EXPLORING THE STUDENT EXPERIENCE: COMPUTER BASED INSTRUCTIONAL SIMULATION IN AN ONLINE INTRODUCTORY COMPUTER APPLICATIONS COURSE

by

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(Under the Direction of Janette R. Hill)

ABSTRACT

While research into distance education has evolved over the years, the fast-paced changes in technology of the past decade have caused a widening divide between the research completed and the technology available (Means et al., 2009). A lack of research shows this disconnect is clearly evident in the realm of computer based instructional simulation (CBIS) in online learning and is further apparent in technical college courses designed to teach technologically diverse students familiarity with computer applications. The purpose of this study was to explore the student experience in relation to the use of computer based instructional simulation in an online introductory computer applications course in a Georgia technical college.

This study was a cross-sectional survey, mixed research study utilizing a self-administered, web-based questionnaire for data collection. The questionnaire was developed specifically for this study and was administered to 141 participants. Data for the study was analyzed quantitatively through descriptive statistics and qualitatively through the development of themes.

The results of this study indicate a positive perception of the CBIS in general and a positive perception of the impact of CBIS on learning for students enrolled in the final weeks of an online introduction to computer applications course at a technical college. The conclusions for this study discussed the perception that experiential learning had occurred in the course; the perception that transfer of learning had occurred; the conclusion that even participants with computer experience still had a positive perception of the CBIS; and the impact of sensitivity and bugs on the perception of the functional fidelity of the CBIS.

INDEX WORDS: CBIS, computer based instructional simulation, online, technical college, computer applications

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A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

DOCTOR OF EDUCATION

ATHENS, GEORGIA

2011

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May 2011

DEDICATION

To my Andrew – the one and only, always and forever.

ACKNOWLEDGEMENTS

My doctoral journey has been a great experience made even better by the support I have received along the way from family and friends. I would first like to thank my husband, Andy Rumney, for his patience and understanding throughout all my endeavors, and in particular throughout the doctoral courses and the dissertation process. I could not have completed this journey without his love and support.

I would like to thank my parents, Edward and Dale Chapman, for completely supporting me in this journey as they have with everything in my life; from the early years through the (many) college years and all the gymnastics in between – they have always been there, without question and without hesitation. I certainly could not have completed this journey without their love and support as well.

Many thanks to several of my closest friends: Angela Campbell, Tina Hutchinson, Felicia Everidge, and Debbie Wentworth for their support and encouragement.

I would also like to thank my dissertation committee for their guidance on this journey. Thanks to Dr. Janette R. Hill, major professor, for her expertise, reminders, and patience – and for answering my emails even in the early hours of the morning. Thanks to Dr. Wendy Ruona for refusing to let me settle and pushing to make sure I had a topic that was important to me. Thanks to Dr. Khalil Dirani for helping me design a questionnaire for my study even under a severe time crunch. Thanks to Dr. Ikseon Choi for keeping me on the right path with his expertise in computer based instructional simulation and learning. Many thanks to each of you for asking the tough questions time and again to ensure my success in this journey.

Also, many thanks to the members of the CTCLI cohort: Sue Chandler, Al Cunningham, Alycia Ehlert, Rodney Ellis, Valery Hall, Amy Holloway, Susan Isaac, Todd Jones, Stan Lawson, Ron Newcomb, Stuart Phillips, Jana Williams, and Jodie Vangrov. Each one of you made this journey interesting and exciting in your own unique way. A special thanks to Ron for sticking with me from day one as both a mentor and a friend; and to Valery, Jana, and Amy for all the encouragement in the final push to wrap up this journey.

A special thanks to my grandparents, Mary and J.P. Chapman, and the 54 wonderful years they had together. I will always remember the lessons they taught me and the wonderful times I shared with them. While my Granddaddy continues to support me in everything I do, my Grandmother was not able to make this journey with me in person. However, she was certainly with me in spirit.

TABLE OF CONTENTS

Page

ACKNOWLEDGEMENTS v

LIST OF TABLES xi

LIST OF FIGURES xiii

CHAPTER

1 INTRODUCTION 1

Distance Education 1

Online Courses 2

Computer Based Instructional Simulation 3

Technical College Learners 4

Statement of the Problem 5

Purpose of the Study 6

Significance of the Study 6

2 REVIEW OF LITERATURE 8

Online Learning 8

Delivery Models 13

Experiential Learning 18

From Simulation to Computer Based Instructional Simulation 27

Need for Study 36

Summary 37

3 METHODOLOGY 38

Study Context..38

Design 41

Instrumentation 43

Population and Sample 50

Data Collection 51

Data Preparation..52

Data Analysis..59

Limitations of the Study..61

Researcher Biases and Assumptions..62

Summary..63

4 DATA ANALYSIS..64

Student Perceptions of the CBIS in General..64

Student Perceptions of the Impact of CBIS on Learning..76

Extent Previous Computer Experience Relates to Student
Experience with CBIS..79

5 CONCLUSIONS and RECOMMENDATIONS 89

Findings of the Study..89

Conclusions and Implications..94

Recommendations..96

Summary..97

REFERENCES 98

APPENDICES

A SAMPLE SYLLABUS 112

B CBIS SCREEN SHOTS 119

Student View Entering Word Training 119

Sample Word Training Exercise Introduction 120

Sample Word Training Exercise – Observe Mode 121

Sample Word Training Exercise – Practice Mode 122

Sample Word Training Exercise – Apply Mode 123

Conclusion of Word Training Exercise 124

Student Training Progress Report 125

C INVITATION TO PARTICIPATE 126

D INTERVIEW QUESTIONS 127

E QUESTIONNAIRE DRAFT PRIOR TO EXPERT REVIEW 128

F EMAIL TO EXPERTS REQUESTING REVIEW OF QUESTIONNAIRE 138

G QUESTIONNAIRE DRAFT PRIOR TO CRITIQUE SESSION 139

H EMAIL REQUEST TO PARTICIPATE IN CRITIQUE SESSION 149

I PILOT STUDY QUESTONNAIRE 150

J PARTICIPANT RESPONSES TO A SAMPLE QUALITATIVE QUESTION FROM THE PILOT STUDY 162

Original Quantitative Question 162

Follow-Up Quantitative Question 162

Participant Responses 162

K CONSENT FORM AND QUESTIONNAIRE 165

L SCREEN SHOT OF QUALITATIVE QUESTION FROM WEB-BASED SURVEY 174

M ALIGNMENT OF RESEARCH QUESTIONS TO INSTRUMENT QUESTIONS 175

N IRB APPROVAL DOCUMENT 178

O FOLLOW-UP INVITATION TO PARTICIPATE 179

LIST OF TABLES

Page

Table 3.1: Ethnicity Statistics for the Georgia Technical College..39

Table 3.2: Sample of Basic Quantitative Analysis of Pilot Study Results by Question................47

Table 3.3: Sample of Basic Quantitative Analysis of Pilot Study Results by Question................48

Table 3.4: Results of Cronbach's Alpha Analysis 49

Table 3.5: Demographics for Participants 53

Table 3.6: Item Means or Frequencies for Research Question 1 – Student Perceptions of the CBIS in General..54

Table 3.7: Item Means or Frequencies for Research Question 2 – Student Perceptions of the Impact of the CBIS on Learning...56

Table 3.8: Item Means or Frequencies for Research Question 3 – Extent Previous Computer Experience Relates to the Student Experience with CBIS...........................57

Table 3.9: Item Frequencies for Demographic Questions 58

Table 4.1: Item Frequencies and Percentages for Research Question 1 – Student Perceptions of the CBIS in General by Question...65

Table 4.2: Item Frequencies and Percentages for Research Question 2 – Student Perceptions of the Impact of CBIS on Learning by Question 77

Table 4.3: Item Frequencies and Percentages for Research Question 3 – Extent Previous Computer Experience Relates to the Student Experience with CBIS by Question 80

Table 4.4: Item Frequencies and Percentages for Combined Variables 83

Table 4.5: Definitions of Variables for Research Question 1 – Student Perceptions

Of CBIS in General...84

Table 4.6: Results of Chi Square and Fisher's Exact for Experience X Research

Question 1 – Student Perceptions of CBIS in General Variables 85

Table 4.7: Item Frequencies and Percentage for Years Variable..86

Table 4.8: Results of Chi Square and Fisher's Exact for Years X Research

Question 1 – Student Perceptions of CBIS in General Variables 86

Table 4.9: Item Frequencies and Percentage for Hours Spent Variable 87

Table 4.10: Results of Chi Square and Fisher's Exact for Hours Spent on a Computer X Research

Question 1 – Student Perceptions of CBIS in General Variables 88

LIST OF FIGURES

Page

Figure 4.1: Research Question 1 – Student Perceptions of CBIS in General Category Combinations by Question..83

Chapter 1

Introduction

As technology has improved throughout the past century, distance education programs have evolved as well – moving from written correspondence mailed parcel post in the late nineteenth century to the current development of fully interactive technologies designed to immerse students in a virtual learning environment. Likewise, the distance education course has moved from the pen and paper of the first generation of distance education to the computer-based online courses delivered today through the Internet. Furthermore, the increase in availability and decrease in cost of high-speed Internet access has led to the ability to create and distribute simulation technology across the Internet in an online, or distance education, environment to a variety of learners in a variety of contexts, including technical college settings.

Distance Education

Distance education is defined as "planned learning that normally occurs in a different place from teaching, requiring special course design and instruction techniques, communication through various technologies, and special organizational and administrative arrangements" (Moore & Kearsley, 2005, p. 2). Distance education was initially developed in the late nineteenth century in the form of correspondence programs designed to send coursework through parcel post between learner and educator in an effort to reach learners who could not otherwise attend school on campus (Moore & Kearsley, 2005). As technology advanced, correspondence programs eventually gave way to video- and/or audio-based distance education programs, then to web-based correspondence, and eventually to the Internet-based programs of today.

Distance education program offerings have undergone a significant increase in size, scope, and importance for colleges and universities in the past decade (Allen & Seaman, 2008). Increasing enrollments and decreasing budgets have led institutions to move programs and courses online in an effort to meet the needs of the learner, reduce the need to add physical classroom space on campus, and shift personnel costs toward adjunct faculty. Distance education also allows colleges and universities to compete nationally and even internationally for students taking courses online – students who will rarely, if ever, use on-campus facilities. Annual Sloan Consortium surveys indicate the number of online students more than doubled from 1.6 million students in fall 2002 to 3.94 million students in fall 2007 (Allen & Seaman, 2008) for students taking at least one online course. Enrollment has continued to increase to 4.6 million in fall 2008, then to 5.58 million in fall 2009 (Allen & Seaman, 2010). Following this trend, enrollment numbers are expected to continue to increase in the coming years.

Online Courses

A fundamental component of distance education programs is the online course. Online courses are defined as courses which typically have no face-to-face meetings and where at least 80 percent of the content is delivered online (Allen & Seaman, 2007, 2008). Due to limitations in Internet access speeds and a lack of research into online teaching pedagogy, online courses originally offered students little in the way of interactivity and generally included reproductions of lecture notes, hand-outs, and testing. As technology and access speeds increased, online courses improved to add video and audio components; however, learner interaction was still at a minimum. Recent changes in technology and additional increases in Internet access speeds have provided educators with the ability to provide learners an interactive online learning environment complete with self-tests, discussion boards, blogs, chat sessions, videos, adaptive-release content, and computer-based simulations. Of these new interactive learning modes, computer-based instructional simulations in online learning environments have increased in popularity over the last decade and are now being used in technical college courses.

Computer Based Instructional Simulation

Simulation is defined by Miller (1971) as “a controlled representation of a real situation” (p 1). As a teaching modality, simulation that is not computer based has been utilized in educational settings for decades (Castenada, 2008). The medical fields commonly use simulations to train medical personnel. An example of medical simulation technology is the use of dummies to train nursing students in clearing airway obstructions and administering CPR. Research has shown the use of simulation in a structured learning environment can increase learner proficiency and skill achievement (Alessi & Trollip, 2001; Simonson, Smaldino, Albright, & Zvacek, 2003). Therefore, the next logical progression for simulation based learning is to move from non-computer based simulation training to computer based simulations designed for use in an online environment.

Computer based instructional simulation (CBIS) is defined by Thomas and Hooper (1991) as a computer program that contains a model of a real or theoretical system and allows the model to be manipulated. More recently, Lee (1999) defined CBIS as “enabling students to bridge the gap between reality and abstract knowledges by the discovery method, to improve motivation and enhance learning by active student interaction” (p. 3). The use of computer based instructional simulations provide learners the opportunity to practice skills and complete objectives in a safe learning environment (Sahin, 2006). Computer based instructional simulations can be designed to provide the learner real-time feedback and opportunity for reflection prior to allowing the learner to repeat the task. For example, nursing programs use computer-based 3-D simulations to train nursing students in the spatial relationships of human anatomy (Hilbelink, 2007). CBIS provides distance education students in online courses the opportunity to participate in simulated lab environments in the absence of on-campus lab interaction.

As the use of computer based instructional simulation becomes more prevalent in distance education, studies are needed to further explore the student experience in relation to computer based instructional simulations in an online learning environment. One place to start the exploration is at the reaction level of Kirkpatrick's (1996) levels of evaluation. Perception data gathered and analyzed at the reaction level can be utilized for future improvements to the CBIS system and as a basis for future research at the learning, behavior, and results levels of Kirkpatrick's levels of evaluation. The data gathered can also assist with the redesign of the implementation of the CBIS to improve the learner's experience, and perhaps, at some point, the learner's level of learning.

Technical College Learners

Two-year colleges have evolved over the years from the junior colleges of the 1940s to the community colleges of the 1970s (Cohen & Brawer, 2003). Included in the community college spectrum is the technical institute, also known as the technical college (Cohen & Brawer; Grubb, 1999). Community colleges have substantially increased enrollment since their inception and offer open access to a variety of students with differing backgrounds and skill levels (Grubb, 1999).

The designation of community and technical colleges as open-access institutions means these schools often enroll a differing student demographic than traditional four-year colleges and universities (Cohen & Brawer, 2003; Dougherty, 2001; Grubb, 1999; Shaw, Rhoads, Valadez, 1999). According to Shaw (1999), "the demographics of community college students reveal a student population that is striking in its diversity , and in its diversion from what is considered to be the 'traditional' college student" (p. 155). Compared to traditional four-year colleges, community colleges enroll larger amounts of students with a poor academic past, students of lower income, and minority students (Grubb, 1999; Dougherty, 2001; Shaw, 1999). Additionally, community colleges enroll more women (Cohen & Brawer, 2003; Dougherty, 2001; Shaw, 1999) and more older students (Grubb, 1999).

The diversity of learners in the community, and subsequently technical, colleges hints at the diversity of backgrounds related to technology. As a result of the digital divide, many low income and minority students have less access to and experience with technology in general and computer and Internet usage in particular (NTIA, 1999). Additionally, many older students were never exposed to computers in high school; therefore, many of these students trail behind younger students in computer and technology experience. Students with a poor academic past, who were placed in basic high school courses which did not require the use of computers, may also lack computer and technology experience. Also, women who completed high school in an era where they were discouraged from participating in technology based courses may lag behind in the use of computers and technology. For the technical college, each online introductory computer applications course typically includes learners from each area mentioned above, in addition to more technologically savvy students – a situation which can present significant challenges.

Statement of the Problem

While research into distance education has evolved over the years, the fast-paced changes in technology of the past decade have resulted in a widening divide between the research completed and the technology available (Means et al., 2009). The divide is particularly evident with certain aspects of distance education, including the realm of computer based instructional simulation in online learning and is even further apparent in technical college courses designed to teach technologically diverse students familiarity with computer applications. In a public technical college where cost versus benefit and success rates are a concern for both the school administrators and the students, exploring how CBIS impacts the student experience is an important area of study.

Purpose of the Study

The purpose of this study was to explore the student experience in relation to the use of computer based instructional simulation in an online introductory computer applications course in a Georgia technical college. This study was guided by the following research questions:

1. What are the student perceptions of the CBIS in general?
2. What are the student perceptions on the impact of the CBIS on learning?
3. To what extent does student previous computer experience relate to the student perceptions of the CBIS?

Significance of the Study

This study provides both theoretical and practical insights into the student experience in relation to CBIS in an online introductory computer applications course at a technical college.

Theoretically, this research will extend existing research in the use of CBIS in military, four-year college, and business settings to include the use of CBIS in online courses in a technical college setting. This extension of the existing research is important to grow the research base in the field of CBIS in an effort to assist future researchers in the field. This research will serve to either support existing CBIS research in other areas i.e. military, four-year colleges, etc. or bring into question any differences that arise between CBIS research in existing areas as compared to the technical college setting.

Practically, this study could lead to improvements in online teaching of computer applications courses at technical colleges. Traditionally, the success rate of students in this course at the Georgia technical college targeted in this study – particularly the online version of this course – is poor. Computer based instructional simulations have the potential to increase success rates and possibly increase retention rates in the introductory computer applications course. Likewise, other computer applications courses may benefit from the results of this study. Additionally, insight from this study could assist colleges teaching a similar introductory applications course in deciding if the cost of the CBIS product is worth the potential benefit.

Finally, given the limited research in the area of CBIS in an online course at a technical college, this study, with its exploratory nature, can provide insight into the first level of Kirkpatrick’s (1996) four levels of evaluation – the reaction level – before undertaking research at the learning level. Research at the reaction level will provide initial data on student perceptions of the CBIS. According to Kirkpatrick, while favorable perceptions at the reaction level do not assure learning, “the more favorable the reactions to a program, the more likely trainees are to pay attention and learn the principles, facts, and techniques discussed” (p. 56). This study will create a foundation for continued studies.

Chapter 2

Review of Literature

The purpose of this study was to explore the student experience in relation to the use of computer based instructional simulation in an online introductory computer applications course in a Georgia technical college. This study was guided by the following research questions:

1. What are the student perceptions of the CBIS in general?
2. What are the student perceptions on the impact of the CBIS on learning?
3. To what extent does student previous computer experience relate to the student perceptions of the CBIS?

This study sought to explore the student experience in relation to experiential learning with a computer based instructional simulation in an online introductory computer applications course. In the process, this study further sought to determine if the student experience relates to the basic tenets of experiential learning.

This chapter examines key areas related to this study including: (a) online learning; (b) simulation; and (c) experiential learning theory.

Online Learning

Online learning quickly became an area of focus for educators and researchers in the turn of the 21st century. However, this area still lacks clear and all-encompassing definitions and is still seen through many different lenses in terms of history. This section will explore online learning by outlining terminology and definitions for online learning. Additionally this section will explore the history of online learning in the context of distance education, including terminology and definitions for distance education. Finally, this section will explore the terminology, definitions, and background for two delivery models in online learning: online courses and blended/hybrid courses (also known as blended/hybrid learning).

Interchangeable terms. In the literature, “online learning” is often used interchangeably with other terms. Cox (2005) lists open-education and e-learning as synonyms for online learning. Ely (2003) states distance education is often called online learning. El Mansour and Mupinga (2007) list terms including e-learning, Internet learning, distributed learning, networked learning, tele-learning, virtual learning, and web-based learning. The interchangeable use of these terms for online learning, coupled with the relative newness of online learning has led to some difficulty in adequately defining online learning.

Definition. Kearsley (1998) defines online education as any form of learning and/or teaching that occurs via a computer network. He adds the caveat that most online instruction occurs in the context of distance education, where learners and teachers are physically separated and most interaction occurs through the computer network. While this definition is certainly adequate, the term “computer network” has been surpassed over the years by the movement of online material away from proprietary school networks and onto the Internet.

Nichols (2008) defines online learning as the use of e-learning tools in a distance education mode, where technology (specifically the Internet) is the only medium for student learning and contact. He also indicates the term online learning can be used to describe the online component of an on-campus course. While this definition does highlight the use of the Internet for online learning, the definition does not include blended learning courses.

In a recent meta-analysis of online learning studies, online learning is defined as learning that takes place partially or entirely over the Internet (Means, Toyama, Murphy, Bakia, & Jones, 2009). The simplicity of this definition overcomes the weaknesses of the previous definitions by being broad enough to encompass online, blended, and web-enhanced courses while indicating delivery via the Internet.

History. While online learning can occur on-campus or off-campus, it is often classified as a function of distance learning, where learners and teachers are physically separated (Cox, 2005; Ely, 2003; Mansour et al., 2007; Nichols, 2008). As such, the history of online learning is closely tied to the history of distance education. A look at the history of distance education will begin with a brief overview of distance education definitions.

Distance education definitions. Over the years, many researchers have provided a definition for distance education based around the concept of having learners and teachers separated by distance (Delling, 1966; Keegan, 1980; Perraton, 1987; Rumble 1989). A recent and widely accepted definition comes from Moore and Kearsley (2005), "distance education is planned learning that normally occurs in a different place from teaching, requiring special course design and instruction techniques, communication through various technologies, and special organizational and administrative arrangements." While many researchers have defined distance education over the years and throughout the rapid changes in technology, one overarching theme is consistent when defining distance education: the separation of the teacher and the learner.

Distance Education History. The history of distance education is outlined by Moore & Kearsley (2005) as a series of five generations. The first generation of distance education, the correspondence model, began in the 1880s and utilized the postal service to transfer learning materials and assignments between the instructor and the learner. The second generation of distance education came along soon after the invention of radio broadcasting (1920s) and grew to include television broadcasting and cable television broadcasting as a means to deliver educational material to learners. The third generation of distance education saw the development of the Articulated Instructional Media Project (AIM) at the University of Wisconsin in Madison in 1964 where a variety of technologies including print, correspondence tutoring, broadcasts, recordings, telephone conferences, home experiment kits, and local library resources were brought together to form a distance education program. The AIM program was the impetus for the development of Britain's open university system in the late 1960s.

The fourth generation of distance education emerged in the 1980s and began with the use of teleconferencing and eventually moved to the use of satellites and interactive video conferencing. The fifth generation of distance education, starting in the late 1980s, encompasses computer-based and Internet-based virtual classes to connect the educator and the learner. This "last" generation of distance education continues to develop and grow as the technologies that support it also continue to evolve.

Online Learning History. The history of online learning is often offered as synonymous with the history of distance education. Therefore, locating a comprehensive history of online learning that is not actually distance education history is difficult at best. Several historical accounts come from the e-learning perspective and should sufficiently encompass online learning.

One of the earliest implementations of online learning was the PLATO system developed by Don Bitzer at the University of Illinois to deliver computer assisted education via a mainframe and terminals (Nicholson, 2007). By the middle of the 1970s, PLATO offered students message boards, email, chat rooms, instant messaging, remote screen sharing, and multiplayer games (Woolley, 1994). PLATO is actually considered the precursor of the Blackboard and WebCT systems used by many schools today (Nicholson, 2007). While the

PLATO system did not allow for distance learning via the Internet, it is still technically an online learning system as defined by Kearsley above.

In the 1970s, email and computer conferencing came into use as supplements for traditional on campus courses and is considered by Harasim (2006) to be the first use of educational computer communications. Additionally, the first virtual communities of practice were launched linking scientists via computer conferencing (Harasim, 2006). While the Internet was not a fully functional entity during this time, the beginnings of the system were in place to allow communication across distance.

In the 1980s, the personal computer became affordable, allowing home users the ability to own a computer and a modem and connect to service providers from home (Morabito, 1999). With the advent of personal computers and the advancements in the Internet, came the development of totally online courses by 1981 and the first online degree program by 1986 (Harasim, 2006).

In the 1990s, the Internet continued to expand with the release of the World Wide Web in 1991 (Zakon, 2010). Additionally, authoring tools opened the door for the delivery of online learning through learning management systems (LMS) such as Blackboard® and WebCT®. Students could now connect remotely to online courseware stored via LMS on Internet-connected web servers. LMS systems provided students with message boards, email, chat rooms, instant messaging, and course materials in one location. During this time, online learning evolved to truly fit Kearsley’s expanded definition above as well as the definition presented by Means, Toyama, Murphy, Bakia, and Jones in their 2009 meta analysis of online learning research.

The 2000s brought an explosion in the growth of online learning programs. In fall 2007, 1.6 million students were enrolled in at least one online course at a college or university (Allen & Seaman, 2007). By fall 2007, the number of students enrolled in at least one online course increased to 3.9 million (Allen & Seaman, 2008). Additionally, increased availability of Internet access and faster speeds at lower costs has led to the continued improvement of online learning through stored and real-time audio and video delivered online.

Delivery Models

Allen and Seaman (2003) outline three delivery models for online learning: web facilitated courses, blended/hybrid courses, and online courses. This section will begin with a review of the terminology, definitions, and background for the online course and the blended/hybrid course (also known as the blended and/or hybrid learning model) and will conclude with a review of the changes in the models.

Online course terminology. As a term, online learning is often used synonymously with distance learning and/or distance education. However, online learning can also be viewed as a delivery model within the larger realm of distance education. Other terms for online learning include: e-learning, Internet learning, distributed learning, networked learning, tele-learning, virtual learning, and web-based learning (El Mansour et al., 2007). Some authors do not consider online learning, e-learning, and web-learning to be synonymous and provide distinct definitions for each term. Online courses are the main form of online learning; therefore, most literature uses the terminology online learning instead of online course.

Online course definitions. As a relatively new area of research in education, online learning lacks consistent definitions and methods of categorization (Beardsley, Foulger & Toth, 2007). Several definitions for online learning were presented in the preceding section.

Following these definitions, an online course can be viewed as a course that takes place across a computer network, generally the Internet, and often is a function of distance education, meaning the instructor and the learners are separated by distance. Allen and Seaman (2007) define an online course as a "course where most or all of the content is delivered online." Additionally, Allen and Seaman (2007) indicate an online course typically has no face-to-face meetings and has 80% or more of the course material delivered online.

Online course background. Early online computer courses were offered through proprietary networks established by either schools or governments. These early networks required students to connect from their home computers using a modem and phone line. The first completely online courses were offered in 1981 in a non-formal adult education setting (Harasim, 2006). The leading innovators in online courses at this time were Murray Turoff and Starr Hiltz, who developed the Electronic Information Exchange System (EIES) in 1974 (Harasim, 2006). The first online courses offered through the EIES system were delivered via computer conferencing technology. In 1982, The Western Behavioral Sciences Institute launched the first online program to deliver non-credit online courses to business executives using the EIES system. The SoliNet system was introduced in Canada in 1985 and delivered non-credit adult courses to Labor Union members and included group discussions, seminars, and workshops delivered via the Solinet conferencing system.

The first online graduate courses were developed by Linda Harasim at the Ontario Institute for Educational Studies at the University of Toronto and were based on collaborative learning utilizing dyads, seminars, discussions, conferences, and project teams (Harasim, 2006). The first online undergraduate courses were developed through the Virtual Classroom (VC) project by Starr Hiltz in 1986 (Harasim, 2006). The VC project was also based on the EIES system (Hiltz, 1994). In 1989, Terri Hedegaard-Bishop led the way to the development of the first online degree program at the University of Phoenix (Harasim, 2006). The program focused on active collaborative learning via online courses (Harasim, 2006). The late 1980s saw continued growth in online education through proprietary networks using email and computer based conferencing.

The introduction of the Internet in the 1990s saw a shift in the online course model away from proprietary networks with limited access and toward Internet-accessible course material with access to anyone with an Internet connection. Teleconferencing via computer now included real-time audio and video capabilities including the use of an online electronic blackboard (Morabito, 1999). Email networks were now able to communicate world-wide and the mid- to late-1990s saw the development of learning management systems (LMS). The development of learning management systems continued to change the online course model by allowing students to access all course materials, media, and communications via a single website. The 1990s also show a shift from the behaviorist approach to learning (computer-assisted instruction with drills) toward a constructive approach to learning (online learning with learner-centered lessons). (Nicholson, 2007). In the 2000s, the online course model has continued to evolve to incorporate advanced technology including podcasting, vodcasting, and interactive multimedia.

