-to-face and online learning with regard to student academic achievement (Allen, Bourihis, Burrell, & Mabry, 2002; Cavanaugh, 2001; Machtmes & Asher, 2000; Phipps & Merisotis, 1999; Russell, 1999; Schulman & Sims, 1999). These findings echo arguments that online education is at least as effective as face-to-face education (Alonso, Manrique, & Vines, 2009; Donavant, 2009).
5.2.4 Research Question Four: Are There Significant Differences in Self-efficacy, Belief, and Motivation about the Acquisition of Computer Knowledge between Online and Face-to-face Students?

There were 17 statements about self-efficacy and beliefs about the acquisition of computer applications. The majority of participants strongly agreed or agreed with the statement regarding self-efficacy and beliefs about the acquisition of computer applications. Chi-Square tests showed significant differences for the two statements. I analyze these two statements first. Then, I categorize and examine the rest of the statements which showed no significant differences based on their responses.

Getting Good Grades and Learning

There were two statements that showed statistically significant differences. One statement stated that “I am capable of getting a letter grade B in this course”. Face-to-face students reacted much more favorably to this statement than online students (90.3% versus 50%). Qualitative data from the interviews supports this quantitative data from the survey. Results from the interview revealed that face-to-face students felt they could easily get a letter grade B as long as they finished everything that the professor asked them to do. They even expressed their confidence that they could achieve at least a letter grade B if they just used the three-hour period efficiently – there was no need to spend extra time on the course outside the classroom. On the other hand, online students stressed that they had to spend at least four hours a week to keep up with the online course schedule and that it took great effort to achieve a letter grade B.

Another statement that showed a statistically significant difference was that “I believe I will learn this subject every well”. Responses from face-to-face participants were much more positive and confident than online students. 90% of the students from the face-to-face class expressed “strongly agree” or “agree” with this statement while the commensurate response from the online class was 41%. Data from the interviews revealed that students from the face-to-face
class expressed more confidence and boldness about their ability to learn well in the course. Some students from the face-to-face class articulated that they needed more challenging content.

Although the qualitative data from the interviews supports the quantitative data from the survey, the significant difference in attitude between face-to-face and online students about learning the course content and achieving a letter grade B is not reflected in their academic achievement as measured by test 1, test 2, and final exam. The Chi-Square tests show that there was no significant difference between the test scores and mode of delivery. Therefore, the learning outcomes do not show significant difference despite the fact that there was significant difference in attitudes toward learning.

It is still not clear in the literature if there is a correlation between attitudes and academic achievement. Some researchers indicate that students’ perception of their own academic competence influences academic achievement, for example in math (Woodward & Brown, 2006) and statistics (Schutz, Drogosz, White, & Distefano, 1998), while other researchers claim that there is no correlation between attitudes and academic performance, for example in algebra (Schumacker & Young, 1996) and calculus (Alkateeb, 2002). Still others conclude that there is a small positive correlation between attitudes and academic achievement (Ma & Kishor, 1997).

**Self-efficacy and Beliefs**

There were 17 statements on self-efficacy and beliefs about the acquisition of computer applications. These statements can be categorized into five groups based on the responses. The first group consists of only positive responses tackling confidence in the following items: mastering concepts and skills, beliefs about learning the course content well, and learning strategies. For statements in the first group where Chi-Square tests showed no statistically significant differences, there were different responses between online and face-to-face participants based on different types of statements. Face-to-face participants tended to agree
more on statements involving conceptual confidence and determination to learn computers. The percentage of strongly agree or agree from face-to-face participants was higher than online participants, although the difference was not considered statistically significant, as indicated by corresponding Chi-Square tests. For example, face-to-face participants expressed more confidence about the following statements: 1) I am certain I can master the skills being taught in this class, 2) I have no doubts about my capability to do well on tests, 3) I believe that I will learn this subject very well, and 4) If you practice 3-5 hours a week on this subject outside the classroom, you will achieve at least a letter grade B for your final mark.

While students from the face-to-face class showed high confidence in general about learning the course content, online students revealed high positive responses about specific aspects of the course. For example, online students felt more confident in completing and checking assignments than face-to-face students. One student from the online class echoed that she felt that she had accomplished something after she finished her assignments. She thought she did it all by herself and she was proud of herself. In addition, online students revealed more positive attitudes toward figuring out difficult concepts and skills. Interviews revealed that students from the face-to-face class asked for help immediately while students from the online class were inclined to solve the problems by themselves.

**Ability to Learn**

Two statements contained positive (Strongly Agree, Agree, Somewhat agree) but slightly negative responses (Somewhat Disagree): 1) The most successful people have discovered how to improve their ability to learn, and 2) If a person can’t understand something within a short amount of time, they should keep on trying. Chi-Square test showed that there were no statistically significant differences between face-to-face students and online students with regard
to responses for these two statements. 86 percent students from both the face-to-face and online classes strongly agreed or agreed with these two statements.

However, interview data showed that face-to-face students tended to discuss less about how to improve their leaning whereas online students were more interested in finding ways to improve their learning. One student from the online class claimed that she completed all of the required exercises and did some extra case studies in the textbook to make sure she grasped the skills and knowledge. Another student from the online class expressed that she would also read reference books and resources on the Internet for related content in addition to the textbook contents. These qualitative data support the quantitative data and adds context and background to the research question. In this case, although no statistically significant difference was found between students’ responses and the mode of delivery, online students did act differently by doing extra work to improve their learning.

**Constructing Knowledge**

For the two statements where participants chose all possible options on the scale except disagree, Chi-Square tests showed that there were no statistically significant differences between face-to-face students and online students. These statements were: 1) successful students understand things quickly, and 2) learning is a slow process of building up knowledge. The percentage of positive responses from the face-to-face class was greater than that from the online class. These two statements were more at the conceptual level rather than at the practical level. Interview with face-to-face students showed that they were more optimistic about learning and success in general. On the other hand, online students interviewed seemed to be more conservative about learning and success. They tended to attribute their success to the learning and effort. One student from the online class stated that she only believed in hard work and efforts in learning. She argued that one might be slow in understanding things but one might still
be successful as long as one tried his/her best. This may explain why online students gave higher negative rating about learning and success in general than face-to-face students.

**A Variety of Perspectives**

The responses from the following statements included all six possible options, from “Strongly Agree” to “Strongly Disagree”: 1) Computer applications are a difficult subject to learn, 2) Going over the tutorials in the text book helped me understand the skills and knowledge, 3) If I find the time to re-do the tutorials in the textbook, I get a lot more out of it the second time, and 4) Genius is 10% ability and 90% hard work. Chi-Square tests showed that there were no statistically significant differences between mode of delivery and responses to these statements; however, qualitative data provided some insights into beliefs about acquisition of computer applications. It is to these insights that I now turn.

