11-7-2013

Factors Affecting Student Satisfaction In Different Learning Deliveries

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FACTORS AFFECTING STUDENT SATISFACTION IN DIFFERENT LEARNING DELIVERIES

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A Dissertation Submitted in Partial
Fulfillment of the Requirements
for the Degree of

DOCTOR OF EDUCATION

Department of Curriculum and Instruction

ILLINOIS STATE UNIVERSITY

2011

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164 Pages December 2011

This study addressed the relationship between student satisfaction and four interaction variables—student-content, student-instructor, student-student, and student-technology—in online, blended, and traditional learning settings. Demographics, previous experience with the Internet, and discussion-board applications were also investigated.

There were 916 respondents, including 185 in online settings, 90 in blended settings, and 641 in traditional settings, to Strachota's (2002) Online Satisfaction Survey. Participants took the survey either in an on-site classroom (traditional learning) or through e-mail, website link, or the Blackboard course management system (online setting). Participants in the blended setting could choose between completing the survey on-site or online, but were asked to respond only once.

Distance learners were less satisfied with their interactions with content, instructors, and other students than were traditional learners, but more satisfied with

technology. Technology orientation sessions and more interactive online programs, such as leading discussions, participating in a learning community, and receiving timely and detailed feedback, should be developed for quality interaction and satisfaction with instructors and learners in a virtual environment. What learners' and instructors' perspectives are and what content is optimal for learner satisfaction should be studied further. Future research could also determine which populations or characteristics are associated with difficulty in using computer technology and which instructional substitutions could be made for future technology novices to improve their satisfaction and completion. Blended learning with well-designed content and orientations has proven to be a good solution for improving student satisfaction with interaction in virtual environments. More research on student satisfaction with interactive variables should be conducted to enhance retention and performance.

ACKNOWLEDGEMENTS

I appreciate the guidance of my dissertation committee members, Dr. Cheri Toledo, Chair, Dr. Thomas Crumpler, Dr. Robyn Seglem, and Dr. Zeng Lin. I also thank Dr. Stephen Perry's encouragement and help. Without your patience and support, I could not have achieved this goal.

K. C.

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CHAPTER I

INTRODUCTION

Introduction

In the past 10 years, distance learning has evolved and proliferated in higher education. Internet technology allows learners access to virtual courses at a distance. More than ever, learners are enrolled in computer-mediated communication at the postsecondary level. Allen and Seaman (2004) noted that online enrollments continued to grow at rates faster than for the overall student body. Universities and colleges also relocate their curricula into cyberspace in order to recruit more students. Parsad and Lewis (2008) noted that 61 percent of institutions offered online courses; 35 percent offered blended courses; and 26 percent offered other types of distance education courses in 2006–07. They continually stated that most 2-year and 4-year education courses reported that their institutions developed the distance institutions that reported offering credit-granting distance education courses (94 %). Higher education institutions were also "the leading providers of technology-based distance education to public school districts and schools" (Zandberg & Lewis, 2008, p. ix).

One example of this is the University of Illinois (U of I) Extension program, which is a successful academic model of a higher education institution that offered technology-mediated programs for local and out-of-state learners, who "draw on research-based expertise from land-grant universities all across the country" (University

of Illinois Extension, 2011, para. 6). Each month, U of I Extension web pages draw more than 10 million page views, and people in more than 200 countries accessed Extension's web-based information (para. 4-5). According to *U.S. News and World Report*'s Best Graduate Schools report, the College of Education at the University of Illinois was ranked 23rd in its list of education program in the United States in 2011 ("Best Education Schools," 2011). This makes it a strong education program for schools that also incorporate distance learning into their programs.

Educators also offer curricula in combinative environments. This approach to learning is referred to as blended learning and is a combination of cyber and traditional environments. According to Allen, Seaman, and Garrett (2007),

> The Sloan Consortium defined blended education as course delivery where 30-79% of content is delivered online... two categories were used to cover the blended space: course/program that is primarily online, and course/program with an equal balance between online and on-campus (p. 6).

Blended learning was believed to improve student learning by offering more interaction between teachers, students, content, and technology and became a preferred model for course delivery (Precel, Eshet-Alkalai, & Alberton, 2009).

Since distance learning has started to play an important role in teaching and learning, researchers have focused on ways of making it more effective and accessible to students. One benefit of—and drawback to—distance learning is that learners can access their course activities at a distance instead of being physically present in on-site locations. As Hsu and Shiue (2005) noted, "In the distance learning environment, learners must be motivated to direct their own learning process because the teachers and students are

physically separated" (para. 3). Distance learners must be more responsible for their own learning. Technology, which was able to support communication between course participants, had been heavily relied on to conduct courses in a virtual environment but also added to the frustration, distress, and isolation of the learners (Abrahamson, 1998; Beaumont, Stirling, &Percy, 2009). Research showed "greater frustration with long distance learning conditions as relative to other methods of instruction" (Hove & Corcoran, 2008, p. 125). Learners can feel isolated and alienated when they are not familiar with online course interfaces and are unable to have face-to face interactions with their instructors or fellow students. Isolation and alienation, consequently, affected learning in a computer-mediated setting and led to retention problems (Bontempi, 2003; Galusha, 1998). According to Dickey (2004), "New strategies bridge feelings of frustration and isolation by offering more engaging and interactive content and by supporting the emergence of individual voices in a distance-learning environment" (p. 280). Thus, more extensive interaction is required for learners to successfully complete distance-learning programs. Moreover, to decrease attrition, distance-learner characteristics should be studied as well. According to Khan (2005), "The more information from [learner-characteristics] categories is available, the better the e-learning designers will understand their target population" (p. 185). More research on learner characteristics will advance course design to lower distance-learners' dropout rates. Additionally, because more students are enrolling in higher-education distance-learning programs, it is important to investigate their characteristics to improve content delivery.

As online and blended learning become more popular in higher education, educators must compare them with traditional learning strategies to increase their

effectiveness. As discussed above, interaction and learner demographics are vital elements for improving student satisfaction and retention. More studies that address the relationship between interaction and satisfaction are essential, and must include the demographics of learner completion and attrition in order to design distance programs that address these gaps. This study explored what factors affected learner satisfaction in online, blended, and traditional learning settings.

Background

Attrition in Distance Learning

Educational institutions have been providing distance-learning programs for traditional and nontraditional learners for a number of years. However, as the rate of enrollment rises, so do the numbers of distance-learning dropouts. Research showed that dropout rates in distance learning were between 50% and 80% (Flood, 2002; Søilen, 2007). Some researchers maintain that blended and traditional learning are superior in terms of student persistence and retention. According to Dziuban, Hartman, and Moskal (2004), "Blended courses have the potential to increase student learning outcomes while lowering attrition rates in comparison with the equivalent fully online courses. In this regard, the blended model is comparable to or in some cases better than face-to-face" (p. 5). When online programs compete with face-to-face instruction to produce equivalent learning, dropout rates become a concern for technology-mediated learning. Studies showed that dropout rates in distance learning were higher than those in traditional learning, and that dropout rates indicated academic non-success (Diaz, 2000; Hiltz, 1997; Phipps & Merisotis, 1999; Rofle, 2007). Though "the mere fact of high drop rates is not necessarily indicative of academic non-success" (Diaz, 2002, para. 3), dropout issues still

had to be addressed in order to advance online teaching and learning (Alexander, 2002; Park, 2007).

Distance Learners

The demographics of distance learners remain fairly consistent; typical distance learners are older and/or female, nontraditional students wishing to maintain their independence while balancing family, work, and education demands. Qureshi, Morton, and Antosz (2002) stated that the distance learners they studied were "motivated adults, age 18-40, mostly females, and because of their family and work commitments, lacked time to participate in on-campus studies" (para. 5). These students displayed certain characteristics that attracted them to distance learning (Brooks, 2006; eSchool News, 2008; Garman, Crider, & Teske, 1999; Kotey & Anderson, 2006; Valentine, 2002). Independent adults pursuing an education were able to control their time, place, and pace of learning through online education (eSchool News, 2008; Qureshi et al., 2002). Therefore, distance learning offered a better setting for learners to maintain their independence than did a traditional classroom setting (Brooks, 2006). In a 2004 survey of distance-learning students by the Academic Technology Center at Worcester Polytechnic Institute (WPI) in Massachusetts (2007), 58% of WPI students were under the age of 35, and 77% attending part-time were employed; the proportions of older and employed students were high in the study. Distance-learning enrollment at the University of Cincinnati in Autumn 2010 was mostly female, part-time, and white, with an average age of 35 (The University of Cincinnati, 2010).

While research indicated that typical distance learners were older, nontraditional students, this began to change over the past decade as universities and colleges increase

the number of online courses offered. Current demographics were expanding to include younger, full-time, and traditional students. Furthermore, these students mainly came from a local area, with more male students and greater racial diversity. Porter (2004) explored how California adult schools served over 38,000 adult learners via distance learning in 2000-2001 and reported that (a) women significantly outnumbered men (65.4% to 34.6%); (b) 75.7% were from Los Angles country; (c) the largest cohort (30.2%) was in the 21-30 age range, and (d) 60.2% were Hispanics. Except for the preponderance of woman, the rest of the findings were not consistent with typical demographics for distance learners.

Furthermore, more faculty members have started using educational technology to enhance their classroom instruction. As a result, more students have been recruited into blended courses, and their demographics can be more varied than those commonly seen in distance-learning programs. According to Dede, Brown-L'Bahy, Ketelhut, and Whitehouse (2004), "Demographic changes and shifting student characteristics also are influential in forming the nature of distance education" (p. 549). Educators need examine changes in learner demographics to design effective online programs.

Demographics That Influence Students' Completion Rate

A variety of studies have examined the relationship between students' completion rates and different learner characteristics, such as gender, marital status, and age. According to Bontempi (2003), "Distance learning is student centered learning, thus knowing the characteristics and demographics of learners helps us to understand the potential barriers to motivation and learning" (para. 4). Students who are older, female, employed full time, or have family commitments tended to choose distance learning

courses (eSchool News, 2008). Other demographics, including "prior levels of knowledge," "study conditions," and "semiotics/interface design," were factors influencing distance learner attrition and persistence (eSchool News, 2008, para. 12-16).

Moreover, a flexible way of time management is another factor. According to 2004 survey of distance-learning students in the WPI (2007), "77% of distance learning students are attending WPI on a part-time basis" (para. 7). Variables such as age, gender, employment status, and so forth differ among studies, but there are similarities. Studies of demographics were able to be used to "tailor distance learning course logistics, syllabus, and course design to meet [learner] needs" (WPI, para. 1), and instruction had to include these demographic components to address these learner needs(L. Bressler, Manrique, & M. Bressler, 2006). In brief, more nontraditional participants can access higher education through distance learning. Flexible education channels enable them to cross barriers to maintain their course attendance while attending to family and work responsibilities.

Interactions That Influence Student Completion

Student perception of the degree of interaction was the primary factor that affected their level of motivation and satisfaction in distance-learning course quality (Bacelar-Nicolau, Caeiro, Martinho, Azeiteiro, & Amador, 2009; Roblyer & Ekhaml, 2000). Interaction has an impact on student persistence in distance learning. According to Ambe-Uva (2006), a "successful distance education system involves interactivity between teachers and students, between students and the environment, and among students themselves, as well as active learning in the classroom" (p. 3). Two-way communication with the various components of distance learning is a necessary part of learning. As Bowen (2006) wrote,

> Successful interactive activities move away from monologue-based interaction to dialogue-based discussions that may include chat rooms, discussion groups, and group activities, such as peer review, collaborative projects, and such. For correspondence courses, dialogue-based interaction can occur via feedback on assignments, e-mails or by phone (p. 9).

Successful interaction made students "feel a sense of community, a community where student thoughts and questions matter," which in turn "increases the likelihood that students will complete their programs" (p. 10). Communication technology can be utilized to improve distance-learning interaction, which is crucial to learner satisfaction and persistence. Therefore, with technological improvements in interaction capabilities, distance learning can, at least theatrically, become as effective as on-campus learning.

Effect of Satisfaction on Student Completion Rates

Student satisfaction was shown to improve learner studies and contribute to retention (Chen, Lin, & Kinshuk., 2008; Chiu, Sun, Sun, & Ju, 2007). Dissatisfied learners can hardly do well in their studies, and this leads to poor performance. Educators should integrate variables affecting learner satisfaction to increase learner persistence.

Learner interaction and characteristics are two elements crucial to student satisfaction, an important factor of success in distance learning. Research showed that student satisfaction came with different learner perceptions and variables for effective distance learning. Chiu et al. (2007) found that attainment, utility, and intrinsic values, as well as distributive and interactional fairness, had significant positive effects on satisfaction. They concluded that "utility value and satisfaction make significant contributions to learners' intention to continue using web-based learning" (p. 1239-1240).

Chen et al. (2008) contend that instruction, interaction, administration, and functionality were classified into four categories that affect e-learning satisfaction; in their study, instruction and interaction were found to be the primary factors. If learners encounter problems, this would have a negative impact on satisfaction and, in turn, contribute to overall satisfaction. Learner satisfaction will influence the success and future of e-learning.

Course delivery can affect student satisfaction in distance learning as well. Smart and Cappel (2006) suggested that "instructors should be selective in the way they integrate online units into traditional, classroom-delivered courses. This integration should be carefully planned based on learner characteristics, course content, and the learning context" (para. Executive Summary). Bishop-Clark, Dietz-Uhler, and Fisher (2007) found that thinking-orientation students were more satisfied with the web-based course, but feeling students felt more isolated from course participants. Sensing-thinkers favored the web-based course than intuitive-feelers. These intrinsic values, along with distributive and interactional fairness—including interaction, and integration of learner characteristics and personality, course content, and learning context—were vital factors related to learner satisfaction. Student achievement can be improved when satisfaction is increased, and educators should consider these factors when designing courses in order to enhance learner satisfaction and successful course completion (Bown, 2006).

Demographic Indicators of Student Failure

Some studies have suggested that individual characteristics, external attributes, and internal factors increase learner attrition in distance learning (Rovai, 2003; Wang & Wu, 2004). Park (2007) analyzed learner characteristics (age, ethnicity, gender,

employment status, and socioeconomic group) and concluded that they were related to student persistence/dropout, though others believe that the influence of learner characteristics is either minor or indirect. Packham, Jones, Miller, and Thomas (2004) found that successful e-learners were typically female, non-higher-education qualified, self-employed, and aged between 31 and 50 and that learners without those characteristics were more likely to drop out. Menager-Beeley (2004) stated that students with low task values, low prior grades in English, and nontraditional students (over 28 years old) were also more likely to drop out of a distance-learning course.

With regard to external attributes, Rovai (2003) theorized that if learners were not able to pay for college, make adequate childcare arrangements, or adjust their work schedules, they were unlikely to persist in school. Wang and Wu (2004) found that external attributes, such as insufficient time and circumstances that hindered study, had the greatest effect on students' decisions to drop out.

Students' involvement in and attachment to their school were internal factors that were essential to success (Rovai, 2003). Rovai also found that quality of the first-year experience, a supportive learning community, academic integration that included active participation and satisfactory experiences, personal attention, and assistance with personal and financial problems were critical to persistence in a distance-learning course. Deficits in these internal factors contributed to dropout. Wang and Wu (2004) found that students with higher intrinsic motivation were more likely to stay or complete their program.

Consequently, distance-learner demographics can predict academic retention and completion rates. Similarly, studies in dropout demographics can help educators

understand student attrition. Homogeneity exists in failed students' different characteristics, external attributes, and internal factors. Educators can use this homogeneity to improve instruction and enhance student learning.

Statement of the Problem

Distance learning proliferated in post-secondary education. More than 61% of community colleges and universities offered online courses from 2006 to 2007 (Parsad & Lewis, 2008). Higher attrition rates in distance-learning programs have compelled educators to investigate the causes for this continuing concern. Instructors increasingly use content-management systems (CMS) to implement their distance courses and also aim to maintain course quality comparable to that of face-to-face delivery. Successful distance learning required interaction between learners and instructors, content, technology, and other learners (Ambe-Uva, 2006). Improving interaction so as to meet learner needs is a vital issue in distance learning.

Research showed that learner satisfaction affected students' learning and led to learner completion (Chen et al., 2008; Chiu et al., 2007). Interaction influenced distance-learning satisfaction, as instruction depended more on technological infrastructure (Chen et al., 2008). The integration of course delivery, including learner characteristics, content, and personality, also affected student satisfaction in distance learning (Bishop-Clark, Dietz-Uhler, & Fisher, 2007; Smart & Cappel, 2006).

Distance-learning interaction and student characteristics should be investigated further for their effects on successful completion. As research showed, interaction influenced student satisfaction in distance learning. The relationships between student satisfaction and elements of interactive learning, including learner-instructor, learner-

learner, learner-content, and learner-interface interaction, are other issues to consider when designing an effective distance-learning course. Some studies have compared blended and online learning, looking for the relationship between interaction and learner satisfaction in virtual environments. However, it is rare to see a comprehensive comparison of traditional, blended, and online learning. A study that includes all three settings will be valuable, since traditional instruction is still dominant in the educational system. In this research, an overall exploration of learner characteristics and students' perceptions of both interaction and satisfaction was conducted to examine their relationship within traditional, blended, and online settings.

Research Questions

The following questions guided this research:

1. What is the relationship between student-content interaction and student satisfaction in online, blended, and traditional courses?
2. What is the relationship between student-instructor interaction and student satisfaction in online, blended, and traditional courses?
3. What is the relationship between student-student interaction and student satisfaction in online, blended, and traditional courses?
4. What is the relationship between student-technology interaction and student satisfaction in online, blended, and traditional courses?
5. What is the difference between student satisfaction in online, blended, and traditional courses?
6. What is the difference between learning interaction and student satisfaction in online, blended, and traditional courses with different demographics?

Definitions of Terms

Asynchronous: not occurring at the same time

Blended learning: a combination of online course activities and face-to-face sessions and "reduced classroom contact hours (reduced seat time)" for teaching and learning (Dziuban, Hartman, & Moskal, 2004, p. 2).

Distance education or *distance learning*: the physical separation of learners and instructors in a course. Educators use correspondence or communication technology to implement online or blended courses.

Learning interaction: the nature of both interaction and inactivity as a series of mutual influences on different components in distance learning. Interactivity is more relevant to technological features (Sutton, 2001).

Online learning: teaching and learning are conducted over the Internet and does not require learners to meet on campus.