Blended learning terminology. Blended learning is synonymous with several other terms in the literature, including hybrid and mixed mode (Bruner, 2006). Other terms for blended learning indicated through a web search include: hybrid learning, hybrid education, blended education, blended e-learning, and hybrid e-learning. Blended learning is generally used to represent learning that occurs in a blended course; therefore, most literature uses the terminology blended learning instead of blended course.

Blended learning definitions. A review of the literature exhibits a multitude of definitions for blended learning. Singh and Reed (2001) define blended learning as “a learning program in that more than one delivery mode is being used with the objective of optimizing the learning outcome and the cost of delivery” (p. 1). Rovai and Jordan (2004) define blended learning as “a hybrid of classroom and online learning that includes some of the conveniences of online courses without the complete loss of face-to-face contact” (p. 1). Colis and Moonen (2001) define blended learning as a condition in which online instruction is incorporated with classroom instruction. Valiathan (2002) states “blended learning is used to describe learning that mixes various event-based activities, including face-to-face classrooms, live e-learning, and self-paced learning” (p. 1). While Clark and Myer (2003) indicate an exact definition for blended learning does not exist and may have different meanings for different people.

Blended learning can also be defined in terms of the course. For example, Allen and Seaman (2003) define a blended learning course as a course where a substantial portion of the content is delivered online in combination with a reduced number of face to face meetings. According to Allen and Seaman (2003), 30-79% of the content of a blended course should be delivered online. The course design and applicability will usually determine the ratio of online to on campus for blended courses (Olapiriyakul & Scher, 2006). Additionally, blended learning can be defined as a “pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with the technologically advanced learning possibilities of the online environment” (Dziuzban, Hartman & Moskal, 2004, p. 3).

Blended learning is essentially some combination of face-to-face meetings and technology-driven components bringing teachers and learners together. While different institutions and individuals may have differing opinions on the exact definition of blended learning, the minimum requirements are essentially the same, a blended learning environment requires a face-to-face component and an online component.

Blended learning background. The literature on the background of the blended learning model of distance education is limited at best. Perhaps the earliest appearance of a model resembling blended learning was actually part of an experiment in the 1970s. Prior to the development of the Electronic Information Exchange System at New Jersey Institute of Technology (NJIT), Starr Hiltz and colleagues experimented with the use of computer conferencing and messaging to enhance course delivery, mixing electronic communication with 25-75% of the normal face-to-face class meetings (Hiltz, 1994). While Harasim (2006) considers the NJIT experiment a precursor to web facilitated courses, it also fits the requirements of a blended course and could be considered a precursor to blended course development. During this time period and with the technology available, one could argue the online component of this course closely followed the behaviorist theory of learning.

Beginning in the 1990s, blended courses were developed as a response to criticisms of online courses including quality and student responsiveness (Yang & Cornelious, 2004), students' feelings of isolation and disconnectedness (Graham, 2001; Guha, 2001), and a lack of personal interaction (Fann & Lewis, 2001). The evolution of the blended course model closely mirrors the evolution of the online course model as discussed above from the 1990s forward.

Online learning summary. Online learning through distance education is quickly becoming a major educational component in the Technical College System of Georgia. For this reason, technical colleges must work to understand the terminology, definitions, and history of online learning as a lens through which to view the future of online learning through distance education in the technical colleges. Additionally, as educators in a technical college system focus on training students for a vocational workforce, these educators must explore the background and methods of experiential learning.

Experiential Learning

A review of the course standards for the Technical College System of Georgia clearly show a majority of courses in the system require a lab component. For the technical college system, this lab component means some type of experiential learning activity for the students – whether the students participate in an on-campus course, an online course, or a blended course. This section will seek to define experiential learning, explore the background of experiential learning including presenting several theories and models, and present different perspectives of experiential learning. This section also provides a brief listing of experiential learning methods.

Foundation and definition. The definition of experiential learning will begin with a brief overview of the philosophical foundation of experiential learning and will then present definitions of experiential learning.

Philosophical foundations. Perhaps the first step in defining a learning theory is to review the philosophical foundation related to the theory. Merriam, Cafarella, and Baumgartner (2007) list five traditional philosophical foundations: behaviorist, humanist, cognitivist, social cognitive, and constructivist. Of these five philosophical foundations, the constructivist foundation is seen in adult learning through the use of experiential leaning, transformational learning, reflective practice, communities of practice, and situated learning (Merriam, Cafarella, & Baumgartner, 2007). The focus in the next section will be on defining experiential learning.

Definition. Experiential learning is defined by Kolb (1984) as “the process whereby knowledge is created through the transformation of experience” (p. 38). Houle (1980) defines experiential learning as “education that occurs as a direct participation in the events of life” (p.221). Silberman (2007) defines experiential learning as the involvement of learners in concrete activity where the learners are able to experience the activity and have the opportunity to reflect on the activity. Furthermore, Kolb and Kolb (2005) indicate experiential learning is a philosophy of education based on Dewey's theory of experience. Fenwick takes the definition of experiential learning to the next step by outlining five perspectives for experiential learning.

Perspectives. Fenwick (2001) proposes five perspectives for experiential learning:

1. Reflecting on concrete experience (constructivist theory of learning);
2. Participating in a community of practice (situative theory of learning);
3. Getting in touch with unconscious desires and fears (psychoanalytical theory of learning);
4. Resisting dominant social norms of experience (critical cultural theories); and
5. Exploring ecological relationships between cognition and practice (complexity theory applied to learning) (p. 160).

Fenwick (2001) also points to four themes for the educator's role in the constructivist movement: the need to engage learners in concrete experience in order to build new knowledge, the need to create conditions for dialogue before and after the experience, encouraging reflection, and providing support. The perspectives and themes presented by Fenwick provide a neatly-packaged guide for scholars to utilize while further exploring concepts related to learning theory. While not all scholars may agree with Fenwick's categories, her five perspectives are a good starting point for discussion and are presented in the following sections.

Constructivist theory of learning. Both an epistemology and a theory (Burns, Heath, & Dimock, 1998; Mednick, 2006), constructivism focuses on the belief "people have concrete experiences; they reflect on them and create new knowledge as a result of these reflections"

(Merriam, Cafarella, & Baumgartner, 2007, p. 160). The central premise of constructivism is "a learner is believed to construct, through reflection, a personal understanding of relevant structures of meaning derived from his or her action in the world" (Fenwick, 2003, p. 10). Constructivism's roots can be found in the work of Swiss psychologist Jean Piaget in 1966 (Fenwick, 2003). Popular models from the constructivist paradigm include models by Kolb and Jarvis (Merriam, Cafarella, & Baumgartner, 2007).

According to Fenwick (2001), constructivism has four main educative roles which are often blended in practice:

1. Facilitator – adult educators encourage people to recall, value, talk about, and perhaps critically analyze their own past experience to construct knowledge from it (p. 14).
2. Instigator – educators create a happening during instruction designed to engage learners "experientially" and thus encourage construction of knowledge (p. 14).
3. Coach – an educator guides learners to reflect on choices in the "hot action" of experience, so they will analyze undesirable outcomes and make corrections (p. 14).
4. Assessor – educators represent, judge, and give credit to people's experiences in terms of the kind of knowledge they have constructed from these experiences (p. 14).

While the constructivist theory of learning is a popular theory, some questions do exist related to the theory. Even if the case can be argued that all individuals can actually reflect on a concrete experience (and learn from the reflection) – what happens if the reflection is guided by flawed logic or misunderstanding on the part of the individual (perhaps a learner new to the experience)? Does reflection based on flawed knowledge simply serve to construct additional flawed knowledge and if so is this state still considered learning? Constructivism scholars continue to explore these questions.

Situative theory of learning. While the constructivist approach emphasizes reflection on experience, situative theory indicates that knowing is intertwined with doing (Merriam, Cafarella, & Baumgartner, 2007). Situated cognition "maintains that learning is rooted in the situation in which the person participates, not in the head of that person as intellectual concepts produced by reflection, nor as inner energies produced by psychological conflicts" (Fenwick, 2003, p. 34). According to Fenwick (2001), with situated theory (also known as situated cognition), individuals learn as they participate through community participation with the objective to become a full participant in the community of practice. Popular models in this area were developed by Boud and Walker and by Usher, Bryant, and Johnson (Merriam, Cafarella, & Baumgartner, 2007).

The role of the educator in situated cognition is not to develop individuals, but rather to help individuals meaningfully participate in the practices they chose to enter (Fenwick, 2001). In this process, educators must take into account their participation in the community of practice and its impact in the overall learning community. This can lead to new roles for some educators as they focus on facilitation versus direct instruction.

While situated cognition has received considerable attention in adult learning, there are several issues that remain unresolved. For example, an issue not adequately addressed in the situative theory of learning concerns the issues of position and power within the learning community. Additionally, the theory fails to address the possibility that members of a community of practice may stray significantly from the intended direction, failing to attain the desired learning goals.

Psychoanalytical theory of learning. The psychoanalytic perspective presents the idea that our unconscious interferes with our conscious experiences (Merriam, Cafarella, &

Baumgartner, 2007) and as a result, we must work through psychic conflicts to learn (Fenwick, 2001). Psychoanalytical theory draws on the works of Freud and Jung and states “learning is derived from interactions in both the conscious and unconscious mind as they wrestle to make sense of the individual’s environment” (Bright, Colvin, & Rosenberg, 2003, p. 4). According to Fenwick (2001), several themes exist in psychoanalytic conceptions of experiential learning including:

1. The individual’s relations between the outside world of culture and objects of knowledge, and the inside work of psychic energies and dilemmas of relating to these objects of knowledge (p. 28);
2. The location and direction of desire is more complex than traditional psychological notions of innate human needs (p. 29); and
3. There are conflicting desires between what is said and how we say it (p. 29).

The role of the educator in psychoanalytical theory is to facilitate analysis of any psychic conflicts within the learner that impede learning (Merriam, Cafarella, & Baumgartner, 2007). When teaching through this lens, educators should encourage students to pay attention to their dreams, behavior, and odd images in their minds while directing activities to help elicit emotions and help the learner uncover aspects of the unconscious that block learning (Merriam, Cafarella, & Baumgartner, 2007). Teaching through this lens, however, could present challenges to educators with little or no background in psychology and could create the potential for emotional damage to the student and the educator.

Critical cultural theories. Through the critical cultural lens, learning is seen as impacted by power structures in the environment. “The power structure of dominance among teacher, learner, and environment significantly impacts learning experiences, cognitions, activities, identity, and meaning" (Bright, Colvin, & Rosenberg, 2003, p. 6). According to Fenwick (2001), existing themes among critical cultural perspectives include:

1. Learning in a particular cultural space is shaped by the discourses and their semiotics …that are most visible and accorded most authority by different groups (p. 40);
2. Borders and boundaries are significant for cultural writers in different ways than for theorists of other perspectives (p. 40); and
3. Post colonialist writers claim that all of our histories and therefore our experiences and learning are entwined in some way with colonization (p. 40).

The role of the educator when viewing experiential learning through the critical cultural lens is to help the learner see the influence of power relationships on their lives (Merriam, Cafarella, & Baumgartner, 2007).

Complexity theory applied to learning. Complexity theory of experiential learning looks at the ecological/enactivist perspective and states learning is produced through interaction "among consciousness, identity, action and interaction, objects and structural dynamics of complex systems" (Fenwick, 2003, p. 37). With enactivist (also called co-emergence) theory, "learning occurs through cognitive and sensory analysis, both the mind and the environment work in conjunction to foster learning. An individual's presence alone impacts his or her environment" (Bright, Colvin, & Rosenberg, 2003, p. 7). According to Fenwick (2001), existing themes among ecological/enactivist perspectives include:

1. [the] understanding of co-emergent cognition, identities, and environment begins by stepping aside from notions of knowledge as a substantive "thing" to be acquired or ingested by learners as isolated cognitive agents, thereafter to exist *within* them. (p. 47);

2. Understandings [are] … embedded in conduct. (p. 47); and
3. Learning…is cast as continuous intervention and exploration, produced through the relations among consciousness, identity, action and interaction, and structural dynamics of complex systems (p. 47).

The role of the educator when viewing experiential learning through the enactivist lens is to interpret and assist students in understanding the changes taking place in the complex system in which they are a part (Merriam, Cafarella, & Baumgartner, 2007).

History, theories, and models. Experiential learning theory is built on six propositions shared by notable scholars in the field:

1. Learning is best conceived as a process, not in terms of outcomes;
2. All learning is relearning;
3. Learning requires the resolution of conflicts between dialectically opposed modes of adaptation in the world;
4. Learning is a holistic process of adaptation to the world;
5. Learning results from synergetic transactions between the person and the environment; and
6. Learning is the process of creating knowledge (Kolb & Kolb, 2005, p. 194).

This section will briefly review the history of experiential learning theory through the theories and models developed by various scholars in the field.

An early influential theory in the area of experiential learning comes from John Dewey, who justified education based on learning by doing and wrote "for learning to happen, an experience must include two key dimensions…the first is continuity…the second is interaction" (Fenwick, 2001, p. 3). Dewey considered knowledge as socially constructed and based on experiences (Roberts, 2003). Kurt Lewin's conception of experiential learning was in a group setting, led by an expert (Sutherlund, 1997). Lewin's model formed a continuous cycle of concrete experience, observations and reflections, formation of abstract concepts and generalizations, and testing implications of concepts in new situations (Kolb, 1984). Jean Piaget's model of learning and cognitive development shows "a process of cognitive growth from concrete to abstract and from active to reflective" that is based on the "continual transaction between assimilation and accommodation, occurring in successive stages" and building into a "new, higher level of cognitive functioning (Kolb, 1984, p. 23). Piaget is actually considered the founding father of constructivism (Sutherlund, 1997).

Malcolm Knowles' developed a theory of andragogy based on his views of the importance of a learner-centered educational process that encouraged learners to reflect on and share experiences (Fenwick, 2001). Mezirow and Freire among others stressed the importance to learning of the way experiences are processed with particular emphasis on critical reflection and viewed learning as a cycle that begins with experience, continues with reflection which later leads to action, which itself becomes a concrete experience for reflection (Kelly, 1997). Kolb further refined the concept of reflection by dividing reflection into two parts: perceiving and processing (Algonquin, 1996). David Kolb and Roger Fry developed a model for experiential learning which included: concrete experience; observation and reflection; forming abstract concepts; and testing in new situations (Smith, 2001).

Jarvis developed a model that addresses shortcomings in Kolb's model such as lack of consideration for the learner's context and failure to account for power issues (Merriam, Cafarella, & Baumgartner, 2007). Jarvis includes the past experiences a learner brings and divides learning from experience into two types: nonreflective learning and reflective learning

(Merriam, Cafarella, & Baumgartner, 2007). Boud and Walker augment Kolb's model by recognizing "specific contexts shape an individual's experience in different ways" (Fenwick, 2001, p. 11). These researchers were also "interested in how differences among individuals – particularly past histories, learning strategies, and emotion influence the sort of learning developed through reflection on experience" (p. 11).

Schön developed an approach to professional education called reflection in action, theorizing that professionals responding to an issue reflect-in-action immediately in an effort to come up with and test out various solutions for problems and later reflect-on-action to further examine the problem, the solution that was implemented, and other possible alternatives (Fenwick, 2001). Beard and Wilson recognize the importance of the affective domain on learning and suggest fear can block learning and can be seen in reactions from the learner such as perfectionism, anger, and aggression (Merriam, Cafarella, & Baumgartner, 2007). Usher, Bryant, and Johnston view experience as a text to learning, something to be read time and again with the potential for constantly changing interpretation (Merriam, Cafarella, & Baumgartner, 2007). These researchers created a model of experiential learning structured around the ability of individuals to adapt to actions in context and the ability of individuals to apply knowledge in real-world contexts (Merriam, Cafarella, & Baumgartner, 2007).

The brief overview of the history, theories, and models of experiential learning presented above shows the transformation of theories in the field over time and provides valuable context for a study involving experiential learning. The next section will focus on methods for implementing experiential learning.

Methods. Experiential learning strategies come in many forms including: experiential simulations, action learning, learning games, computer-based simulations, improvisations, adventure learning, role playing, storytelling (Silberman, 2007), reflective practice (Merriam, Caffarella, and Baumgartner, 2007), reflection-on-action, reflection-in-action, cognitive apprenticeships, and anchored instruction (Merriam, Caffarella, and Baumgartner, 2007). According to Bersin (2004) the “biggest trend in experiential learning in web-based instruction is simulation” (p. 37). Bersin further states experiential learning can be created in an online learning environment through simulations using a software application.

Experiential learning summary. This section defined experiential learning, explored the background of experiential learning including presenting several theories and models, and presented different perspectives of experiential learning. Additionally, the section provided a list of experiential learning methods with a brief focus on computer based instructional simulation. This focus will be expanded in the next section.

From Simulation to Computer Based Instructional Simulation

The use of simulation in experiential learning has changed over the years from the role plays and scenarios of the pre-digital age to the computer based simulations of the digital age. This section will present the definition, types, features, and benefits of simulation in general, and then computer based instructional simulation in particular.

Simulation. Simulations are used for a variety of functions including: investigating the detailed dynamics of a system; developing hypotheses, models, and theories; performing numerical experiments; supporting experiments; and gaining understanding of a process (Hartmann, 1996). As such, a variety of differing definitions exist in the literature for simulation, with most definitions varying based on function. For example, a military strategist, an economist, and an educator are not likely to define the term simulation in the same manner. A military strategist may view simulation from the standpoint of planning battle maneuvers or training for battle, an economist may view simulation from the standpoint of using a simulated model to analyze future economic conditions, and an educator may view simulation from the standpoint of a student using a simulation for learning the function of a system or device. Each is important, but also illustrates the complexity of defining simulation, which is presented in the next section.

Definition. Miller (1971) defines simulation as "a controlled representation of a real situation" (p. 1). Seidner (1978) defines simulation as "the dynamic execution or manipulation of a model of some object system" (p. 15). Andrews (1998) defines simulation as "the use of a model to explore the effects of changing conditions on the real system" (p. 17). Interestingly, a good combination of these definitions came in the last 1960s when Twelker (1969) defined simulation in general terms as either "a technique of modeling" or "a model … of some aspects or a real or proposed system, process, or environment" (p. 13). While helpful, these definitions do not include any reference to learning and define simulation in terms of research rather than education. To include the aspect of learning, educational simulations should be defined.

Educational simulation. Educational simulation, also known as instructional simulation, is defined by Lederman (1983) as a form of experience-based learning using models of reality or some aspect of reality. Alessi and Trollip (2001), define educational simulation as "a model of some phenomenon or activity that users learn about through interaction with a simulation" (p. 213). Aldrich (2009) defines educational simulation as "a broad genre of immersive learning simulations focused on increasing participants' mastery level in the real world" (p. 14). Essentially, educational simulation is a representation of a real world process and/or device used to prepare learners for the actual real world implementation of the process and/or device.

Types. There are a variety of classifications of simulations available in the literature, including broad classifications of simulations and more limited classification of computer based simulations.

Broad classification. A widely used scheme for classifying simulations is based on the level of human involvement and realness (Etter, 2003). This scheme outlines four categories of simulation: live, virtual, constructive, and smart systems (Etter, 2003).

- Live simulation is represented by actual individuals performing actual tasks on real systems;
- Virtual simulation involves actual individuals using simulated systems;
- Constructive simulation utilizes simulated individuals working with simulated systems;
- Smart systems utilize simulated individuals operating real systems (Etter, 2003).

Gredler (1998) classified simulations as either experiential or symbolic. In an experiential simulation, the learner is part of the simulation. In a symbolic simulation, the learner does not actively participate in the simulation, rather the learner views the simulation from the outside.

Additional classifications include experiencing simulations, informing simulations, reinforcing simulations, and integrating simulations (Thomas & Hooper, 1991), as well as gaming, role-playing, simulators, and modeling (Hood, 1997). Additional classifications will be considered in the next section.

Computer based classification. Computer based simulations can be classified based upon the theoretical model of the simulation. McHaney (1991) classifies computer based simulations as Monte Carlo, continuous, discrete event, and gaming. Alessi and Trollip (2001) classify the underlying models as continuous, discrete, and logical.

Monte Carlo simulations are defined as “a scheme employing random numbers … which is used for solving certain stochastic or deterministic problems where the passage of time plays no substantive role” (Law & Kelton, 2000, p. 90). Continuous simulation models are defined as a set of equations representing a system over time (McHaney, 1991). Discrete event simulations include the concept of time and include periods of activity and inactivity in the system (McHaney, 1991). Logical simulations use if-then programming statements, are common among educational simulations, and are not commonly used outside educational simulations (Alessi & Trollip, 2001).

Features. Simulations are imitations of reality (Dubey, 1995) that are dynamic in nature and allow an observer to view a single point in time in a model as well as how the model changes under different parameters (Gibson & Baek, 2009). Generally computer-based (Dubey, 1995; Meister, 1990), simulations have no guarantee of validity before the simulation is performed (Dubey, 1995) and are not automatically reliable. Educational simulations generally include four types of elements: choices to be made, objects to be manipulated, events to react to, and systems to investigate (Alessi & Trollip, 2001). An important aspect of simulations is fidelity, which refers to how closely a simulation imitates reality (Alessi & Trollip, 2001).

Benefits. The potential benefits of simulation to society can be found in many areas including medical, military, weather, and fiscal. For example, the medical field uses a variety of simulation methods including standardized patients, computer based simulations and virtual reality, part task trainers, hybrid simulations, and full body mannequins (Sliwka & Pardo, 2008). These simulations provide healthcare providers the opportunity to prepare for a variety of scenarios in advance – scenarios that include life-saving techniques. Additionally, scientific simulations can be used by researchers in an effort to prepare for potential pandemics.

One of the oldest areas of simulation use is the military. The military uses simulations in a variety of ways including planning for battles; training pilots; preparing soldiers for battle; and anticipating casualty rates, areas affected by potential nuclear fallout, and areas of devastation from battle. Military simulation is used to prepare for battle operations, peace keeping operations, and humanitarian operations.

Meteorologists use simulation to study atmospheric conditions and weather patterns in an effort to predict the weather. Weather predictions are vital for helping areas prepare in advance of dangerous weather conditions. Another benefit of simulation is the ability of governments to utilize fiscal simulations when determining monetary policy. Fiscal simulations can measure future inflation and interest rates and the impacts on government spending and deficits.

Computer Based Instructional Simulation. As computing power has increased and costs of technology have decreased, computer based instructional simulation has become a more viable method of experiential learning for students.

Definition. Computer-based instructional simulation (CBIS) is defined by Thomas and Hooper (1991) as a computer program that contains a model of a real or theoretical system and allows the model to be manipulated. Lee (1999) defines CBIS as "enabling students to bridge the gap between reality and abstract knowledges by the discovery method, to improve motivation and enhance learning by active student interaction" (p. 3). According to Sampath, Panneerselvam, and Santhanam (2007), CBIS "creates a model situation which imitates some aspect of reality…in which conditions are changed as a result of feedback of pupils actions and responses" (p. 294).

Computer-based instructional simulation is essentially a computer program of a logical model that presents an abstracted view of some reality to the learner, allowing the learner to navigate the program, make decisions, and receive feedback. CBIS is designed to assist in student motivation and transfer of learning.

Types. Alessi and Trollip (2001), leaders in the field of CBIS, indicate four types of educational simulations in a multimedia environment: physical simulations, iterative simulations, procedural simulations, and situational simulations. Physical and iterative simulations are summarized as simulations that teach about something, while procedural and situational simulations teach how to do something.

Additional classification systems for educational simulation include: (a) procedural, process, and causal simulations (Reigeluth & Schwartz, 1989); (b) linear, branching, and complex (Conkright, 1985); and (c) structured questions and graphics, variable assignment exercises, diagnostic simulations, and group interactive simulations (Gredler, 1986). This study will focus on the work of Alessi and Trollip and will briefly outline their four types of educational simulations in a multimedia environment.

Physical simulations. Physical simulations are designed to teach learners about something and generally represent learners with a physical object or phenomenon, then provide the user with information about the object or phenomenon (Alessi & Trollip, 2001). Examples of physical simulation topics include how electricity flows through transistors and how data bits flow through a computer processor. Physical simulations do not typically enforce time constraints (Alessi & Trollip, 2001).

Iterative simulations. Iterative simulations are also designed to teach learners about something and present learners with a physical object or phenomenon, and then allow the user to select parameter values before running the simulation. Once the simulation executes, the user can view the results, then begin again with a new set of values (i.e., another iteration). These simulations are often referred to as scientific discovery learning since the simulation does not tell the learner how the underlying model works, the student must determine how the model works through research (Alessi & Trollip, 2001). Iterative simulations, like physical simulations, do not enforce time constraints and examples of iterative simulation topics include the law of supply and demand and changes in population over time (Alessi & Trollip, 2001).

Procedural simulations. Procedural simulations are designed to teach learners how to do something through a sequence of actions and typically include simulated physical objects (Alessi & Trollip, 2001). In these simulations, when the user acts, the program reacts and provides feedback (Alessi & Trollip, 2001). Examples of procedural simulation topics include medical diagnosis, flight simulation, and frog dissection.

Situational simulations. Situational simulations are designed to teach learners how to do something. These simulations focus on the behaviors and attitudes of people or organizations in different situations (Alessi & Trollip, 2001). Situational simulations must employ some measure of randomness and generally involve the user within the simulation in a role playing environment (Alessi & Trollip, 2001). Examples of situational simulation topics include classroom behavior control for teachers and cross-examination development for lawyers (Alessi & Trollip, 2001).

Features. Educational simulations in multimedia environments generally include four types of elements: choices to be made, objects to be manipulated, events to react to, and systems to investigate (Alessi & Trollip, 2001). A CBIS contains a model of a real-world situation with which the student interacts (Gredler, 2002, Kaleidoscope Network of Excellence for Technology Enhanced Learning, n.d.). Additionally, CBIS:

1. Presents a student with a goal to achieve (BTS, 2008; Gradler, 1992; Thomas & Hooper, 1991);
2. Defines roles for learners (Gredler, 2002; Kaleidoscope Network of Excellence for Technology Enhanced Learning, n.d.);
3. Allows learner control (Gredler, 1992, 2002; Twelker, 1969);
4. Enables scaffolding (Kaleidoscope Network of Excellence for Technology Enhanced Learning, n.d.); and
5. Provides feedback to the learner (Gredler, 2002; Fontaine, Cook, Combs, Sokolowski, & Banks, 2009; & Twelker, 1969).

Another important feature of CBIS is fidelity, which refers to how closely a simulation imitates reality (Allesi & Trollip, 2001). Hays (2006) lists two dimension of simulation fidelity: the physical characteristics of the simulation and the functional characteristics of the simulation. Not all simulations are considered high fidelity (i.e. closely matching the real situation). High fidelity tends to lead to increased design costs and does not necessarily lead to increase in learner motivation or transfer of learning. As noted by Gagné (1962), many simulations leave out task irrelevant items in their design.

A final feature of CBIS is the ability to alter time. CBIS can be designed to operate in real time or can be designed to slow down or speed up time (Reiber, 1996). Each feature contributes to the benefits and challenges of CBIS. Some of the overall benefits will be explored in the following section.

Benefits. According to Castenada (2008), “most of the research studies conducted since the end of the 1970s in computer-based simulations have generated contradictory results regarding the use and effectiveness of simulations” (p. 108). However, Hertel and Millis (2002) have documented studies which establish the learning effectiveness of simulations with non-traditional students and Jong (1991) has indicated there is evidence suggesting simulations may improve learning better in different content areas. Various benefits of computer based instructional simulations from the literature include increased learner motivation, improved learning, and increased transfer of learning.

Hertel and Mills (2002) indicate simulations have the potential to motivate learners through active participation which, in turn, can lead to deep learning and subsequent retention of knowledge and skills beyond the learning environment. Gokhale (1996) found that guided computer simulation activities "can be used as an educational alternative to help motivate students into self-discovery and develop their reasoning skills" and that simulations integrated into class structure may be an effective strategy for transfer and application of knowledge to real-world problems (p. 9). Ratchford (1988) found the use of instructional simulations in a secondary French class increased learner motivation in a classroom environment. Cameron (2003) found simulations in online education environments have the potential to increase student motivation and learning. Akpan and Andre (2001) found the use of simulation prior to dissection in science classes can improve student learning. Devasagayam and Hyat (2007) found in a limited study that simulations are an effective pedagogical tool and enhance different abilities of students.