Some students from the face-to-face class during the interview expressed that they were really afraid of learning computer applications at the start of the term. They admitted that they were afraid of it back in high school – they tried to avoid anything with technology. Since they were at college and the computer course was a required one, they felt they had to study hard to pass. After a few weeks, they felt the computer applications such as MS PowerPoint and MS Excel were not so hard. As a matter of fact, they felt they were pretty straightforward and intuitive to learn. They also acknowledged that they felt less frustrated when they were in class where the professor was available for help. Although these students had troubles at the beginning but felt more at ease as they progressed, other students from the same face-to-face class expressed quite different view. These students claimed that computer applications were easy to learn and they proposed having more challenging assignments and projects.

While the feedback from the face-to-face class was divided, comments from the online class showed a consistent outlook. Despite feeling overwhelmed at the beginning of the term-
going through lots of files and folders on the WebCT, online students believed that computer applications were not difficult to learn. They attributed their learning to their effort and abilities as well as rich resources such as online training on the SAM and step-by-step tutorials from the textbook.

On the question pertaining to tutorials in their learning, online students had more positive responses than face-to-face students about contributions the tutorials made toward their learning than face-to-face students. The reason is probably due to the fact that tutorials were mandatory and they counted toward the final grade for online students but they were optional for the face-to-face students. Also, online students were expected to learn from tutorials rather than from the professor, as was the case for the face-to-face students. Thus, some online students sometimes needed to re-do the tutorials to get it right when they were stuck whereas students from the face-to-face class did not bother to do the tutorials. Tutorials did not count toward their final grade; they only did things if it was for marks. Statistical analysis showed no significant difference between the online and face-to-face students with regard to their attitude toward the tutorials. This may add context to the statistical analysis of responses about tutorials.

To summarize, there were no statistically significant differences between mode of delivery and perceptions of the ability to learn computer applications in 15 statements. There were statistically significant differences between mode of delivery and perceptions of test scores in two statements. This concludes the analysis of the self-efficacy and beliefs about acquisition of computer applications. I turn now to motivation in the acquisition of computer applications.

There were ten statements about motivation in the acquisition of computer applications. These statements covered the desire and willingness to do school work and to learn computer applications. The mean response was 2.11 indicating they agreed with all of the statements. Chi-Square tests showed no significant difference between motivation in acquisition of computer applications.
applications and mode of delivery. The following will present the results from the qualitative data which reinforces the no significant phenomenon from the quantitative analysis. I will start with the interview results with the face-to-face students and I then wrap up with the interview results from the online students.

Most students from the face-to-face class felt that they enjoyed learning computer applications. These students also mentioned pleasant prior experiences with computers. One student revealed that she had taken some website design and Photoshop courses before she enrolled in the course. She maintained that she just loved computers and wanted to learn as much as possible. Articulating her part-time working experiences with a hiring agent, she felt the course had equipped her with the skills to deal with the work requirements. She was confident that she would get at least a letter grade A minus in the course. She also expressed the desire to take the second computer course after the course. Another student stated that her father used Excel to manage his small business and asked her some questions when he was stuck. While feeling a bit of pressure from her father, she also felt the need to learn the course very well as she could make real life connections with the content. Although she was working full time while taking full time study, she expressed the desire to learn computer applications as much as possible. Still another student indicated that he had fallen in love with computer when he was just a little boy. He felt he wanted to do his best in the computer course. He also shared that in his workplace he was always the first one to be chosen to test new software – this in turn motivated him to do well in the computer course at school.

Similarly, students from the online class also felt this computer course was important and they enjoyed learning the computer applications. Working part time at a big retailer, one student revealed that the demand from her part time work really motivated her to do well in the course as she used spreadsheets to manage the inventory at her workplace. She felt pleased to apply what
she learned in the computer course to a real life scenario. She felt she had purpose and desire to do well in the course. Another student stated that she was motivated to learn the computer course because her other courses required her to do presentations – that was the reason she wanted to learn MS PowerPoint. She also found that she could use the financial functions in MS Excel to figure out some problems in her financial math course. To this end, she stated that she really enjoyed doing case study, assignments and projects in the course. Overall, data from both quantitative and qualitative results show that there was no significant difference between the face-to-face and the online classes with respect to motivation to learn computer applications.

5.3 Thematic Analysis

Results from the online survey, interviews, classroom observations (both face-to-face and online), and student assignments have yielded thoughtful perspectives on student learning experiences and their perceptions of the computer course they took. The thematic analysis from these experiences and perceptions are divided into four constructs based on the student feedback questionnaire, interviews, classroom observations, and test scores: 1) Course management and delivery, 2) Self-efficacy and beliefs about the acquisition of computer applications, 3) Motivation in the acquisition of computer applications, and 4) Academic achievement as measured by test score. Below, I discuss and integrate these findings in details and link these findings to the current literature about face-to-face education and online education. These findings also form the basis for further research.

5.3.1 Course Management and Delivery

Course satisfaction is influenced by many factors including perceived course quality and delivery (Lockett, 2010). Quality usually refers to technological infrastructure and student services (Thomson & Irele, 2007). The majority of students in this study showed that they had no problems or few issues with technology or getting access to the Internet and the course website.
They also expressed high satisfaction with user services and support in WebCT and SAM despite the occasional slowness and downtime on these platforms. Student perceptions of course delivery connect with course management and the professor’s performance (Zhan, 2008). There was no statistically significant difference between face-to-face and online students’ mean scores on course design and delivery in eight out of ten questions. Students reported positive feedback about course structure, learning materials, and assessment tools. Students also felt great about the professor. They expressed that the professor was always there to help and to guide their study. However, the mean scores from the face-to-face class were a little higher than the online class.

This non-significant difference may have been caused by the fact that the students are taught by the same professor in the same semester. In addition, they follow the same course outline and adopt the same online training platform. The student interviews also backed up this explanation. The students from the face-to-face class claimed that most of the time they followed the online training and they only spent a small portion of their classroom time following the instructions led by the professor. Students from the online class reported that they learned a lot from the online training and the examples the professor posted on the WebCT. In the face-to-face class, the professor spent a small portion of the three hours demonstrating the concepts and skills. He then circulated himself to facilitate students’ hands-on exercises on the computer. As far as online teaching was concerned, the professor presented detailed weekly learning activities, answered students’ questions via email, discussion board, online chart, and sometimes through his office hours meeting with students about their concerns. Students from both the face-to-face and online classes engaged in hands-on learning activities that related to their life experiences such as creating a PowerPoint Presentation to introduce themselves and budgeting their personal finances using MS Excel.
Despite no statistically significant difference between the face-to-face and online classes in course management and delivery, the mean scores from the online class were a little lower than the face-to-face class. This may due to fact that online students have not adjusted the shift of the online learning and the role of the professor in an online environment. Most online students stated that this was their first time taking an online course. They were nervous and overwhelmed as they were not sure how the online class was running and what they needed to do for the term work. Online students may not have understood that the confusion about what they were expected to do and how they conducted online training at the beginning of the term was supposed to be part of the learning process; therefore, they might be less satisfied than face-to-face students. This lower satisfaction with the online course echoes the previous research supporting the idea that the lack of familiarity in online learning and different expectations of the college experience affect student satisfaction with online courses (Osborne, 2000; Song, Singleton, Hill, & Koh, 2004).