Student satisfaction: satisfaction felt by learners when receiving "given feedback information confirming expectations regarding the outcomes of learning" (Williams, Paprock, and Covington, 1998, p. 11).

Synchronous: occurring at the same time

Traditional learning: course implementation in the teacher-directed learning setting with face-to-face interaction.

Significance of the Study

As institutions of higher education increasingly offer online and blended courses, discussion of the issues that influence student persistence will be important for course implementation and increased student retention. This study identified how learning

interaction and learner characteristics affected student satisfaction. How these factors affected one another in online, blended, and traditional learning settings was also examined.

Theoretical Framework

Interaction that improved student performance, persistence, and satisfaction was an essential component of effective distance learning (Jaeger, 2009). Moore and Kearsley's theory of transactional distance (2005) stated that learners and teachers were physically separated and the transactionally distanced in distance-learning environments. Transaction is "the interplay between people who are teachers and learners, in environments that have the special characteristic of being separate from one another" (p. 224). This physical distance "leads to communication gaps, a psychological space of potential misunderstandings between the instructors and the learners that has to be bridged by special teaching techniques" (p. 224) and affects teaching behaviors in dialogue and structure. As they described that dialogue,

> [it focuses] on the interplay of words and actions and any other interactions between teacher and learner when one gives instruction and the other responds… The extent and nature of this dialogue is determined by the educational philosophy of the individual or group responsible for the design of the course, by the personalities of teacher and learner, by the subject matter of the course, and by environmental factors (p. 224).

Teachers and learners are the main components when considering transactional distance in distance learning. Therefore, "student-teacher dialogue" and "student-student discussion" play the leading roles in learning (Laurillard, 2002, p. 71 & p.158). Structure

is the other factor that affects transactional distance. As Moore and Kearsley (2005) explain, “Structure expresses the rigidity or flexibility of the course’s educational objectives, teaching strategies, and evaluation methods” (226-227). Both of these factors—dialogue and structure—are the extent of course components accommodating each learner’s needs to maintain student-content interaction. Online discussion was used to support interaction between teachers and learners and to discuss issues arising from learning materials (McKenzie, 2002).

Keegan (1996) referred to the theory of reintegration for successful distance education. “The intersubjectivity of teacher and learner, in which learning from teaching occurs, has to be artificially re-created” (p. 116). Integration of communication tools such as chat rooms, discussion forums and lists, and e-mail into distance learning improved interaction between teachers, students, and the various learning settings to create an effective learning environment. If not adequately implemented, however, reintegration led to lower course quality and student performance and more dropouts.

Siemens (2004) suggested that learning was not a process that was entirely under the control of the individual but rather “is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing” (para. Connectivism). The personal-to-network-to-organization cycle allows individuals and organizations to learn from each other; learners are able to use the Internet to remain current in a digital age.

“Interaction between the learner and the content or subject of study” was a defining characteristic of education (Moore, 1989, para. 4). Interaction can also be employed to enhance planned effective learning and student satisfaction. The online

discussion forum is the most technologically engaging format for advancing interaction between instructors, learners, and an educational environment. Interaction is also important for successful course completion. The relationship between interaction and student satisfaction in online, blended, and traditional settings must be understood before strategies for improving content delivery and increasing interaction and satisfaction can be designed.

This research was limited by the fact that sample distribution was not average in all three settings. Participants were also from different courses in different programs, so learning in interaction and satisfaction with their courses varied. The instrument could measure general issues in the three settings, but some survey questions might not have been applicable to each setting.

The remaining chapters include a literature review, methods and procedures, data analysis and results, and a discussion of the results, implications, and directions for future research.

CHAPTER II

LITERATURE REVIEW

Introduction

Distance learning removes geographical limitation to engage learners at a distance. As Moore and Kearsley (2005) noted, "All distance education learners are separated by space and/or by time from their teachers" (p. 223). Institutions of higher education have offered programs that employ communication technologies for many years. For the last decade, following the proliferation of Internet technologies, educators also have used it to conduct their instruction in virtual environments. Research has shown that distance learning has been as effective as traditional, and even traditional students are increasingly viewing it as a better option. The demographics of distance learners have also changed, and these characteristics should be explored to see how they affect course completion. Learning interaction and satisfaction also can be vital factors in student retention, and should be studied.

Distance-Learning Patterns

Distance learning has a long history. Moore and Kearsley (2005) distinguished five generations: postal correspondence, broadcast radio and television, open universities, teleconferencing, and the Internet (p. 24).

Printed materials exchanged by mail was how learners accessed their pedagogy when distance learning was initially launched. According to Bower and Hardy (2004),

"Correspondence programs spread rapidly at the end of the nineteenth century, particularly in Britain and the United States" (p. 6). This allowed learners to further their education at their convenience. Lechuga (2006) noted that, "DLU [Distance Learning University] was established in 1969 as a distance education-based institution, offering courses via U.S. mail, i.e. correspondence courses" (p. 73).

Following the development of electronic media, distance educators started using broadcasting to deliver course material. Head and Martin (1957) wrote that 334 institutions offered a radio and/or television workshop, and 81 institutions offered broadcasting degrees in 1954-55. Through broadcasting, educators were able to use either satellites or fiber optics to create a larger learning network and reach more learners nationally and globally. Satellite technology was developed in the 1960s and enabled the rapid expansion of instructional television. For example, "The first state educational satellite system, Learn/Alaska, was created in 1980. It offered six hours of instructional television daily to 100 villages" (Simonson, Smaldino, Albright, and Zvacek, 2000, p. 25). The development of fiber optics allowed for spread of live audio and video systems in education. An instant two-way interaction was possible between instruction and learning through network transmissions. Other distance-learning opportunities were explored by community colleges in partnership with the Iowa Community Network. In the early 80's Iowa community colleges were the first to experiment with educational networks for distance learning (Iowa Communications Network, 2011). Because radio and television were widely available, course activities were easily accessible. However, distance education made little use of broadcasting since carrier channels were expensive, and one-

way transmission of information was ineffective in teaching. It was “the least significant of Moore and Kearsley’s (2005) five generations” (Kember, 2007, p. 125).

The third generation of distance learning—open universities—used print media and television to deliver instruction. Open universities brought about a fundamental change and heightened prestige to distance education. Moore and Kearsley (2005) noted that open universities had more students than any other university by employing the fullest range of communications technologies. The most successful example was the United Kingdom Open University (UKOU). It had more than 250,000 students yearly, 12,000 of whom had disabilities each year. Students were in their teens, 90s, and in between, and the average age of new undergraduate students was 32. Up to 44% of UK student population started undergraduate study without the entry qualifications they would need at a conventional university. Around 70% of our students remained in work while studying (The Open University, 2011). More than 1.6 million people have taken an OU course from UK, Europe, and worldwide. As Bork and Gunnarsdottir (2001) noted that Open University heavily relied on a tutoring system. The tutorial support system maintained UKOU’s teaching level. Open universities, such as UKOU and German Fern University, were successful providers in distance learning’s earlier days (Simonson, Smaldino, Albright, and Zvacek, 2000, p. 26).

Teleconferencing was another generation of distance learning. It included one- or two-way video and two-way audio formats, and this created an interactive setting that was similar to traditional classrooms. Instructors were able to interact with their students in different geographical sites through a more sophisticated communication medium. Students in different classrooms were able to maintain their own interactions as well.

However, the technology was not economical, so fewer students were able to access distance learning through teleconferencing other than earlier-generation broadcasting. Hopper (2004) noted that Respiratory Care pioneered educational teleconferencing in the medical field. Because teleconferencing technology was expensive, however, online courses began dominating distance learning after the technology became widely available.

Most distance educators use the latest online content-management systems (CMS) such as Blackboard, Webct, and eCollege. These software systems are designed to facilitate distance learning in the virtual environment and can function as a virtual environment within which instructors can deliver lectures, offer course resources, manage information, communicate with students, and assess learning. Developed around 10 years ago, use of CMS has become an overwhelming trend. Content-management systems are also employed to deliver blended learning such as that found at the University of Wisconsin System's use in regular face-to-face classes (Morgan, 2003). CMSs have become the main platform for course implementation. It will undoubtedly become steadily more powerful, flexible, and customizable to satisfy different instructional styles, such as blended learning within distance learning, and to be applicable to a variety of learning styles, levels of academic performance, and learner backgrounds. It is possible that CMS is revising traditional pedagogy as well as distance learning; for this reason, it is becoming important in higher education.

Blended Learning

Blended learning, which offers face-to-face interaction in a partially online environment, combines technology with classroom lecture in teaching and learning.

When compared with traditional and fully online courses, this type of learning has maintained "higher levels of student and faculty satisfaction [and] student learning outcomes" (Dziuban, Hartman, & Moskal, 2004, p. 3). Blended learning has become an important instructional mode because of high student demand. Internet and telecommunication technologies are used to deliver course material. Asynchronous CMSs have been dominant in blended learning. Digitization, word-processing, e-mail, chat rooms, and discussion groups have made course resources easily accessible and have fostered participant interaction (Dziuban et al., 2004; MacDonald & McAteer, 2003). Face-to-face instruction is also employed to support the course's electronic components. Most researchers believes that there is no exact definition of blended learning, as the definition is open to diverse technologies and pedagogical styles.

Theories of Distance Learning

Transactional distance and reintegration are theories integral to this research. The former is relevant to pedagogical concerns and the latter to the activities of instructional. Also, connectivism uses technology to intensify learning theories. Distance learning can use these three theories as a foundation to enhance effectiveness.

Theory of Transactional Distance

In their discussion of transactional distance, Moore and Kearsley (2005) state that physical distance resulted in a communication gap, a psychological space of potential misunderstandings between the instructors and the learners that had to be connected by teaching techniques; this was the Transactional Distance. The separation of teacher and learner affected their behavior, and course design, content, interaction, and other teaching processes differ from those used in a face-to-face environment. These teaching behaviors,

regarding course design, were able to describe Transactional Distance and labeled dialogue and structure.

Discussing dialogue and structure, Moore and Kearsley (2005) also wrote:

- Dialogue and structure are determined by the educational philosophy of the teaching organization, the teachers themselves, the academic level of the learners, the nature of the content, and by the communications media that are employed. Dialogue is the interplay of words and actions and any other interactions between teacher and learner when one gives instruction and the other responds.
- Guided didactic conversation is a key characteristic of good distance learning.
- Structure states the course's educational objectives, teaching strategies, and evaluation methods. All these course components are able to address individual learners' needs.

Televised courses had high structure, no dialogue, and high transactional distance. Correspondence courses had more dialogue and less structure and, thus, less transactional distance. Teleconference programs had much dialogue, little predetermined structure, and relatively low transactional distance. Online courses, with little or no dialogue and more structure, asynchronous or synchronous, are of higher transactional distance. Distance learners had to be "entirely independent and make their own decisions about study strategies, decide for themselves how to study, what to study, when, where, in what ways, and to what extent" (Moore & Kearsley, 2005, p. 227).

Transactional distance is related to learning effectiveness. Steinman (2007) argues that large transactional distance with the instructor and with other students affects student

satisfaction and retention. Transactional distance is a starting point from which to build a learning philosophy, design effective courses, and pursue learning success.

Theory of Reintegration

Keegan (1996) contends that reintegration of the act of teaching is necessary for successful distance education. “The intersubjectivity of teacher and learner, in which learning from teaching occurs, has to be artificially re-created. Over space and time, a distance system seeks to reconstruct the moment in which the teaching-learning interaction occurs” (p. 116).

As CMS becomes more popular in education, more communication tools are being integrated to produce a virtual educational environment. According to Morgado, Yonezawa, and Reinhard (2002), “Most of the Internet-based virtual environments that can be applied to remote education were developed through the integration of synchronous and asynchronous communication tools, such as chat, discussion forums and lists, and electronic mail” (p. 175). Reintegration promots interaction between teacher and students, among students, and between students and the learning setting to enhance teaching and learning. Through reintegration, a traditional learning environment can be rebuilt in cyberspace.

However, distance-learning environments that are not well integrated cause problems in teaching and learning. Some traditional school activities are not reproduced in a virtual environment, and positive interaction is not maintained during teaching and learning. Reintegration that is not satisfactorily implemented affects retention, learning, and the status of distance learning (Keegan, 1996).

Theory of Connectivism

Siemens (2004) joins learning theories with technology in connectivism and posits that learning is not a process that is entirely under the control of the individual. He states that "Learning is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing" (para. Connectivism). Thus, the ability to recognize information to meet requirements is vital.

Personal knowledge is composed of a network. In the personal-to-network-to-organization cycle, individuals and organizations feed knowledge and learning to each other via a network. Siemens (2004) states that "The cycle of knowledge development allows learners to remain current in their field through the connections they have formed." An Internet connection supports and intensifies existing large effort activities. Connectivism is able to explain this amplification of learning, knowledge and understanding through the extension of a personal network (para. Connectivism).

Distance-Learning Effectiveness

How effective distance learning is compared to traditional learning has been discussed for a long time. After reviewing research from the past 70 years, Russell (1999) asserts that there is "no significant difference phenomenon… There were/are an enormous number of studies—by far the vast majority of comparative ones—that showed no significant difference, at least in strategic parts of the conclusions" (p. xii). He pointed out that more than one medium can produce adequate learning results. Choosing the less expensive makes it possible to avoid wasting limited educational resources.

Glenn (2001) affirmed Russell's findings after comparing a distance-learning course to a traditional one, stating that "No statistically significant differences were found" in pretest and post-test performance between the two groups. Differences in the relationship between scores and perceptions in the two groups were not statistically significant (para. Abstract).

Benson, Johnson, Taylor, Treat, Shinkareva, and Duncan (2004) found that students perform equally well in distance learning and on-campus courses. Their study examined the differences between online and campus-based delivery models in terms of student achievement, including assessment of content-knowledge gain and the quality of student assignments and projects, in postsecondary career and technical education. They found "no difference in the student achievement measures of the online and on-campus students" (p. 54). This result supports other research on the effectiveness of virtual and face-to-face environments: Distance learning is as effective as traditional learning.

The Higher Withdrawal Rate in Distance Learning

As most research has shown, there is a higher dropout rate in distance learning than traditional. "Dropout" means that a student does not complete a course. As discussed before, the dropout rate can be as high as 80% in distance learning. The primary factors that cause students to drop out appear to be learner characteristics and human interaction.

Tucho (2000) found that gender and job status were significant learner characteristics that affected dropout rate in his study of 168 students at the Community College of Philadelphia in Pennsylvania. Female respondents could not complete their studies for the following reasons: "responsibilities at home," "lack of babysitter," "transportation problems," and independent study skills (p. 64). Many student-workers

quit their studies because of factors related to their jobs. Both gender and job status were statistically significant.

Menager-Beeley (2001) also conducted a study of the relationship between learner characteristics and dropout decisions; 59 subjects out of 150 responded to his survey. He found that "students with low task values, low prior grades in English, and older students (over 28 years) may be more likely to drop out of a class that is completely Web-based" (p. 1). Students who had greater interest in learning and recognized its importance and utility had a higher motivation to stay in the course. Students with better English proficiency, including writing skills, were able to perform better in text-oriented and web-based environments. Students from 28 to 50 years old were more likely to drop out of a course.

The other primary factor affecting the dropout decision is online interaction. Better interaction in a virtual environment can prevent students from feeling isolated and lonely. According to Spitzer (2001), "Good human facilitation can compensate for most other deficiencies, while state-of-the-art technology and fancy graphics alone cannot sustain student interest and motivation for long" (p. 52). Thus, retention is predicted by human mediation instead of technological capability. Spitzer offered the idea of "compromise" to cope with technological limitations—a hybrid or blended learning approach—because the combination of technology and human intervention enhanced technology-based instruction.

Woodley (2004) expanded Tinto's model, positing that improvement in social and academic integration prevents students from dropping out. In Woodley's study, students' withdrawal decisions were influenced by financial concerns, goal and institutional

commitments, and social and academic integration. Social integration was necessary to manage one's occupational, domestic, personal, and social life and interactions with fellow students and tutors. Improvement of assignment feedback advanced academic integration. Better social and academic integration fostered positive human interactions and reduced misunderstandings over course content and student attrition.

Interaction

Effective interaction is required for a successful distance-learning environment. Interaction includes learner-content, learner-instructor, learner-learner (Moore, 1989) and learner-interface (Hillman, Willis, & Gunawardena, 1994). Consideration of each type of interaction is important for effective distance learning.

Learner-Content Interaction

Learner-content interaction is one of the important methods for enhancing distance learning. Baath (1982) stated that in the "models with stricter control of learning towards fixed goals," distance learning focuses more "on the teaching material than on the two-way communication between student and tutor/institution" (p. 15). Positive learner-content interaction can improve learning satisfaction and contribute to student success. It is related to instructional interface and structure and to students' ability to construct their learning as course participants in a self-directed learning environment. Moore (1989) believes that the interaction between the learner and the content or subject of study is a defining characteristic of positive learning experiences. It is "the process of intellectually interacting with content that results in changes in the learner's understanding, the learner's perspective, or the cognitive structures of the learner's mind" (para. 4). Holmberg (1986) contends that this involves internal "guided didactic

conversation," which happens when learners talk to themselves about the information and ideas they encounter in a text, television program, lecture, or elsewhere (p. 4). According to Moore and Kearsley (2005), "procedures in instructional design and the facilitations of interaction" affect course structure to cross the transactional-distance barrier (p. 223). The authors define structure as "the rigidity and flexibility of the course's educational objectives, teaching strategies, and evaluation methods" (p. 226-227).

Technology plays a vital role in designs for learner-content interaction. The instructional conversation between learners and materials reconstructs knowledge, which is accomplished through interaction with content in text-, video-, audio-, and web-based environments (Mitzel, 1971; Moore, 1989). Northrup, Lee, and Burgess (2002) found that interacting with "audio-narrated online presentations and innovative instructional strategies… [including] case studies, structured games, and online discussion" (p. 4), is important to the learner's online experience. Learner-content interaction provides a foundation for conversation, collaboration, and informal discussion. Marks, Sibley, and Arbaugh (2005) defined student-content interaction as "pedagogical tools and assignments, including PowerPoint presentations, streaming audio and video presentations, group projects, individual projects, and embedded links in Web courses" (p. 538). Students were able to collaborate to construct their knowledge with others and collaborate with others to construct their understanding of the subject. Thus, students benefit from the integration of interactive elements into the design and assessment of courses. Effective use of learner-content interactive components was able to promote interaction and satisfaction of distance education students (Chang & Smith, 2008; Westbrook, 1997) and finally contributed to their success.