Additional benefits of CBIS include: increased safety through simulating otherwise dangerous real-world situations (Blake & Scanlon, 2007; Kaleidoscope Network of Excellence for Technology Enhanced Learning, n.d.; Wilson, 2002) and reduced costs through purchasing less expensive computer equipment and software versus expensive real-world devices (Kaleidoscope Network of Excellence for Technology Enhanced Learning, n.d.; Wilson, 2002).

From Simulation to Computer Based Instructional Simulation Summary. The use of simulation, particularly computer based instructional simulation, is continuing to grow in the digital age. This section presented the definition, types, features, and benefits of simulation in general and computer based instructional simulation in particular.

Need for Study

While the use of simulation for experiential learning has been well researched over the years, the use of computer based instructional simulation has yielded much less research. In particular, the use of computer based instructional simulation in the adult education environment of a technical college, where learners differ in background and demographics from learners in a typical four-year college or university, has not been widely studied. Additionally, this study explored simulation in an online introductory computer applications course – a course where the students have full access to the actual software, however, CBIS is still utilized to assist the students in learning the software. Of particular interest in whether the use of the CBIS is viewed by the learners as beneficial to the learning process.

Given the limited research in the area of CBIS in an online course at a technical college, this research explored the first level of Kirkpatrick's (1996) four levels of evaluation – reaction. While research is divided on the effectiveness of using perception of learning as a measure, Kuhn and Rundle-Thiele (2009) indicate that student perception of learning can be useful during a course to quickly assess student progress and further recommend that student perception of learning can be used to "highlight the effectiveness of a course activity…on student learning by benchmarking on previous offerings or against peers" (p. 357). Additionally, Kirkpatrick (1996) states that while favorable perceptions at the reaction level do not assure learning, "the more favorable the reactions to a program, the more likely trainees are to pay attention and learn the principles, facts, and techniques discussed” (p. 56).

Summary

This chapter reviewed the key elements of literature surrounding a study on computer based instructional simulation in an online introductory computer applications course at a technical college. The first section introduced the purpose of the study and the research questions. The second section included and overview and history of online learning including terminology, definitions, and delivery models. The third section included an overview of experiential learning theory and included the philosophical foundation, definitions, perspectives, a brief history to include theories and models, and a brief sampling of methods. The fourth section included an overview of simulation in general and computer based instructional simulation in particular. Both parts of the fourth section included definitions, types, features, and benefits.

Chapter 3

Methodology

The purpose of this study was to explore the student experience in relation to the use of computer based instructional simulation (CBIS) in an online introductory computer applications course in a Georgia technical college. This study was guided by the following research questions:

1. What are the student perceptions of the CBIS in general?
2. What are the student perceptions on the impact of the CBIS on learning?
3. To what extent does student previous computer experience relate to the student perceptions of the CBIS?

This chapter will include a discussion of the study context, design, instrumentation, population and sample, data collection, data preparation, data analysis, limitations, and researcher biases and assumptions.

Study Context

This study focused on the student experience with computer based instructional simulation (CBIS) in the online introduction to computer applications courses at a medium-sized Georgia technical college. This section will begin with a description of the college and the online introduction to computer applications course, then will include a brief discussion of course topics, course enrollment, and the instructional components of the course. Following the course information will be a description of the CBIS system utilized in the course.

College. This study took place at a medium-size technical college in the state of Georgia. The college offers degree, diploma, and certificate credit programs as well as non-credit adult education and continuing education courses. At the time of this study, the Georgia technical college had a total enrollment of 3,985 students in credit programs. The student population included 2,126 (53.4%) female students and 1,859 (46.7%) male students. Ethnicity statistics for the college are included in Table 3.1. The table uses classifications as defined by the college.

Table 3.1

Ethnicity Statistics for the Georgia Technical College

Ethnicity	Number	Percentage
American Indian	11	0.3
Asian	55	1.4
Black	1,469	36.9
Hispanic	55	1.4
White	2,092	52.5
Other	303	7.6
Total	3,985	100

The course. The introduction to computer applications course is a basic computer course offered at the Georgia technical college. All diploma and degree students at the college are required to pass this introductory course with a grade of "C" or higher prior to graduation. The course is offered in two formats: web-enhanced and online. While both formats of the course cover the same material, this study focused on the student experience in the online sections of the course. The online course consists of five segments covering the following topics:

- Introduction to Windows and the Internet
- Microsoft Word

- Microsoft Excel
- Microsoft Access
- Microsoft PowerPoint

A copy of the course syllabus is included in Appendix A. The online introduction to computer applications course typically has eight to twelve sections offered each quarter, with 25 students enrolled per section at the beginning of the quarter. The enrollment declines substantially throughout the quarter as students either drop the course or are administratively dropped from the course for failure to participate. For winter 2010, approximately 30% of students enrolled the first week of the quarter were no longer enrolled by the eighth week of the quarter. The summer quarter sections of the course have significantly lower enrollment than sections offered the other three quarters of the year. The online sections historically average a 40-60% pass rate each quarter.

Instructional Components. The online introduction to computer applications course uses two different websites to deliver the instructional components of the course – ANGEL and an online CBIS system. ANGEL is a learning management system (LMS) used to disseminate course information such as the course syllabus and schedule to students. ANGEL is also used for various assignments in the course including multiple-choice testing and discussion boards.

The online CBIS system is part of a proprietary system called Skills Assessment Manager (SAM) developed by an outside vendor for use in introductory computers applications courses. While SAM has a variety of features and functions, it is used by students in this course for CBIS training exercises, CBIS practical tests, and case studies only. The focus of this study was the CBIS training exercises and CBIS practical tests; the case studies were not part of this study.

Future references to SAM in this study pertain to the CBIS portion of SAM only. Screenshots of the simulation environment are viewable in Appendix B.

The CBIS training exercises for this course are part of a three phase training system where the student is taken to a simulated application environment (for example, a simulation of a Microsoft Excel spreadsheet with data already entered) and asked to complete a task (for example “please change the format of cell A2 to currency with the $ symbol”). In the first phase (i.e. “observe”), the student is given the opportunity to observe the task being completed by the computer; in the second phase (i.e. “practice”), the student is allowed to practice the task with tutorial-style assistance; in the third phase (i.e. “apply”), the student is required to complete the task in the simulated environment without assistance. The student is graded on the successful completion of the third phase and is given as many attempts as necessary to successfully complete this phase.

The CBIS practical tests for this course use the same approach as the training exercises, where students are presented a task to complete in a simulated environment. However, with the CBIS practical tests, the students do not have the benefit of the first two phases (observe and practice) found in the CBIS training exercises. In a CBIS practical test, the student is given anywhere from 10 to 15 tasks. For each task, the student must “apply” knowledge to complete the task successfully within three attempts. The student is graded on the number of tasks completed successfully.

Design

This study was a cross-sectional survey, mixed research study utilizing a self-administered, web-based questionnaire for data collection. The design of this study was mixed research (Tashakorri & Teddlie, 2009). According to Tashakorri and Teddlie, mixed research is a form of mixed method in that quantitative and qualitative type data are collected and analyzed during the study. In this study, data was collected using a questionnaire that included closed and open-ended questions. Data analysis was conducted using quantitative (e.g., descriptive statistics) and qualitative (e.g., themes) methods. For this study, a mixed research design was chosen because a need existed to enhance the quantitative research with qualitative data. Creswell and Plano-Clark (2007) list four major types of mixed designs: the Triangulation Design, the Embedded Design, the Explanatory Design, and the Exploratory Design. The Triangulation Design was utilized for this study.

Triangulation Design. The Triangulation Design uses quantitative and qualitative methods to study the same research question in an effort to determine if the methods converge into a "single understanding of the research problem being investigated" (Fraenkel & Wallen, 2008). In this design, quantitative and qualitative data are gathered concurrently, after which the researcher attempts to merge the two data sets by bringing the results together in either the analysis or interpretation of the research (Creswell & Plano-Clark, 2007). This design was selected as a framework because the use of a survey instrument for this study meant both the quantitative and qualitative data would be gathered concurrently. Additionally, this design allows the efficiency of gathering both data sets simultaneously while still allowing the data sets to be analyzed separately, using the method traditionally associated with each data type (Creswell & Plano-Clark, 2007). The methods of analysis for each data set will be presented in the data analysis section of this chapter.

Creswell and Plano-Clark (2007) outline four variants of the Triangulation Design: the convergence model, the data transformation model, the validating quantitative data model, and the multilevel model. The validating quantitative data model was selected for use in this research study.

Validating Quantitative Data Model. The validating quantitative data model is utilized when researchers "want to validate and expand on the quantitative findings from a survey by including a few open-ended qualitative questions" (Creswell & Plano-Clark, 2007). While the qualitative items in a survey may not result in a rigorous qualitative data set, Creswell and Plano-Clark note the data from these questions can be used to "validate and embellish" the findings of a quantitative survey. For these reasons, the validating quantitative model was utilized for this study.

Survey Method. This study utilized a cross-section survey method where a self-administered, web-based questionnaire was employed for data collection. With a cross-section survey, the collection of data occurs at a single point in time (Fink, 2009; Dumont, 2008). The purpose of the survey method was to explore the student experience with computer based instructional simulation in an online introduction to computer applications course. The low retention rate in this course necessitated a survey method with a rapid turn-around time to allow data collection and analysis to occur fairly quickly so as to involve as many students as possible.

Instrumentation

While existing studies have utilized survey instruments for a study of computer based instructional simulation, none of the existing survey instruments were a good fit for this research study. As such, the decision was made to develop a questionnaire to be used as the survey instrument for this study. This section will outline the development of the survey instrument and discuss reliability and validity of the instrument.

Development. The initial phase of the development process involved interviewing students enrolled in the online introduction to computer applications course at the Georgia technical college during fall quarter 2010. The interview process was used to initially gauge student perceptions of the use of computer based instructional simulation in an effort to use the data to assist in building a survey instrument. The interview process began with an email request sent to all students enrolled in the online sections of the course. The email request briefly outlined the purpose of the research and requested student participation in the interview process (see Appendix C).

As a result of the email request, ten interviews were scheduled. Of the ten scheduled interviews, four students failed to show for the interviews. The remaining six students were interviewed following a structured interview process where probes where frequently used to venture outside the structured questions (see Appendix D). Brief notes were taken during the interview process and memos were written following each interview summarizing the main points of the interview. The recorded interviews were then reviewed to ensure the memos were accurate and to assist in locating themes from the interviews. The original interview questions, in addition to the memos and themes, were used to construct a set of questions for use on the survey instrument. These questions were then reviewed by a methodologist with expertise in the area of surveys in an effort to link each question back to one of the four research questions and to edit each question as needed for clarity and fit with the research questions. After the review, a first draft of the proposed survey was developed and reviewed by the methodologist. After multiple changes across several drafts, a final draft was prepared for expert review by content experts and experts in assessing institutional effectiveness (see Appendix E).

Expert review. An introductory email and a copy of the survey instrument were sent to eight instructors who either currently teach the course being studied, or have taught the course in the past two quarters (see Appendix F). Four of the instructors participated in the content review. Additionally, two Directors of Institutional Effectiveness in the technical college system were asked to review the survey instrument; both participated in the review. From the review process, several suggestions were made including wording changes, adding a question on years experience, and punctuation changes. Additionally, a suggestion was made to change the order of two questions. Based on the suggestions, grammar and wording changes were made and a question on years experience with computers was added. The suggestion to change the order of the questions was determined not a good fit and was not made. Once these changes were made, another draft of the survey was prepared for a student critique session (see Appendix G).

Critique session. Following the expert review, a critique session was conducted. An invitation to participate was extended to 14 students (see Appendix H). Of the 14 students, five met the criteria (having taken the course being studied in the past two quarters) and chose to participate. The reviewers were provided a copy of the questionnaire and asked to complete the questionnaire and note in the margins any difficulties or concerns. Following completion, the reviewers were invited to discuss any issues or concerns with the researcher. Several reviewers expressed their thoughts on the ease of the questionnaire and indicated the questions were easy to follow and easy to answer. The researcher discussed each question with the reviewers and found the reviewers were comfortable with most of the questions. The biggest concern raised was in the section on previous computer experience. The reviewers suggested that “social networking” be further defined to include “i.e. facebook and MySpace” since they thought many students would not equate social networking to those sites.

At the conclusion of the review, the student reviewers were asked to share their notes and all elected to submit their notes for review. A review of the notes did not result in any additional changes to the survey instrument. At the completion of the critique session, another draft of the questionnaire was prepared and sent to a methodologist for review. Changes suggested by the methodologist were made and the questionnaire was prepared to be administered to students in a pilot study (see Appendix I).

Pilot study. A pilot study was conducted of the fully-functional, web-based instrument to further test the reliability of the instrument and collection procedures. Since the actual population for the study was relatively small (141 students), there was concern on the part of the researcher that using a sample of the actual population would result in fewer responses to the actual survey when implemented. Therefore, the pilot survey was administered to a group of similar students. While the study will cover online students in the introduction to computer applications course, the pilot was administered to students in several web-enhanced sections of the same course. The pilot study was delivered through the ANGEL Learning Management System (LMS) since this system is utilized in both online and web-enhanced sections of the course being studied.

For the pilot survey, 56 students were asked to participate with 51 students (91.1%) electing to complete all or part of the questionnaire. As a result of the pilot test, several issues were found and resolved with the instrument:

1. The answer choices to the likert questions were presented in the wrong order (for example: very good → very poor instead of the traditional presentation of very poor → very good).
2. Four questions were changed from short answer to multiple choice

3. An error in the answer options for one question was corrected
4. Several errors with italics were corrected
5. A typographical error was corrected
6. Several questions yielded no answers using the analysis section of the ANGEL Learning Management System (LMS). This issue was resolved for each question by using a data export function in the LMS to gather the data. The decision was made to change the format of the questions in ANGEL to ensure the LMS could adequately analyze the data for these questions.

Basic quantitative analysis was completed on the results of the quantitative questions to ensure the data distribution was normal for each data set. The results of the qualitative questions were reviewed to ensure students who answered the questions appeared to have an understanding of the context of the questions. A sample of four of the quantitative survey questions and the results of the analysis of these questions is provided in Tables 3.2 and 3.3. Please note for these tables, students in the online introduction to computers course used a CBIS called "SAM;" therefore, in any reference to the CBIS in the questionnaire, the CBIS will be called "SAM." A sample of participant responses to one of the qualitative questions is provided in Appendix J.

Table 3.2

Sample of Basic Quantitative Analysis of Pilot Study Results by Question

Question	M	SD	Scale[a]
How was your experience setting up SAM for the first time?	1.8	.75	1 = Very Good 2 = Good 3 = Fair 4 = Poor 5 = Very Poor

Question	M	SD	Scale
What is your current perception of the SAM Training Exercises?	2.3	1.09	1 = Very Good 2 = Good 3 = Fair 4 = Poor 5 = Very Poor

[a] The scale was inverted during the pilot study. This was corrected prior to administering the survey.

Table 3.3

Sample of Basic Quantitative Analysis of Pilot Study Results by Question

Question	Response	Frequency	Scale
Did you face any challenges when using SAM Training Exercises?	Yes No	19 32	1 = Yes 2 = No
If you were teaching this course, would you have your students use SAM Training Exercises?	Yes No	38 13	1 = Yes 2 = No

After completion of basic quantitative analysis of the pilot study, the survey instrument was reviewed again by a methodologist and changes to questions were suggested as needed for clarity. Additionally, response options on several questions were altered and the “not applicable” response option was added to most of the questions. Several questions were changed from short answer to multiple choice as a result of data analysis on the pilot study. Lastly, the presentation of some of the response options was updated from a vertical appearance to a horizontal appearance to ensure consistency throughout the survey. Once these changes were made, the survey instrument was approved by a methodologist for use in this research study. A copy of the consent form and final version of the questionnaire are included in Appendix K. Please note, in the written version of the survey instrument, the answer spaces for the qualitative questions are truncated for space. In the web version of the survey instrument, the participants were provided a large, scrolling text box to answer survey questions. A screenshot of one of these questions is provided in Appendix L.

Reliability. In addition to utilizing the pilot study to assess the reliability of the survey instrument, Cronbach's alpha was used to determine if the questions in each subsection of the questionnaire consistently reflected the construct being measured. For this study, the constructs being measured directly relate to the first two research questions:

1. What are the student perceptions of the CBIS in general?
2. What are the student perceptions on the impact of the CBIS on learning?

The last research question does not measure "a theorized psychological construct" (Shuttleworth, 2009); therefore this question was not included in the calculations for Cronbach's alpha. A table showing the alignment of the research questions to the questionnaire questions is located in Appendix M. The results of the calculations for Cronbach's alpha are shown in Table 3.4. The full text of the questions is available in Appendices K and M.

Table 3.4

Results of Cronbach's Alpha Analysis

Research Question	Cronbach's Alpha	Questions
What are the student perceptions of the CBIS in general?	.80	1, 2, 6, 8, 10, 14, 16, 18, 20
What are the student perceptions on the impact of the CBIS on learning?	.88	26, 27, 28, 29, 30, 31

For the first research question, questions 3, 4, 5, and 12 were not included in the calculation of Cronbach's alpha. Questions 3, 4, and 5 were not included because these items were designed to assist the participant in reflecting on time spent with the CBIS prior to answering Question 6. However, these questions were utilized to assist in the description of the study results. Question 12 was not included because question 13 asked essentially the same question for the qualitative analysis. For both research questions, Cronbach's alpha is .7 or higher, indicating good reliability (Field, 2009).

On the qualitative analysis, reliability was enhanced through coding reviews (Creswell, 2009) and memos (Gall, Gall, & Borg, 2007). Throughout the data analysis, the codes and their definitions were reviewed to ensure a drift did not occur in the coding process (Gibbs, 2007). Also during the data analysis process, the researcher maintained memos reflecting on different segments of the analysis process.

Validity. The validity of the survey instrument was improved through the use of an expert in survey design and development, who guided the instrument development and provided final approval of the instrument prior to implementation. Additionally, validity of the instrument was improved through the use of expert review by content experts and directors of institutional effectiveness and a critique session as well as a pilot study.

Validity of the study was enhanced through the use of triangulation in the study design – using the results of the qualitative portion of the study to affirm the results of the quantitative portion of the study. Additionally, validity in the qualitative research included outlining the biases of the researcher. A review of the biases and assumptions of the researcher is located at the end of Chapter 3.

Population and Sample

The survey population for this study consisted of all students enrolled and actively participating in a section of the online introduction to computer applications course for winter quarter 2011 at a Georgia technical college. At the time of the study, there were eight sections of the course being offered, with a total enrollment of 141 students who were actively participating in the course. Students who were not actively participating in the course were in the process of being removed from the course rosters throughout the study. These students were not included in the survey population since this was a cross-section survey method seeking to gather data from actively participating students at a moment in time. Given the relatively small population size and the ease of access to the students in the population, all students in the survey population were invited to participate in this research study.

Data Collection

This section outlines the steps taken during the data collection process including obtaining the permission needed to conduct the study, the administration of the questionnaire, and the preparation of the data for analysis.

Permission. Permission for this research was obtained at the local level by submitting a request for on-campus research approval to the Vice-President of Academic Affairs for the Georgia technical college. Final approval was given by the Vice-President with the consent of the President of the college. Once local consent was granted, permission from the University of Georgia's Institutional Review Board (IRB) was requested through the submission of required forms. Once IRB permission was granted, data was collected in February and March 2011 (see Appendix N for approval documents).

Administration. The first step in the data collection process was to create a course in the ANGEL learning management system to hold the questionnaire. Once the course was created, the questionnaire was copied from the pilot study course and changes were made as needed as a result of the pilot study. Once the questionnaire was complete, student accounts were added to the course and the course was activated, allowing students to see and access the course and questionnaire. The initial invitation and three reminder emails were sent through the ANGEL email system. The initial invitation is available in Appendix C. The content of the reminder emails is available in Appendix O. At midnight on the last day of the data collection, access to the course and questionnaire was closed to participants.

Once students entered the questionnaire course in ANGEL, they were presented with a link to access the actual questionnaire. Students who clicked the link to open the questionnaire in ANGEL were then presented with a consent letter. A copy of the consent letter is available in Appendix K. Following the presentation of the consent letter was a button to begin the questionnaire. By clicking the button to begin the study, students were providing consent to participate in the study.

Participants. Out of a population of 141, there were 107 (75.9%) questionnaires with usable data. Of the 107 respondents, the largest race/ethnicity was White with 66%; the second largest was Black or African American with 31.1%. The largest age group was 21 – 26 years old with 35.0%; the second largest age group was 32 – 26 years old with 16.0%. The highest level of college education prior to enrolling the course being studied was *Some College* with 54.8%; the second highest was *High School or GED* with 23.1%. Table 3.4 shows basic demographic statistics for the study participants.

Data Preparation

Once data collection was complete, the raw data was exported from the ANGEL LMS to a delimited file. This file was then imported into Microsoft Excel for an initial analysis. A total of 109 (77.3%) out of 141 students elected to participate in the study. Of these, two students failed to provide sufficient answers to be included in the data analysis, leaving 107 (75.9%) sets of data to analyze.

A review of the data showed 22 (20.6%) students either did not answer all of the closed-ended questions or incorrectly answered at least one of the closed-ended questions. All of the closed-ended questions were answered by 85 (79.4%) of the students. An initial analysis of the closed-ended questions is available in Tables 3.5 – 3.8.

A review of the data showed 20 (18.7%) students opted not to answer any of the open-ended questions; 62 (57.9%) answered some of the open-ended questions; and 25 (23.3%) answered all of the open-ended questions.

Table 3.5

Demographics for Participants

Descriptive Variable	N	Freq	Percent
Race/Ethnicity	106		
Asian or Pacific Islander		1	.9
Black or African American		33	31.1
Hispanic		2	1.9
White		66	62.3
Other		4	3.8
Age	99		
18 – 20		6	6.1
21 – 26		35	35.4
27 – 31		13	13.1
32 – 36		16	16.2
37 – 41		14	14.1
42 – 46		9	9.1
47+		6	6.1
Gender	106		
Female		63	59.4
Male		43	40.6

Descriptive Variable	N	Freq	Percent
Previous education level	104		
High School or GED		24	23.1
Some college		57	54.8
College level diploma		7	6.7
Associate degree		7	6.7
Bachelor degree		8	7.7
Master degree		1	1.0

Table 3.6

Item Means or Frequencies for Research Question 1 – Student Perceptions of the CBIS in General

Question [a]	N	M	SD	Scale
1. How was your experience setting up SAM for the first time?	107	4.3	.83	1=Very poor 2=Poor 3=Fair 4=Good 5=Very good
2. What is your current perception of the SAM Training exercises?	105	4.1	.94	1=Very poor 2=Poor 3=Fair 4=Good 5=Very good
3. How many hours did it take you to complete the SAM Windows Training?	106	1.4	.71	1=Less than 1 hour 2=2 hours 3=3 hours 4=4 hours 5=5 or more hours
4. How long did it take you to complete the SAM Word Training?	107	1.4	.75	1=Less than 1 hour 2=2 hours 3=3 hours 4=4 hours 5=5 or more hours
5. How long did it take you to complete the SAM Excel Training	107	1.6	.84	1=Less than 1 hour 2=2 hours 3=3 hours 4=4 hours 5=5 or more hours

Question [a]	N	M	SD	Scale
6. To what extent do you agree or disagree that the SAM Training Exercises were worth the time required for completion?	105	3.9	1.13	1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree
8. To what extent do you agree or disagree that the SAM Training Exercises were worth the effort required for completion?	106	4.0	1.01	1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree
10. To what extent do you agree or disagree that the SAM Training Exercises were representative of the real program?	103	4.1	.93	1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree

Question	N	Frequency		Percent
12. Did you face any challenges when using SAM Training Exercises?	106	Yes No	44 62	41.5 58.5
14. If you were teaching this course, would you have your students use SAM Training Exercises?	106	Yes No	97 9	91.5 8.5
16. If you were teaching this course, would you have your students use SAM Practical Tests?	106	Yes No	91 14	86.7 13.3

Question [a]	N	M	SD	Scale
18. Please rate your overall experience with the SAM Training Exercises.	106	4.01	.95	1=Very negative 2=Negative 3=Neutral 4=Positive 5=Very positive
20. Please rate your overall experience with the SAM Practical Tests.	106	4.0	.98	1=Very negative 2=Negative 3=Neutral 4=Positive 5=Very positive

[a] Questions 3, 4, 5, and 12 are included in the table for reference; however, these questions are not included in the Research Question 1 construct.

Table 3.7

Item Means or Frequencies for Research Question 2 – Student Perceptions of the Impact of the CBIS on Learning

Question	N	M	SD	Scale
26. To what extent do you agree or disagree that the SAM Training Exercises were beneficial to your understanding of the SCT100 course material?	105	4.3	.94	1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree
27. How often have you used skills learned in the SAM Training Exercises in other areas of the SCT100 course?	106	3.8	1.06	1=Never 2=Rarely 3=Sometimes 4=Often 5=Always
28. To what extent do you agree or disagree that the SAM Training Exercises helped prepare you for the SAM Practical Tests?	106	4.3	.91	1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree
29. During the SAM Projects Exercises, how often did you use skills learned from the SAM Training Exercises?	106	4.0	.96	1=Never 2=Rarely 3=Sometimes 4=Often 5=Always
30. How helpful do you feel the SAM Training Exercises have been to you outside the SCT100 course?	106	3.7	1.22	1=Not helpful 2=Slightly helpful 3=Somewhat helpful 4=Moderately helpful 5=Extremely helpful
31. How often did you use skills learned from the SAM Training Exercises outside of your SCT100 course?	106	3.4	1.12	1=Never 2=Rarely 3=Sometimes 4=Often 5=Always

Table 3.8

Item Means or Frequencies for Research Question 3 – Extent Previous Computer Experience Relates to Student Experience with CBIS

Question	N	Frequency		%
32A. I could turn a computer on	106	Yes	106	100.0
32B. I could surf the Internet	106	Yes	106	100.0
32D. I could send email	106	Yes	106	100.0
32E. I could send attachments via email	106	Yes No	100 6	94.3 5.7
32F. I used social networking sites	106	Yes No	98 8	92.5 7.5
33A. I wrote a letter using Word Processing software such as Microsoft Word	106	Yes No	102 4	96.2 3.8
33B. I created a basic spreadsheet using a Spreadsheet program such as Microsoft Excel	106	Yes No	72 34	67.9 32.1
33C. I created a basic database using a database program such as Microsoft Access	106	Yes No	30 76	28.3 71.7
33D. I transferred photos from a camera to a computer	106	Yes No	98 8	92.5 7.5
33E. I edited photos on a computer	105	Yes No	85 20	81.0 19.0
33F. I designed web pages	100	Yes No	36 64	36.0 64.0

Question	N	M	SD	Scale
34. How many years of experience do you have using a computer?	105	4.7	1.23	1 = No experience 2=Less than 1 year 3=1-5 years 4=6-10 years 5=11-15 years 6=16=20 years 7=21-25 years 8=26-30 years 9=31 years or more

Question	N	Frequency		%
35. Before enrolling in the SCT100 course, about how much time did you spend using a computer each week?	106	3.7	1.25	1=Less than 1 hour 2=1-10 hours 3=11-20 hours 4=21-30 hours 5=31-40 hours 6=41-50 hours 7=More than 51 hours

Table 3.9
Item Frequencies for Demographic Questions

Question [a]	N	Category	Freq	%
36. What is your race/ethnicity?	106	Asian or Pacific Islander	1	.9
		Black or African American	33	31.1
		Hispanic	2	1.9
		White	66	62.3
		Other	4	3.8
37. What is your age?	99	18 – 20	6	6.1
		21 – 26	35	35.4
		27 – 31	13	13.1
		32 – 36	16	16.2
		37 – 41	14	14.1
		41 – 46	9	9.1
		47+	6	6.1
38. What is your gender?	106	Female	63	59.4
		Male	43	40.6
39. What is your previous education level (prior to enrolling in SCT100)?	104	High School or GED	24	23.1
		Some college	57	54.8
		College level diploma	7	6.7
		Associate degree	7	6.7
		Bachelor degree	8	7.7
		Master degree	1	1.0

[a] Question 37 has been modified from "What year were you born."