It was the learning environment that inspired the student rather than the mode of delivery. A strategically constructed learning environment presents students with the sense of a learning community and inspires them to persevere when feeling isolated or discouraged (DuCharme-Hansen & Duplin-Byant, 2005). To reduce students’ feelings of isolation or discouragement, instructors should promote communication with students and provide timely feedback. Results from this study reveal that some students felt overwhelmed and isolated at the beginning of the term. But these students began to feel at ease after talking with the professor or email him about their issues and concerns.

While face-to-face students reported that the professor was always there when they needed help and they considered this as one of the contributing factors toward their learning, online students tended to seek help from website resources – this forced them to be more
independent and self-reliant. Furthermore, interview data shows that the experiences students gained from utilizing the online resources goes beyond mastering knowledge and skills, as is argued by Herrington et al. (2001):

Reflect a rich variety of perspectives to give students the opportunity to judge the merit of different position, rather than be given a single (the teacher’s) viewpoint. Such resource enable learners to access a range of expert opinion from the original source, if possible, rather than through secondary sources. Materials reflect the interests of sometimes marginalized groups, and they demonstrate social, cultural and gender inclusivity. (p. 268)

Two out of ten questions about course design and delivery were found to have statistically significant differences – one question was about the course structure and the other question was about examples and applications in the course. More than half of the face-to-face students stated that they strongly agreed that the course structure and materials were well organized whereas only a few online students strongly agreed with this statement. This result may have been caused by the fact that the face-to-face students received a lesson plan each week in class. The lesson plan was not only in the form of a handout but it was also posted on the whiteboard right in front of the classroom, visible to every student. On the other hand, for online students, the professor posted the weekly learning activities on the WebCT and it was up to them to check it out on a weekly basis – there was no reinforcement here. Observations from the online class showed that some online students asked questions that were clearly stated either on the course outline or in the weekly learning activities. For example, they asked what textbook was adopted and when the test date was. Apparently, these students did not read the required postings on the WebCT. This may explain their less positive responses about course structure and material.

Another question that showed a statistically significant response was about course examples and applications. Almost all the face-to-face students strongly agreed or agreed that the course included examples and applications that were relevant to this area of study whereas
slightly more than half of the online students strongly agreed or agreed with the statement. The reason may be that face-to-face students not only had opportunities to interact with live examples from the professor but they also shared their work as examples in class. On the other hand, not all online students checked out the examples the professor posted on the WebCT – they may not have understood the relevance of these examples. Sometimes these examples were in a rich multimedia format and they might have experienced technical difficulties in viewing these examples. In short, face-to-face students were exposed more to examples and applications than online students. This may explain their more positive response to the question about examples and applications.

A question about satisfaction regarding course management and delivery produced no significant difference between the face-to-face and online classes. Students from both sections were satisfied with course structure, online learning activities, assignments, and assessments. This finding was in line with previous research that also found no significant differences between face-to-face and online delivery in terms of satisfaction (Diaz, 2000; Leasure, Davis, & Thievon, 2000; Picciano, 2002; Ragan & Kleoppel, 2004). Students from this study also appreciated that the fact that they received timely feedback from the professor and they could easily figure out the problems by just asking the professor. Students reported that their reasons for enrolling in the online class included the schedule, commuting time, convenience, flexibility, and cost. Major factors in choosing the face-to-face class included increased interaction with the professor and classmates, immediate feedback, decreased opportunity to procrastinate, and meaningful learning activities.

5.3.2 Self-efficacy and Beliefs about the Acquisition of Computer Applications

Both face-to-face and online students expressed overwhelmingly positive attitude and belief about learning computer applications. Overall, there was no difference in the attitudes
about the acquisition of computer applications between these two modes of delivery. This suggests that learning can be equally successful whether it is in a face-to-face or online setting. However, there was a significant difference in perceptions of learning the course very well and capability of getting a good grade between face-to-face and online students. Face-to-face students tended to have more positive attitudes. Two possible reasons may have contributed to this finding. First, whereas face-to-face students had more contact with the professor and they could ask for help immediately when they were stuck, online students had to wait for a response from the professor once they submitted their concerns. Second, face-to-face students followed the traditional teaching and learning method – listen to the lecture followed by hands-on exercise on the computer. The road map for the face-to-face class was clearly laid out at the beginning of each class as the professor posted the weekly agenda on the whiteboard.

On the other hand, online students might have been confused about the way the online class ran. Some online students expressed that this was their first online class and they were not sure about the expectations of the course. They were overwhelmed by files, folders, links, and class notes posted on the WebCT at the beginning of the term. Apparently, face-to-face students did not experience such difficulties – they were exposed to information in class and this exposure even helped those who did not frequently pay attention to the class. This finding is consistent with another study that argued that the impact of dilatory behaviors for face-to-face students was less than for online students (Elvers, Pozella, & Graetz, 2003). The finding is also supported by research that suggests face-to-face students are more confident about accounting concepts than online students.

The literature reveals that self-efficacy is related to academic achievement across subject areas and grade levels: for example, in literacy development in a first grade class (Wilson & Trainin, 2007), high school mathematics courses (Daniels, 2010; Stevens, et al., 2004;
Wadsworth, et al., 2007), and an undergraduate psychology class (Wilhite, 1990). So far, no research is available that investigates the effects of self-efficacy and motivation on academic achievement at the college level and specifically for a computer course. This study has helped to fill in this gap.

5.3.3 Motivation about the Acquisition of Computer Applications

Motivation plays an important role in student learning (Morris, Wu, & Finnegan, 2005; Visser, Plomp, Amirault, & Kuiper, 2002). Students from both the face-to-face and online classes stated that they not only used computer applications in other courses but they also considered the future usefulness of the acquired skills in the workplace. These thoughts motivated them to learn more about computers and to learn them well. They valued the learning activities which satisfied their natural desire to master the computer skills and knowledge. Test scores provided evidence of the student learning. Those students who participated in the interview achieved at least a letter grade of B plus. Motivation affects both learning and academic achievement and it is a key element in both face-to-face and online environments (Schunk, Pinrich & Meece, 2008).

One of the most significant factors in student motivation to learn is frequent contact between students and the instructor (Hatfield, 1995). Learner-instructor interactions are a two way process. On one side, the instructor delivers and facilitates the lesson. The instructor also encourages the learner to provide feedback. On the other side, the learner takes on the learning activities and asks questions. In this study, the experiences of face-to-face students prove that it is this interaction that provides motivation, feedback, and dialogue in creating crucial and effective learning (Moore, 1989; Swann & Shiah, 2003). However, online students experienced “a whole new set of physical, emotional, and psychological issues along with the educational issues” (Palloff & Pratt, 2007, p. 6). The development of social presence, student learning, and
satisfaction with online courses are all interrelated (Richardson & Swan, 2003). Instructors need to motivate online students to strengthen interactions among them.