Learner-Instructor Interaction

Learner-instructor interaction, an active process of constructing knowledge that was supported by dialogue, was important to learning (Laurillard, 2002; McKenzie, 2002). This interaction increased "student satisfaction with the overall learning experience" in a self-directed environment (Woods, 2002, p. 385). Moore (1989) believed that interaction between "the learner and the expert who prepared the subject material, or some other expert acting as instructor" was regarded as essential and highly desirable by learners (para. 7). This type of interaction was a primary teaching strategy (Laurillard, 2002). The technology for discussion activities has proliferated as a means to support effective course objectives in distance learning.

In Moore's 1989 study, students, under the instructor's direction, were shown how to interact with content in the manner that was most effective for that individual, and the instructor had a separate dialogue with each student to motivate and/or resolve misunderstandings. This teaching and learning process led to "a style of guided didactic conversation likely to influence students' attitudes and achievements favorably" (Holmberg, 1986, p. 55).

Research has shown that positive learner-instructor interaction is a vital element of an effective distance-learning experience (Askvig & Arrayan, 2002; Liao, 2006; O'Leary & Quinlan, 2007; Rowland, Hetherington, & Raasch, 2002) and increases learner satisfaction (Chang & Smith, 2008; Yukselturk & Yildirim, 2008). Moore (1989) contends that "the frequency and intensity of the teacher's influence on learners when there is learner-teacher interaction is much greater than when there is only learner-content interaction" (para. 8) and adds, "The instructor is especially valuable in responding to the

learners' application of new knowledge" (para. 10). Student satisfaction and success are also enhanced by receiving timely feedback from their instructor (Kirby, 1999; Yukselturk & Yildirim, 2008). In contrast, feedback that was delayed or limited causes problems in learner-instructor interaction (Kirby, 1999). Additionally, instructor feedback that is individualized is highly effective. Feedback that is timely and personalized motivates students' learning and autonomy and allows the instructor to evaluate student achievement and diagnose difficulties (Moore, 1989).

Various online-discussion tools have been extensively employed in both asynchronous and synchronous courses to facilitate interaction (Bloch, 2002; Harris, 1998; Yukselturk & Yildirim, 2008). Discussion boards and chat rooms allow distance educators to implement collaborative course activities. Dialogue between instructors and learners sustains these collaborative efforts; with teachers' immediate responses, self-directed learners are motivated and able to interact with the course content (Lee & Gibson, 2003; Moore, 1989). Learner-instructor interaction is essential for successful construction of knowledge in a planned virtual environment (Hung & Crooks, 2009).

Learner-Learner Interaction

Learner-learner interaction or inter-learner interaction is communication "between one learner and other learners, alone or in group settings, with or without the real-time presence of an instructor" (Moore, 1989, ¶ 11). Both learner-learner and learner-instructor interaction are key elements that affect student satisfaction within a distance-learning experience (Chang & Smith, 2008; Driver, 2002; Frey & Alman, 2003; Hassenplug & Harnish, 1998; Moore, 1989). Discussion between students is essential to peer interaction and learning (Laurillard, 2002).

Since this type of interaction is important for learning, it has to be analyzed to improve effectiveness (Moore, 1989; Yukselturk & Yildirim, 2008). Communication technologies are used to promote learner-learner interaction and increase student performance (Moore, 1989; Murphy & Ciszewska-Carr, 2007). Online discussion is a vital teaching strategy to maintain small group learner-learner interaction (Driver, 2002; English, 2007; Marks et al., 2005; Pollock, Hamann, & Wilson, 2005) and satisfaction with the interactive learning environment (Jiang & Ting, 1999; Jin, 2005). Asynchronous threaded discussions and e-mail and synchronous chat rooms allow students to interact with individual students, a small group, or the entire class. Furthermore, discussion activities provide the best opportunities for collaborative distance learning in the virtual environment (Chou, 2001; Daradoumis & Marques, 2002). Learners post their responses and inspire further discussion; in this way, they are able to collaboratively manage learning, develop expertise, and construct knowledge (Lee & Gibson, 2003; Moore, 1989; Son, 2002).

McDonough (2004) showed that students with more experience working in pairs and small groups achieve higher levels of learning, while students with a limited background in computer-mediated communication participate less and are more dependent on learner-instructor interaction, or "learner training and program restructuring" (Paran, Furneaux, & Sumner, 2004, p. 350). This affects what Moore (1989) refers to as "learner autonomy," or the ability of the learner to construct knowledge and achieve planned learning objectives (para. 14). Moore goes on to state that the student's circumstances, age, and experience affect learner-learner interaction. As a result, in addition to the study of learner characteristics, interactive settings for online

courses need to be designed for maximum effectiveness. Learner-learner interaction is important for student success in a "self-directed environment" (Lee & Gibson, 2003, p. 185-186).

Learner-Interface Interaction

Hillman, Willis, and Gunawardena (1994) define learner-interface interaction as the "process of manipulating tools to accomplish a task" (p. 34). Successful learner-interface interaction requires the learner to understand both the procedures of working with the interface and the reasons why these procedures obtain results. Learner-interface interaction mediates learner-content, learner-instructor, and learner-learner interactions in distance learning. Effective learner-interface interaction is able to improve the distance-learning student's overall learning experience (Liao, 2006; Sinha, Khreisat, & Sharma, 2009; Verdejo, Barros, & Abad, 1998) and satisfaction (Bray, Aoki, & Dlugosh, 2008; Chang & Smith, 2008; Shee & Wang, 2008). Hence, communication technology fundamentally affects educational transaction in a self-directed learning environment (Garrison, 1990a).

Inability to interact successfully with technology inhibits students' active involvement in the educational transaction (Garrison, 1990a). This causes learners to dedicate more mental resources to retrieving information and to leave fewer resources for lesson content (Hillman et al., 1994). Furthermore, Repman and Logan (1996) note that "a mismatch between technology and instruction and the unnecessary emphasis placed on the technology by the instructor" become barriers to learning (p. 37). If instructors are unfamiliar with educational technologies, that discomfort can affect their students. For example, a distance learner studying a nontechnical subject such as psychology

effectually is taking two courses, content and interface. As a result, to succeed in the course the student has to develop an understanding of the specific communication protocol associated with the delivery system (Hillman et al., 1994).

Distance educators must orient students to distance education technologies to ensure learner-interface interaction for effective learning (Davie & Wells, 1991; Hillman et al., 1994). Training and experience are the foundational solutions to overcome mismatch and discomfort between instructors and technology (Brinkerhoff & Glazewski, 2000; Recesso, 2001; Repman & Logan, 1996). Identifying students' computer performance levels before enrollment, providing technical support, and creating departmental gateway websites for information resources were found to facilitate learner success (Brinkerhoff & Glazewski, 2000; Shelton, 2000, p. 7). Learner-interface interaction is able to "increase student engagement and retention" (Sinha, Khreisat, & Sharma, 2009, p. 4) and reshape learning communities for collaboration (Gilbert, 1996, as cited in Repman & Logan, 1996; Repman & Logan, 1996; Leh, Kouba, & Davis, 2005; Verdejo, Barros, & Abad, 1998). Learners are more likely to have a positive educational experience if the technologies that mediate the other three types of interactions are carefully considered.

Satisfaction

Learners are more likely to be satisfied with their overall educational experiences when the following areas are sensitively examined and planned for: interaction, learner characteristics, technology, instruction, and learning engagement (Harvey, Plimmer, Moon, & Geall, 1997). Each of these items will be discussed in the following sections.

Learning Satisfaction and Interaction

According to Katz (2000), "A distance learning system that is highly interactive and most closely resembles a regular college lecture hall is best suited to contribute significantly to student satisfaction and achievement" (p. 29). In contrast, a less interactive delivery system was unable to engender student satisfaction or achievement in distance learning. Thus, effective interaction is crucial to learner satisfaction in both in distance-learning and traditional settings (Vamosi, 2004). Katz (2002) contends that "Seemingly the feeling of satisfaction with learning, the feeling of control of learning and study motivation are in some way related to the students' need for teacher-student interaction that most closely resembles the traditional classroom" (p. 7). Learner-learner and learner-instructor interaction are positively correlated with learner satisfaction (Baker, 1999; Bray, Aoki, & Dlugosh, 2008; Fulford & Zhang, 1993; Garrison, 1990b; Ritchie & Newby, 1989). Studies have also explored the impact of the four types of interaction and identified them as important to learning satisfaction (Bray, Aoki, & Dlugosh, 2008).

Learning Satisfaction and Learner Characteristics

Learner characteristics often contribute to satisfaction with distance learning. Bower, Kamata, and Smith (2001) reported that of the remote-site teleclass students they studied, those who were "concrete thinkers, emotionally stable, conscientious, and self-assured" were more likely to be satisfied (p. 8). Studies of satisfaction and learner demographics have considered the following variables: learners' independence (Katz, 2002), age (Richardson & Long, 2003), student autonomy (Bray, Aoki, & Dlugosh, 2008), and online learning experiences (Rodriguez, Ooms, Montanez, & Yan, 2005). Bray et al. (2005) found that, "learning satisfaction was higher for students who: (1) could persevere

in the face of distance learning challenges, (2) found computers easy to use, (3) found it easy to interact with instructors, and (4) did not prefer social interaction with others when learning" (para. Abstract). These characteristics of distance learners can be used as indicators of student satisfaction.

Learning Satisfaction and Technology

Technology is generally believed to play an essential role in learner satisfaction (Finlay, Desmet, & Evans, 2004; Guzley, Avanzino, & Bor, 2001), though other analyses have yielded no evidence for this (O'Leary & Quinlan, 2007). Research has shown that learners are more satisfied in distance-learning environments than traditional settings (Kuo, 2005) and have positive course experiences (Motiwalla & Tello, 2000) because distance-learning programs are more flexible in terms of time and geography (Kuo, 2005; Reinhard, Yonezawa, & Morgado, 2000), since online courses can be accessed anytime and anywhere.

Learning Satisfaction and Instruction

In their discussion of the relationship among instructional design, instructor behaviors, and learner satisfaction, Wilson, Cordry, and King (2004) state,

> By creating a comfortable learning online community through online learning, student satisfaction with online course availability could continue to grow at an explosive and successful rate, creating new opportunities for more students to participate in desired academic development (p. 21).

Therefore, being part of a successful online academic community satisfies distance learners.

Course design is also important for satisfaction in online environments (Shea, Pickett, & Pelz, 2003; Stein, Wanstreet, Calvin, Overtoom, & Wheaton, 2005). Stein et al. (2005) contend that instructors must include interaction in the course structure and note that although student-initiated interactions are important, they do not contribute as much to overall satisfaction. Moreover, Bozkaya and Erdem Aydin (2007) posit that student satisfaction with an instructor is associated with the teacher's verbal and nonverbal immediacy behaviors "through video conference and face-to-face academic tutoring services"; the latter behaviors include "having eye contact with learners, acting in a natural way, and using facial expressions while presenting the content" (para. Conclusion and Implications). These behaviors increase learners' satisfaction with the teacher. Hence, interactive design profoundly affects learner satisfaction in distance learning.

Learning Satisfaction and Learning Engagement

Research has also focused on the correlations among academic engagement, perceived academic quality, critical thinking, and learner satisfaction. Richardson and Long (2003) believe that student satisfaction is directly related to "some aspects of academic engagement," "some aspects of perceived academic quality," and "the close link between academic engagement and perceived academic quality" (p. 240). They define academic engagement as "communication, institutional affiliation, learning from materials, relations with tutors, and tutorial pace" and state that the attributes of quality academics include "appropriate assessment, generic skills, good materials, and student choice" (p. 240). Additionally, Schumm, Webb, Turek, Jones, and Ballard (2006) found that "satisfaction with critical thinking appeared to be the most important predictor variable," along with instruction, overall training, and usefulness or relevance of training

(p. 47). Therefore, satisfaction is also related to academic engagement, perceived academic quality, and critical thinking.

Characteristics of Distance Learners

Characteristics of distance learners can affect their success. Analyzing and responding to these characteristics can improve students' success and retention in an online learning environment. The demographics of conventional distance learners have changed; new technology is available, and more students are attracted to this learning mode.

Demographics of Typical Distance Learners

Traditional distance learners have been characterized "with respect to maturity, experience and barriers [that] help to situate this type of learner in the broader university context" (Qureshi, Morton, & Antosz, 2002, para. Summary). They are older, White, and female, with family or work responsibilities, or with time or geographical restrictions. Distance learning enables more nontraditional learners to access higher education. These learners are more diversified than their face-to-face counterparts or earlier distance learners. In studies by Halsne and Gatta (2002),

> Online learners were… typically White/Caucasian, not of Spanish/Hispanic origin, and 26 to 55 years of age. The average online learner's total family income of over $40,000 a year was higher than that of the traditional learner. Online learners were typically full-time workers, and their professional status was as a professional, educator, or "other" occupational category. Typical online learners had more education than their traditional learner counterparts, [and] had part-time student status. (para. Conclusions).

Distance learners have higher socioeconomic status than traditional students. Research has found other differences, such as gender, race, and age. Benson et al. (2004) found that "in all cases, there were fewer ethnic minorities enrolled in online courses than in on-campus courses" (p. 50); Whites were more prevalent in most of the online courses. Distance learners were also older than their on-campus counterparts. Shortall and Evans (2005) studied demographic distribution in distance and campus-based Teaching English as Foreign Language (TEFL) programs and found that "only 14% of [open/distance learning] students were under 30, while over 40% were over 40" (p. 348).

Changing Demographics of Distance Learners

As discussed before, distance learners are often White, mature women with family responsibilities and time or location restrictions. However, some researchers argue that variables such as age, gender, and socioeconomic status are not the important factors in distance-learning studies (Biner & Dean, 1998; Menager-Beeley, 2001).

To ensure educational quality at Texas's Austin Community College (ACC), Wallace (2002) investigated student learning expectations and experiences in eight-week distance-learning courses for ACC faculty and administrators. He found that 43.0% of the participants were between 17 and 21, 67.8% primarily attended daytime classes, and 43% were employed full or part time. Their demographics are different from typical distance-learners who are mature and time-restricted. Thus, the contrast between traditional community college students and their long-distance counterparts is evident.

While exploring distance-learning demographics, motivation, and barriers at a Canadian university, Qureshi, Morton, & Antosz (2002) reported that long-distance students had weaker motivation than on-campus students. Distance-education students

were “more mature, more experienced, and were more likely facing barriers (situational, institutional and personal, [and] predictable relationships) and less motivated (a totally unexpected relationship)” (para. Summary).

Magagula and Ngwenya (2004) compared the background characteristics of distance and on-campus learners enrolled in parallel programs at the University of Swaziland. They found that learners who were “females (68%), single (90%), between 20 to 25 years old (92%), had completed O levels [compared to the other educational levels of certificate or/and diploma] (76%), and were unemployed (97%). Learners were dominant in both off- and on-campus” populations (para. Findings). Their characteristics are highly homogenous either on online or on-site. Regarding the online learners, this is not similar to typical distance learners, who are more likely to be married, older, and employed.

In their study of distance learning in postsecondary career and technical education, which included a total of 112 on-campus students and 81 online students at three community colleges in 2002 and/or 2003, Benson et al. (2004) found that “in three courses, more women were enrolled in the online format, while in the other two courses more men were enrolled in the online format” (p. 50). The study’s findings were inconclusive, as the content of the courses had gender biases. In their study of the Teaching English as a Foreign Language program, Shortall and Evans (2005) examined all students between 1994 and 2003 and found “considerable difference in gender distribution across the two groups [distance and traditional learning]: 65% of [open/distance Learning students] are male, while over 60% of [on campus] students are female” (p. 348). This finding was different from the typical demographics, where

women had a larger representation, but it was consistent with other research (Martens, Valcke, Portier, Wages, & Poelmans, 1997; Menager-Beeley, 2001), which suggests that gender has nothing to do with distance learning.

Distance Learners Who Successfully Complete Courses

Studies have found several features of demographics and personality that affect student achievement. Inglis (1987) found that a few demographic factors and learning variables are predictive of high affective development: "being 46 years old or older; living in the largest urban centers; experiencing the influence of family, physical handicap, and employment; and having 10 or more hours of leisure time" (para. Abstract). Also in Inglis's study, the learning variables that influenced student success were studying continuously for periods from 1 to 10 years, making one or more visits to the institution, having great study expectations, having personal development reasons for studying, having previous educational experiences, and studying more than 10 hours per week.

The personality characteristics of successful learners were also been studied. More autonomous characteristics are necessary in distance learning, since distance learning has fewer or no lectures and less face-to-face interaction. Nontraditional students are believed to be suited to a virtual learning environment. Threlkeld and Brzoska (1994) conclude that besides necessary characteristics, such as maturity, high motivation levels, and self-discipline, other characteristics required for adult learners to succeed include tolerance for ambiguity, a need for autonomy, and an ability to be flexible. Biner and Dean (1997) found that three basic personality characteristics are predictive of student achievement in telecourses: being self-sufficient, being less compulsive, and exercising a

high degree of expedience in their daily lives. Menager-Beeley (2001) states that "Importance, Interest, and Utility, three components of Task Value, appear to be positively related to a student's decision to stay enrolled in a class" (p. 5); students who have high task values are expected to persist. Kramarae (2001) found that highly motivated students study effectively and finish successfully. Being independent, older, computer-savvy, and ambitious also contribute to success. Other characteristics include having financial and emotional support at home, relating course work to life, embracing challenges, possessing communication and typing skills, enjoying written communication, and working hard.

Students must be self-disciplined (Li, 2002) and possess effective learning skills and coping mechanisms to be successful in distance learning environments. Sizoo, Malhotra, and Bearson (2003) found that controlling anxiety, for instance, contribute to a successful learning experience; the authors suggest that students can reduce anxiety by regaining control over their academic responsibilities and overstudying recommended materials.

Summary

Long-term developments in distance learning have affected higher education. Many universities and colleges have started offering online programs. Research shows that distance learning is as effective as traditional learning. This study explores distance learning's higher dropout rate. Theoretically, lack of interaction is the problem, and therefore better academic and social integration can improve retention of distance-learning students.

Several factors contribute to course completion in distance learning. Research shows that learner characteristics affect performance, so studies of these characteristics should predict the levels of student retention and satisfaction. Demographics for distance learning changed when it became a viable option in education, yet homogeneity still exists in distance-learner characteristics. Learner satisfaction is also a factor that affects student achievement.

The review of relevant literature has been presented in this chapter. Chapter 3 will discuss the methods and procedures used in this study.