Data Analysis

For this study, two types of data analysis were used: descriptive and qualitative. A descriptive analysis was utilized for the data resulting from the closed-ended questions on the questionnaire. A qualitative analysis was used for the data resulting from the open-ended questions on the questionnaire.

Quantitative. Basic descriptive statistics allow raw scores to be organized, summarized, simplified, and presented in a form that is more manageable (Gravetter & Wallnau, 2007). For each question on Sections I, II, and III of the questionnaire, basic descriptive statistics including frequency and percentage were calculated using SPSS. These statistics were then presented in a tabular format and the results were analyzed by question for Research Questions 1 and 2.

For Research Question 3, the data analysis expanded to include the chi square test. The chi square test is used to determine if a relationship exists between two categorical variables (Field, 2009). Initial testing with SPSS revealed issues with multiple categories per variable for Research Question 3 having a frequency less than 5, preventing accurate chi square results (Field, 2009). This issue was resolved by combining categories to create a smaller number of categories with the possibility of higher frequencies per category. For each data set being analyzed, the number of categories was reduced from five to two. After the categories were adjusted, the chi square test was successfully utilized on a majority of the data sets. For the remaining data sets, with frequencies still less than 5, the Fisher's exact test was utilized in SPSS. The Fisher's exact test is normally used on 2 x 2 contingency tables with small sample sizes (Field, 2009). At the completion of the chi square and Fisher's exact analysis, all results were analyzed by variable and presented in a tabular format for review.

Qualitative. Qualitative research is "a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem" (Creswell, 2009, p. 4). This type of research is based on the view that individuals construct reality through their interactions in society and the qualitative researcher seeks to understand the meaning(s) these individuals have constructed (Merriam, 1998). The general characteristics of qualitative research include: seeking to understand a phenomenon of interest from the perspective of the participant; using the researcher as the key instrument for data collection and analysis; using fieldwork; employing an inductive research strategy; and producing a study that is richly descriptive (Merriam, 1998).

The open-ended questions from the questionnaire were analyzed using qualitative analysis. For each question, the participant responses were printed and ordered by question. Starting with Question 7, the responses were analyzed one question at a time.

The analysis process began by reading each response for an initial feel of the data and to identify "concepts, themes, events, and topical markers" (Rubin, 2005, p. 207). During this initial reading, positive and negative comments were denoted by "+" or "-" signs in the margins. Writing memos during the data analysis process allows the researcher to reflect on what is occurring both within the data and within the researcher (Ruona, 2005). Once the initial reading was complete, a brief memo was taken outlining the overall feel of the data and noting any potential themes. Once the potential themes were noted, subsequent readings of the responses were completed until each theme was separately highlighted and any new themes were noted. At the completion of the theme highlighting, all themes were listed with the number of times each theme occurred in the responses. These numbers were then used to determine which themes were used most frequently. Once the main themes were determined, the initial memo was read again to note and resolve any discrepancies between the initial memo and the final determination of the themes and to ensure a drift had not occurred in the process of coding themes (Gibbs, 2007).

Limitations of the Study

This study utilized a convenience, non-random sample of students in a Georgia technical college and as a result, no statistical inference was assumed. All generalizations made were based on data collected from the sample.

Additionally, this study utilized a cross-section survey, mixed research method. This method is utilized to gather data at a particular moment in time – for this study, data was gathered during the last 3 weeks of the quarter, prior to the final exam. This type survey method means the generalizations in this study only pertain to a point in time for each participant during the three weeks studied and cannot be inferred to different weeks in the quarter.

The qualitative portions of this study cannot be generalized outside the bounds of this study. Maxwell (2005) indicates two main threats to data validity are the researcher's biases and the researcher's influence on the environment and participants in the study. In an effort to enhance validity, a subjectivity statement was prepared to explore the researcher's biases and assumptions. The statement is included in the next section.

Steps were also taken in this study to reduce the researcher's influence on the environment and the participants in the study. These steps included (a) limited contact between the researcher and participants, (b) keeping all necessary contact (i.e. invitations to participate and follow-up invitations) neutrally worded to avoid the introduction of bias; and (c) careful wording of questions in the questionnaire to ensure bias was not introduced through the use of leading questions.

Researcher Biases and Assumptions

As the primary instrument for data collection in a qualitative study, the researcher is limited by being human and potentially introducing personal biases into the research process (Merriam, 1998). As such, the researcher should share his or her biases and assumptions prior to data collection. Given a portion of this mixed research study was the analysis of answers to qualitative questions, exploring researcher bias and assumptions has been included.

I selected this technical college for the study because I have worked at this college in various capacities for a little over ten years. For five of those years, I was an instructor in the Computer Information Systems (CIS) program – the program that is responsible for teaching the online introductory computer application course on which this study was based. As such, I developed a deep understanding of the issues facing students in the online introductory computer applications course and saw first-hand the large number of students who struggle to successfully complete this course.

For four of my ten years with the college, I was the program chair for the CIS program and actively worked to redesign the online introductory computer applications course in an effort to increase the student success rate in the course. As such, I have a vested interest in seeing my course design changes lead to increases in student success. However, my successor is responsible for implementing the computer based instructional simulation lessons in the course. For the most part, the course I designed remains intact, with the addition of the CBIS, and changes to the practical tests.

Currently, I am the Distance Education Coordinator for the college and I am responsible for managing the entire online program for the college. My remaining interaction with the online introductory computer applications course is two-fold: I still teach the course (as an adjunct instructor – but not during this study), and I still assist the CIS program chair with making changes to the course. However, I am not the author of the changes, I am only responsible for the change process. While the CIS chair may ask for my guidance in relation to the course, all final decisions on changes rest with the chair.

My time and experience with the college has allowed me to develop close working relationships with the instructors and chair in the CIS program. This relationship was vital to ensuring a smooth implementation for my study. My relationship with the college and its students means I had a vested interest in ensuring my study was as free from bias as possible. My interest lies in shedding light on the use of CBIS in the online introductory computer applications course and its usefulness to the students. In the end, my main concern is the students – if they perceive they are learning and whether the CBIS is beneficial to their experience in the course.

Summary

In an effort to better understand the student experience with CBIS in an online introduction to computer applications course, this study sought to examine student perceptions of the CBIS in general; student perceptions of the impact of CBIS on learning; and the extent to which student previous computer experience related to the student perceptions of CBIS. This chapter included a discussion of the study context; outlined the design and instrumentation for the study; and discussed the population and sample, data collection, data preparation, and data analysis. This chapter also included a discussion of the limitations of the study as well as researcher biases and assumptions.

Chapter 4

Data Analysis

The purpose of this study was to explore the student experience in relation to the use of computer based instructional simulation (CBIS) in an online introductory computer applications course in a Georgia technical college. This study was guided by the following research questions:

1. What are the student perceptions of the CBIS in general?
2. What are the student perceptions on the impact of the CBIS on learning?
3. To what extent does student previous computer experience relate to the student perceptions of the CBIS?

This chapter will include a discussion of the data analysis for each research question presented, in order, by research question.

Student Perceptions of the CBIS in General

Research Question 1 sought to describe the student perceptions of the computer based instructional simulation (CBIS) in general terms through descriptive statistics and qualitative analysis. The statistical and qualitative analysis was used to describe data obtained from Section I of the questionnaire given to participants. Table 4.1 shows the frequencies and percentage for the closed-ended questions presented in Section I of the questionnaire. Following the table, each question will be analyzed. For this research study SAM is synonymous with CBIS; however, participants are accustomed to the term SAM; therefore, SAM is used on the questionnaire.

Table 4.1

Item Frequencies and Percentages for Research Question1 – Student Perceptions of the CBIS in General by Question

Question[ab]	Scale	M	SD	Frequency	%
1. How was your experience setting up SAM for the first time?	1=Very poor	4.3	.83	0	0
	2=Poor			3	2.8
	3=Fair			17	15.9
	4=Good			37	34.6
	5=Very good			50	46.7
2. What is your current perception of the SAM Training exercises?	1=Very poor	4.1	.94	1	1.0
	2=Poor			6	5.7
	3=Fair			18	17.1
	4=Good			38	36.2
	5=Very good			42	40.0
3. How many hours did it take you to complete the SAM Windows Training?	1=Less than 1 hour	1.4	.71	74	69.8
	2=2 hours			27	25.5
	3=3 hours			2	1.9
	4=4 hours			2	1.9
	5=5 or more hours			1	.9
4. How long did it take you to complete the SAM Word Training?	1=Less than 1 hour	1.4	.75	77	72.0
	2=2 hours			24	22.4
	3=3 hours			2	1.9
	4=4 hours			3	2.8
	5=5 or more hours			1	.9
5. How long did it take you to complete the SAM Excel Training	1=Less than 1 hour	1.5	.84	67	62.6
	2=2 hours			25	23.4
	3=3 hours			12	11.2
	4=4 hours			2	1.9
	5=5 or more hours			1	.9
6. To what extent do you agree or disagree that the SAM Training Exercises were worth the time required for completion?	1=Strongly disagree	3.9	1.13	4	3.8
	2=Disagree			11	10.5
	3=Neutral			15	14.3
	4=Agree			36	34.3
	5=Strongly agree			39	37.1

Question[ab]	Scale	M	SD	Frequency	%
8. To what extent do you agree or disagree that the SAM Training Exercises were worth the effort required for completion?	1=Strongly disagree	4.3	.83	4	3.8
	2=Disagree			6	5.7
	3=Neutral			14	13.2
	4=Agree			48	45.3
	5=Strongly agree			34	32.1
10. To what extent do you agree or disagree that the SAM Training Exercises were representative of the real program?	1=Strongly disagree	4.1	.93	2	1.9
	2=Disagree			2	1.9
	3=Neutral			20	19.4
	4=Agree			36	35.0
	5=Strongly agree			43	41.7
12. Did you face any challenges when using SAM Training Exercises?	Yes			44	41.5
	No			62	58.5
14. If you were teaching this course, would you have your students use SAM Training Exercises?	Yes			97	91.5
	No			9	8.5
16. If you were teaching this course, would you have your students use SAM Practical Tests?	Yes			91	86.7
	No			14	13.3
18. Please rate your overall experience with the SAM Training Exercises.	1=Very negative	4.1	.95	3	2.8
	2=Negative			5	4.7
	3=Neutral			10	9.4
	4=Positive			50	47.2
	5=Very positive			38	35.8
20. Please rate your overall experience with the SAM Practical Tests.	1=Very negative	4.0	.98	3	2.8
	2=Negative			7	6.6
	3=Neutral			11	10.4
	4=Positive			51	48.1
	5=Very positive			34	32.1

[a] Questions 3, 4, 5, and 12 are included in the table for reference; however, these questions are not included in the Research Question 1 construct.

Question 1: Experience Setting Up SAM the First Time. When participants were asked about their experience setting up the CBIS system (i.e. SAM) for the first time, a majority of participants (81.3%) responded either Good or Very good while 15.9% responded Fair and 2.8% of participants responded Poor. The mean for this question was 4.3 with a standard deviation of .83.

Question 2: Current Perception of the SAM Training Exercises. When participants were asked about their current perception of the SAM Training exercises, 76.2% of the participants responded either Good or Very good; 17.1% responded Fair; and 6.7% responded Poor or Very poor. The mean for this question was 4.1 with a standard deviation of .94.

Questions 6 – 7: Are SAM Training Exercises Worth the Time. To assist with Question 6, participants were asked Questions 3 – 5 pertaining to time spent completing the SAM Windows, SAM Word, and SAM Excel Training exercises. These questions prompted participants to reflect on the time spent with the SAM Training exercises prior to answering Question 6. The responses to these questions also provided a frame of reference for Question 6. For all three time-related questions, a majority of participants responded Less than 1 hour when asked how much time was spent on a given SAM Training Exercise: 69.8% (Question 3 - Windows); 72.0% (Question 4 - Word); and 62.6% (Question 5 - Excel).

When participants were asked if the SAM Training Exercises were worth the time required for completion, 71.4% responded either Strongly agree or Agree; 14.3% responded Neutral; and 14.3% responded either Disagree or Strongly disagree. The mean for this question was 3.9 with a standard deviation of 1.13.

As a follow up to Question 6, participants were asked in Question 7 to comment on whether or not the SAM Training Exercises were worth the time required for completion.

Question 7 received 79 responses with a majority of participants reiterating that the SAM Training Exercises were worth the time required. Of the positive responses to this question, four themes emerged related to why participants indicated that SAM Training was worth the time: (a) learning by doing, (b) visual learners, (c) preparing for assignments and tests, and (d) helps in an online course.

Learning by doing. As a theme, *learning by doing* was the most frequently mentioned by participants when responding that SAM Training was worth the time. Participants stressed the importance of having "a chance to practice," being able to "practice and learn the material," of having a "hands-on approach," and being able to "try it myself." One participant explained:

> Doing the trainning [*sic*] exercises is pretty much hands on trainning [*sic*], and a lot of people including myself, learn things faster when they are actually doing what they are trying to learn instead of just reading the instructions out of a book.

Visual learners. As a theme, *visual learners* was the second most frequently referenced theme to explain why respondents indicated that SAM Training was worth the time. Participants indicated that SAM Training was worth the time because it presented the steps visually to students. Participant responses included: "SAM Training is a far better tool than a book…most individuals are visual learners" and "The SAM training exercises definitely gave me more of a visual way to learn how to do things."

Preparing for assignments and tests. Many participants indicated that the SAM Training Exercises were worth the time because these exercises helped the participants *prepare for other assignments and tests*. One participant stated "the SAM Training helped me prepare for the practical test and even taught me a few things I didn't know."

Helps in an online course. The last main theme for why participants indicated that SAM Training was worth the time was the advantage of *helping in an online course* without being on campus with an instructor. As one participant stated:

> Since I am in an online class, I do not have the benefit of a teacher in front of me to show me how to complete an exercise, so it's nice to have SAM there to do assist in that! The exercises are trivial sometimes, but to those who do not know the computer at all, it is of great assistance.

A second participant stated "it's like being able to be in a hands-on/in-house class while learning online."

While a majority of participants were positive about the time required to complete the SAM Training, there were two recurring negative themes: (a) takes too long and (b) too easy. Several self-described experienced computer users shared their feelings that SAM Training was simply *too slow*, *too easy*, and too redundant. However, of the negative comments, most were balanced with a positive comment from the same participant. For example, one participant stated "since i already knew the software i was using, it didn't really benefit me at all but if i did not know anything about the software then it would have been a great learning process."

Questions 8 – 9: Are SAM Training Exercises Worth the Effort. When participants were asked if the SAM Training exercises were worth the effort required for completion, 77.4% responded either Strongly agree or Agree; 13.2% responded Neutral; and 9.5% responded either Disagree or Strongly disagree. The mean for this question was 4.3 with a standard deviation of .83.

As a follow up to Question 8, participants were asked in Question 9 to comment on whether or not the SAM Training Exercises were worth the effort required for completion.

Question 9 received 63 responses with a majority of the responses being positive. Of the positive responses to this question, three themes emerged related to why participants indicated that SAM Training was worth the effort: (a) understanding the material, (b) learning by doing, and (c) learning new tasks.

Understanding the material. *Understanding the material* was the most frequently referenced theme to explain why respondents indicated that SAM Training was worth the time. This theme was referenced more than the other two positive themes combined. The data indicate that participants thought the SAM Training was worth the time because it was vital to helping participants understand the material presented in the course. One participant stated "the training exercises really helped me to understand how to use all the Microsoft office tools." Another participant stated: "the SAM training exercises were very helpful for me to understand the lessons."

Learning by doing. For Question 9 participants stressed the importance of *learning by doing* as a reason SAM Training was worth the effort. One participant stated "it helped me a lot doing the exercises instead of just reading it in a book." A second participant stated "I learn better by actually using and doing what I have learned."

Learning new tasks. Another theme that emerged for Question 9 was *learning new tasks*. Participants stated "I learned even more about word [*sic*] and also about some different shortcuts I didn't know" and "there is always something new to learn."

While a majority of the comments for this question were positive, there were several negative comments. A recurring theme among the negative comments was the SAM Training Exercises were *too simple*. One student stated "this training should and would be better directed at the elementary and middle school level of education."

Questions 10 – 11: Are SAM Training Exercises Representative of the Real Program. When participants were asked if the SAM Training exercises were representative of the real program (i.e. Windows, Word, Excel), 76.7% responded either Strongly agree or Agree; 19.4% responded Neutral; and 3.8% responded either Disagree or Strongly disagree. The mean for this question was 4.1 with a standard deviation of .93.

As a follow up to Question 10, participants were asked in Question 11 to comment on whether or not the SAM Training Exercises were representative of the real program. This question received 61 responses that were fairly evenly split across two themes, a positive theme stressing high fidelity (i.e. how closely the SAM Training interface replicated the actual program); and a negative theme related to the sensitivity of the SAM Training interface.

High Fidelity. A clear majority of the positive comments to Question 11 were related to the perception of the *high level of fidelity* of the SAM Training interface. Comments included: "I couldn't tell the difference," "it was very realistic to me," and "completing the exercises in SAM is just like doing it in WORD."

Sensitivity. A large portion of the negative comments for Question 11 were related to the *sensitivity* of SAM Training. While many participants commented SAM Training looked like the real program, these same participants described the interface as too sensitive. According to one participant:

> At times the training program can be a little over-sensitive. In the training session, I had issues with using the Excel fill bar, moving graphs, and editing data, whereas with the actual Excel program, I experienced no problems.

Questions 12 – 13: Challenges Faced When Using SAM Training Exercises. While Questions 12 and 13 are not directly tied to the Research Question 1 construct, these questions provide insight into other questions that are related to the construct; therefore, Questions 12 and 13 will still be discussed.

When participants were asked if there were any challenges when using SAM Training Exercises 41.5% responded Yes and 58.5% responded No.

For Question 13 asking participants to describe any challenges faced, the overwhelming theme was *bugs in the training*. While participants gave the perception of not being especially bothered by the bugs at this point, they did think enough about the bugs to explain them (many in detail) in responding to this question. For example, one participant wrote:

> There were a few instances where the program seemed to not recognize actions that I made as being correct when they were. For example: I'm trying to reposition a chart in an excel document to fit into the range A:15-D:25. I move the chart inside the range, but it's not perfectly centered, so the program keeps saying it's incorrect.

Questions 14 – 15: Would Participants Use SAM Training Exercises. When participants were asked if they were teaching this course, would they use SAM Training exercises, 91.5% responded Yes and 8.5% responded No.

As a follow up to Question 14, participants were asked in Question 15 to provide more detail on "If you were teaching the course, would you have your students use the SAM Training Exercises?" Question 15 received 61 responses, with almost all responses being positive. An analysis of the comments for Question 15 revealed several themes including: (a) helpful, (b) hands-on, (c) better than the book, and (d) good for online.

Helpful. *Helpful* was the most frequently referenced theme for explaining why participants would chose to utilize SAM Training in a course they were teaching. Participants indicated that SAM Training was a *helpful* tool and generally stated SAM was "very" *helpful* versus just *helpful*. One participant commented "it was very helpful and made it very easy to understand I would highly recommend it for other teachers to use when teaching this course." Another participant commented "because it's very helpful for some people that are not that good with computers."

Hands-on. For Question 15, participants stressed the importance of SAM being *hands-on*. The data indicate that participants thought SAM Training provided practical experience they needed. One participant commented, "The SAM training exercises are very effective tools for giving real hands-on experience to students." Another participant commented, "using the hands-on experience, it makes everything a lot easier and easier to comprehend."

Better than the book. Another theme that emerged for Question 15 was *better than the book*. Several participants indicated that the SAM Training was a much *better environment for learning than trying to follow the steps in the book*. One participant stated "I feel that the SAM excercises [*sic*] are superior to the workbook excercises [*sic*]." Another participant stated "Sams training serves as an interactive assistant to the book , this is needed to solidify understanding."

Good for online. A final theme that emerged was *good for online*. Several participants indicated that the SAM Training was the best way to teach the software to students in an online class. Comments from the participants included: "since the classes are online, SAM takes the place of the teacher;" "…being an online computer class, it would be hard to explain how to do certain things over email, or even really learn it all through the book;" and "for online-learning purposes, SAM training is a mostly efficient way to teach computer software use."

While most of the comments for this question were positive, there were a few negative comments. One participant stated "I would suggest a program easier to use and understand."

While on the other end of the spectrum, a participant stated "…people at this level are a little more competent than the program is designed for."

Questions 16 – 17: Would Participants Use SAM Testing. When participants were asked if they were teaching this course, would they use SAM Practical Tests, 86.7% responded Yes and 13.3% responded No.

As a follow up to Question 16, participants were asked in Question 17 to provide more detail on "If you were teaching the course, would you have your students use the SAM Practical Tests?" Question 17 received 57 responses, with a majority of the responses being positive. An analysis of the comments for Question 17 revealed two overriding themes: task completion and helped with written test.

Task completion. *Task completion* was the most frequently referenced theme to explain why respondents indicated that SAM Testing should be utilized in the course. This theme had 19 references compared to 3 references for the next theme. Participants indicated that SAM Testing proved a student could *complete the actual tasks* involved in the course. A variety of terms were used to describe this theme including: understanding; learned; apply; and comprehension. For example, one participant stated "these test are very effective at determining if a student can actually apply the information they have learned." Other comments included "I think the SAM Practical Tests are a fair way to gauge student comprehension of the material...." and "…a true assessment to the knowledge learned from the course."

Helped with the test. Another theme that emerged for Question 17 was *helped with the test*. Multiple participants indicated that the SAM Practical Tests helped them *prepare for the written tests* in the course. One participant commented "they are a good tune-up for the Written Test."

The negative comments for Question 17 were few and followed the basic script of the other negative comments for other questions – the program is *too sensitive* and the *program has bugs*.

Questions 18 – 19: Overall Experience with SAM Training Exercises. When participants were asked to rate their overall experience with SAM Training Exercises, 83.0% responded either Positive or Very positive; 9.4% responded Neutral; and 7.5% responded either Negative or Very negative. The mean for this question was 4.1 with a standard deviation of .95.

As a follow up to Question 18, participants were asked in Question 19 to share any additional comments or suggestions pertaining to SAM Training Exercises. Question 19 received 47 responses with a majority of the responses being positive. An analysis of the responses showed a mixture of comments that mostly mirrored comments made to previous questions. The only clear theme for the Question 19 comments was an *affinity for SAM Training*. From like, to love, to great, multiple respondents shared their *affinity for SAM Training*. One participant stated “it was great, Tony the Tiger style.” Another participant simply stated “I love it.”

Two respondents also shared that the three steps (i.e. observe, practice, and apply) were helpful. At the same time, two other participants shared how long the three steps took to complete.

Questions 20 – 21: Overall Experience with SAM Practical Tests. When participants were asked to rate their overall experience with SAM Practical Tests, 80.2% responded either Positive or Very positive; 10.4% responded Neutral; and 9.4% responded either Negative or Very negative. The mean for this question was 4.0 with a standard deviation of .98.

As a follow up to Question 20, participants were asked in Question 21 to share any additional comments or suggestions pertaining to SAM Practical Test. Question 21 received 36 responses with a majority of the responses being positive. However, Question 21 had a higher percentage of negative responses than any other open-ended question in the questionnaire.

An analysis of the responses showed a mixture of comments that mostly mirrored comments made to previous questions. A clear theme emerged from the responses Question 21 that was also seen in several other sets of data – *bugs*. Except this time participants were much more concerned with the impact the *bugs* in the program had on their grades. One participant stated “it does a poor job of grading, with no room for error.” Another participant stated “I always have to go back and make several corrections, which is not a good sign and two of the programs I have years of experience.” Additional negative comments included: “I dont [*sic*] feel like its [*sic*] a smart approach to teaching students” and “…one wrong click and the problem is wrong.” Another participant stated “I was unable to answer anything the way I was shown in training.”

Student Perceptions of the Impact of the CBIS on Learning

Research Question 2 sought to describe the student perceptions of the impact of CBIS on learning through descriptive statistics. The statistics will be used to describe data obtained from Section II of the questionnaire given to participants. Table 4.2 shows the frequencies and percentages for the closed-ended questions presented in Section II of the questionnaire. For this section, Questions 26 – 31 will be analyzed.

Table 4.2

Item Frequencies and Percentages for Research Question 2 – Student Perceptions of the Impact of the CBIS on Learning by Question

Question [a]	Scale	M	SD	Frequency	%
26. To what extent do you agree or disagree that the SAM Training Exercises were beneficial to your understanding of the SCT100 course material?	1=Strongly disagree	4.3	.94	2	1.9
	2=Disagree			4	3.8
	3=Neutral			11	10.5
	4=Agree			33	31.4
	5=Strongly agree			55	52.4
27. How often have you used skills learned in the SAM Training Exercises in other areas of the SCT100 course?	1=Never	3.8	1.06	4	3.8
	2=Rarely			9	8.5
	3=Sometimes			23	21.7
	4=Often			42	39.6
	5=Always			28	26.4
28. To what extent do you agree or disagree that the SAM Training Exercises helped prepare you for the SAM Practical Tests?	1=Strongly disagree	4.3	.91	2	1.9
	2=Disagree			3	2.8
	3=Neutral			11	10.4
	4=Agree			36	34.0
	5=Strongly agree			54	50.9
29. During the SAM Projects Exercises, how often did you use skills learned from the SAM Training Exercises?	1=Never	4.0	.96	1	.9
	2=Rarely			9	8.5
	3=Sometimes			16	15.1
	4=Often			45	42.5
	5=Always			35	33.0
30. How helpful do you feel the SAM Training Exercises have been to you outside the SCT100 course?	1=Not helpful	3.7	1.22	9	8.6
	2=Slightly helpful			8	7.6
	3=Somewhat helpful			19	18.1
	4=Moderately helpful			40	38.1
	5=Extremely helpful			29	27.6

Question [a]	Scale	M	SD	Frequency	%
31. How often did you use skills learned from the SAM Training Exercises outside of your SCT100 course?	1=Never	3.4	1.12	8	7.7
	2=Rarely			11	10.6
	3=Sometimes			29	27.9
	4=Often			42	40.3
	5=Always			14	13.5

[a] SCT100 is the name of the course in this study.

Question 26: Benefit of SAM Training to Understanding of Course Material. When participants were asked to what extent they agreed or disagreed that the SAM Training Exercises were beneficial to their understanding of the material in the course, a majority of participants (83.8%) responded either Strongly agree or Agree; while 10.5% responded Neutral and 5.7% of participants responded either Disagree or Strongly disagree. The mean for this question was 4.3 with a standard deviation of .94 and N=105.

Question 27: Use of SAM Training Exercise Skills in Other Areas of Course. When participants were asked how often they have used skills learned in the SAM Training Exercises in other areas of the course, a majority of participants (66.0%) responded either Often or Always; while 21.7% responded Sometimes; and 12.3% of participants responded Poor. The mean for this question was 3.8 with a standard deviation of 1.06 and N=106.

Question 28: Extent SAM Training Exercises Prepared Participants for Practical Tests. When participants were asked to what extent they agreed or disagreed that the SAM Training Exercises helped them prepare for the SAM Practical Tests, a majority of participants (84.9%) responded either Strongly agree or Agree; while 10.4% responded Neutral; and 4.7% of participants responded Disagree or Strongly disagree. The mean for this question was 4.3 with a standard deviation of .91 and N=106.