5.3.4 Academic Achievement

The results of this study show that there is no significant difference in students’ test scores between the face-to-face and online classes. Some researchers have showed that online students outperform their face-to-face peers on test scores for algebra and geometry (Daniel, 2008). Other researchers have indicated that online students did not perform as well as face-to-face students in their listening and speaking skills (Barker & Wendel, 2001). Research also shows that math and science have proven difficult to teach online because of the highly technical skills involved in these subjects; online test scores in math and sciences at grades six and nine were significantly lower than face-to-face students (Schollie, 2001). The computer applications course in this study also dealt with some technical skills such as mathematics and financial calculations using the spreadsheet.

The results of this study also indicate that students who were very satisfied with the course design and delivery often achieved high academic performance as indicated by their test scores. Pearson Chi-Square tests (Chi-Square value = 8.705, df = 2, Asymp.Sig. = 0.013, N = 52) show that there is a statistically significant difference between mode of delivery and participants’ perception of learning the subject well. For the face-to-face participants, 43.3% strongly agreed with the statement, 36.7% agreed, and 20% somewhat agreed. On the other hand, 27.3% from online class strongly agreed, 13.6% agreed and 59.1% somewhat agreed. This significant difference is reflected in the students’ final marks where the mean grade was 72.5 for the online class and 78.03 for the face-to-face class.

I compared some students’ test scores with their responses to the online questionnaire (including open-ended questions) and interviews. I found that the higher the satisfaction, the
higher the test scores. Results from some existing research are also consistent with this finding (Beard, Harper & Riley, 2004; Campbell, 2010; Daniel, 2008). I also found that students who reported a high level of satisfaction with the course felt that they learned a lot from the course. This finding is in line with results of other research. In examining what variables are predictive of students’ perceived learning, Jiang and Ting (1999) collected data from 287 students in 78 courses and found that instructor-learner interaction was the most significant predictor of perceived learning (Fredericken et al, 2000; Stein et al., 2005).

5.4 Implications for Further Research

To succeed and thrive in the competitive knowledge economy, post-secondary students need to build strong digital skills to prepare themselves. The computer course offered at the College provides students with both specific digital skills such as creating MS PowerPoint Presentations and manipulating data using MS Excel, and generic skills such as critical thinking, communication, and teamwork. Although this study has addressed some of the learning experiences in the acquisition of computer applications in different modalities (face-to-face and online class), new research questions arise based on the findings of this study. Some of these questions are: How do issues specific to the course design and delivery influence students’ academic learning? How does prior knowledge of computer skills affect student perceptions of course design and delivery? What factors contribute to students dropping the course? What strategies and tools are available when students are stuck? How can we promote social presence in both face-to-face and online classes? How can courses be designed and delivered in a way that involves students and motivates their learning? Does blended learning benefit students more than face-to-face and online learning? Do group projects increase students’ participation in both face-to-face and online classes?
This study indicates that students from both face-to-face and online classes learned a lot through examples, online training and assignments. The professor served as a facilitator on both classes. He provided on-site scaffolding for the face-to-face class by circulating himself among students and he supplied a virtual platform for the online class by assisting discussion board, online chat, and emails. Further research might focus on the professor’s role within the different learning modalities. What strategies does the professor employ to accommodate different learning needs in different learning environments?

The questionnaire and the interview data from this study reveal that students came to the computer class with different backgrounds and expectations. Some students had some advanced level of computer knowledge. Others had working knowledge about computer applications. Still others had no idea about computers. Even with students who possess similar level of prior computer knowledge; they may have different learning styles – visual learners, kinesthetic learners, abstract learners, and so on. How does the professor design and deliver curriculum to address these dynamics in both face-to-face and online classes? Designing and delivering a relevant and responsive curriculum will assist students in acquisition of computer applications and make this learning meaningful and purposeful for them.

A critical characteristic of learning is that it creates the zone of proximal development. (Vygotsky, 1978). The learning environment involves a complex web of relationships among technology, pedagogy and content. Koelher and Mishra (2006) introduced Technological Pedagogical Content Knowledge (TPCK) as a framework to explain the complex interplay among technology, pedagogy and content in order to better understand how to effectively teach with technology. TPCK is essentially social and cultural and it is grounded in activities, practices and communities where learning is taking place. Thus, further research should be conducted to seek sociocultural and situated approaches to better understanding TPCK in both face-to-face
and online environments. How do professors incorporate TPCK into authentic design-based learning activities to generate new insights, knowledge, perspectives and understandings?

Teaching using technology in both physical and virtual environments requires an understanding of how learning has been taking place. Learning occurs socially within communities of practice. This implies that we design learning activities relevant to students’ prior knowledge and experiences. In order to achieve this goal, we have to understand what our students’ interests are and go from there. The effective applying TPCK could result in purposeful, meaningful, and enriched learning.

Finally, further research could investigate how to best combine the strength of both face-to-face and online learning from the findings of this study. Professional development programs should include activities where professors who teach computer applications can share their practices and policies in an interactive online environment with private layer protection. This interactive online environment can also provide a public layer where students are invited to interact and share their projects and learning experiences. Such an interactive online environment could also be incorporated with required courseware such as WebCT and SAM to promote “collective cognitive responsibility, knowledge advancement, and dynamic diffusion of information” (Zhang et al, 2009, p. 8). An exploratory study focusing on community knowledge building in computer applications course could create a recursive process to improve program outcomes and maximize student learning for both face-to-face and online classes.

5.5 Suggestions and Considerations

The findings of this study suggest several teaching and learning strategies that may help to maximize student learning in both face-to-face and online classes. By examining student perceptions of course design and delivery, their attitudes and beliefs about learning the computer course, the College administrators and faculty members can better meet the needs of students
enrolling in both face-to-face and online classes in the future. They can also make informed decisions about future course development and recognize areas that need improvement. Providing quality course design and delivery may enhance the student learning experience and improve student retention.

Both face-to-face and online students were asked for their suggestions to improve the computer course. The two major areas students made recommendations on were improved communication mechanisms and better course design and delivery. Suggestions for communication improvements included in-person orientations to the online course, weekly live video conferencing, more phone and in-person contact with the teacher, and better interaction among students. Course design and delivery suggestions emphasized clarity, consistency, and detailed expectations for assignments and tests, and employing group projects in the curriculum to promote interactivity.

The College administrators and faculty members need to be aware of the study findings. While the online course appear to be just as good as the face-to-face course, the College should be careful not to reduce the number of face-to-face classes as the face-to-face classes continues to attract a large amount of the student population. At the same time, the College should get the word out that student modality choice is not related to satisfaction for the modality of interest, academic achievement, and attitudes and beliefs about learning the subject. It is recommended that the College continue to support future research studies to determine how to best utilize face-to-face and online education to create blended learning, which has been gaining popularity in academia. Further research needs to explore which aspects of face-to-face and online class are effective for students and how these aspects could be integrated in the blended classes.

Based on the findings of this study, instructional designers and instructors need to reflect on three considerations that are key elements for effective design and delivery of both face-to-
face and online courses: preparing student readiness, building learning communities using effective technology, and employing appropriate learning activities.