CHAPTER III

METHODS AND PROCEDURES

Introduction

The relationship between interaction and satisfaction within online, blended, and on-campus courses will be discussed. Instruments and data collection methodology will be elucidated.

Purpose

The purpose of this study was to explore what factors affect learner satisfaction in online, blended, and traditional learning. Learning interaction, student satisfaction, experience with the Internet, discussion-board applications, and demographics also were investigated.

Location: A Midwest University

A Midwest University is one of 75 institutions that provide online courses in The Illinois Virtual Campus (IVC). The Midwest Extended University (MEU) offers courses in more than 20 fields via the Internet and interactive television. In the Fall 2010 semester, 2,143 students enrolled in online courses through MEU, up from 1,948 enrollees in the fall of 2009—an increase of 10.01% (“Distance Education,” 2010; “Distance Education,” 2009).

The MEU facilitated distance learning through the coordination and logistical support of extension, Internet, contract, flex, and continuing- education courses,

certificates, and programs; in addition, blended instruction was integrated into some of the courses. On December 31, 2009, MEU ceased its operations and shifted its functions to existing campus units.

Course Structure

This study collected data from 44 undergraduate sections of online, blended, and traditional courses. There were nine online sections, four blended sections, and 31 traditional sections. Online instruction was conducted through the web-based learning environment, and all course activities, content modules, and evaluations were implemented online. Though there were no physical meetings during the semester, online contact with teachers and peers was available via e-mail, discussion forums, and chat rooms. Blended instruction included electronic components and on-campus lectures; students participated in online activities similar to those in exclusively online courses, and on-site classes were similar to traditional, face-to-face learning. Blended students reduced their classroom time, but most of the traditional sections surveyed asked students to participate in course discussions via Blackboard or other virtual environments, such as Wikis, blogs, or Shelfari.com. These web-enhanced courses were still categorized as traditional learning. Since there were 44 sections in the study, three sections each from the online and blended-learning settings and four from the traditional settings were described as representative of courses in the three types of deliveries, as follows.

Online Courses

Nine online sections were included in the survey in Fall 2010: Introduction to Spanish (Department of Languages, Literatures, and Cultures), and Medical Sciences and

Life (Department of Health Sciences). Three of the night sections are described as follows:

1. Introduction to Spanish (one section)

The course was designed specifically for undergraduate students who needed to fulfill the College of Arts and Sciences Foreign Language Requirement. The course covered vocabulary and grammatical structures. The textbook, workbook, and homework assignments were online. Students worked independently in structured exercises by listening to Internet recordings, watching an online video, viewing lectures on grammar, and completing objective-based forms online. Students had to use both Quia and Blackboard online systems for learning activities to successfully finish this course. Both Quia and Blackboard online activities separately contributed 35% to their final grades. Students also had to take a final proficiency exam for the remaining 30% of the grade to complete the course.

Students had to study one to two hours per day, four days per week to complete their work online. If students required assistance, they could access university and department academic resources, such as tutors at the Grammar Help Desk, or post a discussion note in the online discussion board, or meet with the professor.

The course had an enrollment of 150 students in the Fall of 2010 and had more participants and effective respondents than the other surveyed online courses. The instructor also offered extra credit to help increase response rate. There were 65 surveys obtained by the end of the online survey from this section.

2. Medical Sciences and Life (two sections)

The two sections were designed to study the basic language of medical sciences and allied health with emphasis on word construction, analysis, definitions, pronunciation, spelling, and standard abbreviations. The sections were Internet-based using Blackboard. Students had to attend Internet-based practice exams and study the CD-ROM textbook for chapter review, pronunciation, and student activities. Assignments and chapter exams contributed 20% each to students' final grades. Midterm and final examinations also counted as 30% each in the final grades.

All communication between instructor and students occurred through the Blackboard e-mail and discussions. Blackboard was also used for submission of assignments and completion of chapter, midterm, and final examinations. Face-to-face meetings could be arranged to assist students with questions.

There were a total of 92 students enrolled in the two sections in the Fall of 2010, so there were more survey samples and effective respondents obtained than was the case in the other online courses in the study. The instructor also provided extra credit for the students to increase survey participation. Fifty-eight surveys completed in the two sections.

Blended Courses

There were four blended sections participating the survey in Fall 2010: Marketing Management (Departments of Marketing) and Business Management (Department of Accounting). Three of the four sections are described as follows:

1. Marketing Management (two sections)

The two sections introduced students to the basic principles, terms, and concepts of marketing. The sections also prepared students for the more rigorous junior and senior business classes they would undertake. Furthermore, the sections also provided students with an understanding of the influence of marketing on day-to-day life.

Marketing Management offered content via both the Internet and face-to-face. Course delivery relied heavily on Blackboard and 11 scheduled lectures in Fall 2010. Video lectures were strongly associated with the sections. The video lectures moved rapidly through a great deal of material, half of which was not in the textbook. An abbreviated set of lecture notes was available to students on the web page in the College of Business. However, students needed to attend lectures (both in-class and videos) to get all of the helpful hints for examinations. There were several tasks, including quizzes, simulation games, and assignments, required to finish this course. Sixteen online chapter quizzes and 16 in-class vocabulary quizzes were combined to contribute 32% each to the final course grade. Also, competitive simulation games were 24% of the grade, and in-class and homework assignments were 12% of the grade.

Students could contact the instructor by e-mail or telephone, and were encouraged to see the instructor at their convenience whenever in the College of Business. In addition, the sections used a good deal of technology to thoroughly cover the text. This helped students develop better computer skills. Students were encouraged to address specific questions involved in course materials and technology to the instructor and general computer questions to the university's help desk.

There were 80 students enrolled in the two sections in Fall 2010. The sections contributed 70 completed surveys from blended settings to the research.

2. Business Management

The course introduced principles of managing the linkage between organizational strategy and enterprise information technologies, including e-commerce architecture, development and strategy. This was an introductory, hands-on course using information systems to partially or entirely support the practices of business commerce. Students learned how individuals and businesses use the Internet to make a profit. This blended course was set up for both online and assigned classroom meetings. The course management system used was Blackboard, which contained access to or directions for all course materials and assessments. Concerning face-to-face time, students could choose not to come if they were able to meet their online course requirements well. Many students found the work to be fairly intuitive by following the tutorials provided. Students' final scores were determined by a 700-point scale, which included 14 quizzes worth total 300 points, two individual projects worth 300 points, and an e-business plan worth 100 points.

The course offered either online help or face-to-face assistance. Students were able to use the discussion area on Blackboard, send an e-mail, or come to their instructor's office or the classroom. They were asked to follow a schedule that provided deadlines for projects and examinations and were encouraged to work on the course daily to complete it successfully.

Thirty-three students enrolled in Business Management in the fall semester of 2010, and 11 students completed the survey online. The instructor provided extra credit to increase the respondent rate.

Traditional Courses

Thirty-one traditional sections participated in the survey in Fall 2010. All sections in the traditional setting that were surveyed employed web-enhanced educational technology in addition to traditional lectures. The sections employed a variety of technology, including Blackboard, blogs, Wikis, podcasts, LiveText, and the web. Traditional sections were: Special Education Teaching (Department of Special Education), Seminar on Agriculture (Department of Agriculture Education), and Education and Society (Department of Curriculum and Instruction). Five of the 31 sections were described as follows:

1. Special Education Teaching (two of four sections)

The sections offered entry-level knowledge for instruction of exceptional learners and included collaborative instruction and modifications in practice. The sections emphasized the knowledge required of all educators to effectively collaborate with parents and other school personnel and to teach exceptional and diverse students in school settings. Four quizzes (160 points), three cyber-mentor correspondences (30 points), one learning-environment summary (30 points), one diversity project (12 points), a website portfolio (30 points), and participation (43 points) were graded on a scale of 305 points possible. Students needed to complete all quizzes, assignments, and participation to receive a passing grade.

The sections were designed to be a combination of lecture and active engagement with the course topic and with classmates. Participation was important to the student's success. Blackboard was employed to enhance course content. Students needed to complete the universal-precautions quiz and receive e-mail correspondence on Blackboard related to their LiveText electronic portfolio, class assignments, and notifications.

There were 70 students enrolled in Special Education Teaching in the fall semester of 2010. Sixty-one students completed the paper survey.

2. Seminar on Agriculture

The section reviewed basic learning and teaching principles as they affect the practical aspects of teaching in agricultural education. It included discussions of the relationship of agricultural education to the general education curriculum and career and technical education. The major component of the section covered practical exercises in teaching techniques, program and course planning and development, assessment, laboratory and classroom management, motivating students, and teacher professionalism. Lesson plans (15%), micro teaching lessons (25%), Institutional Technology Passport System (20%), other assignments (10%), and exams (30%) contributed to the final grade.

Students were able to access grades, discussions, day-to-day activities, PowerPoint slides, and other class materials via Blackboard. They were also asked to turn in assignments and conduct other activities for assessment purposes through an e-portfolio. Students could reach their instructor via e-mail or by telephone.

Eight students were enrolled in Seminar on Agriculture in the Fall 2010 semester, and six students completed the survey.

3. Education and Society (two of four sections)

The two sections of Education and Society focused on current directions, research, and individual needs of diverse student populations. The sections helped prepare students to become effective social studies educators capable of teaching elementary students the content knowledge, intellectual skills, and civic values necessary for fulfilling the responsibilities of citizenship in a participatory democracy. The clinical experience of the sections provided students with extended opportunities to observe, teach, and create lessons for students across a wide range of abilities in one-to-one, small-group, and whole-class settings. A total of 300 points was possible in this course: cultural discovery experience (20 points), web page assignment (20 points), critical history lesson plan (25 points), good citizen lesson plan (25 points), financial education lesson plan (25 points), technology-based cooperative teaching (product and presentation; 25 points), class-related assignments (100 points), social studies (30 points), and final assessment (30 points).

Blackboard was used to enhance instruction. For example, each candidate posted a 600-word reflection on his or her cultural-discovery experience on the Blackboard website. Each candidate also created a WebQuest that could be used for teaching K-9 students about concepts related to family and community. The student posted the assignment in his or her Teacher Education Portfolio and sent it to the instructor for assessment on LiveText, which is a requirement of Illinois professional teaching standards.

Thirty-nine Education and Society students completed the survey in Fall 2010.

Population and Sample

Participating students were enrolled in online, blended, and traditional courses at the Midwest University in the fall semester of 2010. The study population comprised 18,254 undergraduate students. A total of 916 respondents were collected from 44 sections from the 5th to 10th weeks of the semester. Of these, 185 were from nine online sections, 90 from four blended sections, and 641from 31 traditional sections. Tables 1, 2, and 3 show the number of respondents in each learning delivery type. Students were asked to complete a questionnaire that explored learner satisfaction and to provide demographic information—gender, age, ethnicity, and previous experience with the Internet and discussion-board applications.

Table 1

The Nine Online Sections and Respondents

Online Sections	Number of Respondents
Adolescent Education	5
Global Agriculture	15
Medical Sciences and Life (2 sections)	69
Issues in Speech Language Pathology & Audiology (2 sections)	1
Introduction to Spanish	74
Reading in Spanish	1
Humanities Studies	20
Total	185

Table 2

The Four Blended Sections and Respondents

Blended Sections	Number of Respondents
Marketing Management (2 sections)	69
Diverse Learner	10
Business Management	11
Total	90

Table 3

The 31 Traditional Sections and Respondents

Traditional Sections	Number of Respondents
Special Education Teaching (4 sections)	112
Education and Society (4 sections)	72
Literacy in Secondary Education (3 sections)	54
Reading in Secondary Education	31
Teaching Diverse Students	23
Issues in Early Childhood Education	23
Seminar on Agriculture	6
Language Arts in the Elementary School (2 sections)	47
Early Adolescence Education	18
Language Arts Instruction (2 sections)	26
Early Childhood Education	37

Issues in Education	22
La Cultura Española	15
Student Academic Behavior (3 sections)	52
Diverse Student Assessment	9
Issues in Child Development	24
Communication with Disabilities	17
Instruction in Secondary Education	30
Science Education	23
Total	641

Research Design and Rationale

Strachota's Online Satisfaction Survey was used in this study to examine how learning interaction, demographics, and use of the Internet and discussion boards affected student satisfaction. The survey was revised so as to be administered in online, blended, and traditional settings. Questions in the survey were designed to elicit students' perceptions of satisfaction in different learning settings. This study addressed the following question: Within three learning settings, what was the relationship between student satisfaction and diverse variables, including learning interaction, demographics, and previous experience with use of the Internet and discussion-board applications? Three sample groups, composed of sections drawn from classes in four different academic programs, participated: 9 online sections, 4 blended sections, and 31 traditional sections, for a total of 44 sections. The following questions guided this research:

1. What is the relationship between student-content interaction and student satisfaction in online, blended, and traditional courses?
2. What is the relationship between student-instructor interaction and student satisfaction in online, blended, and traditional courses?
3. What is the relationship between student-student interaction and student satisfaction in online, blended, and traditional courses?
4. What is the relationship between student-technology interaction and student satisfaction in online, blended, and traditional courses?
5. What is the difference between student satisfaction in online, blended, and traditional courses?
6. What is the difference between learning interaction and student satisfaction in online, blended, and traditional courses with different demographics?

Instrumentation

The instrument used was Strachota's (2002) Online Satisfaction Survey, which explored learning interaction, satisfaction, and demographics in online, blended, and traditional learning environments. The instrument was chosen to investigate what influence student-content interaction, student-instructor interaction, student-student interaction, and student-technology interaction had on student satisfaction in online, blended, and traditional courses. It also explored the relationships between student demographics and the five variables in the three different learning environments.

The Online Satisfaction Survey contains five sections: learner-content, learner-instructor, learner-learner, learner-technology, and general satisfaction. Strachota (2003)

referred to Cassidy and Eachus's Computer Self-Efficacy Survey (2000) to revise the "learner-technology interaction" section of the survey. According to Cassidy and Eachus (2002), "Self-efficacy beliefs have repeatedly been reported as a major factor in understanding the frequency and success with which individuals use computers" (p. 134). Isik (2008) stated, "Computer self-efficacy plays an important role in determining online satisfaction of students who take 100% online courses" (p. 945). The Computer Self-Efficacy Scale was developed to "[measure] computer self-efficacy in student computer users and its relevance to learning in higher education" (Cassidy & Eachus, 2002, p. 1). Strachota's Online Satisfaction Survey used 15 of 30 questions from the Computer Self-Efficacy Scale, since "the scale was found to have high levels of internal and external reliability and construct validity" (Cassidy and Eachus, 2002, p. 1). Some questions in the survey were modified to collect data from three learning settings; other questions were revised for conciseness. The survey is divided into six sections. Five of the sections have five questions about each type of interaction, and the sixth, participant demographics, has 25, for a total of 35 questions.

Strachota's survey included variables of demographics, interaction, and satisfaction (as shown in Table 4). The independent variables were student-content interaction, student-instructor interaction, student-student interaction, and student-technology interaction. The dependent variable was student satisfaction. The control variables were learning setting, gender, ethnicity, age, marital status, class level, student status, employment, distance between residence and the university, and experience with use of the Internet.

Table 4

Survey Variables

Independent	Dependent	Control
1. student-content interaction	student satisfaction	1. learning setting
2. student-instructor interaction		2. gender
3. student-student interaction		3. age
4. student-technology interaction		4. ethnicity
		5. marital status
		6. class level
		7. student status
		8. employment
		9. distance between residence and the university
		10. experience with use of the Internet

Validity and Reliability of Instrumentation

Committee members read and modified the survey questionnaire for content validity, and instructors from surveyed courses in online, blended, and traditional settings previewed the survey and offered suggestions for adjusting it to fit different learning environments. Finally, a group of students tested different formats of the questionnaire to increase content validity before use in the study.

The instrument was developed from Strachota's Online Satisfaction Survey and deleted questions that did not apply to both blended and traditional settings. There were a

total of 35 questions (n = 35), including five sections with five questions for each type of interaction and one section with 10 questions about demographics. Internal reliability was high; Cronbach's alpha was 0.871, > 0.7, which indicates a high degree of internal constancy in a multi-item scale.

Data Collection

The entire survey was administered at Midwest University with approval from its Institutional Review Board. Instructors told the students about the survey via e-mail, course module, and/or in person. Between the 5th and 10th weeks of the fall semester of 2010, participants took the survey in an on-site classroom for the traditional setting or, for online classes, via either e-mail with a website link or the Blackboard course module. Participants in the blended setting could complete the survey either on-site or online, but were told to do it only once. To attract more online respondents, instructors asked students to complete the survey at the beginning of the second surveyed week (week 6) and offered extra credit.

Both independent and dependent variables used a 4-point Likert scale, from strongly agree (4 points) to strongly disagree (1 point), to answer 25 questions (Appendix A). Scales for control variables were as follows: Learning setting was online learning = 0, blended learning = 1, and traditional learning = 2. Gender was female = 0 and male = 1. Ethnicity designation was African American = 0, American Indian or Alaskan Native = 1, Asian and Pacific Islander = 2, Caucasian = 3, Hispanic = 4, Hispanic/Latino = 5, and Other (please specify) = 6. The scale for age was 18-25 = 0, 26-35 = 1, 36-45 = 2, and over 45 = 3. Marital status was single = 0 and married = 1. Class level was freshman = 0, sophomore = 1, junior = 2, senior = 3, and second bachelor degree = 4. Student status was

full-time = 0 and part-time = 1. Employment was unemployed = 0, part-time = 1, and full-time = 2. The scale for distance from the university was 0-5 miles = 0, 6-10 miles = 1, 11-20 miles = 2, 21-30 miles = 3, 31-40 miles = 4, over 40 miles = 5, and out of Illinois = 6. The scale for previous experience with use of the Internet was Never = 0, Rarely (less than 5 hours a month) = 1, Periodically (5-10 hours a month) = 2, Often (11-20 hours a month) = 3, and Daily = 4.

Data Analysis

An online survey tool, Select Survey, was used to collect data during the 5th to 10th weeks of the fall semester of 2010. In the 11th week, data were exported to an Excel spreadsheet. The results were analyzed by Statistical Package for the Social Sciences (SPSS), version 18. Descriptive analysis was performed to identify correlations between variables. Regression statistics also were applied to investigate which factors affected learner satisfaction in three different learning settings.

Data were analyzed to determine how interaction variables influenced student satisfaction in online, blended, and traditional courses. Study hypotheses were as follows:

Hypotheses

Question 1:

H_0: No significant relationship exists between student-content interaction and student satisfaction at the $\alpha = .05$ level.