Question 29: Use of SAM Training Exercise Skills to Complete Projects. When participants were asked how often during the SAM Projects exercises they have used skills learned in the SAM Training, a majority of participants (75.5%) responded either Often or Always; while 15.1% responded Sometimes; and 9.4% of participants responded Poor. The mean for this question was 4.0 with a standard deviation of .96 and N=106.

Question 30: Helpfulness of SAM Training Exercises Outside Course. When participants were asked how helpful do they feel the SAM Training Exercises have been outside the course, a majority of participants (65.7%) responded either Moderately helpful or Extremely helpful; while 18.1% responded Somewhat helpful; and 16.2% of participants responded Slightly helpful or Not helpful. The mean for this question was 3.7 with a standard deviation of 1.22 and N=106.

Question 31: Use of SAM Training Exercise Skills Outside Course. When participants were asked how often they have used skills learned in the SAM Training Exercises outside of the course, a majority of participants (53.8%) responded either Often or Always; while 27.9% responded Sometimes; and 18.3% of participants responded Poor. The mean for this question was 3.4 with a standard deviation of 1.12 and N=106.

Extent Previous Computer Experience Relates to Student Experience with CBIS

Research Question 3 sought to describe the extent to which previous computer experience relates to the student experience with CBIS. Statistics will be used to compare the data obtained from Sections I and III of the questionnaire given to participants. Table 4.3 shows the frequencies and percentages for the closed-ended questions presented in Section III of the questionnaire. Following the table, each instrument question will be analyzed.

Table 4.3

Item Frequencies and Percentages for Research Question 3 – Extent Previous Computer Experience Relates to Student Experience with CBIS by Question

Question [a]	Scale	Frequency	%
32. Previous computer experience prior to enrolling in SCT100:			
a. Turn on a computer	Yes	106	100
	No	0	0
	Unable to answer	0	0
b. Surf the Internet	Yes	106	100
	No	0	0
	Unable to answer	0	0
c. Open email	Yes	106	100
	No	0	0
	Unable to answer	0	0
d. Send email	Yes	106	100
	No	0	0
	Unable to answer	0	0
e. Send attachments	Yes	100	94.3
	No	6	5.7
	Unable to answer	0	0
f. Used social networking	Yes	98	92.5
	No	8	7.5
	Unable to answer	0	0
33. Previous computer experience prior to enrolling in SCT100:			
a. Create a letter	Yes	102	96.2
	No	4	3.8
	Unable to answer	0	0
b. Create a spreadsheet	Yes	72	67.9
	No	34	32.1
	Unable to answer	0	0
c. Create a database	Yes	30	28.3
	No	76	71.7
	Unable to answer	0	0

Question [a]	Scale	Frequency	%
d. Transfer photos to pc	Yes	98	92.5
	No	8	7.5
	Unable to answer	0	0
e. Edit photos on pc	Yes	85	81.0
	No	20	19.0
	Unable to answer	0	0
f. Design web pages	Yes	36	36.0
	No	64	64.0
	Unable to answer	0	0
34. How many years experience do you have using a computer?	No exp	0	0
	Less than 1 yr	1	1.0
	1-5 yrs	18	17.1
	6-10 yrs	25	23.8
	11-15 yrs	34	32.4
	16-20 yrs	17	16.2
	More than 20 yrs	10	9.5
35. Before enrolling in the SCT100 course, about how much time did you spend using a computer each week?	Zero hours	0	0
	Less than 1 hours	6	5.7
	1-10 hours	56	52.8
	11-20 hours	23	21.7
	21-30 hours	9	8.5
	31-40 hours	5	4.7
	41+ hours	7	6.6

[a] SCT100 is the name of the course in this study.

Questions 32 and 33: Previous Computer Experience. Questions 32 and 33 sought to determine the level of previous computer experience (prior to enrolling in the course) for each participant. The data analysis for this question resulted in the creation of a new variable called Experience. The Experience variable was then compared to the data from the Research Question 1 construct.

Experience. Initial analysis of Questions 32 and 33 shows all participants indicated previous experience with turning on a computer, surfing the Internet, opening email, and sending email. From this point, a gradual shift begins from Yes responses to No responses beginning with 94.3% of participants indicating they could send attachments; 92.5% indicating they used social networking; 96.2% indicating they have written a letter in word processing software; 67.9% indicating they have created a spreadsheet; and 28.3% indicating they have created a database. Additionally, 92.5% indicated they have transferred photos to a computer; 81.0% have edited photos on a computer; and 36.0% have designed web pages.

A review of the data for Questions 32 and 33 indicated multiple frequencies less than 5, which violates one of the assumptions of the chi square test. As a result, a new variable called Experience was created. The Experience variable consisted of the responses to the questions pertaining to the core requirements of the course. Any requirements with 100% Yes responses were not listed as part of the variable. The variable was made by adding student responses to the word processing, spreadsheets, and databases questions. Participants with experience in either none or one of these three areas were considered Beginners. Participants with experience in either two or three of these areas were considered Intermediates. Table 4.4 shows the frequencies and percentages for this variable along with variables described in the next section.

***Research Question 1 Construct* – Student Perceptions of the CBIS in General.** A review of the data for Questions related to the Research Question 1 construct indicated multiple frequencies less than 5; therefore, existing categories were combined to create smaller categories with the potential for a higher frequency per category. For Questions 1, 2, 6, 8, 10, 18, and 20, the categories were initially combined to create three categories; however, this change still resulted in frequencies less than 5. Therefore, the categories for these questions were combined from five categories to two categories in an effort to determine if a relationship existed on any level between the Experience variable and the Research Question 1 data. Figure 4.1 shows the resulting combinations of the categories. Table 4.4 shows the frequencies and percentages for the newly combined variables; Table 4.5 defines the variables for reference.

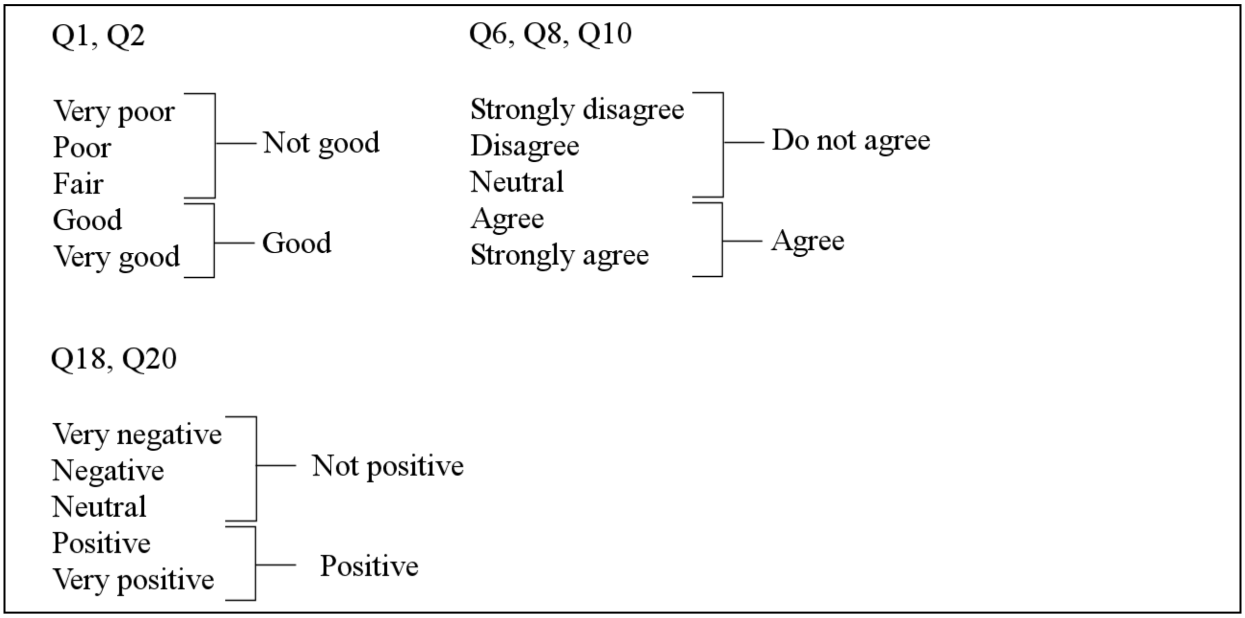

Figure 4.1. Research Question 1 – Student Perceptions of CBIS in General Category Combinations by Question

Table 4.4

Item Frequencies and Percentages for Combined Variables

Variable	Scale	Frequency	%
Experience	Beginner	33	31.1
	Intermediate	73	68.9
First Experience	Not Good	20	18.7
	Good	87	81.3
Training Perception	Not good	18	17.1
	Good	87	82.9
Worth the Time	Do not agree	30	28.6
	Agree	75	71.4
Worth the Effort	Do not agree	24	22.6
	Agree	82	77.4

Variable	Scale	Frequency	%
Fidelity	Do not agree	24	23.3
	Agree	79	76.7
Exp Training	Not positive	18	17.0
	Positive	88	83.0
Exp Testing	Not positive	21	19.8
	Positive	85	80.2

Table 4.5

Definitions of Variables for Research Question 1 – Student Perceptions of CBIS in General

Variable	Definition
First Experience	Experience Setting Up SAM the First Time
Training Perception	Current Perceptions of the SAM Training Exercises
Worth the Time	Are SAM Training Exercises Worth the Time
Worth the Effort	Are SAM Training Exercises Worth the Effort
Fidelity	Are SAM Training Exercises Representative of the Real Program
Use Training	Would Participants Use SAM Training Exercises
Use Testing	Would Participants Use SAM Testing
Exp Training	Overall Experience with SAM Training Exercises
Exp Testing	Overall Experience with SAM Practical Tests

The new variables were then tested using a chi square test. For any instances where frequencies remained below 5, the Fisher's exact test was utilized. Results of the testing are shown in Table 4.6.

Table 4.6

Results of Chi Square and Fisher's Exact for Experience X Research Question 1 – Student Perceptions of CBIS in General Variables

Analysis	Chi Square Result	Fisher's Exact Result (2-sided)	Significant?
Experience X First Experience	.68		No
Experience X Training Perception	.05		No
Experience X Worth the Time	.30		No
Experience X Worth the Effort	.08		No
Experience X Fidelity	.18		No
Experience X Use Training		.27	No
Experience X Use Testing		1.00	No
Experience X Exp Training	.15		No
Experience X Exp Testing	.78		No

Question 34: Years of Experience. Question 34 sought to determine the number of years of previous computer experience (prior to enrolling in the course) for each participant. The data analysis for this question resulted in the creation of a new variable called Years. The Years variable was then compared to the data from the Research Question 1 construct.

Years. Initial analysis of the data for Question 34 shows the highest percentage of participants (32.4%) responded they had 11 – 15 years of experience with computers prior to enrolling in the course being studied. The second highest percentage was 6 –10 years (23.8%), followed by 1 – 5 years (17.1%), 16 – 20 years (16.2%), more than 20 years (9.5%), and less than 1 year (1.0%). No respondents indicated no experience for this question. The mean for this question was 4.7 with a standard deviation of 1.23 and N=105.

Since Question 34 had multiple frequencies less than 5, the decision was made to create a Years variable and divide the existing data into two categories: 10 years or less and 11+ years. Table 4.7 shows the frequencies and percentages for this variable. The new variable was then tested against the Research Question 1 data using a chi square test. For any instances where frequencies remained below 5, the Fisher's exact test was utilized. Results of the testing are shown in Table 4.8

Table 4.7

Item Frequencies and Percentages for Years Variable

Variable	Scale	Frequency	%
Years	10 years or less	44	51.9
	11+ years	61	58.1

Table 4.8

Results of Chi Square and Fisher's Exact for Years X Research Question 1 – Student Perceptions of CBIS in General Variables

Analysis	Chi Square Result	Fisher's Exact Result (2-sided)	Significant?
Years X First Experience	.23		No
Years X Training Perception	.48		No
Years X Worth the Time	.83		No
Years X Worth the Effort	.36		No
Years X Fidelity	.76		No
Years X Use Training		.30	No
Years X Use Testing	.26		No
Years X Exp Training	.42		No
Years X Exp Testing	.69		No

Question 35: Hours per Week on a Computer. Question 35 sought to determine the number of hours each participant spent on a computer each week prior to enrolling in the course being studied. The data analysis for this question resulted in the creation of a new variable called Hours. The Hours variable was then compared to the data from the Research Question 1 construct.

Hours Spent. Initial analysis of Questions 35 shows the highest percentage of participants (52.8%) responded they spent 1 – 10 hours using a computer each week. The second highest percentage was 11 – 20 hours (21.7%), followed by 21—30 hours (8.5%), 41+ hours (6.6%), less than 1 hour (5.7%), and 31 – 40 hours (4.7%). No respondents indicated zero hours for this question. The mean for this question was 3.74 with a standard deviation of 1.33 and N=106.

Since Question 35 had at least one frequency less than 5, the decision was made to create a Hours Spent variable and divide the existing data into two categories: 20 hours or less and 21+ hours. Table 4.9 shows the frequencies and percentages for this variable. The new variable was then tested against the Research Question 1 data using a chi square test. For any instances where frequencies remained below 5, the Fisher's exact test was utilized. Results of the testing are shown in Table 4.10

Table 4.9

Item Frequencies and Percentages for Hours Spent Variable

Variable	Scale	Frequency	%
Hours Spent	20 hours or less	62	58.5
	21+ hours	44	41.5

Table 4.10

Results of Chi Square and Fisher's Exact for Hours Spent on a Computer X Research Question 1– Student Perceptions of CBIS in General Variables

Analysis	Chi Square Result	Fisher's Exact Result (2-sided)	Significant?
Hours Spent X First Experience	.39		No
Hours Spent X Training Perception	.47		No
Hours Spent X Worth the Time	.25		No
Hours Spent X Worth the Effort	.17		No
Hours Spent X Fidelity	.64		No
Hours Spent X Use Training		1.00	No
Hours Spent X Use Testing	.46		No
Hours Spent X Exp Training	.78		No
Hours Spent X Exp Testing	.53		No

Chapter 5

Conclusions and Recommendations

The purpose of this study was to explore the student experience in relation to the use of computer based instructional simulation (CBIS) in an online introductory computer applications course in a Georgia technical college. This study was guided by the following research questions:

1. What are the student perceptions of the CBIS in general?
2. What are the student perceptions on the impact of the CBIS on learning?
3. To what extent does student previous computer experience relate to the student perceptions of the CBIS?

This chapter includes a discussion of the results of this study, conclusions drawn from the results, and recommendations for practice and future research.

Findings of the Study

The quantitative and qualitative findings of this study will be presented in order by research question. These findings are representative of participant perceptions in the final weeks of a quarter.

Research Question 1: Student Perceptions of the CBIS in General. Quantitative responses related to Research Question 1 consistently supplied positive results to each question, generally by a wide margin. An analysis of percentages revealed:

- A significant number of participants (81.3%) had a positive experience setting up SAM for the first time.

- A large majority (76.2%) had a positive perception of the SAM Training Exercises.
- A large majority (71.4%) of the participants agreed the SAM Training Exercises were worth the time required for completion (for a majority of participants, the time requirement was less than one hour).
- A significant number of participants (77.4%) of the participants agreed the SAM Training Exercises were worth the effort required for completion.
- A small majority (58.5%) of the participants indicated they did not experience challenges when using the SAM Training Exercises.
- Most (91.5%) of the participants indicated if they were teaching the course, they would use the SAM Training Exercises in the course.
- A significant number of participants (86.7%) indicated if they were teaching the course, they would use the SAM Practical Tests in the course.
- A significant number of participants (83.0%) indicated an overall positive experience with the SAM Training Exercises.
- A significant number of participants (80.2%) indicated an overall positive experience with the SAM Practical Tests.

The positive responses to the Likert-scale questions indicate a positive student perception of the CBIS in general. These results were further confirmed by an abundance of positive responses to the open-ended questions utilized as a follow-up to some of the quantitative questions. Participant responses to the open-ended questions revealed the CBIS experience was positive based on a variety of themes including themes related to experiential learning, the need for CBIS in an online course, and fidelity.

Experiential Learning. The most frequently mentioned theme in response to Research Question 1 centered around the benefit of experiential learning. Kolb (1984) defines experiential learning as "the process whereby knowledge is created through the transformation of experience" (p. 38). Silberman (2007) defines experiential learning as the involvement of learners in concrete activity where the learners are able to experience the activity and have the opportunity to reflect on the activity. In this study, participants consistently indicated an affinity for the CBIS because of the hands-on approach of the interface. The themes related to experiential learning included learning by doing, learning new tasks, and hands-on. These themes follow Kolb's definition of creating knowledge through experience. These themes also follow Silberman's definition of involving learners in concrete activity where the learners are able to experience the activity.

The Need for CBIS in an Online Course. As an overarching theme, experiential learning fits well with another theme – the need for CBIS in an online course. According to Bersin (2004), the "biggest trend in experiential learning in web-based instruction is simulation" (p. 37). Bersin further states experiential learning can be created in an online learning environment through simulations using a software application. Participant responses to open-ended questions indicated their success in the course was directly tied to being able to utilize the CBIS in place of an instructor. Where in an on-campus course, the instructor would step through the tasks with students, the CBIS was able to help the online students step through the tasks in the absence of face-to-face contact with an instructor. The CBIS in this course provided students an opportunity for experiential learning in an online environment using a software application.

Fidelity. An important aspect of any simulation is fidelity, which refers to how closely a simulation imitates reality (Alessi & Trollip, 2001). Hays (2006) lists two dimension of simulation fidelity: the physical characteristics of the simulation and the functional characteristics of the simulation. This study found that participants perceived the CBIS in this study to have a high level of physical fidelity; however, there were many complaints on the level of functional fidelity. These complaints were seen in themes related to the sensitivity of the interface and the bugs in the interface.

While a high level of fidelity may be desired, a high level of fidelity can lead to increased design costs and does not necessarily lead to an increase in learner motivation or transfer of learning. As noted by Gagné (1964), many simulations leave out task irrelevant items in their design. In this study, some of the participant complaints related to functional fidelity in the CBIS can be directly attributed to the vendor leaving task irrelevant items out of the simulation.

Research Question 2: Student Perceptions on the Impact of the CBIS on Learning. Responses related to Research Question 2 consistently supplied positive results to each question, generally by a wide margin. An analysis of percentages revealed:

- A significant number of participants (83.8%) indicated that the SAM Training Exercises were beneficial to their understanding of the course material.
- A small majority (66.0%) of participants indicated they have used skills learned in the SAM Training Exercises in other areas of the course being studied.
- A significant number of participants (84.9%) indicated that the SAM Training Exercises helped them prepare for the SAM Practical Tests. Several participants also indicated in a response to a previous open-ended question that the SAM Training Exercises also helped them prepare for the written tests in the course.
- A large majority of participants (75.5%) indicated they used skills learned from the SAM Training Exercises when completing the SAM Projects Exercises.

- A majority (65.7%) of participants indicated that the SAM Training Exercises have been moderately or extremely helpful to them outside the course being studied.
- A small majority (53.8%) of participants indicated they have used the skills learned from the SAM Training Exercises outside of the course either often or always.

These positive responses indicate a positive student perception of the impact of CBIS on learning and further indicate a perception of transfer of learning to other assignments in the course and other tasks outside of the course.

The positive results indicated in the responses to the survey questions related to Research Question 2 were further confirmed by an abundance of positive responses related to the overarching theme of the benefit of experiential learning. Jong (1991) has indicated there is evidence suggesting simulations may improve learning better in different content areas. Hertel and Mills (2002) indicate simulations have the potential to motivate learners through active participation which, in turn, can lead to deep learning and subsequent retention of knowledge and skills beyond the learning environment. Gokhale (1996) found that guided computer simulation activities “can be used as an educational alternative to help motivate students into self-discovery and develop their reasoning skills” and that simulations integrated into class structure may be an effective strategy for transfer and application of knowledge to real-world problems (p. 9). Cameron (2003) found simulations in online education environments have the potential to increase student motivation and learning. The results in this study support the findings in these previous studies by indicating participants perceived that the CBIS had a positive impact on learning as well as transfer of learning.

Research Question 3: Extent Previous Computer Experience Relates to Student Perceptions of the CBIS. The data for Research Question 3 revealed a group of participants with the following experience:

- A majority (68.9%) of the participants had previous computer experience with two or more of the following: word processing, spreadsheets, and databases.
- A small majority (58.1%) of the participants had 11+ years of previous computer experience.
- A small majority (58.5%) of the participants spent 20 hours or less on the computer each week (prior to enrolling the course being studied).

For Research Question 3, an analysis of the relationship between the student previous computer experience variables and the variables from the Research Question 1 construct found no significant relationship existed between any of the variables. Devasagayam and Hyat (2007) found in a limited study that simulations are an effective pedagogical tool and enhance different abilities of students. However, in this study, no significant relationship was found between participant previous computer experience and any of the variables from the Research Question 1 construct.

Conclusions and Implications

The following conclusions have been drawn based on the findings of this study and are based on participant perceptions in the final weeks of the quarter.

1. Students in the online introduction to computer applications course perceive that experiential learning has occurred as a result of the use of CBIS in the course. This lends support to the assertion by Bersin (2004) that experiential learning can be created in an online learning environment through simulation. This also lends support to the finding

by Cameron (2003) that simulations in online education environments have the potential to increase student motivation and learning. Additionally, Kuhn and Rundle-Thiele (2009) indicate that student perception of learning can be useful during a course to quickly assess student progress and further recommend that student perception of learning can be used to "highlight the effectiveness of a course activity…on student learning by benchmarking on previous offerings or against peers" (p. 357).

2. Students in the online introduction to computer applications course perceive that transfer of learning has occurred as a result of the use of CBIS in the course. While many studies find no clear indication to support the theory of transfer of learning, Hertel and Mills (2002) indicate simulations have the potential to motivate learners through active participation which, in turn, can lead to deep learning and subsequent retention of knowledge and skills beyond the learning environment. Also, Gokhale (1996) found that guided computer simulation activities "can be used as an educational alternative to help motivate students into self-discovery and develop their reasoning skills" and that simulations integrated into class structure may be an effective strategy for transfer and application of knowledge to real-world problems (p. 9).
3. Computer experience has no direct relationship to student perceptions of CBIS. The analysis of computer experience revealed at least half the participants possessed a level of knowledge that may lead them to perceive the CBIS as trivial and a waste of time; however, significantly more than half of the students had a positive perception of the CBIS.
4. Allesi & Trollip (2001) consider fidelity an important feature of CBIS. While many participants in this study found the CBIS to have a high level physical fidelity, the large

volume of complaints pertaining to the functional fidelity of this CBIS should be noted. The two largest negative themes found in the study were complaints pertaining to the sensitivity and the bugs found in the CBIS.

Recommendations

The findings and conclusions for this study have resulted in the following recommendations for practice and further research.

Practice. Based on the finding and conclusions for this study, the following recommendations for practice are presented:

1. Technical colleges should use this research as a starting point for discussions on improving the effectiveness of the online introduction to computer applications course through the use of CBIS.
2. Technical colleges should use this research as a starting point for discussions on improving the effectiveness of online courses with a lab component through the use of CBIS.

Further Research. Based on the finding and conclusions for this study, the following recommendations for additional study are presented:

1. A replication of this study should be conducted utilizing a longitudinal survey method to evaluate the student experience at different times during the course.
2. This study should be extended to include a focus on learning outcomes and the impact of CBIS on learning instead of the current focus on student perceptions.
3. This study should be modified and expanded to seek data from students who withdraw from the online introduction to computer applications course during the quarter.

4. This study should be expanded to research the student learning experience and/or learning outcomes for all aspects of the course, not just the CBIS.

Summary

The results of this study indicate a positive perception of the CBIS in general and a positive perception of the impact of CBIS on learning for students enrolled in the final weeks of an online introduction to computer applications course at a technical college. The conclusions for this study discussed the perception that experiential learning had occurred in the course; the perception that transfer of learning had occurred; the conclusion that even participants with computer experience still had a positive perception of the CBIS; and the impact of sensitivity and bugs on the perception of the functional fidelity of the CBIS. Technical colleges should use this study as a starting point for discussions on the importance of CBIS in online courses with a lab component.

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Appendix A

Sample Syllabus

SCT100 – Introduction to Computers ONLINE

REQUIRED TEXT: *Introduction to Computers,* Shelly, Cashman, Vermaat, Course Technology, ISBN 1-4266-4239-8. *This is a custom textbook bundled with Microsoft Windows 7 Essential book and SAM Projects and can be purchased in the bookstore.*

Course-specific software requirements:

- Windows XP, Vista, or 7
- Office 2007 with Word, PowerPoint, Excel, and Access. (Be certain Access is included in Office -- not all versions of Office include Access).
- Projects access code (purchased in bundle with book from GTC bookstore). Projects and Microsoft Windows 7 Essential book can also be purchased separately. The bookstore has a trial copy of Office 2007 available for purchase.

COURSE DESCRIPTION: The course introduces fundamental concepts and operations necessary to use microcomputers. Emphasis is placed on basic functions and familiarity with computer use. Course content includes computer terminology and introduction to Windows OS, Office XP, networking terminology, word processing, and spreadsheet, database, and PowerPoint applications. Also includes introduction to e-mail and Internet/World Wide Web use.

COURSE OBJECTIVES:

1. **Computer & Networking Terminology:** Student will define common terms such as operating system, CPU, etc. The ability to define these terms and differentiate between terms will be demonstrated through class exercises and written exam.
2. **Windows Environment:** Student will demonstrate ability to perform basic Window GUI operations using a mouse. The ability to use this environment will be demonstrated via practices, exercises, practical and written exams.
3. **Internet/WWW:** Student will demonstrate ability to send and receive e-mail and to access the Internet. This ability will be tested via class exercises.
4. **Intro to Word Processing:** Student will demonstrate ability to create, name, edit, store, format, and recall files. These abilities, along with the ability to spell check, will be tested via written and practical exams.
5. **Intro to spreadsheets:** Student will demonstrate ability to create, name, edit, store, format, and recall files. These abilities will be tested via written and practical exams.

6. **Intro to Databases:** Student will demonstrate ability to create, name, edit, store, format, and recall files. These abilities will be tested via written and practical exams.

- **Intro to PowerPoint:** Student will demonstrate ability to create, name, edit store, format, and recall presentation files. These abilities will be demonstrated via practices, exercises, and written exam.

INSTRUCTIONAL DELIVERY METHODS: Lecture notes, PowerPoint presentations, hands-on lab projects, and textbook reading

SUPPLEMENTAL INSTRUCTION: Students requiring additional instruction should contact the Student Support Center in Room A233 or schedule an appointment with the instructor for additional assistance.

CONTACT HOURS PER WEEK (Lecture/Lab): ~1 Lecture /~2 Lab

WORK ETHICS GRADE: Your Work Ethics Grade will appear on your school transcript but will not preclude you from graduating. The grade will be based on Attendance, Character, Teamwork, Appearance, Attitude, Productivity, Organization, Communication, Cooperation, and Respect. Your completion of work ethics assignments will determine your work ethics grade for the quarter. Work Ethics assignments are listed under the "Communicate" tab in ANGEL – all answers will be posted using the Discussion Forum in ANGEL.

GRADING SCALE: 90-100 = A / 80 – 89 = B / 70 – 79 = C / 60 – 69 = D (no credit) / 0 – 59 = F (no credit)

All grades will be posted in ANGEL. To view your grades in ANGEL:

1. Click on the Reports (Grades) tab
2. Under "Category" select "Grades"
3. Wait for screen to refresh
4. Click "RUN"
5. Screen should refresh and grade report should appear

Final course averages in ANGEL are not official. Official grades will be available in Gateway and BannerWeb at the end of the quarter. In the event of a conflict between the ANGEL average and the Gateway average, the Gateway average will be the average reported to the school.