**Student Readiness**

Students come to class with different attitudes, beliefs, and experiences that might impact their learning. The findings of this study revealed that some students believed that they could learn computers very well but others felt nervous about dealing with computers. While face-to-face students can meet their instructor and classmates in real time, online students lack a sense of presence and connection. Therefore, instructors need to establish a social presence to enhance student interactions and strengthen student readiness in the online environment. Feedback from students’ questionnaires and interviews indicates that the course needs to be completely set up on the WebCT and on the SAM even before the start of the term so that students can fully participate once the term begins. This study suggests setting up clear, consistent, and detailed expectations at the beginning of the course to present a road map for students. Furthermore, giving prompt feedback can help alleviate confusions experienced by some students. Research has showed that teachers’ expectations can help students get ready for the course (Auwarter & Aruguete, 2008).

**Learning communities**

One of the findings from this study is the revelation of some negative aspects of online learning, such as isolation and lack of motivation. Instructors need to develop teaching strategies to compensate for the inherent lack of face-to-face communication in an online class. Online participants reported that they missed the interactive part of the course. This interaction naturally takes place in the face-to-face class where students have in-person discussions. Instructors should use a variety of technological features to provide opportunities for students to feel engaged in a learning community and to establish feelings and connections with others. Such
technological features can include simulators, role-playing activities, virtual classrooms, and streaming media. Furthermore, these technology packages should be functional and easy to navigate. Better use of the collaborative tools on the WebCT could encourage greater interaction among students. For example, instructors can schedule weekly live video conferencing to ensure that they have real time communication with online students who may demand immediate feedback over course related issues.

Students also reported the need to have reminders for assignments, upcoming due dates as well as timely feedback. These might help ensure that the students complete assignments on time and reach a higher level of learning. Because more than half of the students in this study held part-time jobs and had family responsibilities, students need reminders as they are constantly juggling multiple tasks and roles. Regular reminders can help students keep on track in their term work. The instructor’s acknowledgement of receiving assignments helped establish the instructor’s presence, and content feedback from the instructor encouraged students to discuss their work.

**Learning activities**

Participants in this study hoped that they would have fun assignments so that they could feel more engaged instead of feeling bored. The aim in designing and conducting learning activities should result in engagement with other students and with course content. The starting point for an effective course should begin with activities establishing human-to-human contact to orient students to the course environment (Palloff & Pratt, 2007). This should be followed by planning and conducting meaningful and purposeful activities based on students’ interests and prior knowledge to encourage students to actively participate in the learning process. Instructors could use different levels of assignments to adapt to different student learning needs and encourage their active learning. Instructors may also need to employ group projects in the
curriculum to promote interactivity, participation, and cooperative and collaborative learning. Results from this study point out the isolation and lack of interaction as drawbacks of the computer application course. Group projects may foster a more robust community of learning, amplify intellectual development, and support divergent thinking through idea-generating activities.

The findings of this study suggest a number of implications for instructors to share students’ epistemological beliefs about learning. Student learning behaviors are partly shaped by their learning beliefs. Some students in this study reported that they were not sure about what the expectations of the course were. It might be necessary to set up an on-campus orientation initially to create clear expectations for the course, which could then be referred to and supported by different modes of delivery. When sharing the epistemological beliefs, instructors need to set up clear and consistent expectations at the beginning of the semester. This will help students adjust to their roles in the learning process and assume greater responsibility for learning. Furthermore, by sharing epistemological beliefs, instructors become aware of student needs and preferences, and can adjust learning activities and objectives accordingly.

5.6 Limitations

One limitation of this study is that self-reported data can be subject to the responder’s bias. Students self-select the preferred mode of delivery, so the groups may not represent all students. Some results may be due to the student self-selection of the mode of delivery. Since standardized instruments were not used to collect all data, reliability of results may be affected. For example, test marks and final grades are used as a measure of student achievement. While these are not as objective as standardized tests, they are the measure of academic success generally used in the College; therefore, they are used as an indicator for student achievement. The data is based on only one semester, thus subject to some degree of uncertainty. In addition,
there is little evidence about how the computer classes were conducted and what students were doing in the classroom. The classroom observations may help to ground student perceptions of computer course. These limitations will be seriously considered when I do further study.

This research does not take into account differences among students as the class is the unit of analysis. There is wide variance of achievement and attitudes within the two classes, which indicate students have a variety of different characteristics. Many factors such as gender, age, educational experience, and motivation influence these differences. Further research needs to focus on how these factors affect learning not only at the group level but also at the individual level.

The research does not address how the different learning styles of students relate to the use of educational technologies. Understanding of how the technological pedagogical content knowledge (Mishra & Koehler, 2006) interacts with student learning styles is limited. Further studies could provide more information about how different technologies might be better suited for specific learning tasks and learning styles.

5.7 Contributions of the Research

This research has two important contributions: local implications for computer education and broader implications for a theoretical framework with respect to methodology. The following explores these contributions.

Local Practice

Distance education is expanding at the College. The demand for more online courses has accelerated in the School of Business due to physical space constraints and increased number of enrollment. Innovative learning is one of the College’s three strategic plans for the year 2020 (Innovative learning, field education, and partnership). This innovative learning involves both face-to-face and online education in order to maintain and improve the quality of education for
all modes of delivery via creating powerful learning environments where instructional designers, instructors, and students work together. While the learning environment contains many factors, this thesis takes on student perceptions of course design and delivery, epistemological beliefs, and academic achievement. These aspects are important parts of effective education.

The results of this study can help to inform the administrators, instructors, and students in understanding different learning environments. This study also contributes to the theoretical aspects of the literature by providing specific and context bound situations on face-to-face and online education at the community college level. The study results can help facilitate the exchange of ideas on learning among stakeholders in order to develop a more effective learning environment and promote successful learning. Finally, the suggestions from the results might help to improve both face-to-face and online education, especially considering the fast-growing demand for online education at the College.

I have shared my study results with my supervisor at the College and she is planning to team up with a couple of the faculty members and support staff to further investigate online education at the College in the areas of blended learning, maintaining and improving retention rate, and enhancing communication between students and instructors. This thesis could serve as a basis for the upcoming research at the College and it helps refine the curriculum to better meet students' need and ensure their success. I have also shared my thesis at a focus group developing online student questionnaire feedback. The online feedback was rolled out in the Fall of 2011. That will be the first time that the College will have an official questionnaire for online students.

The contribution of my thesis is not only restricted to the collective level, but it also contributes at the individual level. I have been engaged in a dialogue with a few faculty members at the College who either teach online or conduct research on distance education. We discussed and shared the best teaching practices for online classes – how to motivate student learning and
help them engage in the learning process. I also shared my survey with a colleague who is embarking on the Masters journey. The study results also enlightened my own online teaching practice. For example, participants in this study indicated that they need the due date everywhere: on the course outline, on the course calendar, on the weekly schedule, on the announcement, and on the email. I will be taking this suggestion in two brand new online courses for three-year accounting and financial services students that I will be teaching. I also plan on employing group projects in these two online courses to foster interactions among students and minimize the impact of isolation and unease for the online students.