H_1: A significant relationship exists between student-content interaction and student satisfaction at the $\alpha = .05$ level.

Question 2:

H_0: No significant relationship exists between student-instructor interaction and student satisfaction at the $\alpha = .05$ level.

H_1: A significant relationship exists between student-instructor interaction and student satisfaction at the $\alpha = .05$ level.

Question 3:

H_0: No significant relationship exists between student-student interaction and student satisfaction at the $\alpha = .05$ level.

H_1: A significant relationship exists between student-student interaction and student satisfaction at the $\alpha = .05$ level.

Question 4:

H_0: No significant relationship exists between student-technology interaction and student satisfaction at the $\alpha = .05$ level.

H_1: A significant relationship exists between student-technology interaction and student satisfaction at the $\alpha = .05$ level.

Question 5:

H_0: No significant difference exists between student satisfaction in online, blended, and traditional courses at the $\alpha = .05$ level.

H_1: A significant difference exists between student satisfaction in online, blended, and traditional courses at the $\alpha = .05$ level.

Question 6:

H_0: No significant difference exists between learning interaction and student satisfaction in online, blended, and traditional courses with different demographics at the $\alpha = .05$ level.

H_1: A significant difference exists between learning interaction and student satisfaction in online, blended, and traditional courses with different demographics at the $\alpha = .05$ level.

Summary

Study methods and procedures are described. Purpose, location, participants, courses, population and sample, research design and rationale, and data collection are introduced.

Diverse variables, such as learning interaction, student satisfaction, and student characteristics, have been studied to measure the relationship in online, blended, and traditional courses. The impact that these variables have on student satisfaction within diverse learning environments is the focus of this study.

This chapter has delineated the methods and procedures of this research study. Chapter 4 will present data analysis and results for the study's six research questions.

CHAPTER IV

DATA ANALYSIS AND RESULTS

Introduction

The aim of study was to discover what affects learner satisfaction in online, blended, and traditional settings. Learning interaction is one of the main factors that influence learner satisfaction. Student demographics and experience with Internet use and online learning are also important and are discussed. Strachota's (2002) Online Satisfaction Survey was modified and used to investigate these factors in three learning environments.

Analysis of Data

Data were collected between the 5th and 10th weeks of the fall semester of 2010.

Description of Respondent Characteristics

Participant demographics were analyzed for characteristics that had influenced learner satisfaction in online, blended, and traditional settings. The sample consisted of 916 respondents, with 185 in an online setting, 90 in a blended setting, and 641 in a traditional setting. Most participants (94.6%) were between 18 and 25 years old, regardless of whether they were in an online (96.2%), blended (96.7%), or traditional (93.8%) setting. Female (76.4%) students were dominant in the study as a whole; 68.1% in the online setting and 83.6% in the traditional setting were female, but males were the

majority (58.9%) in the blended setting. Caucasian (95.6%) was the main ethnicity, both overall and in each of the three settings: 90.8% in online, 91.1% in blended, and 91.7% in traditional. Most participants (95.5% overall) were single, with 96.8% of online students, 97.8% of blended, and 94.9% of traditional. There were more senior respondents (43.9%) in the study as a whole, with 36.5% in the online setting and 45.7% in the traditional setting, but there were more juniors (70.0%) in the blended setting. The majority of research participants (98.2%) were full-time students, 95.1% of online, 98.9% of blended, and 98.0% of traditional. Most survey-takers (59.3%) were employed part-time: 53.0% of online, 63.3% of blended, and 60.5% of traditional. A significant majority (71.3%) lived 0-5 miles from the university, which included 74.1% of online, 76.7% of blended, and 72.1% of traditional students. Most research participants (90.4%) used the Internet daily, as did 84.3% of online, 83.3% of blended, and 93.1% of traditional respondents.

Participants were highly homogenous as to demographic background. Most of the participants in online, blended, and traditional settings were between 18 and 25 years old, Caucasian, single, full-time students and part-time employees, lived 0-5 miles from the university, and used the Internet daily. Blended classes had more males and juniors, while both online and traditional settings had more females and seniors. The greatest number of blended respondents were collected from two sections of Marketing Management, which affected demographic distributions overall for the blended settings.

Studies of Research Questions

The study explored how learning interactions and learner satisfaction influenced learning in online, blended, and traditional settings. The first four questions concentrated on the relationships between four types of interaction—student-content, student-

instructor, student-student, and student-interface—and learner satisfaction in different learning settings. The other two questions compared differences in learner satisfaction and demographics with interaction and satisfaction variables in three settings.

Question 1: What is the relationship between student-content interaction and student satisfaction in online, blended, and traditional courses?

H_0: No significant relationship exists between student-content interaction and student satisfaction at the $\alpha = .05$ level.

H_1: A significant relationship exists between student-content interaction and student satisfaction at the $\alpha = .05$ level.

Interaction variables were measured in the survey to find how they correlated with student satisfaction in three learning settings. Stepwise multiple regression in the SPSS program was used to evaluate the level of interaction. R square change and significance were the two columns that merit discussion. Student-content interaction, student-instructor interaction, student-student interaction, and student-technology interaction were the four independent variables, and general satisfaction was the dependent variable in the first four questions. In the first question, student-content was the independent variable, and general satisfaction was the dependent variable. How these factors interacted with one another in different settings was also discussed in the first four questions. Student-content interaction was $R^2 = .516$, as shown in Table 5, which means that 51.6% variance of learner satisfaction could be predicted by student-content interaction in the study. $F = 939.003$, $p = .000$, $< .05$, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not

supported. Student-content and student-instructor interaction was $R^2 = .536$, as shown in Table 5, which means that 53.6% variance of learner satisfaction could be predicted by student-content and student-instructor interaction in the study. F = 977.091, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported. Student-content, student-instructor, and student-technology interaction was $R^2 = .551$, as shown in Table 5, which means that 55.1% variance of learner satisfaction could be predicted by student-content, student-instructor, and student-technology interaction in the study. F = 1006.226, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported. Student-content, student-instructor, student-technology, and student-student interaction was $R^2 = .553$, as shown in Table 5, which means that 55.3% variance of learner satisfaction could be predicted by student-content, student-instructor, student-technology, and student-student interaction in the study. F = 1010.783, p = .033, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported.

Table 5

Model Summary: The Relationship Between Different Interactions and Student Satisfaction in the Study

R	R Square	R^2 Change	F Change	df2	Sig. F Change
.718[a]	.516	.516	939.003	882	.000
.732[b]	.536	.020	38.088	881	.000
.742[c]	.551	.015	29.135	880	.000
.744[d]	.553	.002	4.557	879	.033

Note. [a]Predictors: (Constant), Student-Content. [b]Predictors: (Constant), Student-Content, Student-Instructor. [c]Predictors: (Constant), Student-Content, Student-Instructor, Student-Technology. [d]Predictors: (Constant), Student-Content, Student-Instructor, Student-Technology, Student-Student.

The Relationship Between Student-Content Interaction and Student Satisfaction in the Online Setting

Student-content interaction was $R^2 = .310$, as shown in Table 6, which means that 31.0% variance of learner satisfaction could be predicted by student-content interaction in the online classes. F = 82.180, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported. Student-content and student-technology interaction was $R^2 = .384$, as shown in Table 6, which means that 38.4% variance of learner satisfaction could be predicted by student-content and student-technology interaction in the online classes. F = 104.018, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported. Student-content, student-technology, and student-instructor interaction was $R^2 = .408$, as shown in Table 6, which means that 40.8% variance of learner satisfaction could be predicted by student-content, student-technology, and student-instructor interaction in the online classes. F = 111.498, p = .007, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported.

Table 6

Model Summary: The Relationship Between Different Interactions and Student Satisfaction in the Online Setting

R	R Square	R^2 Change	F Change	df2	Sig. F Change
.557[a]	.310	.310	82.180	183	.000
.620[b]	.384	.074	21.838	182	.000
.639[c]	.408	.024	7.480	181	.007

Note. [a]Predictors: (Constant), student-content. [b]Predictors: (Constant), student-content, student-technology. [c]Predictors: (Constant), student-content, student-technology, student-instructor.

The Relationship Between Student-Content Interaction and Student Satisfaction in the Blended Setting

Student-content interaction was $R^2 = .097$, as shown in Table 7, which means that 9.7% variance of learner satisfaction could be predicted by student-content interaction in the blended classes. F = 18.617, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported. Student-instructor interaction was $R^2 = .449$, as shown in Table 7, which means that 44.9% variance of learner satisfaction could be predicted by student-instructor interaction in the blended classes. F = 71.735, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported. Student-instructor and student-content interaction was $R^2 = .546$, as shown in Table 7, which means that 54.6% variance of learner satisfaction could be predicted by student-instructor and student-content interaction in the blended classes. F = 90.352, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported. Student-instructor, student-content, and student-technology interaction was $R^2 = .615$, as shown in Table 7, which means that 61.5% variance of learner satisfaction could be predicted by student-

instructor, student-content, and student-technology interaction in the blended classes. F = 105.606, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported.

Table 7

Model Summary: The Relationship Between Different Interactions and Student Satisfaction in the Blended Setting

R	R Square	R^2 Change	F Change	df2	Sig. F Change
.670[a]	.449	.449	71.735	88	.000
.739[b]	.546	.097	18.617	87	.000
.784[c]	.615	.068	15.254	86	.000

Note. [a]Predictors: (Constant), student-instructor. [b]Predictors: (Constant), student-instructor, student-content. [c]Predictors: (Constant), student-instructor, student-content, student-technology.

The Relationship Between Student-Content Interaction and Student Satisfaction in the Traditional Setting

Student-content interaction was R^2 = .496 as shown in Table 8, which means that 49.6% variance of learner satisfaction could be predicted by student-content interaction in the traditional classes. F = 627.906, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported. Student-content and student-instructor interaction was R^2 = .557 as shown in Table 8, which means that 55.7% variance of learner satisfaction could be predicted by student-content and student-instructor interaction in the traditional classes. F = 716.354, p = .000, < .05, which means that the regression model in predicting dependent variable

was statistically significant. Hence, H_0 was not supported. Student-content, student-instructor, and student-student interaction was $R^2 = .562$ as shown in Table 8, which means that 56.2% variance of learner satisfaction could be predicted by student-content, student-instructor, and student-student interaction in the traditional classes. F = 723.435, p = .008, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported.

Table 8

Model Summary: The Relationship Between Different Interactions and Student Satisfaction in the Traditional Setting

R	R Square	R^2 Change	F Change	df2	Sig. F Change
.704[a]	.496	.496	627.906	639	.000
.746[b]	.557	.061	88.448	638	.000
.750[c]	.562	.005	7.081	637	.008

Note. [a]Predictors: (Constant), student-content. [b]Predictors: (Constant), student-content, student-instructor. [c]Predictors: (Constant), student-content, student-instructor, student-student.

Question 2: What is the relationship between student-instructor interaction and student satisfaction in online, blended, and traditional courses?

H_0: No significant relationship exists between student-instructor interaction and student satisfaction at the α = .05 level.

H_1: A significant relationship exists between student-instructor interaction and student satisfaction at the α = .05 level.

In the second question, student-instructor interaction was the independent variable and general satisfaction was the dependent variable. Student-instructor interaction was R^2 = .020 (Table 5), which means that 2.0% variance of learner satisfaction could be predicted by student-instructor interaction. F = 38.088, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported.

The Relationship Between Student-Instructor Interaction and Student Satisfaction in the Online Setting

Student-instructor interaction was R^2 = .024 (Table 6), which means that 2.4% variance of learner satisfaction could be predicted by student-instructor interaction in the online classes. F = 7.480, p = .007, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported.

The Relationship Between Student-Instructor Interaction and Student Satisfaction in the Blended Setting

Student-instructor interaction was R^2 = .449 (Table 7), which means that 44.9% variance of learner satisfaction could be predicted by student-instructor interaction in the blended classes. F = 71.735, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported.

The Relationship Between Student-Instructor Interaction and Student Satisfaction in the Traditional Setting

Student-instructor interaction was $R^2 = .061$ (Table 8), which means that 6.1% variance of learner satisfaction could be predicted by student-instructor interaction in the traditional classes. F = 88.448, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported.

Question 3: What is the relationship between student-student interaction and student satisfaction in online, blended, and traditional courses?

H_0: No significant relationship exists between student-student interaction and student satisfaction at the $\alpha = .05$ level.

H_1: A significant relationship exists between student-student interaction and student satisfaction at the $\alpha = .05$ level.

In the third question, student-student was the independent variable and general satisfaction was the dependent variable. Student-student interaction was $R^2 = .002$ (Table 5), which means that 0.2% variance of learner satisfaction could be predicted by student-student interaction in the study. F = 4.557, p = .033, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported.

The Relationship Between Student-Student Interaction and Student Satisfaction in the Online Setting

Student-student interaction in the online classes was not available from stepwise regression (Table 6), since its value was too little and insignificant. Entry regression was performed to find the exact values for discussion. *t* value and significance were the two items in the table of coefficients that the discussion will focus on.

The *t* value of student-student interaction was -.843, < 2 (Table 9), which means that learner satisfaction with student-student interaction in the online classes was not significant. Also, its significance was p = .401, > .05, which means that the regression model in predicting dependent variable was not statistically significant. Hence, H_0 was supported.

Table 9

Coefficients: The Relationship between Different Interactions and Student Satisfaction in the Online Setting

Model	Unstandardized Coefficients (B)	Standardized Coefficients (Beta)	t	Sig.
(Constant)	-.724		-2.032	.044
sc	.626	.400	6.013	.000
si	.259	.193	2.853	.005
ss	-.051	-.054	-.843	.401
stech	.393	.285	4.709	.000

Note. Dependent Variable: general satisfaction. sc, Predictors: (Constant), student-content. si, Predictors: (Constant), student-instructor. ss, Predictors: (Constant), student-student. stech, Predictors: (Constant), student-technology.

The Relationship Between Student-Student Interaction and Student Satisfaction in the Blended Setting

Student-student interaction in the blended classes was not available from stepwise regression (Table 7), since its value was too little and insignificant. Entry regression was performed to find the exact values for discussion.

The *t* value of student-student interaction was .410, < 2 (Table 10), which means that learner satisfaction with student-student interaction in the blended classes was not significant. Also, its significance was p = .683, > .05, which means that the regression model in predicting dependent variable was not statistically significant. Hence, H_0 was supported.

Table 10

Coefficients: The Relationship Between Different Interactions and Student Satisfaction in the Blended Setting

Model	Unstandardized Coefficients (B)	Standardized Coefficients (Beta)	t	Sig.
(Constant)	-1.126		-2.719	.008
sc	.431	.341	3.985	.000
si	.481	.432	5.178	.000
ss	.040	.033	.410	.683
stech	.334	.263	3.864	.000

Note. Dependent Variable: general satisfaction. sc, Predictors: (Constant), student-content. si, Predictors: (Constant), student-instructor. ss, Predictors: (Constant), student-student. stech, Predictors: (Constant), student-technology.

The Relationship Between Student-Student Interaction and Student Satisfaction in the Traditional Setting

Student-student interaction was $R^2 = .005$ (Table 8), which means that 0.5% variance of learner satisfaction could be predicted by student-student interaction in the traditional classes. F = 7.081, p = .008, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported.

Question 4: What is the relationship between student-technology interaction and student satisfaction in online, blended, and traditional courses?

H_0: No significant relationship exists between student-technology interaction and student satisfaction at the $\alpha = .05$ level.

H_1: A significant relationship exists between student-technology interaction and student satisfaction at the $\alpha = .05$ level.

In the fourth question, student-technology was the independent variable and general satisfaction was the dependent variable. Student-technology interaction was $R^2 = .015$ (Table 5), which means that 1.5% variance of learner satisfaction could be predicted by the student-technology interaction in the study. F = 29.135, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported

The Relationship Between Student-Technology Interaction and Student Satisfaction in the Online Setting

Student-technology interaction was $R^2 = .074$ (Table 6), which means that 7.4% variance of learner satisfaction could be predicted by student-technology interaction in the online classes. F = 21.838, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported.

The Relationship Between Student-Technology Interaction and Student Satisfaction in the Blended Setting

Student-technology interaction was $R^2 = .068$ (Table 7), which means that 6.8% variance of learner satisfaction could be predicted by student-technology interaction in the blended classes. F = 15.254, p = .000, < .05, which means that the regression model in predicting dependent variable was statistically significant. Hence, H_0 was not supported.

The Relationship Between Student-Technology Interaction and Student Satisfaction in the Traditional Setting

Student-technology interaction in the traditional classes was not available from stepwise regression (Table 8), since its value was too little and insignificant. Entry regression was performed to find the exact values for discussion.

The *t* value of student-technology interaction was 1.379, < 2 (Table 11), which means that learner satisfaction with student-technology interaction in the

traditional classes was not significant. Also, its significance was p = .168, > .05, which means that the regression model in predicting dependent variable was not statistically significant. Hence, H_0 was supported.

Table 11

Coefficients: The Relationship Between Different Interactions and Student Satisfaction in the Traditional Setting

Model	Unstandardized Coefficients (B)	Standardized Coefficients (Beta)	t	Sig.
(Constant)	-.484		-2.966	.003
sc	.581	.519	15.629	.000
si	.362	.260	8.011	.000
ss	.103	.082	2.459	.014
stech	.043	.037	1.379	.168

Note. Dependent Variable: general satisfaction. sc, Predictors: (Constant), student-content. si, Predictors: (Constant), student-instructor. ss, Predictors: (Constant), student-student. stech, Predictors: (Constant), student-technology.

Question 5: What is the difference between student satisfaction in online, blended, and traditional courses?

H_0: No significant difference exists between student satisfaction in online, blended, and traditional courses at the α = .05 level.

H_1: A significant difference exists between student satisfaction in online, blended, and traditional courses at the α = .05 level.

Satisfaction with Student-Content Interaction in Different Settings

Interaction and satisfaction variables were measured to compare student satisfaction in three settings. Univariate analysis of variance in the SPSS program was performed to evaluate the level of satisfaction with interaction variables. A post hoc test was used to describe the multiple comparisons. Mean difference and significance were the two columns that compared all possible means between the three treatment groups.

Online learning, blended learning, and traditional learning were independent variables, and student-content interaction, student-instructor interaction, student-student interaction, student-technology interaction, and general satisfaction were dependent variables in the following. In this question, student-content interaction was the dependent variable. Learning settings differed significantly at $F(2, 895) = 19.09$, $p < .001$ (Table 12).