ATTENDANCE POLICY: Students must complete the required course assignment by the first Thursday of the quarter to avoid being reported as a No-Show for the class and withdrawn. Students must remain active throughout the quarter by completing assignments weekly and maintaining contact with the instructor. The educational programs at Georgia Technical College reflect those requirements and standards that are necessary for future successful employment in business and industry. Employers expect their employees to be present and to be on time for work each and every day. Likewise, GTC expects each student to be present and to be on time each and every day for all classes. Consequently, excessive absenteeism and tardiness may impact work ethics evaluations and course grades. Therefore, it may become necessary to withdraw from a course due to excessive absenteeism. Formal withdrawal from the college or a particular course is the sole responsibility of the student. Failure to complete the formal withdrawal process through Student Services may result in a failing grade for the course and could jeopardize financial aid status.

Records of absences are maintained by each instructor. GTC is aware of unforeseen emergencies; however, it is the student's responsibility to make sure they meet the requirements for attendance in their program of study. Students absent from class for any reason are still responsible for all work missed. Students should enroll only in those classes that they can reasonably expect to attend on a regular basis. The 38th day of the quarter is the last day you can drop a class and still receive a WP if you have a 70 average or above. After this day, you will receive a WF.

STOPPED ATTENDING POLICY: After a student has completed the required first assignment, he/she is considered on the class roster. At mid-term or at any time during the quarter prior to mid-term, faculties are required to identify in Gateway students who have stopped attending. The definition of "stopped attending" is:

- A student who has not submitted an assignment (excluding work ethics) in an on-line course for 14 consecutive calendar days.

It is the student's responsibility to contact the instructor if s/he is to be absent from class or has missed class. It is the instructor's decision as to whether to allow the student to return to class that quarter or to submit the student as "stopped attending" if the student misses the above defined number of classes/hours.

Students submitted as "stopped attending" are not eligible to be reinstated in the course for that quarter; they will receive a grade of "WF", Withdrew Failing, unless the student withdraws from the course using the appropriate withdrawal procedure.

EVALUATION PROCEDURE:

WRITTEN TESTS (15% of course grade): The format for the written tests will be a mixture of various types of questions: e.g., short answer, essay, scenario, and multiple choices. The tests will cover all material covered in the class, including lectures notes, text, lab work, and other assigned reading. Written Tests will be taken in ANGEL in accordance to the schedule. (see schedule for due dates). Failure to complete a test prior to the due date will result in a grade of zero – DO NOT wait until the last minute to take tests – in the event you are knocked off-line during a test, there will be a one-day delay in resetting the test. If you wait until Sunday to take the test and are knocked off-line, you will not have time to complete the test prior to the due date – which means a grade of zero will be assigned. If you are knocked off-line during a test, please email the instructor in ANGEL.

PRACTICAL TESTS (55% of course grade): The practical tests will involve completion of tasks related to the material. Information for all Practical Tests will be posted in ANGEL. However, 3 of the Practical exams will be submitted to Projects.

WRITTEN FINAL EXAM (20% of course grade): The Final Exam will be comprehensive and will follow the format and rules for course tests. It will be posted and taken in ANGEL.

CLASS ASSIGNMENTS / LAB ASSIGNMENTS (10% of course grade): Class and lab assignments will be utilized to gauge understanding of course concepts. Assignment due dates are located on the course schedule -- LATE ASSIGNMENTS ARE NOT GENERALLY ACCEPTED unless agreed upon in advance. All assignments will be submitted through their respective drop box in ANGEL or into Projects. Please **DO NOT send assignments to the instructor's school email account**.

STUDENT RIGHTS, RESPONSIBILITIES, & CONDUCT: All students are expected to follow GTC rules and policies as established in the GTC Catalog / Student Handbook. Students are expected to uphold the school's standard of conduct relating to academic honesty. Students assume full responsibility for the content and integrity of the academic work they submit. The guiding principle of academic integrity shall be that a student's submitted work, examinations, reports, and projects must be that of the student's own work. Students shall be guilty of violating the honor code if they:

- Represent the work of others as their own
- Use or obtain unauthorized assistance in any academic work
- Give unauthorized assistance to other students
- Misrepresent the content of submitted work

The penalty for violating the honor code is severe. Any student violating the honor code is subject to receive a failing grade for the course and will be reported to the Vice-President of Academic Affairs. If a student is unclear about whether a particular situation may constitute an honor code violation, the student should meet with the instructor to discuss the situation.

For this class, it is permissible to assist classmates in general discussions of computing techniques. General advice and interaction are encouraged. Each person, however, must develop his or her own solutions to the assigned projects, assignments, and tasks. In other words, students may not "work together" on graded assignments. Such collaboration constitutes cheating. A student may not use or copy (by any means) another's work (or portions of it) and represent it as his/her own. If you need help on an assignment, contact your instructor or the tutor, not other classmates.

COMPUTER-RELATED CONDUCT:

- Please remember an e-mail in all CAPS is considered SHOUTING
- Email correspondence with the instructor should have proper grammar, spelling, and punctuation
- School computers are not to be used to complete your online class assignments
- All correspondence with the instructor for this course should be sent to the instructor using Course Mail in ANGEL. Emails that are time-sensitive should be sent directly to the instructor's school email account.

DISABILITY ACCOMODATIONS: A student who believes he/she has a disability of any type should contact xxxxxxx in the Student Support Center or by phone at xxx-xxx-xxxx.

SPECIAL NOTE: Please check for Announcements on the Course screen (main screen) in ANGEL often for important course information.

<table>
<tr><th colspan="3">SCT 100 Tentative Class Schedule</th></tr>
<tr><td colspan="3">All assignments and tests are due by midnight of the date(s) listed.</td></tr>
<tr><td colspan="3">YOUR FIRST ASSIGNMENT:
To remain in the course, you must complete the SETTING UP SIM assignment by <u>midnight, Sunday, October 3.</u>

YOUR SECOND ASSIGNMENT:
Before you can begin your Week 1 Assignments, you must complete the ONLINE INTRO QUESTIONNAIRE.</td></tr>
<tr><th>Work Ethics</th><th>Week</th><th>Dates</th></tr>
<tr><td rowspan="2">Attendance</td><td>Week 1 Assignments</td><td></td></tr>
<tr><td colspan="2">• Contacting your Instructor
• ANGEL Videos
• Introductions Discussion Board
• Read "Introduction to Computers" pages COM2-COM34
• Attendance Discussion Board</td></tr>
<tr><td rowspan="2">Character</td><td>Week 2 Assignments</td><td></td></tr>
<tr><td colspan="2">• This week you will read and follow the steps in either:

Introduction to Windows 7 (pages WIN 2 - WIN 65)
OR
Introduction to Windows Vista (pages WIN VISTA 2 - WIN VISTA 65)
OR
Introduction to Microsoft Windows and Steps for the Windows XP User (APP 35 - 103)
Please read the Intro that corresponds to the operating system on your computer

• Training Assignment - Windows Training
• Student Email and Banner
• Character Discussion Board
• October 11 –School Holiday (Columbus Day)</td></tr>
<tr><td rowspan="2">Teamwork</td><td>Week 3 Assignments</td><td></td></tr>
<tr><td colspan="2">• Intro to Computers Written Test
• Intro to Windows Practical Test

• Tutorial Video DVD
• Office 2007 Information
• Read and follow the steps: Word Chapter 1: Creating and Editing a Word Document pages WD2 - WD62
• Teamwork Discussion Board</td></tr>
</table>

<table>
<tr><th>Work Ethics</th><th>Week</th><th>Dates</th></tr>
<tr><td rowspan="2">Appearance</td><td>Week 4 Assignments</td><td></td></tr>
<tr><td colspan="2">

Practice Assignment – In the Lab 1: Creating a Flyer with a Picture
Project Assignment - Creating a Flyer with a Picture
Read and follow the steps: Word Chapter 2: Creating a Research Paper WD74 - WD129
Practice Assignment – In the Lab 1: Preparing a Short Research Paper
Project Assignment – Preparing A Short Research Paper
Training Assignment - Word Training
Appearance Discussion Board

</td></tr>
<tr><td rowspan="2">Attitude</td><td>Week 5 Assignments</td><td></td></tr>
<tr><td colspan="2">

Word Written Test
Word Practical Test
Read and follow the steps: Excel Chapter 1: Creating a worksheet and an Embedded Chart EX2 - EX69
Practice Assignment – In the Lab 1: Annual Cost of Goods Worksheet
Project Assignment – Konas Expresso Coffee – Annual Cost of Sales
Attitude Discussion Board
October 29 – Student Holiday

</td></tr>
<tr><td rowspan="2">Productivity</td><td>Week 6 Assignments</td><td></td></tr>
<tr><td colspan="2">

Read and follow the steps: Excel Chapter 2: Formulas, Functions, Formatting, and Web Queries EX82 - EX143
Practice Assignment – Apply Your Knowledge Profit Analysis Worksheet
Project Assignment – Façade Importers – Sales Analysis Worksheet
Training Assignment - Excel Training
Productivity Discussion Board
November 11 –School Holiday (Veterans Day)

</td></tr>
<tr><td rowspan="2">Organization</td><td>Week 7 Assignments</td><td></td></tr>
<tr><td colspan="2">

Excel Written Test
Excel Practical Test
Read and follow the steps: Access Chapter 1: Creating and Using a Database (pp AC2 - AC63)
Practice Assignment - Changing Data, Creating a Form, and Creating a Report
Organization Discussion Board

</td></tr>
</table>

<table>
<tr><th>Work Ethics</th><th>Week</th><th>Dates</th></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Communication</td><td colspan="2">Project Assignment - Creating the JMS TechWizards Database
Read and follow the steps: Access Chapter 2: Querying a Database Using the Select Query Windows (pp AC74 - AC96)
Practice Assignment - Using the Query Wizard, Creating a Parameter Query, Joining Tables, and Creating a Report
Communication Discussion Board
November 24 – Student Holiday
November 25 –School Holiday (Thanksgiving Day)
November 26 -School Holiday</td></tr>
<tr><td rowspan="2">Cooperation</td><td>Week 9 Assignments</td><td></td></tr>
<tr><td colspan="2">Project Assignment - Querying the JMS TechWizards Database
Training Assignment - Access Training
Access Written Test
Access Practical Test
Cooperation Discussion Board</td></tr>
<tr><td rowspan="2">Respect</td><td>Week 10 Assignments</td><td></td></tr>
<tr><td colspan="2">Read and complete the steps: PowerPoint Chapter 1: Using a Design Template and Text Slide Layout to Complete a Presentation pp PPT2 - PPT65
Read and complete the steps: Supplemental -- Adding a Transition pp PPT122 - PPT125
Project Assignment – Creating a Presentation with a Bulleted List – Establishing Credit
Training Assignment - PowerPoint Training
PowerPoint Written Test
PowerPoint Practical Test</td></tr>
<tr><td rowspan="2"></td><td>FINAL EXAM</td><td></td></tr>
<tr><td colspan="2">In class December 15th</td></tr>
<tr><td rowspan="2"></td><td>IMPORTANT DATES</td><td></td></tr>
<tr><td colspan="2">Drop/Add ends
Mid-Quarter is
Last day to withdraw from class without a mandatory WF is

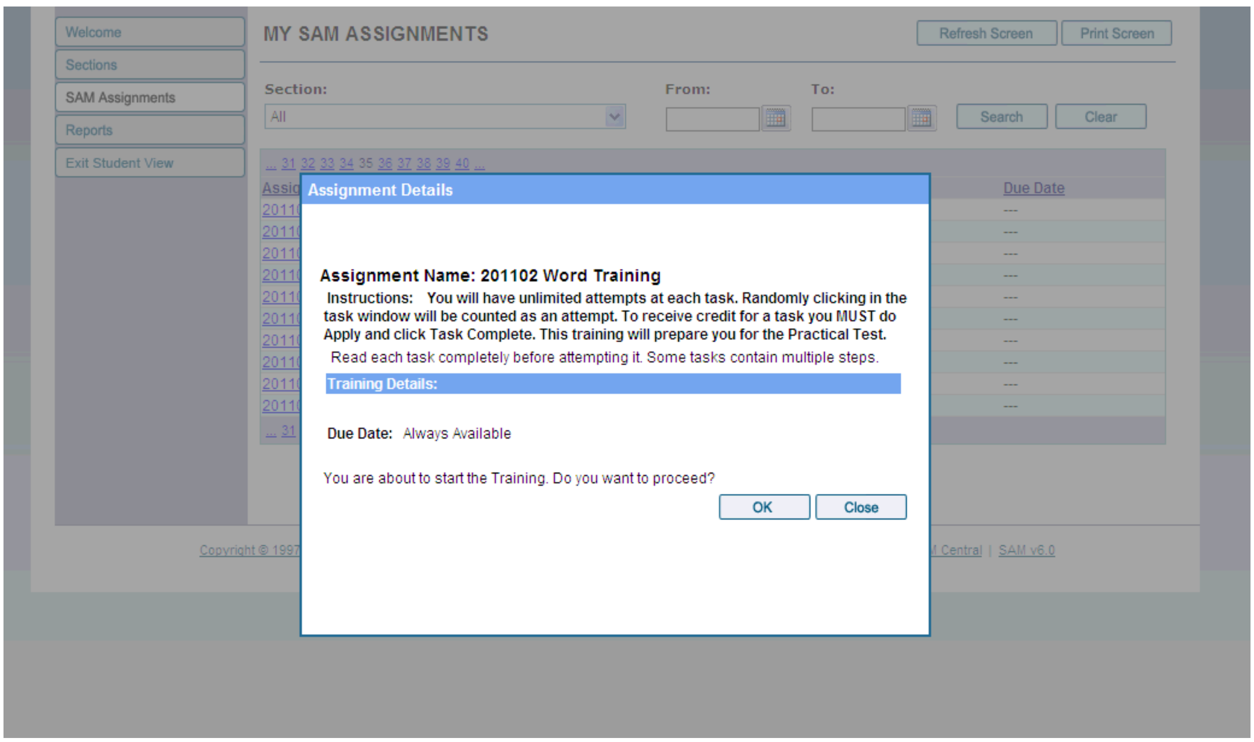
CURRENT STUDENT REGISTRATION FOR NEXT QUARTER:</td></tr>
</table>

Appendix B

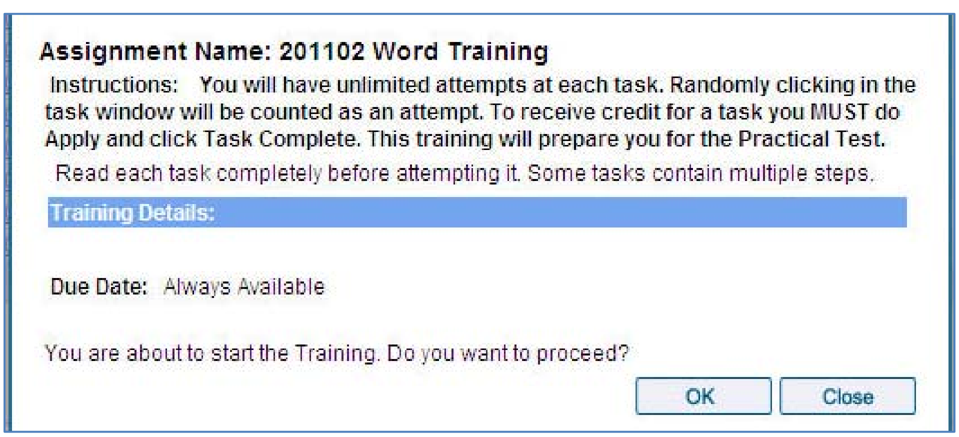
CBIS Screen Shots

Student View Entering Word Training

Partial window view.



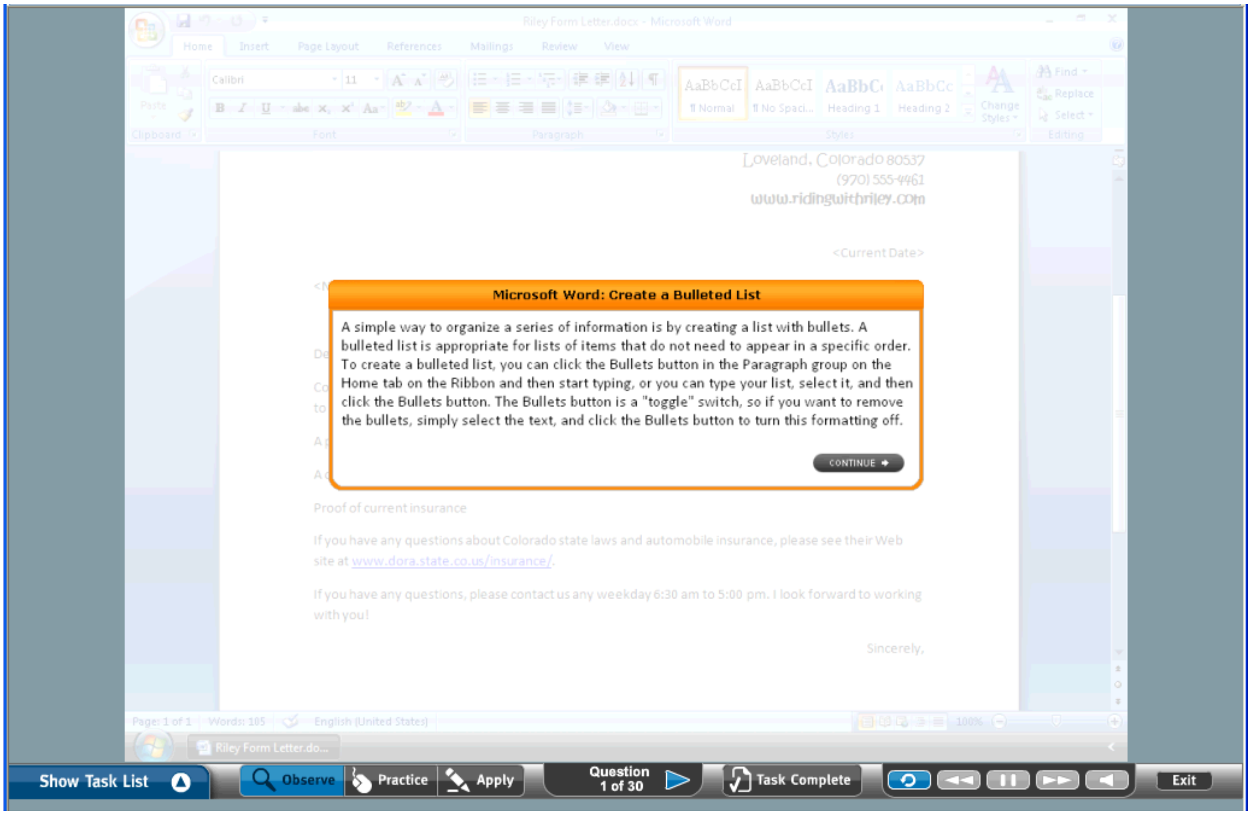
Zoom view.



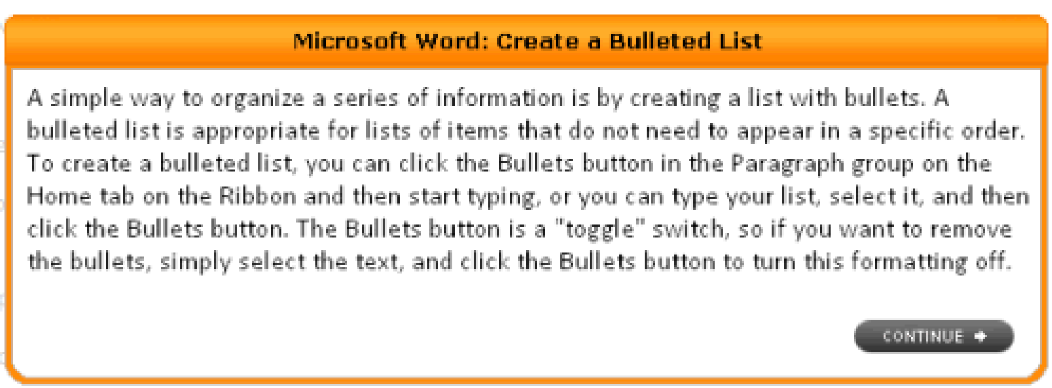
Sample Word Training Exercise Introduction

Complete window view.

Each Word training exercise is introduced with a short description of the task(s) to be completed.

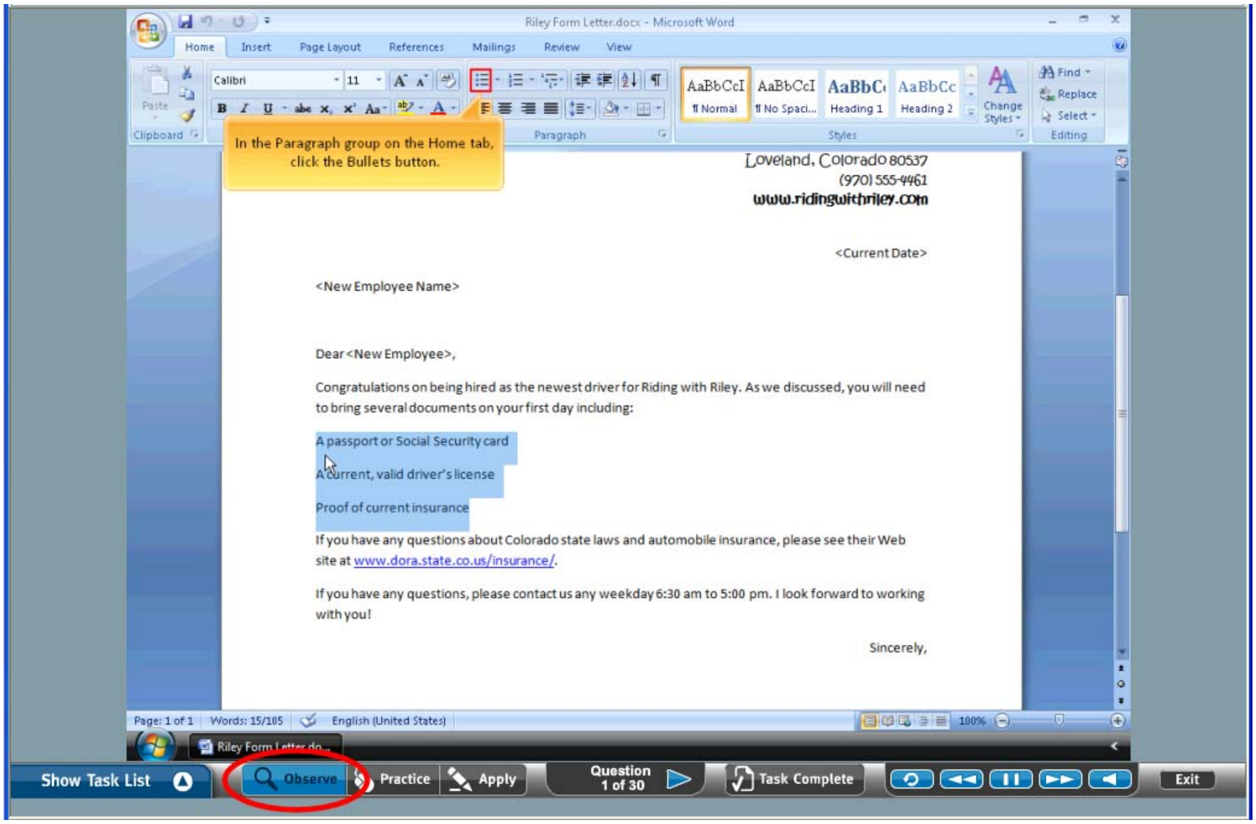


Zoom view.



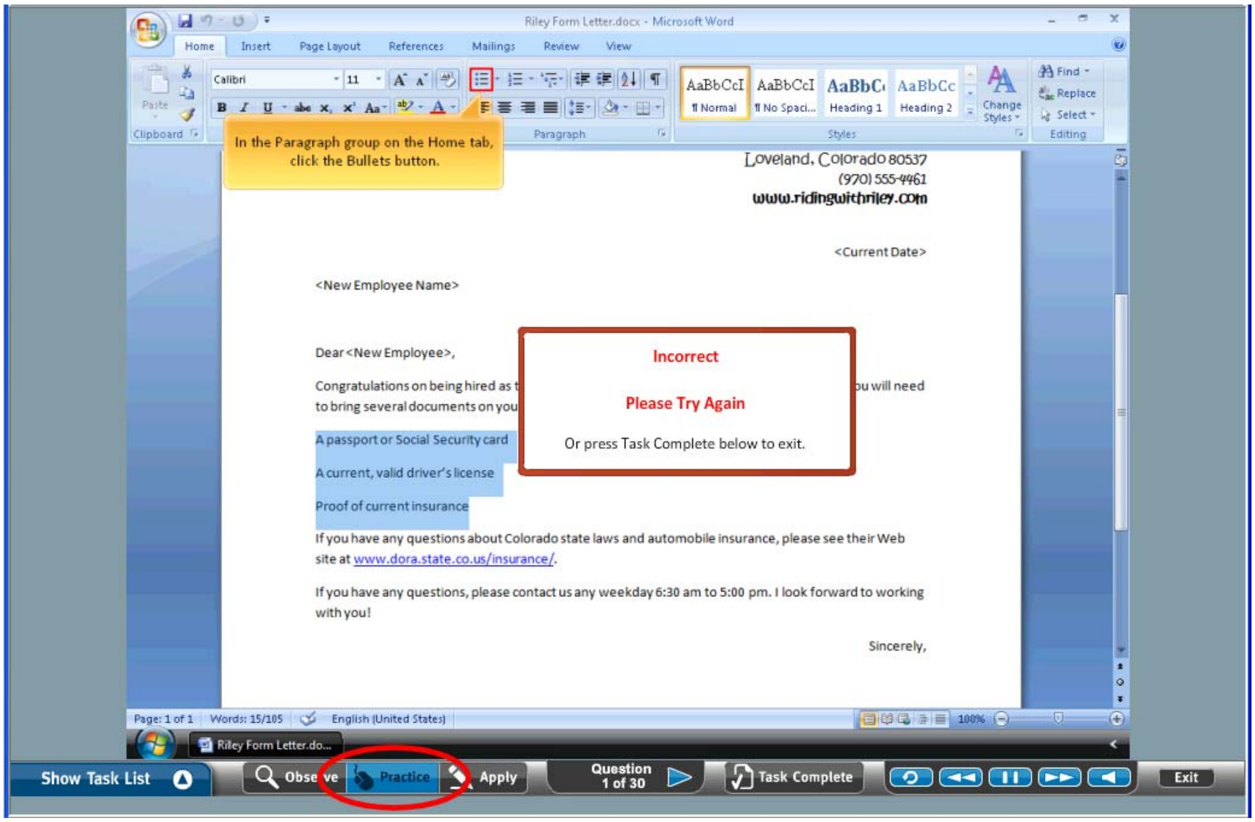
Sample Word Training Exercise – Observe Mode

The observe mode includes both sound and motion. A narrator speaks the steps while the program is manipulated to complete the steps (the student sees the mouse move, menus open, etc.). Text-based callouts are also included.