**Broader Implications**

Face-to-face and online education in computer courses is different from a decade ago. Years ago, questions about quality of printed materials in online education were asked but less so. We now have tools like video conferencing and simulated software with interactive features for users. Student populations today are also different from a decade ago – more students hold part-time jobs and they juggle multiple tasks. The course content for computer education has been changed a lot - MS Excel 2010 has added a lot more new features compared to MS Excel 2000. With these changes in mind, the study focus is not only on the comparison of face-to-face and online learning experiences, but also on the quality of education that the students receive and their satisfaction with the computer course. Specifically, the data I gathered not only included the students’ grades, but also open-ended questions and interview data. These data added to the context and richness of the study.

Critics have addressed problems with the comparative research. The first centres on the assumption that face-to-face education is the ideal mode of delivery and can be used as the gold standard against which other modes of delivery are measured (Brown & Wack, 1999). The second problem is that it fails to present adequate differentiators such as teaching methods,
learning materials, and student motivation between face-to-face and online education (Saba, 1998a). My study has overcome these limitations to some degree. First, I regard both the face-to-face class and online class as equals – they are the same course just in a different delivery mode. There is no evidence that I have used one delivery mode as a standard and tried to compare it with another mode of delivery. I collected and analyzed data from both face-to-face and online classes equally. Second, the learning materials and student motivation were similar in my study. In addition, both the face-to-face class and the online class adopted simulated and interactive online training software. This software has been intensively used as a teaching aid. Therefore, the teaching method in both delivery modes should not be considered a major differentiator.

5.8 Summary

This chapter concludes the thesis study with discussions of the study results, major findings, implications for further research, suggestions for teaching and learning, and contributions of the study. I have argued that the online students had similarities and differences with face-to-face students in their perceptions of course design and delivery, academic achievement, and their beliefs and attitudes about learning computers. Although most differences were not statistically significant, the findings have illuminated some key factors in supporting student learning as well as the strengths and weaknesses of both face-to-face class and online classes. By sharing student perceptions of the computer course and their learning, instructors need to set clear expectations for the course and adjust their teaching plans accordingly. Instructors may also need to reflect on some interactions among the students, the teacher, and course content to effectively design and deliver the computer course for both face-to-face and online classes.
References


Campbell, S. P. (2010). *Students’ perceptions of hybrid courses in higher education.* (Master Thesis, University of Nebraska at Omaha, UMI Number 1478922).


Appendix A: Information Letter

Dear Potential Participant,

You are invited to take part in the research study on “Investigating College Computer Courses Delivered in Both Online Class and Face-to-face Class” which is being conducted by Baolong Fu, a doctoral student from the Ontario Institute for Studies in Education at University of Toronto. The research study is under the supervision of Professor Douglas McDougall to fulfill the thesis component of my degree requirements.

This research study compares online computer course with face-to-face computer course in terms of students’ profiles, attitudes and academic achievement. The purpose of the research project is to provide a detailed understanding of the similarities and differences in the attitudes and beliefs of college students attending online versus face-to-face and the relationship between these psychometric characteristics and academic achievement. This project is also aimed at fulfilling degree requirements for a Ph.D. at the Ontario Institute for Studies in Education at the University of Toronto.

There are several significances this research can offer. Firstly, the search will inform college administrators about how well students are doing on both modes of instructions and implement the practices and policies to enhance students’ persistence, thereby, improve program outcomes. Secondly, the research will also help students to make informed and firm choices regarding to which mode of instruction they will choose to attend. Lastly, teachers refine their ability to develop and design pedagogically relevant and responsive curriculum using best teaching and learning practices from both the online classes and face-to-face classes to suit students’ needs.

All data collected during the study will remain confidential. You have no obligation to participate in this study. You will be free to ask questions or concerns throughout the study, and may withdraw at any time if you choose. If you withdraw from this study, the data pertaining to you would be destroyed immediately. Your instructor will not see your survey. All survey responses will be identified with an ID code number and your name will not be linked to the research data. Only I and my supervisor Professor Douglas McDougall will have access to the raw data. All raw data will be secured in a locked facility and will be destroyed within five years of completion of the study.

Who can participate in the research?

Students who are taking computer course in the fall of 2009 are invited to this research.

What choice do I have?

Participation is entirely voluntary. If you decide to participate, you may withdraw from the project at any time without giving a reason. I may also withdraw a participant if it is considered in the participant’s best interest or it is appropriate to do so for another reason. If this happens,
the research will explain why and advise you about any follow-up procedures or alternative arrangements as appropriate.

All information collected will be confidential. All information collected will be stored securely with me and kept for a period of five years in a locked facility. At no time will any individual be identified in any reports resulting from this study.

What will I be asked to do?
- Fill out the Questionnaire and participant an interview.
- The following information is needed: students age, gender, attitudes toward the course, and test score.
- A questionnaire will take approximately 15 minutes and an interview will take about 30 minutes.
- The participation will take place at the College.
- The researcher will conduct an interview.

What are the risks and benefits of participating?

There is no risk for participating this study. There is no direct benefit for the participants, but the study will inform further students about the similarities and differences between an online class and a face-to-face class so that they can make an informed and firm choice with respect to which mode of delivery they are inclined to choose from. You will receive a copy of the summary of findings from the study.

How will the information collected be used?

I will submit the research analysis to an examining committee which is chaired by Professor Douglas McDougall at the Ontario Institute for Studies in Education at the University of Toronto. The demographic of participants, their attitudes toward the course design and delivery and their academic achievement will be reported.

What do I need to do to participate?

Please read this Information Letter and be sure you understand its contents before you consent to participate. If there is anything you do not understand, or you have any questions, please contact the Principal Investigator.

If you would like to participate, please sign the consent form, complete a questionnaire, and attend an interview.

Thank you for considering this invitation,
Signature of researcher

Contact information:

Primary Investigator: Baolong Fu  Supervisor: Dr. Doug McDougall, Professor
Ph.D. Candidate                   Department of Curriculum, Teaching & Learning
                                      Ontario Institute of Studies in Education / UT
Appendix B: Teacher Consent Form

Dear

I am a doctoral student in Curriculum Teaching and Learning at the Ontario Institute for Studies in Education at the University of Toronto. My research study is on “Investigating College Computer Course Delivered in Both Online Class and Face-to-face Class” which is under the supervision of Professor Douglas McDougall to fulfill the thesis component of my degree requirements.

This research study compares online computer course with face-to-face computer course in terms of students’ profiles, attitudes and academic achievement. The purpose of the research project is to provide a detailed understanding of the similarities and differences in the attitudes and beliefs of college students attending online versus face-to-face and the relationship between these psychometric characteristics and academic achievement.

I understand you are teaching both the face-to-face and online classes. All the students in your classes may participate this study. I would like you to introduce me to your class in a course message. I will forward an Information Letter and a Student Consent Form to your students and ask them to return directly back to me. Participation is voluntary. I do not anticipate any risk to you and any references to the teacher will be in generic terms. I will ensure that no reference is made that would identify you in any way. The emphasis for this study will be on comparing the students’ attitude and academic achievement and does not explore the teacher’s role in any specific way. Record will be maintained in a secure password protected file and destroyed within five years of completion of the study.