Table 12

Tests of Between-Subjects Effects: Satisfaction with Student-Content Interaction in Different Settings

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8.520[a]	2	4.260	19.092	.000
Intercept	5164.312	1	5164.312	23146.326	.000
Learning Settings	8.520	2	4.260	19.092	.000
Error	199.689	895	.223		
Total	9747.360	898			
Corrected Total	208.208	897			

Note. Dependent Variable: Student-Content Interaction. [a]R Squared = .041 (Adjusted R Squared = .039).

Mean differences were significant at the .000 level, p = .000, <.05 (Table 13) when either the online setting was compared to the blended setting or the online to the traditional, but it was not significant at .995, p = .995, > .05, when the blended setting was compared to the traditional with the post hoc tests, multiple comparisons. Student satisfaction with student-content interaction was higher in blended and traditional settings, since mean differences were positive when either the blended setting was compared to the online setting at .2371 or the traditional to the online at .2419. Students were more satisfied with student-content interaction in blended and traditional settings. H_0 was not fully supported.

Table 13

Post Hoc Tests: Satisfaction with Student-Content Interaction in Different Settings

(I) Learning settings	(J) Learning settings	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
0	1	-.2371*	.000	-.3797	-.0944
	2	-.2419*	.000	-.3349	-.1489
1	0	.2371*	.000	.0944	.3797
	2	-.0049	.995	-.1299	.1202
2	0	.2419*	.000	.1489	.3349
	1	.0049	.995	-.1202	.1299

Note. Mean Square (Error) = .223. 0: Online learning setting. 1: Blended learning setting. 2: Traditional learning setting.
*The mean difference is significant at the .05 level.

Satisfaction with Student-Instructor Interaction in Different Settings

Online learning, blended learning, and traditional learning were the independent variables, and student-instructor interaction was the dependent variable. Learning settings differed significantly at F (2, 906) = 225.903, p < .001 (Table 14).

Table 14

Tests of Between-Subjects Effects: Satisfaction with Student-Instructor Interaction in Different Settings

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	87.928[a]	2	43.964	225.903	.000
Intercept	5398.909	1	5398.909	27741.532	.000
Learning Settings	87.928	2	43.964	225.903	.000
Error	176.321	906	.195		
Total	11216.160	909			
Corrected Total	264.249	908			

Note. Dependent Variable: Student-Instructor Interaction.
[a]R Squared = .333 (Adjusted R Squared = .331).

Mean differences were significant at the .000 level, p = .000, < .05 (Table 15), when the blended setting was compared to the online setting, or the traditional to the online, and the traditional to the blended. Student satisfaction with student-instructor interaction was higher in blended and traditional settings, since mean differences were positive when either the blended setting was compared to the online (.5610) or the traditional to the online (.7870) using the post hoc tests, multiple comparisons. Student satisfaction with student-instructor interaction was even better in the traditional setting, since its mean difference, at .2261, was positive when compared to the blended. Students

had the highest levels of satisfaction with student-instructor interaction in the traditional setting. H_0 was not supported.

Table 15

Post Hoc Tests: Satisfaction with Student-Instructor Interaction in Different Settings

(I) Learning settings	(J) Learning settings	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
0	1	-.5610*	.000	-.6949	-.4270
	2	-.7870*	.000	-.8741	-.7000
1	0	.5610*	.000	.4270	.6949
	2	-.2261*	.000	-.3432	-.1089
2	0	.7870*	.000	.7000	.8741
	1	.2261*	.000	.1089	.3432

Note. Mean Square(Error) = .195. 0: Online learning setting. 1: Blended learning setting. 2: Traditional learning setting.
*. The mean difference is significant at the .05 level.

Satisfaction with Student-Student Interaction in Different Settings

Online learning, blended learning, and traditional learning were independent variables, and student- student interaction was the dependent variable. Learning settings differed significantly at $F(2, 910) = 271.655$, $p < .001$ (Table 16).

Table 16

Tests of Between-Subjects Effects: Satisfaction with Student-Student Interaction in Different Settings

Source	Type III Sum of Squares	df	Mean Square	F	Sig.

Corrected Model	154.477[a]	2	77.238	271.655	.000
Intercept	4500.890	1	4500.890	15830.071	.000
Learning Settings	154.477	2	77.238	271.655	.000
Error	258.736	910	.284		
Total	9794.360	913			
Corrected Total	413.213	912			

Note. Dependent Variable: Student-Student Interaction.
[a]R Squared = .374 (Adjusted R Squared = .372).

Mean differences were significant at the .000 level, p = .000, < .05 (Table 17), when either the online setting was compared to the blended or the online to the traditional, and the blended to the traditional. Student satisfaction with student-student interaction was higher in blended and traditional settings, since the mean differences were positive when either the blended setting was compared to the online at .8066 or the traditional to the online at 1.0419 from the post hoc tests, multiple comparisons. Student satisfaction with student-student interaction was even better in the traditional setting, since its mean difference (.2353) was positive compared to that for the blended setting. Students had higher levels of satisfaction with student-student interaction in the traditional setting than in the other two. H_0 was not supported.

Table 17

Post Hoc Tests: Satisfaction with Student-Student Interaction in Different Settings

(I) Learning settings	(J) Learning settings	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound

0	1	-.8066*	.000	-.9678	-.6454
	2	-1.0419*	.000	-1.1468	-.9369
1	0	.8066*	.000	.6454	.9678
	2	-.2353*	.000	-.3762	-.0944
2	0	1.0419*	.000	.9369	1.1468
	1	.2353*	.000	.0944	.3762

Note. Mean Square (Error) = .284. 0: Online learning setting. 1: Blended learning setting. 2: Traditional learning setting.
*The mean difference is significant at the .05 level.

Satisfaction with Student-Technology Interaction in Different Settings

Online learning, blended learning, and traditional learning were independent variables and student-technology interaction was the dependent variables. Learning settings differed significantly at F (2, 912) = 5.132, p = .006, < .05 (Table 18).

Table 18

Tests of Between-Subjects Effects: Satisfaction with Student-Technology Interaction in Different Settings

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2.607[a]	2	1.303	5.132	.006
Intercept	5682.801	1	5682.801	22375.198	.000
Learning Settings	2.607	2	1.303	5.132	.006
Error	231.628	912	.254		
Total	10479.720	915			
Corrected Total	234.234	914			

Note. Dependent Variable: Student-Technology Interaction.
[a]R Squared = .011 (Adjusted R Squared = .009).

The mean difference was significant at the .005 level, p = .005, < .05 (Table 19), when the online setting was compared to the blended, and at the .013 level, p = .013, < .05, when the blended setting was compared to the traditional, but it was not significant at the .586 level, p= .586, >.05, when the online setting was compared to the traditional using the post hoc tests, multiple comparisons. Student satisfaction with student-technology interaction was higher in blended settings, since mean differences were positive when comparing to either the online setting (.2027) or the traditional (.1613). Students had the highest levels of satisfaction with student-technology interaction in the blended setting. H_0 was not fully supported.

Table 19

Post Hoc Tests: Satisfaction with Student-Technology Interaction in Different Settings

(I) Learning settings	(J) Learning settings	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
0	1	-.2027*	.005	-.3547	-.0507
	2	-.0415	.586	-.1402	.0573
1	0	.2027*	.005	.0507	.3547
	2	.1613*	.013	.0281	.2944
2	0	.0415	.586	-.0573	.1402
	1	-.1613*	.013	-.2944	-.0281

Note. Mean Square (Error) = .254. 0: Online learning setting. 1: Blended learning setting. 2: Traditional learning setting.
*The mean difference is significant at the .05 level.

Satisfaction in Different Settings

Online learning, blended learning, and traditional learning were independent variables, and general satisfaction was the dependent variable. Learning settings differed significantly at F (2, 906) = 5.984, p = .003, < .05 (Table 20).

Table 20

Tests of Between-Subjects Effects: Satisfaction in Different Settings

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4.362[a]	2	2.181	5.984	.003
Intercept	5066.866	1	5066.866	13904.257	.000
Learning Settings	4.362	2	2.181	5.984	.003
Error	330.156	906	.364		
Total	9858.960	909			
Corrected Total	334.518	908			

Note. Dependent Variable: General Satisfaction.
[a]R Squared = .013 (Adjusted R Squared = .011).

The mean difference was significant at the .002 level, p = .002, < .05 (Table 21), when the traditional setting was compared to the online setting, but it was not significant at the .109 level, p = .109, > .05, when the blended setting was compared to the online setting, .965, p = .965, > .05, when the traditional setting was compared to the blended from the post hoc tests, multiple comparisons. General satisfaction was higher in the traditional setting, since the mean difference, at .1748, was positive compared to that of

the online setting. Students had better general satisfaction in traditional than online settings. H_0 was not fully supported.

Table 21

Post Hoc Tests: Satisfaction with Student-Technology Interaction in Different Settings

(I) Learning settings	(J) Learning settings	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
0	1	-.1573	.109	-.3406	.0260
	2	-.1748*	.002	-.2939	-.0557
1	0	.1573	.109	-.0260	.3406
	2	-.0175	.965	-.1778	.1429
2	0	.1748*	.002	.0557	.2939
	1	.0175	.965	-.1429	.1778

Note. Mean Square (Error) = .364. 0: Online learning setting. 1: Blended learning setting. 2: Traditional learning setting.
*The mean difference is significant at the .05 level.

Question 6: What is the difference between learning interaction and student satisfaction in online, blended, and traditional courses with different student demographics?

H_0: No significant difference exists between learning interaction and student satisfaction in online, blended, and traditional courses with different demographics at the $\alpha = .05$ level.

H_1: A significant difference exists between learning interaction and student satisfaction in online, blended, and traditional courses with different demographics at the $\alpha = .05$ level.

Satisfaction with Student-Content Interaction in Different Settings with Different Demographics

Demographic groups were measured in the questions to compare student satisfaction with interaction variables in three settings. Univariate analysis of variance in the SPSS program was used to evaluate satisfaction with the various types of interaction among gender, age, and ethnicity groups. A post hoc test was used to describe the multiple comparisons. Mean difference and significance were the two columns used to compare all possible means.

Learning setting and demographic factors were independent variables and student-content interaction, student-instructor interaction, student-student interaction, student-technology interaction, and general satisfaction were dependent variables in the following subcategories. Since a post hoc test was used to compare groups, all satisfaction and interaction variables and demographic groups were recoded. Student-content interaction, student-instructor interaction, student-student interaction, student-technology interaction, and general satisfaction were recoded into high, medium, and low for each. Age was recoded into traditional (18-25) and nontraditional (>25), and ethnicity was recoded into White and minority.

There were only three respondents of nontraditional students in the blended setting, and these were not large enough to be statistically significant. Therefore, all demographic factors were not processed as fixed factors, but as covariates with other satisfaction and interaction variables in the following discussion. In this question, student-content interaction was a dependent variable. Gender, age, and ethnicity were

covariate, independent variables. There were no demographic variables, including gender at .200, p = .200, > .05, age at .260, p = .260, > .05, and ethnicity at .364, p = .364, > .05, that were significant for satisfaction with student-content interaction, as seen in Table 22.

Table 22

Tests of Between-Subjects Effects: Satisfaction with Student-Content Interaction in Different Settings with Different Demographics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	27.194[a]	5	5.439	7.884	.000
Intercept	1129.688	1	1129.688	1637.531	.000
Gender	1.137	1	1.137	1.648	.200
Age2	.876	1	.876	1.269	.260
Ethnicity2	.568	1	.568	.824	.364
Learning Settings	23.124	2	11.562	16.759	.000
Error	627.094	909	.690		
Total	3929.000	915			
Corrected Total	654.289	914			

Note. Dependent Variable: Student-Content Interaction in 3 Settings.
[a]R Squared = .042 (Adjusted R Squared = .036).

Satisfaction with Student-Instructor Interaction in Different Settings with Different Demographics

Student-instructor interaction was a dependent variable, and gender, age, and ethnicity were independent variables. There were not any demographics variables, including gender at .573, p = .573, > .05, age at .420, p = .420, > .05, and ethnicity at .744,

p = .744, > .05, that were significant for satisfaction with student-instructor interaction, as seen in Table 23.

Table 23

Tests of Between-Subjects Effects: Satisfaction with Student-Instructor Interaction in Different Settings with Different Demographics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	176.635[a]	5	35.327	57.299	.000
Intercept	1152.279	1	1152.279	1868.942	.000
Gender	.196	1	.196	.318	.573
Age2	.401	1	.401	.650	.420
Ethnicity2	.066	1	.066	.107	.744
Learning Settings	172.369	2	86.185	139.787	.000
Error	560.436	909	.617		
Total	4808.000	915			
Corrected Total	737.071	914			

Note. Dependent Variable: Student-Instructor Interaction in 3 Settings.
[a]R Squared = .240 (Adjusted R Squared = .235).

Satisfaction with Student-Student Interaction in Different Settings with Different Demographics

Student-student interaction was the dependent variable, and gender, age, and ethnicity were independent variables. There were not any demographic variables, including gender at .746, p = .746, > .05, age at .309, p = .309, > .05, and ethnicity at .830, p = .830, > .05, that were significant for satisfaction with student-instructor interaction, as seen in Table 24.

Table 24

Tests of Between-Subjects Effects: Satisfaction with Student-Student Interaction in Different Settings with Different Demographics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	156.541[a]	5	31.308	73.854	.000
Intercept	1224.682	1	1224.682	2888.945	.000
Gender	.044	1	.044	.105	.746
Age2	.439	1	.439	1.035	.309
Ethnicity2	.020	1	.020	.046	.830
Learning Settings	152.621	2	76.311	180.012	.000
Error	385.343	909	.424		
Total	4779.000	915			
Corrected Total	541.884	914			

Note. Dependent Variable: Student-Student Interaction in 3 Settings.
[a]R Squared = .289 (Adjusted R Squared = .285).

Satisfaction with Student-Technology Interaction in Different Settings with Different Demographics

Student-technology interaction was the dependent variable, and gender, age, and ethnicity were independent variables. Gender was significant at .046, p = .046, < .05. However, the other two demographic variables, age at .120, p = .120, > .05, and ethnicity at .965, p = .965, > .05, had no significance in satisfaction with student-technology interaction, as seen in Table 25.

Table 25

Tests of Between-Subjects Effects: Satisfaction with Student-Technology Interaction in Different Settings with Different Demographics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	10.902[a]	5	2.180	2.796	.016
Intercept	1403.834	1	1403.834	1800.365	.000
Gender	3.111	1	3.111	3.990	.046
Age2	1.888	1	1.888	2.422	.120
Ethnicity2	.002	1	.002	.002	.965
Learning Settings	4.553	2	2.277	2.920	.054
Error	708.792	909	.780		
Total	4603.000	915			
Corrected Total	719.694	914			

Note. Dependent Variable: Student-Technology Interaction in 3 Settings.
[a]R Squared = .015 (Adjusted R Squared = .010).

Satisfaction in Different Settings with Different Demographics

General satisfaction was the dependent variable, and gender, age, and ethnicity were independent variables. There were no demographic variables, either gender at .688, $p = .688$, $> .05$, age at .942, $p = .942$, $> .05$, or ethnicity at .091, $p = .091$, $> .05$, that were significant in general satisfaction, as seen in Table 26.

Table 26

Tests of Between-Subjects Effects: Satisfaction in Different Settings with Different Demographics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4.175[a]	5	.835	1.467	.198
Intercept	1606.550	1	1606.550	2823.411	.000

Gender	.092	1	.092	.162	.688
Age2	.003	1	.003	.005	.942
Ethnicity2	1.629	1	1.629	2.863	.091
Learning Settings	2.402	2	1.201	2.111	.122
Error	517.231	909	.569		
Total	5034.000	915			
Corrected Total	521.405	914			

Note. Dependent Variable: General Satisfaction in 3 Settings.
[a]R Squared = .008 (Adjusted R Squared = .003).

Gender, age, and ethnicity demographic variables had almost no statistical significance for satisfaction with student-content interaction, student-instructor interaction, student-student interaction, or student-technology interaction in the three settings, as previously discussed. Gender ($p = .046, < .05$) was the only demographic variable affecting satisfaction with student-technology interaction, as seen in Table 24. Also, learning setting ($p = .054 > .05$) was close to significant for student-technology interaction, as seen in Table 24. Therefore, the relationship between gender and learning setting was investigated further with reference to satisfaction with student-technology interaction. The gender and learning setting variables were studied as fixed factors instead of covariates, to explore which variables, individually and collaboratively, affected student-technology interaction (dependent variable) using univariate analysis. The post hoc test was used to describe the multiple comparisons.

Gender at .002, $p = .002, < .05$, and gender*learning settings at .022, $p = .022, < .05$ were significant for satisfaction with student-technology interaction, as seen in Table 27.

Table 27

Tests of Between-Subjects Effects: Satisfaction with Student-Technology Interaction in Different Settings with Different Demographics-Gender

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	14.981[a]	5	2.996	3.865	.002
Intercept	1925.175	1	1925.175	2483.258	.000
Gender	7.340	1	7.340	9.468	.002
Learning Settings	3.125	2	1.563	2.016	.134
Gender * Learning Settings	5.968	2	2.984	3.849	.022
Error	704.713	909	.775		
Total	4603.000	915			
Corrected Total	719.694	914			

Note. Dependent Variable: Student-Technology Interaction in 3 Settings.
[a]R Squared = .021 (Adjusted R Squared = .015).

The mean difference was significant at .015, p = .015, < .05 (Table 28), when the blended setting was compared to the online, at .046, p = .046, < .05, when the blended setting was compared to the traditional, but it was not significant at .521, p= .521, >.05, when the traditional setting was compared to the online from the post hoc tests, multiple comparisons. Satisfaction with student-technology interaction was higher in blended settings, since mean differences were positive when comparing either to online (.3161) or traditional (.2358) settings. Satisfaction with student-technology interaction was best in the blended setting with different demographics-gender. H_0 was not supported.

Table 28

Post Hoc Tests: Satisfaction with Student-Technology Interaction in Different Settings with Different Demographics-Gender

(I) Learning settings	(J) Learning settings	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
0	1	-.3161*	.015	-.5819	-.0502
	2	-.0802	.521	-.2531	.0927
1	0	.3161*	.015	.0502	.5819
	2	.2358*	.046	.0032	.4685
2	0	.0802	.521	-.0927	.2531
	1	-.2358*	.046	-.4685	-.0032

Note. Mean Square (Error) = .775. 0: Online learning setting. 1: Blended learning setting. 2: Traditional learning setting.
*The mean difference is significant at the .05 level.