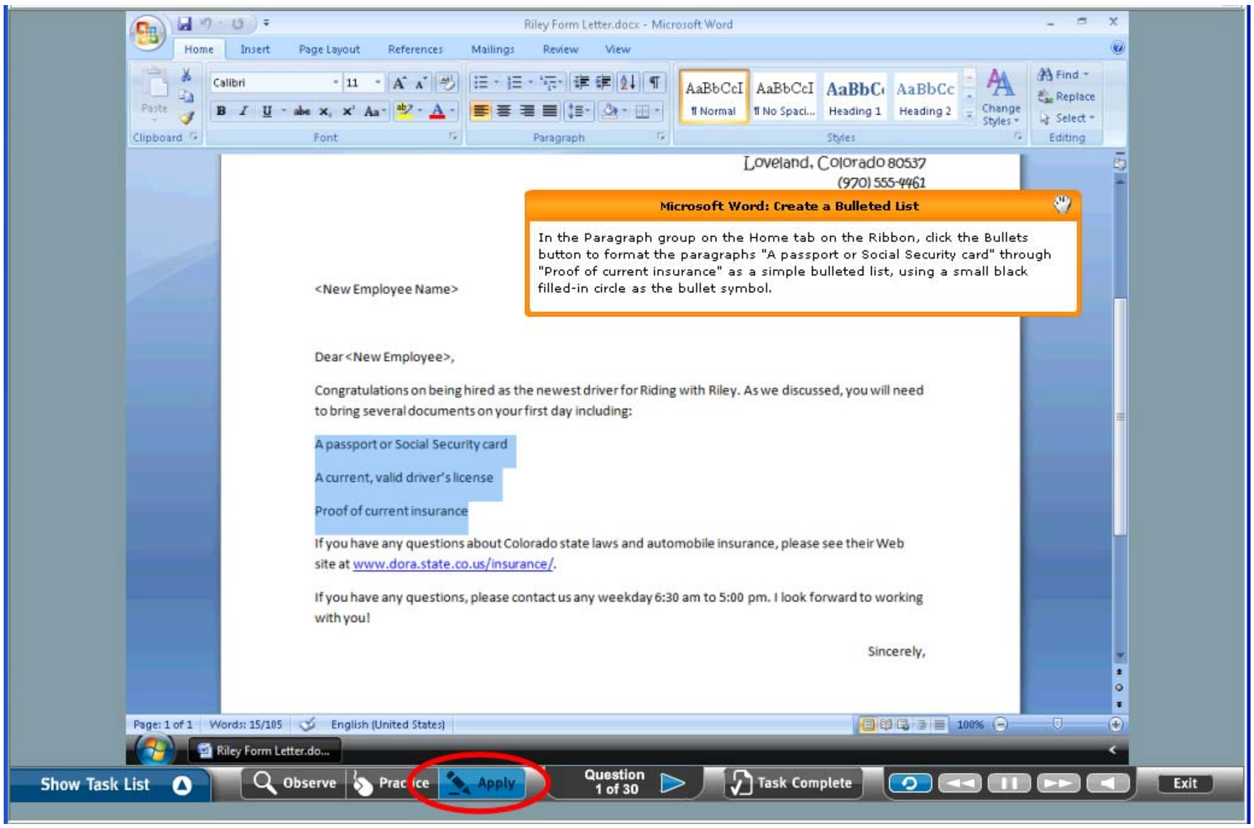
Sample Word Training Exercise – Practice Mode

The practice mode includes both sound and motion. A narrator speaks the steps while the student manipulates the program to complete the steps (the student sees the mouse move, menus open, etc.). If the student makes a mistake, a prompt appears requesting the student try again. Text-based callouts are also included.

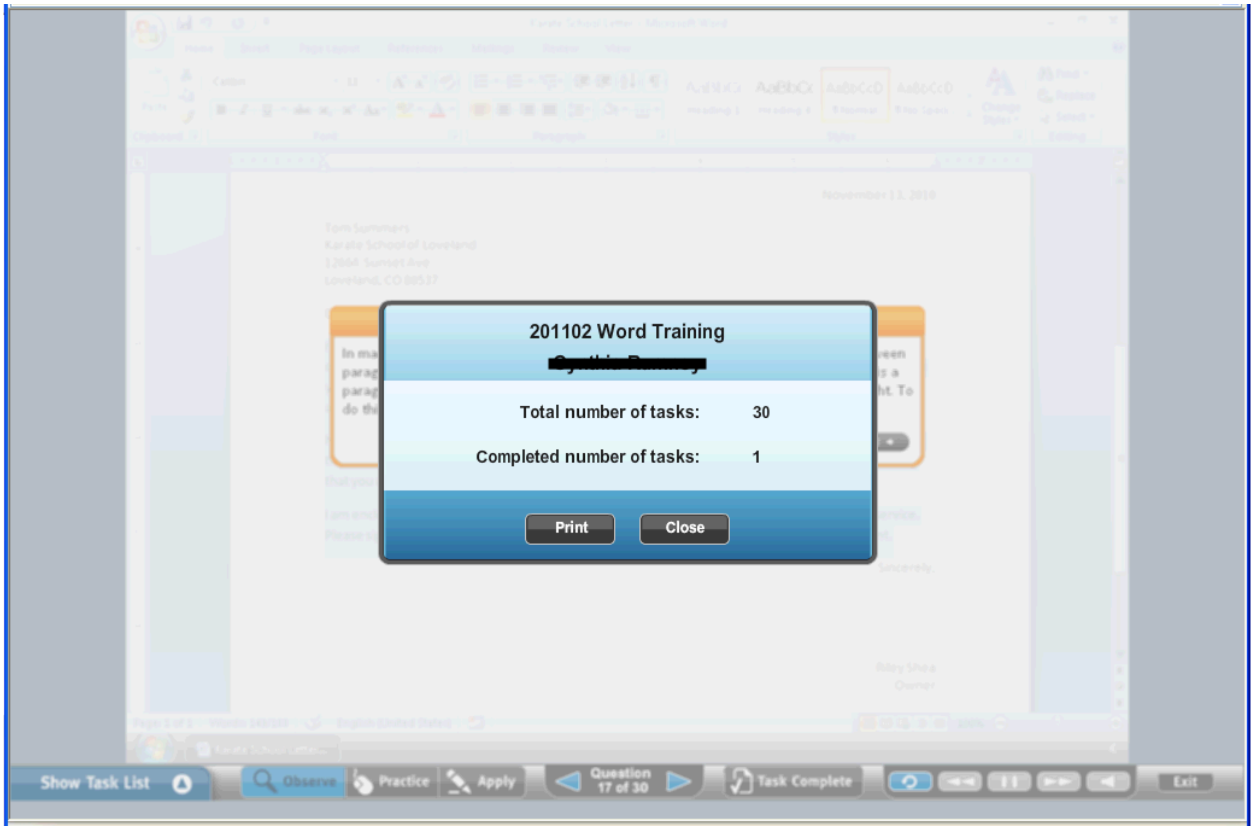


Sample Word Training Exercise – Apply Mode

The exercise mode includes a text box with a reminder of the directions. The student is responsible for completing the task without voice prompts or call-outs. The student is notified of mistakes and allowed to attempt the task again. On the exercises, repeat attempts are allowed until the student correctly completes the task. On the test, the student is only allowed three attempts to correctly complete the task.



Conclusion of Word Training Exercise



Student Training Progress Report

Training Progress

Tuesday, October 26, 2010

Student: [redacted]

Launch Assignment

Assignment: 201102 Word Training

Percent Complete: 3% (1/30)

Subject	Activity	Task ID	Task	Completed
MS Word 2007	Use the Undo and Redo buttons	1054	Delete the text "www.ridingwithriley.com" in the last line of the current document, restore the text by clicking Undo on the Quick Access Toolbar, then delete the text once again by clicking Redo on the Quick Access Toolbar.	--
MS Word 2007	Insert Text	490	Click the Insert tab on the Ribbon, click the Quick Parts button in the Text group, point to Document Property, and then click Title to insert the document's title.	--
MS Word 2007	Indent Paragraph	475	Drag the First Line Indent marker on the ruler to the .5-inch mark to indent the first line of the three selected paragraphs.	10/26/2010 2:10:00 PM
MS Word 2007	Center a paragraph	1058	In the Paragraph group on the Home tab on the Ribbon, click the Center button to horizontally center the text "Child Care Shuttle Registration Form" in the current document.	--
MS Word 2007	Line Spacing	511	Click the Line spacing button in the Paragraph group on the Home tab to change the line spacing of the selected paragraph to 1.5 spacing.	10/26/2010 2:20:20 PM
MS Word 2007	Create a bulleted list	1127	In the Paragraph group on the Home tab on the Ribbon, click the Bullets button to format the paragraphs "A passport or Social Security card" through "Proof of current insurance" as a simple bulleted list, using a small black filled-in circle as the bullet symbol.	10/26/2010 2:12:00 PM

Appendix C

Invitation to Participate

SCT100 Online Students,

You are invited to participate in a research study conducted by Cynthia Rumney, a student in the Department of Adult Education at the University of Georgia. As a participant in the study, you will asked to complete a survey based on your experience with simulations (i.e. SAM training and practical testing in SAM) in SCT100.

Participants who complete the survey will be entered into a drawing to win one of four $50 Visa Gift Cards!

To access the survey, please go to the Lessons tab and click the link titled “RESEARCH STUDY SURVEY.” You will be presented with an informational letter and consent form prior to beginning the survey. Please complete the survey prior to midnight, Sunday, Month day, 2011.

Please do not hesitate to contact me if you have questions.

Thank you in advance for your participation,

Cynthia Rumney

Appendix D

Interview Questions

1. Please describe your level of computer knowledge prior to taking the online introduction to computers course.

2. Please describe the experience of setting up SAM.

3. What was your initial perception when completing the first SAM Training exercise for Windows?

4. Did this perception change as you moved through the Word, Excel, Access, and PowerPoint SAM Training exercises and the Practical Tests? If so, how?

5. Do you feel the SAM Training exercises were beneficial to your understanding of the course material? SAM Practical Tests?

6. Would you say the SAM Training exercises were worth the time and effort required? Why or why not? SAM Practical Tests?

7. What, if any, challenges did you face using SAM? Can you provide any examples?

8. At any time during the Case Study exercises, did you draw on skills learned from the SAM Training ?

9. Was the SAM Training and Practical test environment representative of the real application? Why or why not?

10. Please rate your overall experience with SAM Training and Practical tests on a scale of 1 – 10 (1 = awful and 10 = great). Can you elaborate?

11. What additional comments and/or suggestions would you like to share on SAM in particular and/or the course in general?

Appendix E

Questionnaire Draft Prior to Expert Review

Student Perceptions of SAM Training and Practical Testing Survey

Purpose, confidentiality and contact info here

Section I: The purpose of this section is to explore your perceptions of the SAM Training Exercises and the SAM Practical tests in your online SCT100 course. Please answer each question carefully, then click “Next” to move to the next question.

1. How was your experience setting up SAM for the first time?
    - Very Good
    - Good
    - Fair
    - Poor
    - Very Poor

2. What is your current perception of the SAM Training exercises?
    - Very Good
    - Good
    - Fair
    - Poor
    - Very Poor

3. How many hours did it take you to complete the SAM Training for Word? Please round to the nearest hour. Please enter a “0” if you did **not** complete the SAM Training for Word.

4. How long did it take you to complete the SAM Training for Excel? Please round to the nearest hour. Please enter a “0” if you did **not** complete the SAM Training for Excel.

5. How long did it take you to complete the SAM Training for Access? Please round to the nearest hour. Please enter a "0" if you did **not** complete the SAM Training for Access.

6. A. To what extent do you agree or disagree that the SAM *Training Exercises* were worth the time required?
    - Strongly Agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree

   6. B. Please explain your answer in the space below. (Your explanation is very important to understanding the student experience with SAM. Please take your time and provide as much detail as possible.)

7. A. To what extent do you agree or disagree that the SAM *Training Exercises* were worth the effort required?
    - Strongly Agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree

7. B. Please explain your answer in the space below. (Your explanation to this question is very important to understanding the student experience with SAM. Please take your time and provide as much detail as possible.)

8. A. Do you agree or disagree that the SAM Training exercises were representative of the real program? For example, did the Word Training simulation "feel" like the real Word program?
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree

   8. B. Please explain your answer in the space below.

9. A. Did you face any challenges when using SAM Training?
   - Yes
   - No

9. B. If you faced challenges when using SAM Training, please provide details in the space below.

10. A. If you were teaching this course, would you have your students use SAM Training?

- Yes
- No

10. B. Please explain your answer in the space below.

11. A. If you were teaching this course, would you have your students use SAM Practical tests?

- Yes
- No

11. B. Please explain your answer in the space below.

12. Please rate your overall experience with the SAM *Training Exercises*
    - Strongly Favorable
    - Favorable
    - Neutral
    - Unfavorable
    - Strongly Unfavorable

13. In the space below, please share any additional comments and/or suggestions you have pertaining to SAM *Training Exercises*. Provide as much detail as possible.

14. What is your overall experience with the SAM *Practical Tests*
    - Strongly Favorable
    - Favorable
    - Neutral
    - Unfavorable
    - Strongly Unfavorable

15. In the space below, please share any additional comments and/or suggestions you have pertaining to SAM *Practical Tests*. Provide as much detail as possible.

Section II: The purpose of this section is to explore your perceptions of the impact of the SAM Training Exercises on learning. Please answer each question carefully, then click “Next” to move to the next question.

16. The SAM Training exercises have three components: Observe, Practice, and Apply. Which of the SAM Training components listed below did you use when completing the training exercises? Please only check components you used more than once. Please check all that apply.

☐ Observe
☐ Practice
☐ Apply

17. To what extent do you agree or disagree that the SAM *Training Exercises* were beneficial to your understanding of the SCT100 course material?

○ Strongly Agree
○ Agree
○ Neutral
○ Disagree
○ Strongly Disagree

18. How often have you used skills learned in the SAM *Training Exercises* in other areas of the SCT100 course?
    - Very Frequently
    - Frequently
    - Occasionally
    - Very Rarely
    - Never

19. To what extent do you agree or disagree that the SAM *Training Exercises* helped prepare you for the SAM *Practical Tests*?
    - Strongly Agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree

20. During the SAM *Projects Exercises*, how often did you use skills learned from the SAM Training Exercises?
    - Very Frequently
    - Frequently
    - Occasionally
    - Very Rarely
    - Never

21. How helpful do you feel the SAM Training Exercises have been to you outside the SCT100 course?
    - Extremely helpful
    - Very helpful
    - Moderately helpful
    - Slightly helpful
    - Not at all helpful

22. How often did you use skills learned from the *SAM Training Exercises* outside of your SCT100 course?
    - Very Frequently
    - Frequently
    - Occasionally
    - Very Rarely
    - Never

Section III: The purpose of this section is to determine your level of computer experience prior to beginning the SCT100 course.

23. What was your previous computer experience (before enrolling in the SCT100 course)? For each task listed below, please select either "Yes" or "No" based on your experience prior to enrolling in SCT100.

I could turn a computer on	☐	Yes	☐	No
I could surf the Internet	☐	Yes	☐	No
I could open email	☐	Yes	☐	No
I could send email	☐	Yes	☐	No
I could send attachments via email	☐	Yes	☐	No
I used social networking sites	☐	Yes	☐	No
I wrote a letter using Word Processing software such as Microsoft Word	☐	Yes	☐	No
I created a basic spreadsheet using a Spreadsheet program such as Microsoft Excel	☐	Yes	☐	No
I created a basic database using a database program such as Microsoft Access	☐	Yes	☐	No
I transferred photos from a camera to a computer	☐	Yes	☐	No
I edited photos on a computer	☐	Yes	☐	No
I designed web pages	☐	Yes	☐	No

24. Before enrolling in the SCT100 course, about how much time did you spend using a computer each week? Please round to the nearest hour.
    - Less than 1 hour
    - 1 – 10 hours
    - 11 – 20 hours
    - 21 – 30 hours
    - 31 - 40 hours
    - 41 – 50 hours
    - More than 51 hours

Section IV: The purpose of this section is to gather basic demographic data. Please answer each question carefully, then click “Next” to move to the next question.

25. What is your race/ethnicity? Please select the option you most closely relate to below.
    - American Indian or Alaskan Native
    - Asian or Pacific Islander
    - Black or African American
    - Hispanic
    - White

26. What is your age?

27. What is your gender? Please select the option you most closely relate to below.
    - Female
    - Male

28. What is your previous education level (before enrolling in the SCT100 course)?

- High school or GED
- Some college
- College level diploma
- Associates Degree
- Bachelors Degree
- Masters Degree
- None of the above

Please click “Submit” below to complete the survey. Once submitted, you should see a screen that states “submission complete.” If you do not

Thank you very much for your time and effort!

Appendix F

Email to Experts Requesting Review of Questionnaire

All,

If you don't mind, will you please review and critique the attached survey for SCT100? This survey is for my research and needs to be reviewed by content experts. The purpose of the study is to explore the student experience with SAM Training and SAM Practical tests.

My research questions are:

1) What are the student perceptions of the CBIS in general?

2) What are the students perceptions on the impact of the CBIS on learning?

3) To what extent does student previous computer experience relate to the student experience with CBIS?

(CBIS = Computer based instructional simulation, i.e. SAM Training and Practical Tests)

Please use the track changes option in Word if you make/suggest any changes.

Thanks!
Cindy

Appendix G

Questionnaire Draft Prior to Critique Session

Student Perceptions of SAM Training and Practical Testing Survey

Purpose, confidentiality and contact info here

Section I: The purpose of this section is to explore your perceptions of the SAM Training Exercises and the SAM Practical tests in your online SCT100 course. Please answer each question carefully, then, click “Next” to move to the next question.

1. How was your experience setting up SAM for the first time?
   - Very Good
   - Good
   - Fair
   - Poor
   - Very Poor

2. What is your current perception of the SAM Training exercises?
   - Very Good
   - Good
   - Fair
   - Poor
   - Very Poor

3. How many hours did it take you to complete the SAM Training for Word? Please round to the nearest hour. Please enter a “0” if you did **not** complete the SAM Training for Word.

4. How long did it take you to complete the SAM Training for Excel? Please round to the nearest hour. Please enter a “0” if you did **not** complete the SAM Training for Excel.

5. How long did it take you to complete the SAM Training for Access? Please round to the nearest hour. Please enter a “0” if you did **not** complete the SAM Training for Access.

6. A. To what extent do you agree or disagree that the SAM *Training Exercises* were worth the time required?
    - Strongly Agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree

    6. B. Please explain your answer in the space below. (Your explanation is very important to understanding the student experience with SAM. Please take your time and provide as much detail as possible.)

7. A. To what extent do you agree or disagree that the SAM *Training Exercises* were worth the effort required?
    - Strongly Agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree

7. B. Please explain your answer in the space below. (Your explanation to this question is very important to understanding the student experience with SAM. Please take your time and provide as much detail as possible.)

8. A. Do you agree or disagree that the SAM Training exercises were representative of the real program? For example, did the Word Training simulation "feel" like the real Word program?
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree

8. B. Please explain your answer in the space below.

9. A. Did you face any challenges when using SAM Training?
   - Yes
   - No

9. B. If you faced challenges when using SAM Training, please provide details in the space below.

10. A. If you were teaching this course, would you have your students use SAM Training?

- ○ Yes
- ○ No

10. B. Please explain your answer in the space below.

11. A. If you were teaching this course, would you have your students use SAM Practical tests?

- ○ Yes
- ○ No

11. B. Please explain your answer in the space below.

12. Please rate your overall experience with the SAM *Training Exercises*
    - Strongly Favorable
    - Favorable
    - Neutral
    - Unfavorable
    - Strongly Unfavorable

13. In the space below, please share any additional comments and/or suggestions you have pertaining to SAM *Training Exercises*. Provide as much detail as possible.

14. What is your overall experience with the SAM *Practical Tests*
    - Strongly Favorable
    - Favorable
    - Neutral
    - Unfavorable
    - Strongly Unfavorable

15. In the space below, please share any additional comments and/or suggestions you have pertaining to SAM *Practical Tests*. Provide as much detail as possible.

Section II: The purpose of this section is to explore your perceptions of the impact of the SAM Training Exercises on learning. Please answer each question carefully, then, click “Next” to move to the next question.

16. The SAM Training exercises have three components: Observe, Practice, and Apply. Which of the SAM Training components listed below did you use when completing the training exercises? Please only check components you used more than once. Please check all that apply.
    - ☐ Observe
    - ☐ Practice
    - ☐ Apply

17. To what extent do you agree or disagree that the SAM *Training Exercises* were beneficial to your understanding of the SCT100 course material?
    - ○ Strongly Agree
    - ○ Agree
    - ○ Neutral
    - ○ Disagree
    - ○ Strongly Disagree

18. How often have you used skills learned in the SAM *Training Exercises* in other areas of the SCT100 course?
    - Very Frequently
    - Frequently
    - Occasionally
    - Very Rarely
    - Never

19. To what extent do you agree or disagree that the SAM *Training Exercises* helped prepare you for the SAM *Practical Tests*?
    - Strongly Agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree

20. During the SAM *Projects Exercises*, how often did you use skills learned from the SAM Training Exercises?
    - Very Frequently
    - Frequently
    - Occasionally
    - Very Rarely
    - Never

21. How helpful do you feel the SAM Training Exercises have been to you outside the SCT100 course?
    - Extremely helpful
    - Very helpful
    - Moderately helpful
    - Slightly helpful
    - Not at all helpful

22. How often did you use skills learned from the *SAM Training Exercises* outside of your SCT100 course?
    - ○ Very Frequently
    - ○ Frequently
    - ○ Occasionally
    - ○ Very Rarely
    - ○ Never

Section III: The purpose of this section is to determine your level of computer experience prior to beginning the SCT100 course.

23. What was your previous computer experience (before enrolling in the SCT100 course)? For each task listed below, please select either "Yes" or "No" based on your experience prior to enrolling in SCT100.

I could turn a computer on	☐	Yes	☐	No
I could surf the Internet	☐	Yes	☐	No
I could open email	☐	Yes	☐	No
I could send email	☐	Yes	☐	No
I could send attachments via email	☐	Yes	☐	No
I used social networking sites	☐	Yes	☐	No
I wrote a letter using Word Processing software such as Microsoft Word	☐	Yes	☐	No
I created a basic spreadsheet using a Spreadsheet program such as Microsoft Excel	☐	Yes	☐	No
I created a basic database using a database program such as Microsoft Access	☐	Yes	☐	No
I transferred photos from a camera to a computer	☐	Yes	☐	No
I edited photos on a computer	☐	Yes	☐	No
I designed web pages	☐	Yes	☐	No

24. How many years of experience do you have using a computer? Please type you answer in the box. Please round to the nearest year.

25. Before enrolling in the SCT100 course, about how much time did you spend using a computer each week? Please round to the nearest hour.
    - Less than 1 hour
    - 1 – 10 hours
    - 11 – 20 hours
    - 21 – 30 hours
    - 31 - 40 hours
    - 41 – 50 hours
    - More than 51 hours

Section IV: The purpose of this section is to gather basic demographic data. Please answer each question carefully, then, click "Next" to move to the next question.

26. What is your race/ethnicity? Please select the option you most closely relate to below.
    - American Indian or Alaskan Native
    - Asian or Pacific Islander
    - Black or African American
    - Hispanic
    - White

27. What is your age?

28. What is your gender? Please select the option you most closely relate to below.
    - Female
    - Male

29. What is your previous education level (before enrolling in the SCT100 course)?

- High school or GED
- Some college
- College level diploma
- Associates Degree
- Bachelors Degree
- Masters Degree
- None of the above

Please click “Submit” below to complete the survey. Once submitted, you should see a screen that states “submission complete.” If you do not

Thank you very much for your time and effort!

Appendix H

Email Request to Participate in Critique Session

Students,

You have been selected to participate in a critique session to assist in developing a questionnaire that will be used as part of a research study. The research study is being conducted by Cynthia Rumney, a student in the Department of Adult Education at the University of Georgia. You were selected for this critique session based on your completion of SCT100 online with SAM during last quarter.

As a participant in the critique session, you will be asked to complete a paper survey based on your experience with simulations (i.e. SAM training and practical testing in SAM) in SCT100. While completing the survey, you will be asked to note any problems you experienced with the survey, for example, confusing questions or poorly worded questions. You will then have the opportunity to share your input in a discussion about the survey questions.

The critique session will take place Wednesday, February 10th at 10AM in room B213.

Please do not hesitate to contact me if you have questions.

Thank you in advance for your participation,

Cynthia Rumney

Appendix I

Pilot Study Questionnaire

Student Perceptions of SAM Training and Practical Testing Survey

CONSENT FORM

I agree to participate in a research study titled "EXPLORING THE STUDENT EXPERIENCE: COMPUTER BASED INSTRUCTIONAL SIMULATION IN AN ONLINE INTRODUCTORY COMPUTER APPLICATIONS COURSE" conducted by Cynthia Rumney from the Department of Adult Education at the University of Georgia (478-988-6800) under the direction of Dr. Janette Hill, Department of Adult Education, University of Georgia (706-542-4035). I understand that my participation is voluntary. I can refuse to participate or stop taking part at anytime without giving any reason, and without penalty or loss of benefits to which I am otherwise entitled. I can ask to have all of the information about me returned to me, removed from the research records, or destroyed. I do not have to participate in the research to be entered into the drawing for the gift cards.

The reason for this study is to explore the student experience in relation to the use of computer based instructional simulation in an online introductory computer applications course. If I volunteer to take part in this study, I will be asked to do the following things:

1) Complete a survey to include demographic questions, questions related to my perception of previous computer experience, and questions related to my experience with simulation (i.e. SAM training and practical tests in SAM).
2) Allow the Principal Investigator and Co-Principal Investigator to review my grades from the course. Grade information will be collected after the completion of the quarter.
3) My information/identity will be kept confidential throughout the study (through the use of a pseudonym). My pseudonym will be linked to my name in a password-protected Microsoft Word document only and destroyed upon completion of this study.

The benefit for me is that participation in the survey process may promote self-reflection in reference to my experience with computer based instructional simulation. The researcher hopes to learn more about the student experience in relation to computer based instructional simulation in an online introduction to computers course.

No risk or discomfort is expected.

No individually-identifiable information about me, or provided by me during the research, will be shared with others. I will be assigned an identifying pseudonym, and this pseudonym will be used on all documents related to the research. Only the Principal Investigator (PI) and the Co-Principal Investigator (Co-PI) will be able to link me to my pseudonym.

Please note that Internet communications are insecure and there is a limit to the confidentiality that can be guaranteed due to the technology itself. However, once we receive the completed surveys, we will store them in a locked cabinet in my office and destroy any contact information that we have by July 30, 2011. If you are not comfortable with the level of confidentiality provided by the Internet, please feel free to print out a copy of the survey, fill it out by hand, and mail it to me at the address given below, with no return address on the envelope.

Cynthia Rumney
Middle Georgia Technical College
80 Cohen Walker Drive
Warner Robins, GA 31088

The investigator will answer any further questions about the research, now or during the course of the project.

I understand that by completing the research survey I am agreeing to take part in this research project and understand that I may print a copy of this consent form for my records.

Additional questions or problems regarding your rights as a research participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 612 Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu

Student Perceptions of SAM Training and Practical Testing Survey

Section I: The purpose of this section is to explore your perceptions of the SAM Training Exercises and the SAM Practical tests in your online SCT100 course. Please answer each question carefully, then click “Next” to move to the next question.

1. How was your experience setting up SAM for the first time?

❍ Very poor ❍ Poor ❍ Fair ❍ Good ❍ Very good

2. What is your current perception of the SAM Training exercises?

❍ Very poor ❍ Poor ❍ Fair ❍ Good ❍ Very good

3. How many hours did it take you to complete the SAM Windows Training? Please round to the nearest hour.
   - ❍ Did not complete the SAM Windows Training
   - ❍ Less than 1 hour
   - ❍ 1 hour
   - ❍ 2 hours
   - ❍ 3 hours
   - ❍ 4 hours
   - ❍ 5 hours or more

4. How long did it take you to complete the SAM Word Training? Please round to the nearest hour.
   - ❍ Did not complete the SAM Word Training
   - ❍ Less than 1 hour
   - ❍ 1 hour
   - ❍ 2 hours
   - ❍ 3 hours
   - ❍ 4 hours
   - ❍ 5 hours or more

5. How long did it take you to complete the SAM Excel Training? Please round to the nearest hour.
   - ❍ Did not complete the SAM Excel Training
   - ❍ Less than 1 hour
   - ❍ 1 hour
   - ❍ 2 hours
   - ❍ 3 hours
   - ❍ 4 hours
   - ❍ 5 hours or more

6. To what extent do you agree or disagree that the SAM *Training Exercises* were worth the time required?

❍ Strongly disagree ❍ Disagree ❍ Neutral ❍ Agree ❍ Strongly agree

7. Please explain your answer in the space below. (Your explanation is very important to understanding the student experience with SAM. Please take your time and provide as much detail as possible.)