There are several significances this research can offer. Firstly, the search will inform college administrators about how well students are doing on both modes of instructions and implement the practices and policies to enhance students’ persistence, thereby, improve program outcomes. Secondly, the research will also help students to make informed and firm choices regarding to which mode of instruction they will choose to attend. Lastly, teachers refine their ability to develop and design pedagogically relevant and responsive curriculum using best teaching and learning practices from both the online classes and face-to-face classes to suit students’ needs.

Thank you for making your course available for this study. I look forward to working with you on this project. Please sign and send me a copy of the form to confirm your willingness to have your course included in this study.

Thanks again,
Baolong Fu

Declaration of Consent

I (name) ______________________ hereby agree that my course ____________________

may be used in the research study that Baolong Fu is conducting regarding the comparative study between a face-to-face course and an online course.

I understand that Baolong will need:
- to ask participants to fill out a questionnaire.
- to interview participants in a way that does not jeopardize successful completion of the course.

Print Name: _____________________________________
Signature: _________________________
Date: _________________________________________

Contact information:

Primary Investigator: Baolong Fu  Supervisor: Dr. Doug McDougall, Professor
Ph.D. Candidate  Department of Curriculum, Teaching & Learning
Ontario Institute of Studies in Education / UT
Appendix C: Student Consent Form

I, (please print)________________________________________ have read and understood the information on the research study *Investigating College Computer Course Delivered in Both Online Class and Face-to-face Class* which is to be conducted by *Baolong Fu* and all questions have been answered to my satisfaction.

I agree to voluntarily participate in this study and give my consent freely. I understand that the study will be conducted in accordance with the Information Letter, a copy of which I have retained for my records.

I understand I can withdraw from the project at any time, without penalty, and do not have to give any reason for withdrawal.

I consent to:

- *Fill out a questionnaire*: Yes ☐ No ☐
- *Participate an interview*: Yes ☐ No ☐

________________________________________

Print Name: _____________________________________

Signature: _______________________________________

Date: ____________________________________________

Contact information:

Primary Investigator: Baolong Fu    Supervisor: Dr. Doug McDougall, Professor
Department of Curriculum, Teaching & Learning
Ontario Institute of Studies in Education / UT
Appendix D: Online Survey

The purpose of this questionnaire is to provide a detailed understanding of the similarities and differences in the attitudes and beliefs of college students attending online versus face-to-face and the relationship between these psychometric characteristics and academic achievement. You are supposed to read the information letter and sign the consent form.

Your input is important as it will help students to make informed and firm choices regarding to which mode of instruction they will choose to attend. You have 20 minutes to fill in the survey. Some demographic questions are to ensure adequate representation in the sample. The information you provide is confidential. This is an anonymous survey.

Should you have questions or comments, please contact Baolong Fu. Thank you in advance for your participation!
**Student Profile**

1. I am  
   - Female  
   - Male  
   - LGBT

2. My age is  
   - Younger than 20  
   - 20-24  
   - 25-29  
   - 30 or older

3. My program is  
   - Marketing  
   - Management Studies  
   - Human Resources  
   - Other

4. My first language is English  
   - Yes  
   - No

5. Which class are you attending?  
   - Face-to-face computer class  
   - Online computer class

6. How many classes are you taking this semester?  
   - 1  
   - 2  
   - 3  
   - 4  
   - 5  
   - 6  
   - 7

**Course management and delivery**

Please rate each of the following on a 1-6 scale, where (1) is "Strongly Agree," (2) is "Agree," (3) is "Somewhat Agree," (4) is "Somewhat Disagree," (5) is "Disagree" and (6) is "Strongly Disagree."

1. The course structure and materials are well organized.
   - 1  
   - 2  
   - 3  
   - 4  
   - 5  
   - 6

2. The course outline accurately described course content, objectives and evaluation methods.
   - 1  
   - 2  
   - 3  
   - 4  
   - 5  
   - 6

3. The course includes examples and applications which are relevant to this area of study.
   - 1  
   - 2  
   - 3  
   - 4  
   - 5  
   - 6

4. Texts and supplemental materials are informative and relevant to the course.
   - 1  
   - 2  
   - 3  
   - 4  
   - 5  
   - 6

5. Assignments contribute to my learning of the course material.
   - 1  
   - 2  
   - 3  
   - 4  
   - 5  
   - 6

6. Instruments of evaluation (e.g. tests, assignments, quizzes) are fair and appropriate.
   - 1  
   - 2  
   - 3  
   - 4  
   - 5  
   - 6
7. The course assessments are in agreement with the course content and learning objectives

   1  2  3  4  5  6

8. This course has motivated me to increase my knowledge and competence in this area of study.

   1  2  3  4  5  6

9. The learning activities are relevant to the stated course outcomes

   1  2  3  4  5  6

10. Overall, this course is

    Outstanding Very Good Good Satisfactory Somehow Satisfactory Unsatisfactory

11. What do you think are the greatest benefit of online courses? (Check all that apply)

    a) Accessibility
    b) Flexibility
    c) Student centered
    d) Encourages collaboration
    e) Other (Please type your response)

12. What do you think are the greatest drawback of online courses? (Check all that apply)

    a) Isolation
    b) Lack of face-to-face interactions
    c) Lack of technological skills for student
    d) Other (Please type your response)

13. What do you think are the greatest benefit of face-to-face courses? (Check all that apply)

    a) Personal attention from the instructor
    b) In-person interactions with the instructor and other students
    c) Get the work done in the class
    d) Seek help immediately
    e) Other (Please type your response)
14. What do you think are the greatest drawback of face-to-face courses? (Check all that apply)
   a) Inflexibility (restricted class time and location)
   b) The instruction does not fit my learning style
   c) I am a fast learner and the class pace is slow
   d) I am a slow learner and the class pace is fast
   e) Other (Please type your response)

15. Please list and describe any positive and/or negative factors about the course.

16. Do you have any suggestions for improving the course?

**Self-efficacy and belief about the acquisition of computer knowledge**

Please rate each of the following on a 1-6 scale, where (1) is "Strongly Agree," (2) is "Agree," (3) is "Somewhat Agree," (4) is "Somewhat Disagree," (5) is "Disagree" and (6) is "Strongly Disagree.