Students had higher satisfaction with student-technology interaction in the blended setting when gender was a fixed factor. The gender variable was also studied to investigate which subgroup, female or male, had a higher level of satisfaction with student-technology interaction in the blended setting. Female and learning setting were independent variables, fixed factors with student-technology interaction, in univariate analysis.

The learning setting, at .243, p = .243, > .05, was not significant for satisfaction with student-technology interaction when female was a fixed factor, as seen in Table 29.

Table 29

Tests of Between-Subjects Effects: Satisfaction with Student-Technology Interaction in Different Settings with Different Demographics-Female

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2.209[a]	2	1.105	1.417	.243
		93			

Intercept	948.664	1	948.664	1217.158	.000
Learning Settings	2.209	2	1.105	1.417	.243
Error	542.469	696	.779		
Total	3401.000	699			
Corrected Total	544.678	698			

Note. Dependent Variable: Student Technology Interaction in 3.
[a]R Squared = .004 (Adjusted R Squared = .001).

The mean difference was not significant at .978, p = .978, > .05 (Table 30), when the blended setting was compared to the online setting, at .248, p = .248, > .05, when the traditional setting was compared to the online setting, or at .759, p= .759, >.05, when the traditional setting was compared to the blended setting from the post hoc tests, multiple comparisons. Female satisfaction with student-technology interaction in the three settings could not be compared to one another, since the three mean differences were not statistically significant. Being female was not significant for satisfaction with student-technology interaction in three settings. H_0 was supported.

Table 30

Post Hoc Tests: Satisfaction with Student-Technology Interaction in Different Settings with Different Demographics-Female

(I) Learning settings	(J) Learning settings	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
0	1	-.0332	.978	-.4210	.3545
	2	-.1395	.248	-.3448	.0658
1	0	.0332	.978	-.3545	.4210
	2	-.1063	.759	-.4588	.2462
2	0	.1395	.248	-.0658	.3448

	1	.1063	.759	-.2462	.4588

Note. Mean Square (Error) = .779. 0: Online learning setting. 1: Blended learning setting. 2: Traditional learning setting.
*The mean difference is significant at the .05 level.

The female variable was replaced by the male because the female variable did not significantly affect satisfaction with student-technology interaction in the blended setting. Gender (male) and learning setting were independent variables, fixed factors with student-technology interaction, in univariate analysis.

Learning setting, at .005, p = .005, < .05, was significant for satisfaction with student-technology interaction when gender (male) and learning settings were fixed factors, as seen in Table 31.

Table 31

Tests of Between-Subjects Effects: Satisfaction with Student-Technology Interaction in Different Settings with Different Demographics-Male

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8.349[a]	2	4.174	5.480	.005
Intercept	980.457	1	980.457	1287.180	.000
Learning Settings	8.349	2	4.174	5.480	.005
Error	162.244	213	.762		
Total	1202.000	216			
Corrected Total	170.593	215			

Note. Dependent Variable: Student Technology Interaction in 3 Settings.
[a]R Squared = .049 (Adjusted R Squared = .040).

The mean difference was significant at .030, p = .030, < .05 (Table 32) when the blended setting was compared to the online setting and at .004, p = .004, < .05 when the blended setting was compared to the traditional setting, but not at .944, p = .944, > .05, when the online setting was compared to the traditional setting using the post hoc test, multiple comparisons. Males had a higher level of satisfaction with student-technology interaction in the blended setting. H_0 was not supported.

Table 32

Post Hoc Tests: Satisfaction with Student-Technology Interaction in Different Settings with Different Demographics-Male

(I) Learning settings	(J) Learning settings	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
0	1	-.4249*	.030	-.8163	-.0334
	2	.0463	.944	-.2907	.3833
1	0	.4249*	.030	.0334	.8163
	2	.4712*	.004	.1241	.8182
2	0	-.0463	.944	-.3833	.2907
	1	-.4712*	.004	-.8182	-.1241

Note. Mean Square (Error) = .762. 0: Online learning setting. 1: Blended learning setting. 2: Traditional learning setting.
*The mean difference is significant at the .05 level.

Univariate analysis was employed to explore differences between satisfaction and interaction variables in the three learning settings with different demographics. Gender and learning setting were found to be the main factors that affected satisfaction with student-technology interaction in the different settings. Male students had higher levels of satisfaction with student-technology interaction in the blended setting.

Discussion of the Difference between Interaction and Satisfaction in Different Settings with Other Demographics

Gender, age, and ethnicity were previously evaluated to compare with Strachota's studies (2002). The rest of the demographic variables—class level, employment, living distance from university, and Internet use—were continually analyzed with respect to all five interaction and satisfaction variables to examine how they affected one another in the three settings. Univariate analysis of variance and the post hoc test were employed to find significant demographic variables from the four factors between interaction and satisfaction, as in the previous discussion of gender, age, and ethnicity (Question 6). These four factors were first dealt with as covariates and then fixed variables to look further for significant demographics.

Satisfaction with Student-Content Interaction in Different Settings with Other Demographics

Learning setting and demographic factors were independent variables and student-content interaction, student-instructor interaction, student-student interaction, student-technology interaction, and general satisfaction were dependent variables in the following discussion. All five variables were recoded as high, medium, or low. All four demographic factors—class level, employment, distance from university, and Internet use—were recoded into two or three groups to have enough respondents in each setting for analysis. Class level was recoded into freshman/sophomore, junior, and senior/second

bachelor-groups. Employment was recoded into unemployed and employed. Distance from university was recoded into 0-20 miles and 21-out of Illinois. Internet use was recoded into rarely (less than 20 hours a month) and daily. Marital status and student status could not be recoded into two or three groups for statistical purposes, since respondent distribution was almost entirely single and full-time.

The four demographic factors (class level, employment, distance from university, and Internet use) were first processed as covariates with the learning setting as a fixed factor with other satisfaction and interaction variables in the following discussion, as with previous analysis of explorations in gender, age, and ethnicity (Question 6). In this question, student-content interaction was the dependent variable. Class level, employment, living distance to university, and Internet use were covariate, independent variables. Class level, living distance to university, and learning setting were found to be significant and were continually processed as fixed variables. Then learning setting was the only significance, at .000, p = .000, < .05, for satisfaction with student-content interaction (Table 33).

Table 33

Tests of Between-Subjects Effects: Satisfaction with Student-Content Interaction in Different Settings with Other Demographics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	46.741[a]	17	2.749	4.061	.000
Intercept	621.742	1	621.742	918.321	.000
Learning Settings	20.552	2	10.276	15.178	.000
Class Level 2	.617	2	.309	.456	.634
Living Distance to University 2	.103	1	.103	.152	.697

Learning Settings * Class Level 2	2.446	4	.611	.903	.461
Learning Settings * Living Distance to University 2	1.151	2	.576	.850	.428
Class Level 2 * Living Distance to University 2	1.350	2	.675	.997	.369
Learning Settings * Class Level 2 * Living Distance to University 2	1.563	4	.391	.577	.679
Error	605.953	895	.677		
Total	3927.000	913			
Corrected Total	652.694	912			

Note. Dependent Variable: Student Content Interaction in 3 Settings.
[a]R Squared = .072 (Adjusted R Squared = .054).

The mean difference was significant at .000, p = .000, < .05 (Table 34), when the traditional setting was compared to the online setting, at .001, p = .001, < .05, and when the blended setting was compared to the online setting, but not, at .968, p= .968, >.05, when the traditional setting was compared to the blended setting using the post hoc tests, multiple comparisons. Satisfaction with student-content interaction was higher in traditional and blended settings since mean differences were positive when compared to either the online setting, at .4098, or to the traditional setting, at .3872. This supports the previous conclusion, that satisfaction with student-content interaction was higher in the traditional and blended settings, and also supports the discussion of Question 5 above. H_0 was not supported.

Table 34

Post Hoc Tests: Satisfaction with Student-Content Interaction in Different Settings with Other Demographics

(I) Learning settings	(J) Learning settings	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
0	1	-.3872*	.001	-.6359	-.1386
	2	-.4098*	.000	-.5717	-.2479
1	0	.3872*	.001	.1386	.6359
	2	-.0226	.968	-.2400	.1949
2	0	.4098*	.000	.2479	.5717
	1	.0226	.968	-.1949	.2400

Note. Mean Square (Error) = .677. 0: Online learning setting. 1: Blended learning setting. 2: Traditional learning setting.
*The mean difference is significant at the .05 level.

Satisfaction with Student-Instructor Interaction in Different Settings with Other Demographics

Student-instructor interaction was a dependent variable. Class level, employment, living distance to university, and Internet use were covariate, independent variables. Learning setting was a fixed factor, one of the independent variables. Class level and learning settings were found to be significant and continually processed as fixed variables. Then learning settings (.000, p = .000, < .05), class level (.031, p = .031, < .05), and learning setting*class level (.035, p = .035, < .05) were found to be significant, as seen in Table 35.

Table 35

Tests of Between-Subjects Effects: Satisfaction with Student-Instructor Interaction in Different Settings with Other Demographics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	196.031[a]	8	24.504	40.941	.000
Intercept	872.205	1	872.205	1457.274	.000
Learning Settings	156.875	2	78.438	131.053	.000
Class Level 2	4.194	2	2.097	3.503	.031
Learning Settings * Class Level 2	6.218	4	1.554	2.597	.035
Error	542.257	906	.599		
Total	4805.000	915			
Corrected Total	738.289	914			

Note. Dependent Variable: Student Instructor Interaction in 3 Settings.
[a]R Squared = .266 (Adjusted R Squared = .259).

The freshman/sophomore group in the traditional setting had the highest mean value, at 2.602, for satisfaction with student-instructor interaction using the post hoc test, multiple comparisons.

Mean differences were significant at .000, p = .000, < .05 (Table 36), when the traditional setting was compared to the online setting, at .001, p = .001, < .05, when the traditional setting was compared to the blended setting, and at .000, p = .000, < .05, when the blended setting was compared to the online setting using the post hoc tests, multiple comparisons. Satisfaction with student-instructor interaction was the highest in the traditional setting since mean differences were positive when compared to either the blended setting, at .3191, or to the online setting, at .1.1135. Students had the highest

satisfaction with student-instructor interaction in the traditional setting. H_0 was not supported.

Table 36

Post Hoc Tests: Satisfaction with Student-Instructor Interaction in Different Settings with Other Demographics-Class Level in 3 Settings

(I) Learning settings	(J) Learning settings	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
0	1	-.7944*	.000	-1.0281	-.5608
	2	-1.1135*	.000	-1.2654	-.9616
1	0	.7944*	.000	.5608	1.0281
	2	-.3191*	.001	-.5235	-.1146
2	0	1.1135*	.000	.9616	1.2654
	1	.3191*	.001	.1146	.5235

Note. Mean Square (Error) = .599. 0: Online learning setting. 1: Blended learning setting. 2: Traditional learning setting.
*The mean difference is significant at the .05 level.

The mean difference was significant at .008, p = .008, < .05 (Table 37), when the freshman/sophomore group was compared to the senior/second-bachelor group, at .002, p = .002, < .05, and when the junior group was compared to the senior/second-bachelor group, but not, at .822, p = .822, > .05, when the freshman/sophomore group were compared to the junior group using the post hoc test, multiple comparisons. The freshman/sophomore group and the junior groups had higher satisfaction with student-instructor interaction, since mean differences were positive when the two groups individually compared to the senior/second-bachelor group, at .2374 (freshman/sophomore), or, at .1888 (junior). This indicates that the freshman/sophomore

group and the junior group had higher satisfaction with student-instructor interaction in the traditional setting. H_0 was not supported.

Table 37

Post Hoc Tests: Satisfaction with Student-Instructor Interaction in Different Settings with Other Demographics-Class Level in 3 Settings

(I) Class Level in 3	(J) Class Level in 3	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
.00	1.00	.0485	.822	-.1422	.2393
	2.00	.2374*	.008	.0506	.4241
1.00	.00	-.0485	.822	-.2393	.1422
	2.00	.1888*	.002	.0594	.3183
2.00	.00	-.2374*	.008	-.4241	-.0506
	1.00	-.1888*	.002	-.3183	-.0594

Note. Mean Square (Error) = .599. 0: Freshman/sophomore group. 1: Junior group. 2: Senior/second-bachelor group.
*The mean difference is significant at the .05 level.

Satisfaction with Student-Student Interaction in Different Settings with Other Demographics

Student-student interaction was a dependent variable. Class level, employment, distance from university, and Internet use were covariate, independent variables. Learning setting was an independent, fixed factor. Learning setting was found to be significant and continually processed as a fixed variable. Then learning setting was reproduced—the only one significant, at .000, p = .000, < .05, for satisfaction with student-student interaction, as seen in Table 38.

Table 38

Tests of Between-Subjects Effects: Satisfaction with Student-Student Interaction in Different Settings with Other Demographics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	157.243[a]	2	78.622	185.978	.000
Intercept	1846.110	1	1846.110	4366.955	.000
Learning Settings	157.243	2	78.622	185.978	.000
Error	385.967	913	.423		
Total	4780.000	916			
Corrected Total	543.210	915			

Note. Dependent Variable: Student-Student interaction in 3 Settings.
[a]R Squared = .289 (Adjusted R Squared = .288).

The mean differences were significant at .000, p = .000, < .05 (Table 39), when the traditional setting was compared to the online setting, at .000, p = .000, < .05, when the blended setting was compared to the online setting, at .000, p= .000, < .05, and when the traditional setting was compared to the blended setting using the post hoc tests, multiple comparisons. Satisfaction with student-student interaction was the highest in the traditional setting, since the mean differences were positive when compared to either the online setting, at 1.0411, or to the blended setting, at .3756. Students in the traditional setting had the highest satisfaction with student-student interaction. H_0 was not supported. This also supported discussion of Question 3 above.

Table 39

Post Hoc Tests: Satisfaction with Student-Student Interaction in Different Settings with Other Demographics

(I) Learning settings	(J) Learning settings	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
0	1	-.6655*	.000	-.8616	-.4693
	2	-1.0411*	.000	-1.1684	-.9137
1	0	.6655*	.000	.4693	.8616
	2	-.3756*	.000	-.5474	-.2038
2	0	1.0411*	.000	.9137	1.1684
	1	.3756*	.000	.2038	.5474

Note. Mean Square (Error) = .423. 0: Online learning setting. 1: Blended learning setting. 2: Traditional learning setting.
*. The mean difference is significant at the .05 level.

Satisfaction with Student-Technology Interaction in Different Settings with Other Demographics

Student-technology interaction was a dependent variable. Class level, employment, distance from university, and Internet use were covariate, independent variables. Learning setting was an independent variable, fixed factor. Class level and Internet use were found to be significant and continually processed as fixed variables. Class level at .035, p = .035, < .05 and Internet use at .000, p = .000, < .05, were the two variables significant for satisfaction with student-technology interaction, as seen in Table 40.

Table 40

Tests of Between-Subjects Effects: Satisfaction with Student-Technology Interaction in Different Settings with Other Demographics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	52.728[a]	17	3.102	4.173	.000
Intercept	373.839	1	373.839	502.960	.000
Learning Settings	.211	2	.105	.142	.868
Class Level 2	4.992	2	2.496	3.358	.035
Internet Use 2	14.803	1	14.803	19.916	.000
Learning Settings * Class Level 2	1.376	4	.344	.463	.763
Learning Settings * Internet Use 2	.024	2	.012	.016	.984
Class Level 2 * Internet Use 2	.414	2	.207	.278	.757
Learning Settings * Class Level 2 * Internet Use 2	2.625	4	.656	.883	.473
Error	666.721	897	.743		
Total	4611.000	915			
Corrected Total	719.449	914			

Note. Dependent Variable: Student Technology Interaction in 3 Settings.
[a]R Squared = .073 (Adjusted R Squared = .056).

Mean value, at 2.253, for the senior/second-bachelor group and daily Internet use was the highest in satisfaction with student-technology interaction, and mean value, at 2.247, for the junior group and daily Internet use was the second highest using the post hoc tests, multiple comparisons. However, means (at 2.253 and 2.247) for these two demographic groups were not significantly different.

The mean differences were significant at .006, p = .006, < .05 (Table 41), when the senior/second-bachelor group was compared to the freshman/sophomore group and at .016, p = .016, < .05, when the junior group was compared to the freshman/sophomore

group, but not significant, at .941, p= .941, >.05, when the senior/second-bachelor group was compared to the junior group, using the post hoc tests, multiple comparisons. Satisfaction with student-technology interaction was higher with the senior/second-bachelor group and the junior group since the mean differences were positive either when the senior/second-bachelor group was compared to the freshman/sophomore group at .2715 or when the junior group was compared to the freshman/sophomore group at .2512. Both the senior/second-bachelor group and the junior group with daily Internet use had higher satisfaction with student-technology interaction. H_0 was not supported. This partially supports the previous discussion, as the difference between these two demographic groups was similar.

Table 41

Post Hoc Tests: Satisfaction with Student-Technology Interaction in Different Settings with Other Demographics-Class Level in 3

(I) Class Level in 3	(J) Class Level in 3	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
.00	1.00	-.2512*	.016	-.4638	-.0386
	2.00	-.2715*	.006	-.4796	-.0634
1.00	.00	.2512*	.016	.0386	.4638
	2.00	-.0204	.941	-.1646	.1239
2.00	.00	.2715*	.006	.0634	.4796
	1.00	.0204	.941	-.1239	.1646

Note. Mean Square (Error) = .743. 0: Freshman/sophomore group. 1: Junior group. 2: Senior/second-bachelor group.
*The mean difference is significant at the .05 level.

Satisfaction in Different Settings with Other Demographics

General satisfaction was a dependent variable. Class level, employment, living distance to university, and Internet use were covariate, independent variables. Learning setting was an independent, fixed factor. Class level was found significant and continually processed as a fixed variable. Then class level at .002, p = .002, < .05 was significant for general satisfaction, as seen in Table 42.

Table 42

Tests of Between-Subjects Effects: Satisfaction in Different Settings with Other Demographics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6.862[a]	2	3.431	6.092	.002
Intercept	3400.949	1	3400.949	6038.415	.000
ClassLevel2	6.862	2	3.431	6.092	.002
Error	513.656	912	.563		
Total	5042.000	915			
Corrected Total	520.518	914			

Note. Dependent Variable: General Satisfaction in 3 Settings.
[a]R Squared = .013 (Adjusted R Squared = .011)

The mean differences were significant at .003, p = .003, < .05 (Table 43), when the junior group was compared to the senior/second-bachelor group but not at .081, p = .081, > .05, when the freshman/sophomore group was compared to the senior/second-bachelor group, or, at .991, p= .991, >.05, when the junior group was compared to the freshman/sophomore group using the post hoc tests, multiple comparisons. General satisfaction was higher in the junior group since the mean difference was positive when

compared to the senior/second-bachelor group at .1758. The junior group had higher general satisfaction at 2.3075, which supports previous discussion. H_0 was not supported.