8. To what extent do you agree or disagree that the SAM *Training Exercises* were worth the effort required?

❍ Strongly disagree ❍ Disagree ❍ Neutral ❍ Agree ❍ Strongly agree

9. Please explain your answer in the space below. (Your explanation to this question is very important to understanding the student experience with SAM. Please take your time and provide as much detail as possible.)

10. To what extent do you agree or disagree that the SAM *Training Exercises* were representative of the real program? For example, to what extent did the Word SAM Training "feel, look, and act" like the real Word program?

❍ Strongly disagree ❍ Disagree ❍ Neutral ❍ Agree ❍ Strongly agree

11. Please explain your answer in the space below.

12. Did you face any challenges when using SAM *Training Exercises*?

❍ Yes ❍ No ❍ Did not use SAM Training

13. If you faced challenges when using SAM Training, please provide details in the space below.

14. If you were teaching this course, would you have your students use SAM *Training Exercises*?

❍ Yes
❍ No

15. Please explain your answer in the space below. Please provide as much detail as possible.

16. If you were teaching this course, would you have your students use SAM *Practical Tests*?

- ❍ Yes
- ❍ No

17. Please explain your answer in the space below. Please provide as much detail as possible.

18. Please rate your overall experience with the SAM *Training Exercises.*

❍ Strongly unfavorable ❍ Unfavorable ❍ Neutral ❍ Favorable ❍ Strongly favorable

19. In the space below, please share any additional comments and/or suggestions you have pertaining to SAM *Training Exercises*. Provide as much detail as possible.

20. What is your overall experience with the SAM *Practical Tests?*

- ❍ Strongly unfavorable
- ❍ Unfavorable
- ❍ Neutral
- ❍ Favorable
- ❍ Strongly favorable

21. In the space below, please share any additional comments and/or suggestions you have pertaining to SAM *Practical Tests*. Provide as much detail as possible.

Section II: The purpose of this section is to explore your perceptions of the impact of the SAM Training Exercises on learning. Please answer each question carefully, then click “Next” to move to the next question.

22. The SAM Training exercises have three components: Observe, Practice, and Apply. Which of the SAM Training components listed below did you use when completing the training exercises? Please only check components you used more than once. Please check all that apply.

☐ Observe
☐ Practice
☐ Apply

23. To what extent do you agree or disagree that the SAM *Training Exercises* were beneficial to your understanding of the SCT100 course material?

❍ Strongly disagree ❍ Disagree ❍ Neutral ❍ Agree ❍ Strongly agree

24. How often have you used skills learned in the SAM *Training Exercises* in other areas of the SCT100 course?

❍ Never ❍ Very rarely ❍ Occasionally ❍ Frequently ❍ Very frequently

25. To what extent do you agree or disagree that the SAM *Training Exercises* helped prepare you for the SAM *Practical Tests*?

❍ Strongly disagree ❍ Disagree ❍ Neutral ❍ Agree ❍ Strongly agree

26. During the SAM *Projects Exercises*, how often did you use skills learned from the SAM Training Exercises?

❍ Never ❍ Very rarely ❍ Occasionally ❍ Frequently ❍ Very frequently

27. How helpful do you feel the SAM *Training Exercises* have been to you outside the SCT100 course?

❍ Not at all helpful ❍ Slightly helpful ❍ Moderately helpful ❍ Very helpful ❍ Extremely helpful

28. How often did you use skills learned from the *SAM Training Exercises* outside of your SCT100 course?

❍ Never ❍ Very rarely ❍ Occasionally ❍ Frequently ❍ Very frequently

Section III: The purpose of this section is to determine your level of computer experience prior to beginning the SCT100 course.

29. What was your previous computer experience (before enrolling in the SCT100 course)? For each task listed below, please select either "Yes" or "No" based on your experience prior to enrolling in SCT100.

I could turn a computer on	❍	Yes	❍	No	❍	Unable to Answer
I could surf the Internet	❍	Yes	❍	No	❍	Unable to Answer
I could open email	❍	Yes	❍	No	❍	Unable to Answer
I could send email	❍	Yes	❍	No	❍	Unable to

						Answer
I could send attachments via email	❍	Yes	❍	No	❍	Unable to Answer
I used social networking sites (such as facebook and MySpace)	❍	Yes	❍	No	❍	Unable to answer

30. What was your previous computer experience (before enrolling in the SCT100 course)? For each task listed below, please select either "Yes" or "No" based on your experience prior to enrolling in SCT100.

I wrote a letter using Word Processing software such as Microsoft Word	❍	Yes	❍	No	❍	Unable to Answer
I created a basic spreadsheet using a Spreadsheet program such as Microsoft Excel	❍	Yes	❍	No	❍	Unable to Answer
I created a basic database using a database program such as Microsoft Access	❍	Yes	❍	No	❍	Unable to Answer
I transferred photos from a camera to a computer	❍	Yes	❍	No	❍	Unable to Answer
I edited photos on a computer	❍	Yes	❍	No	❍	Unable to Answer
I designed web pages	❍	Yes	❍	No	❍	Unable to answer

31. How many years of experience do you have using a computer? Please round to the nearest year.

- ❍ No experience
- ❍ Less than 1 year
- ❍ 1 – 5 years
- ❍ 6 – 10 years
- ❍ 11 – 15 years
- ❍ 16 – 20 years
- ❍ 21 – 25 years
- ❍ 26 – 30 years
- ❍ 36 years or more

32. Before enrolling in the SCT100 course, about how much time did you spend using a computer each week? Please round to the nearest hour.

- ❍ Less than 1 hour
- ❍ 1 – 10 hours
- ❍ 11 – 20 hours
- ❍ 21 – 30 hours
- ❍ 31 - 40 hours
- ❍ 41 – 50 hours
- ❍ More than 51 hours

Section IV: The purpose of this section is to gather basic demographic data. Please answer each question carefully, then click “Next” to move to the next question.

33. What is your race/ethnicity? Please select the option you most closely relate to below.

- ❍ American Indian or Alaskan Native
- ❍ Asian or Pacific Islander
- ❍ Black or African American
- ❍ Hispanic
- ❍ White

34. What is your age? Please type your answer in the box below. Please round to the nearest year.

[ ]

35. What is your gender? Please select the option you most closely relate to below.
- ❍ Female
- ❍ Male

36. What is your previous education level (before enrolling in the SCT100 course)?
- ❍ High school or GED
- ❍ Some college
- ❍ College level diploma
- ❍ Associate Degree
- ❍ Bachelor Degree
- ❍ Master Degree
- ❍ None of the above

Please click “Submit” below to complete the survey. Once submitted, you should see a screen that states “submission complete.” If you do not

Thank you very much for your time and effort!

Appendix J

Participant Responses to a Sample Qualitative Question from the Pilot Study

Original Quantitative Question

To what extent do you agree or disagree that the SAM *Training Exercises* were worth the time required?

Follow-Up Qualitative Question

Please explain your answer in the space below. (Your explanation is very important to understanding the student experience with SAM. Please take your time and provide as much detail as possible.)

Participant Responses

Sample Size
51

Responses = 40 78% response rate
I have never used A computer it is hard on me
I am very experienced in computers and SAM training has flaws all through it. SCT 100 is an introduction to computers class, students should be learning generally how to use the computer and somewhat how to get on the programs and figure things out. SAM teaches one exact way to do each task when there are 3 or 4 ways of going about it. Just because a student uses a different way to do the same thing does not mean it should be counted wrong. I personally feel like the class should be taught by the instructor, not a program. The instructor should also be the one grading our projects rather than SAMs.
I agree that the SAM training exercises are worth the time because some people have never used these applications to their full extent and the SAM training allows exclusive time in learning the processes that can be completed using these applications.
i believe it helps but it a very slow and i have to keep myself for leaveing.
It isn't neccesarily an aid in learning. The book we PAY for tells us the same thing. To PAY for a 75 dollar peice of cardboard with a log-in code is quite a waste of our tuition money. In fact we use the book more than SAM's. The Sam's "card" was an extreme waste of what small part of a tree it cost to produce. Why isn't something that is made to help us out as a student, made cheaper or free for that matter. A $75 peice of paper! Come on.
yes,it give me time to learn it and also it teach me how to work and understand the computer

because it takes you through all the steps and give you a chance to practice
i do not like Sams.
Sam training is not bad at all.
I feel as though doing the Sam training helps me in more ways than one. It helps me get ready for the practical tests as well as it helps me with general computer tasks.
I am a hands on learner and it gives me hands on time
cause it helps you get the basic traning first
i dont think that it takes 1 complete hour to finish but great that u have that opportunity
i agree with the training exercises because it shows you how to operate the system and shows you things you might not have known
i choose this because i actually failed my last test and i would like to retake it but sam only allows you one attempt to take your test and i wish they could give you more atleast two at the most to improve a better grade.
I thought it was worth my time because I found the training exercises to be informative.
i strongly disagree due to the fact that sam is set up on the bases of students with computer experience where in the classroom environment there are students on all levels alot being a beginner
SAM Training is a great tool for first time users. I do not like the program because it does not recognize that there are alternate ways to do something. I do not feel that I should be penalized for doing something a different way, as long as the end result is the same.
They are worth the time required to me beacuse it helps me better understand how to do the tasks required for the SAM projects as well as the practical tests.
Taught me the basics on using certain programs
Well, the test is exactly like the SAM Training, so it really helps that you already have gone through it.
The SAM Training is very helpful it helps me understand the work by getting a chance to practice doing the work.
The training excercises are very good because there are people in my class that don;t know basically anything about a computer. For those of us who have a litte more experience it's kind of boring, but for them it's great.
in some cases students do not have the knoweledge of accomplishing a process. Sam has alot to offer those who do not know much of computers. its shows everything step by step.
i agree thst the Sam training was worth the time.
I agree that the Sam Training were worth my time because i found out how to use it

They get you ready for the sams practical tests so I think that the training is helpful.
don't like it at all
what is on the training exercises, is not like the actual Sams test.
showing us how sam wants it is ok, but it shouldnt make that our only choice.
I think its for people that dont know anything about computers.
The hands-on work is very helpful.
some of the exercises were extremely easy and others were a bit more challenging. It gave me alot of new knowledge of the programs.
SAM Training is worth the time. It provides practice for what we are doing in class. I enjoy having an idea of what is going on. It helps to keep up with everything.
They help by providing hands on training.
SAM Training exercises are very good learning tools. I feel the time allocated to class hours is not long enough. The instructor has to move in a pace too fast to comprehend any methods in practiced.
The time provided to do the exercises was very reasonable for me.
It was extremely time consuming but also extremely beneficial.
i have not finished doing the sams training i have not had alot of time to really work on them at home with my busy schedule
With the exercises I did, it helped me learn new material that i didnt know i could do.

Appendix K

Consent Form and Questionnaire

Student Perceptions of SAM Training and Practical Testing

CONSENT FORM

I agree to participate in a research study titled "EXPLORING THE STUDENT EXPERIENCE: COMPUTER BASED INSTRUCTIONAL SIMULATION IN AN ONLINE INTRODUCTORY COMPUTER APPLICATIONS COURSE" conducted by Cynthia Rumney from the Department of Adult Education at the University of Georgia (478-988-6800) under the direction of Dr. Janette Hill, Department of Adult Education, University of Georgia (706-542-4035). I understand that my participation is voluntary. I can refuse to participate or stop taking part at anytime without giving any reason, and without penalty or loss of benefits to which I am otherwise entitled. I can ask to have all of the information about me returned to me, removed from the research records, or destroyed. I do not have to participate in the research to be entered into the drawing for the gift cards.

The reason for this study is to explore the student experience in relation to the use of computer based instructional simulation in an online introductory computer applications course. If I volunteer to take part in this study, I will be asked to do the following things:

1) Complete a survey to include demographic questions, questions related to my perception of previous computer experience, and questions related to my experience with simulation (i.e. SAM training and practical tests in SAM).
2) Allow the Principal Investigator and Co-Principal Investigator to review my grades from the course. Grade information will be collected after the completion of the quarter.
3) My information/identity will be kept confidential throughout the study (through the use of a pseudonym). My pseudonym will be linked to my name in a password-protected Microsoft Word document only and destroyed upon completion of this study.

The benefit for me is that participation in the survey process may promote self-reflection in reference to my experience with computer based instructional simulation. The researcher hopes to learn more about the student experience in relation to computer based instructional simulation in an online introduction to computers course.

No risk or discomfort is expected.

No individually-identifiable information about me, or provided by me during the research, will be shared with others. I will be assigned an identifying pseudonym, and this pseudonym will be used on all documents related to the research. Only the Principal Investigator (PI) and the Co-Principal Investigator (Co-PI) will be able to link me to my pseudonym.

Please note that Internet communications are insecure and there is a limit to the confidentiality that can be guaranteed due to the technology itself. However, once we receive the completed surveys, we will store them in a locked cabinet in my office and destroy any contact information that we have by July 30, 2011. If you are not comfortable with the level of confidentiality provided by the Internet, please feel free to print out a copy of the survey, fill it out by hand, and mail it to me at the address given below, with no return address on the envelope.

Cynthia Rumney
Middle Georgia Technical College
80 Cohen Walker Drive
Warner Robins, GA 31088

The investigator will answer any further questions about the research, now or during the course of the project.

I understand that by completing the research survey I am agreeing to take part in this research project and understand that I may print a copy of this consent form for my records.

Additional questions or problems regarding your rights as a research participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 612 Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu

Student Perceptions of SAM Training and Practical Testing

Section I: The purpose of this section is to explore your perceptions of the SAM Training Exercises and the SAM Practical tests in your online SCT100 course. Please answer each question carefully, then click "Next" to move to the next question.

1. How was your experience setting up SAM for the first time?

❍ Very poor ❍ Poor ❍ Fair ❍ Good ❍ Very good ❍ Not applicable

2. What is your current perception of the SAM Training exercises?

❍ Very poor ❍ Poor ❍ Fair ❍ Good ❍ Very good ❍ Not applicable

3. How many hours did it take you to complete the **SAM Windows Training**? Please round to the nearest hour.

❍ Less than 1 hour ❍ 2 hours ❍ 3 hours ❍ 4 hours ❍ 5 hours or more ❍ Not applicable

4. How long did it take you to complete the **SAM Word Training**? Please round to the nearest hour.

❍ Less than 1 hour ❍ 2 hours ❍ 3 hours ❍ 4 hours ❍ 5 hours or more ❍ Not applicable

5. How long did it take you to complete the **SAM Excel Training**? Please round to the nearest hour.

❍ Less than 1 hour ❍ 2 hours ❍ 3 hours ❍ 4 hours ❍ 5 hours or more ❍ Not applicable

6. To what extent do you agree or disagree that the SAM *Training Exercises* were worth the time required for completion?

❍ Strongly disagree ❍ Disagree ❍ Neutral ❍ Agree ❍ Strongly agree ❍ Not applicable

7. Please explain your answer and provide any comments in the space below. (Your explanation is very important to understanding student's experience with SAM. Please take your time and provide as many details as possible.)

9. To what extent do you agree or disagree that the SAM *Training Exercises* were worth the effort required for completion?

❍ Strongly disagree ❍ Disagree ❍ Neutral ❍ Agree ❍ Strongly agree ❍ Not applicable

9. Please explain your answer and provide any comments in the space below. (Your explanation to this question is very important to understanding student's experience with SAM. Please take your time and provide as many details as possible.)

11. To what extent do you agree or disagree that the SAM *Training Exercises* were representative of the real program? (For example, to what extent do you agree or disagree that the Word SAM Training "feels, looks, and acts" like the real Word program?)

❍ Strongly disagree ❍ Disagree ❍ Neutral ❍ Agree ❍ Strongly agree ❍ Not applicable

11. Please explain your answer and provide any comments in the space below.

12. Did you face any challenges when using SAM *Training Exercises*?

❍ Yes ❍ No ❍ Not applicable

13. If you faced challenges when using SAM Training, please provide details in the space below.

14. If you were teaching this course, would you have your students use **SAM Training Exercises**?

❍ Yes ❍ No ❍ Not applicable

15. Please explain your answer in the space below and provide as much detail as possible.

16. If you were teaching this course, would you have your students use **SAM Practical Tests**?

❍ Yes ❍ No ❍ Not applicable

17. Please explain your answer in the space below. Please provide as much detail as possible.

18. Please rate your overall experience with the **SAM Training Exercises**.

❍ Very negative ❍ Negative ❍ Neutral ❍ Positive ❍ Very Positive ❍ Not applicable

19. In the space below, please share any additional comments and/or suggestions you have pertaining to **SAM Training Exercises**. Provide as much detail as possible.

20. Please rate your overall experience with the **SAM Practical Tests**?

❍ Very negative ❍ Negative ❍ Neutral ❍ Positive ❍ Very Positive ❍ Not applicable

21. In the space below, please share any additional comments and/or suggestions you have pertaining to **SAM Practical Tests**. Provide as much detail as possible.

Section II: The purpose of this section is to explore your perceptions of the impact of the SAM Training Exercises on learning. Please answer each question carefully, then click "Next" to move to the next question.

22. The SAM Training exercises have three components: Observe, Practice, and Apply. Which of the SAM Training components listed below did you use when completing the training exercises? Please check all that apply.

☐ Observe ☐ Practice ☐ Apply ☐ Not applicable

23. In which sections of the course did you use the **Observe** component? Please check all that apply.

☐ Windows Training ☐ Word Training ☐ Excel Training ☐ Not applicable

24. In which sections of the course did you use the **Practice** component? Please check all that apply.

☐ Windows Training ☐ Word Training ☐ Excel Training ☐ Not applicable

25. In which sections of the course did you use the **Apply** component? Please check all that apply.

☐ Windows Training ☐ Word Training ☐ Excel Training ☐ Not applicable

26. To what extent do you agree or disagree that the **SAM Training Exercises** were beneficial to your understanding of the SCT100 course material?

❍ Strongly disagree ❍ Disagree ❍ Neutral ❍ Agree ❍ Strongly agree ❍ Not applicable

27. How often have you used skills learned in the **SAM Training Exercises** in other areas of the SCT100 course?

❍ Never ❍ Rarely ❍ Sometimes ❍ Often ❍ Always ❍ Not applicable

28. To what extent do you agree or disagree that the **SAM Training Exercises** helped prepare you for the **SAM Practical Tests**?

❍ Strongly disagree ❍ Disagree ❍ Neutral ❍ Agree ❍ Strongly agree ❍ Not applicable

29. During the **SAM Projects Exercises**, how often did you use skills learned from the **SAM Training Exercises**?

❍ Never ❍ Rarely ❍ Sometimes ❍ Often ❍ Always ❍ Not applicable

30. How helpful do you feel the **SAM Training Exercises** have been to you outside the SCT100 course?

❍ Not helpful ❍ Slightly helpful ❍ Somewhat helpful ❍ Moderately helpful ❍ Extremely helpful ❍ Not applicable

31. How often did you use skills learned from the **SAM Training Exercises** outside of your SCT100 course?

❍ Never ❍ Rarely ❍ Sometimes ❍ Often ❍ Always ❍ Not applicable

Section III: The purpose of this section is to determine your level of computer experience prior to beginning the SCT100 course.

32. This question asks about your previous computer experience before enrolling in the SCT100 course. For each task listed below, please select either “Yes” or “No” based on your experience prior to enrolling in SCT100.

I could turn a computer on	❍	Yes	❍	No	❍	Unable to Answer
I could surf the Internet	❍	Yes	❍	No	❍	Unable to Answer
I could open email	❍	Yes	❍	No	❍	Unable to Answer
I could send email	❍	Yes	❍	No	❍	Unable to Answer
I could send attachments via email	❍	Yes	❍	No	❍	Unable to Answer
I used social networking sites (such as facebook and MySpace)	❍	Yes	❍	No	❍	Unable to answer

33. This question asks about your previous computer experience before enrolling in the SCT100 course. For each task listed below, please select either “Yes” or “No” based on your experience prior to enrolling in SCT100.

I wrote a letter using Word Processing software such as Microsoft Word	❍	Yes	❍	No	❍	Unable to Answer
I created a basic spreadsheet using a Spreadsheet program such as Microsoft Excel	❍	Yes	❍	No	❍	Unable to Answer
I created a basic database using a database program such as Microsoft Access	❍	Yes	❍	No	❍	Unable to Answer
I transferred photos from a camera to a computer	❍	Yes	❍	No	❍	Unable to Answer
I edited photos on a computer	❍	Yes	❍	No	❍	Unable to Answer
I designed web pages	❍	Yes	❍	No	❍	Unable to answer

34. How many years of experience do you have using a computer? Please round to the nearest year.

❍ No experience ❍ Less than 1 year ❍ 1 - 5 years ❍ 6 - 10 years ❍ 11 - 15 years ❍ 16 - 20 years ❍ 21 years or more

35. Before enrolling in the SCT100 course, about how much time did you spend using a computer each week? Please round to the nearest hour.

❍ Less than 1 hour ❍ 1 - 10 hours ❍ 11 - 20 hours ❍ 21 - 30 hours ❍ 31 - 40 hours ❍ More than 41 hours

Section IV: The purpose of this section is to gather basic demographic data. Please answer each question carefully, then click “Next” to move to the next question.

36. What is your race/ethnicity? Please select the option you most closely relate to below.

❍ American Indian or Alaskan Native ❍ Asian or Pacific Islander ❍ Black or African American ❍ Hispanic ❍ White ❍ Other

37. What year were you born? Please type your answer in the box below.

[ ]

38. What is your gender? Please select the option you most closely relate to below.

❍ Female ❍ Male

39. What is your previous education level (before enrolling in the SCT100 course)?

❍ High School or GED ❍ Some college ❍ College level diploma ❍ Associate Degree ❍ Bachelor Degree ❍ Master Degree ❍ None of the above

Please click “Submit” below to complete the survey. Once submitted, you should see a screen that states “submission complete.” If you do not

Thank you very much for your time and effort!

Appendix L

Screen Shot of Qualitative Question from Web-Based Survey

Please explain your answer and provide any comments in the space below. (Your explanation is very important to understanding student's experience with SAM Training. Please take your time and provide as much detail as possible).

Appendix M

Alignment of Research Questions to Instrument Questions

Research Question	Instrument Questions
What are the student perceptions of the CBIS in general?	1. How was your experience setting up SAM for the first time? 2. What is your current perception of the SAM Training exercises? 3. How many hours did it take you to complete the SAM Windows Training? 4. How long did it take you to complete the SAM Word Training? 5. How long did it take you to complete the SAM Excel Training? 6. To what extent do you agree or disagree that the SAM Training Exercises were worth the time required for completion? 7. Please explain your answer and provide any comments in the space below. 8. To what extent do you agree or disagree that the SAM Training Exercises were worth the effort required for completion? 9. Please explain your answer and provide any comments in the space below. 10. To what extent do you agree or disagree that the SAM Training Exercises were representative of the real program? 11. Please explain your answer and provide any comments in the space below. 12. Did you face any challenges when using SAM Training Exercises? 13. If you faced challenges when using SAM Training, please provide details in the space below. 14. If you were teaching this course, would you have your students use SAM Training Exercises? 15. Please explain your answer in the space below and provide as much detail as possible.

Research Question	Instrument Questions
	16. If you were teaching this course, would you have your students use SAM Practical Tests? 17. Please explain your answer in the space below. Please provide as much detail as possible. 18. Please rate your overall experience with the SAM Training Exercises. 19. In the space below, please share any additional comments and/or suggestions you have pertaining to SAM Training Exercises. 20. Please rate your overall experience with the SAM Training Exercises. 21. In the space below, please share any additional comments and/or suggestions you have pertaining to SAM Practical Tests.
What are the student perceptions on the impact of the CBIS on learning?	26. To what extent do you agree or disagree that the SAM Training Exercises were beneficial to your understanding of the SCT100 course material? 27. How often have you used skills learned in the SAM Training Exercises in other areas of the SCT100 course? 28. To what extent do you agree or disagree that the SAM Training Exercises helped prepare you for the SAM Practical Tests? 29. During the SAM Projects Exercises, how often did you use skills learned from the SAM Training Exercises? 30. How helpful do you feel the SAM Training Exercises have been to you outside the SCT100 course? 31. How often did you use skills learned from the SAM Training Exercises outside of your SCT100 course?
To what extent does student previous computer experience relate to the student experience with CBIS?	22. The SAM Training exercises have three components: Observe, Practice, and Apply. Which of the SAM Training components listed below did you use when completing the training exercises? 23. In which sections of the course did you use the Observe component? 24. In which sections of the course did you use the Practice component?

Research Question	Instrument Questions
	25. In which sections of the course did you use the Apply component? 32. This question asks about your previous computer experience before enrolling in the SCT100 course. For each task listed below, please select either “Yes” or “No” based on your experience prior to enrolling in SCT100. a. I could turn on a computer b. I could surf the Internet c. I could open email d. I could send attachments via email e. I used social networking sites 33. This question asks about your previous computer experience before enrolling in the SCT100 course. For each task listed below, please select either “Yes” or “No” based on your experience prior to enrolling in SCT100. a. I wrote a letter using Word Processing software such as Microsoft Word b. I created a basic spreadsheet using a Spreadsheet program such as Microsoft Excel c. I created a basic database using a database program such as Microsoft Access d. I transferred photos from a camera to a computer e. I edited photos on a computer f. I designed web pages 34. How many years of experience do you have using a computer? 35. Before enrolling in the SCT100 course, about how much time did you spend using a computer each week?
How do demographics relate to the student experience with CBIS?	36. What is your race/ethnicity? Please select the option you most closely relate to below. 37. What year were you born? 38. What is your gender? 39. What is your previous education level (before enrolling in the SCT100 course)?

Appendix N

IRB Approval Document

The University of Georgia

Office of The Vice President for Research
DHHS Assurance ID No. : FWA00003901

Institutional Review Board
Human Subjects Office
612 Boyd GSRC
Athens, Georgia 30602-7411
(706) 542-3199
Fax: (706) 542-3360
www.ovpr.uga.edu/hso

APPROVAL FORM

Date Proposal Received: 2010-12-17 **Project Number:** 2011-10472-0

Name	Title	Dept/Phone	Address	Email
Dr. Janette R. Hill	PI	LEAP 412 Rivers Crossing 542-4035		janette@uga.edu
Ms. Cynthia Chapman Rumney	CO	Adult Education 478-960-1124	[redacted]	rumney@uga.edu

Title of Study: Exploring the student experience: Computer based instructional simulation in an online introductory computer applications course

45 CFR 46 Category: Administrative 2
Parameters:
Approved for Institutions with Authorization Letters on File;

Change(s) Required for Approval:
Revised Application;
Revised Consent Document(s);

Approved : 2011-02-01 Begin date : 2011-02-01 Expiration date : 2016-01-31

NOTE: Any research conducted before the approval date or after the end data collection date shown above is not covered by IRB approval, and cannot be retroactively approved.

Number Assigned by Sponsored Programs:

Funding Agency:

Your human subjects study has been approved.

Please be aware that it is your responsibility to inform the IRB:
. . . of any adverse events or unanticipated risks to the subjects or others within 24 to 72 hours;
. . . of any significant changes or additions to your study and obtain approval of them before they are put into effect;
. . . that you need to extend the approval period beyond the expiration date shown above;
. . . that you have completed your data collection as approved, within the approval period shown above, so that your file may be closed.

For additional information regarding your responsibilities as an investigtor refer to the IRB Guidelines.
Use the attached Researcher Request Form for requesting renewals, changes, or closures.
Keep this original approval form for your records.

Chairperson or Designee,
Institutional Review Board

Appendix O

Follow-Up Invitation to Participate

SCT100 Online Students,

If you haven't already completed the research study survey, please don't forget!

Participants who complete the survey will be entered into a drawing to win one of four $50 Visa Gift Cards!

To access the survey, please go to the Lessons tab and click the link titled "RESEARCH STUDY SURVEY." You will be presented with an informational letter and consent form prior to beginning the survey. Please complete the survey prior to midnight, Sunday, Month day, 2010.

Please do not hesitate to contact me if you have questions.

Thank you in advance for your participation,

Cynthia Rumney