1. I am certain I can master the skills being taught in this class.
   
   1 2 3 4 5 6

2. I am confident I can understand the basic concepts taught in this course.
   
   1 2 3 4 5 6

3. I am certain I can understand the most difficult and complex material presented in the reading for this course.
   
   1 2 3 4 5 6

4. I have no doubts about my capability to do well on tests.
   
   1 2 3 4 5 6

5. Computer applications are difficult subject to learn.
   
   1 2 3 4 5 6

6. I believe that I will learn this subject very well.
   
   1 2 3 4 5 6
7. If you practice 3-5 hours a week on this subject outside the classroom, you will achieve at least B for your final mark.
   1 2 3 4 5 6

8. Successful students understand things quickly.
   1 2 3 4 5 6

9. The most successful people have discovered how to improve their ability to learn.
   1 2 3 4 5 6

10. Going over the tutorials in the text book help me understand the skills and knowledge.
    1 2 3 4 5 6

11. If I find the time to re-do the tutorials in the textbook, I get a lot more out of it the second time.
    1 2 3 4 5 6

12. Genius is 10% ability and 90% hard work.
    1 2 3 4 5 6

13. If a person can’t understand something within a short amount of time, they should keep on trying.
    1 2 3 4 5 6

14. Usually you can figure out difficult concepts if you eliminate all outside distractions and really concentrate.
    1 2 3 4 5 6

15. Learning is a slow process of building up knowledge.
    1 2 3 4 5 6

16. I check my assignments before I turn them in.
    1 2 3 4 5 6

17. I am capable of getting a letter grade B in this course.
    1 2 3 4 5 6

**Motivation**

1. I am self-motivated to do my schoolwork.
    1 2 3 4 5 6

2. I want to do my best in school.
    1 2 3 4 5 6
3. Learning computer applications is really great.
   1 2 3 4 5 6

4. I really enjoy learning computer applications.
   1 2 3 4 5 6

5. Computer applications is an important part of my program.
   1 2 3 4 5 6

6. I plan to learn as much as computer applications as possible.
   1 2 3 4 5 6

7. I love learning computer applications.
   1 2 3 4 5 6

8. I hate computer applications.
   1 2 3 4 5 6

9. I think that learning computer applications is dull.
   1 2 3 4 5 6

10. In general, I enjoy doing case study, assignments or projects in COMP 1010 or COMP 1115.
    1 2 3 4 5 6

11. In general, I feel motivated to try to learn and understand more about Computer Applications.
    1 2 3 4 5 6

12. Could you please rate the relative value of (put a check mark)

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13. How technologically proficient do you consider yourself in using computers for face-to-face learning? (e.g. familiarity with the use of browsers and search engines, downloading and installing plug-ins to view multimedia files, familiarity with media-creation tools such PowerPoint).
   a. Good or Excellent
   b. Average
   c. Below average

14. How important do you think face-to-face education is for your academic success?
   a. Very Important
   b. Important
   c. Not important

Thanks for your time and effort!
Appendix E: Interview Protocol (online class)

Introduction

This is a face-to-face interview. I am working on a thesis study to compare the online computer course with face-to-face computer course in terms of students’ perceptions of the course, attitudes and academic achievement. One of the data collections is to learn more from your perspective about your experiences with the course you are taking.

I want you to know that this study does not evaluate you; I am looking to learn from your experiences to identify the best learning practices in both face-to-face and online learning environment. This interview will take approximately 30 minutes.

Before we start, I need you to read and sign the consent form. Do you have any questions before we get started?

Note: These questions are only guidelines for beginning the dialogue with the participant. The questions will be dynamic and the direction of the questions may change as the phenomenon is developing or being clarified.

Can you tell me something about yourself?

Factors in Choosing This Online Course

What were the major factors for you to choose this online class you are currently enrolled?

How many online courses are you enrolled in this semester? Expect to be this year?

Previous technology experience / fluency / access – How comfortable are you using technology? How comfortable were you before the online course? How comfortable were you after the online course?

In general, what factors do you feel best supported your learning in the computer course? (Content, Teacher, Tests, Activities, Overall Environment)

User Services and Support

Do you need any help with completing your work? If you do, who do you ask for help? How do you receive help?

Have you had any trouble with the technology or getting access to the Internet when you wanted to participate in this course?

Belief / Feelings / Motivation

What could be done to get you to participate more in this course or in other online courses?
Does this online course fit your needs and preferences? (Time constraints, grade, subject, gender, ability, and ethnicity) Why / How?

How would you ascribe your performance in this online course to the following factors: ability, effort, task difficulty, and luck?

Describe your motivation to use computer tools in this online course. Please describe what motivated your use.

Please compare your ability to use computer tools before and after this online course.

What, if anything, do you think could be done for you now to improve your learning in the computer course?

**Strengths and Weaknesses**

What are the benefits of taking this course online instead of in a regular classroom?

What, if any, were your apprehensions in taking an online class? What were the appealing points?

As detailed as you can be, what has been the *most* rewarding experience for you in this online environment and why?

What are some of the disadvantages of taking this online course? What are some of the challenges you have felt while taking this online course?

How would you compare the quality of the online course with similar face-to-face course?

**Closing**

Is there anything else you would like to add about your experiences with this online learning application?
Appendix F: Interview Protocol (face-to-face class)

**Protocol Two: Face-to-face class**

**Introduction**

I am working on a thesis study to compares online computer course with face-to-face computer course in terms of students’ perceptions of the course, attitudes and academic achievement. One of the data collections is to learn more from your perspective about your experiences with the course you are taking.

I want you to know that this study does not evaluate you; I am looking to learn from your experiences to identify the best learning practices in both face-to-face and online learning environment. This interview will take approximately 30 minutes.

Before we start, I need you to read and sign the consent form. Do you have any questions before we get started?

Note: These questions are only guidelines for beginning the dialogue with the participant. The questions will be dynamic and the direction of the questions may change as the phenomenon is developing or being clarified.

**Factors in Choosing This Face-to-face Course**

What were the major factors for you to choose this face-to-face class you are currently enrolled?

How many face-to-face courses are you enrolled in this semester? Expect to be this year?

Previous technology experience / fluency / access – How comfortable are you using technology? How comfortable were you before the face-to-face course? How comfortable were you after the face-to-face course?

In general, what factors do you feel best supported your learning in computer course? (Content, Teacher, Tests, Activities, Overall Environment)

**User Services and Support**

Do you need any help with completing your work? If you do, who do you ask for help? How do you receive help?
Have you had any trouble with the technology or getting access to the Internet when you wanted to participate in this course?

**Belief / Feelings / Motivation**

What could be done to get you to participate more in this face-to-face course or in other face-to-face courses?

Does this face-to-face course fit your needs and preferences (Time constraints, grade, subject, gender, ability, and ethnicity)? Why / How?

How would you ascribe your performance in this face-to-face course to the following factors: ability, effort, task difficulty, and luck?

Describe your motivation to use computer tools in this face-to-face course. Please describe what motivated your use.

Please compare your ability to use computer tools before and after this face-to-face course.

What, if anything, do you think could be done for you now to improve your learning in the computer course?

**Strengths and Weaknesses**

What are the benefits of taking this face-to-face course instead of online?

What, if any, were your apprehensions in taking a face-to-face class? What were the appealing points?

As detailed as you can be, what has been the most rewarding experience for you in this face-to-face environment and why?

What are some of the disadvantages of taking this face-to-face program? What are some of the challenges you have felt while taking this face-to-face program?

How would you compare the quality of the online program with similar face-to-face programs?

**Closing**

Is there anything else you would like to add about your experiences with this face-to-face learning application?