Table 43

Post Hoc Tests: Satisfaction in Different Settings with Other Demographics-Class Level in 3 Settings

(I) Class Level in 3	(J) Class Level in 3	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
.00	1.00	-.0100	.991	-.1950	.1751
	2.00	.1659	.081	-.0153	.3470
1.00	.00	.0100	.991	-.1751	.1950
	2.00	.1758*	.003	.0503	.3014
2.00	.00	-.1659	.081	-.3470	.0153
	1.00	-.1758*	.003	-.3014	-.0503

Note. Mean Square (Error) = .563. 0: Freshman/sophomore group. 1: Junior group. 2: Senior/second-bachelor group.
*The mean difference is significant at the .05 level.

Summary

The demographics of survey participants and which interaction factors affected learning satisfaction in three learning settings were discussed using descriptive and univariate analysis. Gender, age, and ethnicity were the main demographic factors investigated using descriptive analysis. Most participants (94.6%) were between 18 and 25 years old, regardless of whether students were in the online (96.2%), blended (96.7%), or traditional (93.8%) setting. Female students (76.4%) were dominant in the whole study, as well as in online (68.1%) and traditional (83.6%) settings, but males were in the majority (58.9%) in the blended setting. Caucasian (95.6%) was the main ethnicity

overall, as well as in all three settings: 90.8% online, 91.1% blended, and 91.7% traditional.

A stepwise regression was used to reveal how student-content, student-instructor, student-student, and student-technology interactions affected learner satisfaction and one another. There was a significant relationship between satisfaction with student-content and student-instructor interaction in all three learning settings. There was not a significant relationship between satisfaction with student-student interaction in the online and blended settings, but there was in the traditional setting. Satisfaction with student-technology interaction remained a significant relationship in online and blended settings, but not in the traditional.

Specific studies on satisfaction with other interaction variables were conducted using univariate analysis. Students had better general satisfaction in both blended and traditional settings than online. The demographic variables of gender, age, and ethnicity were not significant for student-content, student-instructor, student-student interactions or general satisfaction in any of the three settings. Male students had higher satisfaction with student-technology interaction in blended settings.

The remaining four demographic variables—class level, employment, distance from university, and Internet use—were investigated by analyzing satisfaction and interaction factors using univariate analysis in Questions 5 and 6 to supplement the previous questions and compare with Strachota's research (2002). Satisfaction with student-content interaction was higher in traditional and blended settings. The freshman/sophomore group and the junior group had higher satisfaction with student-instructor interaction in the traditional setting. The senior/second-bachelor group and the

junior group with daily Internet use had higher satisfaction with student-technology interaction. The junior group had the highest general satisfaction in the study.

Chapter 4 has presented the results of the data analysis. A discussion of the findings and implications of the study, as well as implications for future research will be discussed in the following chapter.

CHAPTER V

DISCUSSION

Introduction

Topics to be discussed include the influence of student-content interaction, student-instructor interaction, student-student interaction, and student-technology interaction on student satisfaction in online, blended, and traditional settings. Study implications and recommendations for future research will also be discussed.

Findings

Learner Characteristics

A total of 916 enrolled students participated in the study during the Fall 2010 semester. This study focused on undergraduates and included 185 students in an online setting, 90 in a blended setting, and 641 in a traditional setting. Most students were between 18 and 25, female, and Caucasian. Most participants were also single, full-time students with part-time employment, lived 0-5 miles from the university, and used the Internet daily. Data collection was conducted at the university, where traditional students are dominant on campus. There was significant homogeneity in demographic distribution in the research, as well as in all three settings.

Satisfaction with Student-Content Interaction

Student-content interaction predicted 51.6% variance of satisfaction in the study. This interaction was the most important variable compared to the other interaction

variables (student-instructor, 2.0%; student-student, 0.2%; and student-technology, 1.5%) and significantly affected satisfaction (Question 1, Table 5). In online, blended, and traditional settings, students reported different levels of satisfaction when student-content interaction was examined. Student-content interaction significantly predicted 31.0% variance of satisfaction in the online setting (Table 6), 9.7% in the blended setting (Table 7), and 49.6% in the traditional setting (Table 8). Student-content interaction was the most essential factor influencing learner satisfaction.

Furthermore, in looking at satisfaction with student-content interaction, students in blended and traditional settings were found to have higher levels of satisfaction in this area than students in online settings, since mean differences were positive when either the blended setting was compared to the online setting at .2371 or the traditional to the online at .2419 (Question 5, Table 13). The findings also showed that online learners (R Square Change = 31%, Table 6) were more satisfied with student-content interaction than other interaction variables (Question 1), but not as much as students in the other settings. Demographics were also studied to determine their impact on learner satisfaction (Question 6). The learning-setting variable was the only significant demographic factor affecting satisfaction with student-content interaction. Students were more satisfied with student-content interaction in traditional and blended settings. This also paralleled the previous finding about satisfaction with student-content interaction, which is the key factor for learner satisfaction in blended and traditional settings (Question 6).

Satisfaction with Student-Instructor Interaction

Student-instructor interaction predicted 2.0% variance of satisfaction. This interaction was the second most important variable, and significantly affected satisfaction

(Question 2, Table 5). In online, blended, and traditional settings, students were satisfied with the level of student-instructor interaction. Student-instructor interaction significantly predicted 2.4% variance of satisfaction in the online (Table 6), 44.9% in the blended (Table 7), and 6.1% in the traditional setting (Table 8). In all learning settings, student-instructor interaction was an essential factor that affected learner satisfaction. Additionally, when satisfaction was analyzed in relation to student-instructor interaction, students had the highest levels of satisfaction with student-instructor interaction in the traditional setting, since its mean difference were positive when compared to the blended at .2261 and online at .5610 (Question 5, Table 15). Interaction between instructor and students in the traditional setting was shown to be better than in the blended and online settings.

Class level was the only demographic factor that influenced learner satisfaction (Question 6). The freshman/sophomore and the junior groups had higher levels of satisfaction with student-instructor interaction in the traditional setting.

Satisfaction with Student-Student Interaction

Student-student interaction predicted 0.2% variance of satisfaction and was the least important variable compared to the other three types of interaction (Question 3). However, when analyzing interaction in the online, blended, and traditional settings, student-student interaction predicted 0.5% variance of satisfaction in the traditional setting, but was not significant for the other two settings. In addition, when the study focused on satisfaction to discuss student-student interaction, student satisfaction with student-student interaction was even better in traditional setting since its mean difference was positive when comparing with blended at .2353 and when the blended setting

compared with online at .8066 (Question 5, Table 17). When learning setting was the only significant demographic factor, students had higher satisfaction with student-student interaction in the traditional setting. This result also repeated the previous discussion about satisfaction variable with student-student interaction (Question 6).

Satisfaction with Student-Technology Interaction

Student-technology interaction predicted 1.5% variance of satisfaction. This type of interaction was an important variable, and significantly affected satisfaction (Question 4). In online and blended settings, students had higher predicted variance of satisfaction, at 7.4% and 6.8%, related to student-technology interaction, but this relationship was insignificant for the traditional setting. In addition, when the study focused on satisfaction to explore student-technology interaction, student satisfaction with student-technology interaction was higher in blended settings, since mean differences were positive when comparing to either the online setting (.2027) or the traditional (.1613) (Question 5, Table 19). Gender and learning setting were the two demographic factors that affected learner satisfaction with student-technology interaction (Question 6). Males had higher levels of satisfaction with student-technology interaction in the blended setting since its mean difference was positive when compared to the online setting, at .4249, and to the traditional setting, at .4712 (Questions 6, Table 32). Other demographics, including class level and Internet use, were studied when analyzing learner satisfaction. Satisfaction with student-technology interaction was higher with the senior/second-bachelor group and the junior group who reported daily Internet use, since the mean differences were positive either when the senior/second-bachelor group was compared to the freshman/sophomore

group at .2715 or when the junior group was compared to the freshman/sophomore group at .2512 (Question 6, Table 41).

Comparison with Strachota's Study

The research was highly homogeneous in demographics, since most survey takers were 18-25 years old, female, and Caucasians. Age, gender, and ethnicity were not significant factors that affected student-content, student-instructor, and student-student interactions, but male students had higher levels of satisfaction with student-technology interaction in the blended setting. However, Strachota (2002) conducted a similar study emphasizing online learners at Midwest Technical College. Her study was also dominated by 18-to-25-year-old, female, Caucasian students, but results differed radically obtained in this research. She stated that

> [The] effect of age and race was found for the constructs of learner-content interaction, learner-learner interaction and general satisfaction. Learner-instructor interaction revealed a main effect for gender with females being more satisfied than males. Leaner-technology revealed a main effect for age with the 18-25 year olds being more satisfied than the 26-35 and the >45 year old groups (p. 121).

The three main demographic variables (age, gender, and race) played a much greater role in levels of satisfaction with student-content, student-instructor, student-student, and student-technology interactions in Strachota's study than they in this 2011 study.

Relationships between the remaining four demographic factors in this study (class level, employment, distance from university, and Internet use) and satisfaction and interactions types in the three learning settings were presented in the previous discussion.

Implications

Student-Content Interaction

Student-content interaction is vital; it promotes learning satisfaction and contributes to student success. Both instructional structure/interface and collaboration between students are involved in student-content interaction in learning environments. Instructional design influenced structure (Moore & Kearsley, 2005) by containing the "course's educational objectives, teaching strategies, and evaluation methods" (Moore & Kearsley, 2005, p. 226-227). Learners were able to construct their understanding through the interaction with content in text-, video-, audio-, and web-based environments (Marks, Sibley, & Arbaugh, 2005; Mitzel, 1971; Moore, 1989). In this study, learners were highly satisfied with student-content interaction in all three learning settings. There was a significant relationship between student-content interaction and student satisfaction; in the online setting, student-content interaction was the most important factor compared to the other types of interactions in the study. However, student-content interaction in the online setting needs to be improved since it was not as competitive as in the other two settings. Well-designed content structure that includes effective communication tools increases learner collaboration and participation, learner flexibility, instructional effectiveness, and learner satisfaction in online environments (Reinhard, Yonezawa, & Morgado, 2000). Online programs that contain sufficient student-content interaction need to include individual and group presentations, projects, and assignments. Institutions should also provide distance-learning facilities to advance student-content interaction for online instruction.

Student-Instructor Interaction

Dialogue between learner and instructor maintained interaction between these two groups and was applied as a main teaching strategy (Laurillard, 2002; Marks, Sibley, & Arbaugh, 2005). Timely feedback from instructors raised student satisfaction and enhanced student success (Kirby, 1999; Yukselturk & Yildirim, 2008). Learner-instructor interaction is required for teachers and students to construct knowledge in a planned virtual environment. In traditional and blended settings, students can easily interact with instructors and receive timely feedback. According to this study, student-instructor interaction is a crucial factor that affects learner satisfaction in online, blended, and traditional settings: students had the highest levels of satisfaction with instructors in traditional settings, followed by blended, and online settings had the lowest levels. Face-to-face conversation between students and instructors without a technical interface allowed students to have more interaction and, therefore, higher satisfaction levels in traditional and blended settings. Discussions can be employed in virtual environments to increase student-instructor interaction. Timely response and individualized feedback from instructors also increase instructor-student interaction across technological barriers. The freshman/sophomore group and the junior group in the traditional setting were highly satisfied with student-instructor interaction; these younger groups are likely still used to traditional learning, and may have more difficulty adapting to online and blended learning environments than those in the senior/second-bachelor group. Instructors should offer orientation sessions for students, which would improve their likelihood of completing the course; such sessions would ideally include training in the technology, and instructions on how to access course materials, use library and other electronic

resources, register for the course, and retrieve transcripts and grades (Gunawardena, Linder-VanBerschot, LaPointe, & Rao, 2010; Ludwig, 2002). Administrators should also consider offering different formats for the same course; blended courses, which include face-to-face interaction, can be a good option for new students.

Student-Student Interaction

Both learner-learner and learner-instructor interaction were key elements (Frey & Alman, 2003; Moore, 1989) in student satisfaction within a distance-learning experience (Driver, 2002; Hassenplug & Harnish, 1998). Student-student discussion was essential to peer interaction and learning (Laurillard, 2002). Discussion activities are implemented for learners to collaboratively construct knowledge within a self-directed setting. Student-student interaction contributed to significant satisfaction in the whole research and in traditional settings, but demonstrated insignificant satisfaction in online and blended environments. There generally was a significant relationship between student-student interaction and student satisfaction in the study. To promote more satisfaction with student-student interaction through a course management system, collaborative activities such as group discussion and assignments, for which students are able to construct their learning and interact with other course students should be conducted to improve student-student interaction in online and blended settings.

Student-Technology Interaction

Research shows that technology has a statistically significant effect on student satisfaction and participation (Finlay, Desmet, & Evans, 2004), that distance education is satisfactory alternative to classroom instruction (Guzley, Avanzino, & Bor, 2001), and that learners are more satisfied in distance-earning environments than traditional settings

(Kuo, 2005), because distance-learning programs have more flexibility in terms of time and geographic logistics (Kuo, 2005; Reinhard, Yonezawa, & Morgado, 2000). In this study, student-technology interaction significantly increased learner satisfaction in blended settings as well as online. There generally is a significant relationship between student-technology interaction and student satisfaction (Liao, 2006). Blended courses offer flexible teaching and learning with online and lecture formats, which frees students from obstacles of time and geography for online activities, but still provides face-to face interaction with instructors and peers. Blended learning's superiority to online learning is evident from studies that have examined both student achievement and satisfaction (Precel, Eshet-Alkalai, & Alberton, 2009). In traditional settings, instructors and institutions have also started using online content to conduct web-enhanced instruction. This allows learners both web and conventional content in the traditional setting as well as the blended setting. Students can have autonomy in deciding when and where to access their online course activities using educational technology. Administrators and faculties should provide more blended or web-enhanced courses to meet the high demand for distance learning since learners are highly satisfied with blended courses.

In addition, males were more satisfied with student-technology interaction in the blended setting in the study. Interaction and gender factors are predictors of course satisfaction (Chang & Smith, 2008). In his 2004 study, Koohang found that males had significantly higher positive perceptions of the use of a digital library in an undergraduate hybrid program than did females. Studies in online setting also found that male college students are perceived to be more computer competent than females (Williams, Ogletree, Woodburn, & Raffeld, 1993) and males are more likely to use the Internet in web-based

instruction (Enoch & Soker, 2006). On the other hand, technology is male-oriented in its language (Wilson, 1992), design, and development (Cockburn & Ormond, 1993). Females may not be able to adapt to some educational technology as successfully as males, since females are more likely to be relational learners (Campbell & Varnhagen, 2002). Gender difference can affect learners' technology use. Sufficient gender-friendly orientations (Ludwig, 2002) in course management systems, ice-breaking course activities, and timely and individualized instructor feedback should be used to assist a variety of learners, including females, with completion of online and blended programs. Administrators and faculty members can also consider offering more blended formats than online, since the former can accommodate both females and males with face-to-face contact in web-based instruction.

Moreover, both the senior/second-bachelor group and the junior group with daily Internet use were highly satisfied with student-technology interaction in this study. Higher class level, including seniors, second-bachelor seekers, and juniors, adapted more easily to educational technology than did students in lower class levels. Internet use for studying is also prevalent and is required in any type of learning settings. Experienced learners, such as higher class level and daily Internet users, are more satisfied with student-technology interaction. Administrators and faculty members should provide orientation sessions for lower-class-level students and technical neophytes to enhance their satisfaction and completion rate, as discussed previously in relation to student-instructor interaction.

Conclusions

Traditional learning is still the most prominent mode of delivering courses on most college campuses in the United States. Factors affecting student satisfaction in traditional learning have been researched to improve course quality and retention. In the past decade, as a result of the development of the Internet and advances in computer technology, virtual course delivery approaches have increased dramatically. Most educational institutions have offered distance-learning programs via course management systems. As far back as 2000, Katz discussed the importance of building "a distance learning system that is highly interactive and most closely resembles a regular college lecture hall […] to contribute significantly to student satisfaction and achievement" has become a vital task (p. 29). Research has demonstrated that student characteristics, content (Smart & Cappel, 2006; Bishop-Clark, Dietz-Uhler, & Fisher, 2007), learning interactions, and technology use affect learner satisfaction (Ambe-Uva, 2006). The findings of this study contributed to the ongoing discussion of these factors as follows:

1. Student-content interaction was the key factor for learner satisfaction in all settings. Online learner satisfaction with content interaction was higher than other interactions, but it still had room to improve compared with other settings.
2. Traditional learners, especially at lower class levels, such as the sophomore and freshman group and the junior group, were highly satisfied with interacting with instructors.
3. Traditional learners were also highly satisfied with interacting with other students.

4. Blended learners, especially males or those at higher class levels, and online learners had higher satisfaction with student-technology interaction.

It was found that traditional learners are highly satisfied with interacting with content, instructors, and their classmates. They can receive face-to-face responses from their teachers and other students in learning. Traditional learners in lower class levels are possibly more dependent on student-instructor interaction than other kinds of interaction, so they had higher satisfaction with interacting with instructors in the study. However, online learners had less satisfaction with interacting with content, instructors, and other students than did traditional learners, but higher satisfaction with technology. Motivated students can individually complete online programs with limited interaction with other course participants. They rely more on course content than do students in traditional settings. More interactive online programs, such as opportunities to lead discussions, being part of a learning community, receiving prompt, individualized instructor feedback, engaging in authentic group activities, and participating in diverse assessment tasks with timely and detailed feedback, should be developed for quality interaction (Rovai, 2004; Stepich & Ertmer, 2003) and student satisfaction with instructors and learners. Furthermore, orientation sessions should be provided for newcomers to adapt in a virtual environment to successfully complete online programs. Administrators and faculty members also can consider providing more blended courses to meet more student preferences since face-to-face interaction can assist online instruction (Cacheiro, Rodrigo, Laherran, & Olmo, 2006; Precel, Eshet-Alkalai, & Alberton, 2009). Blended learning with well-designed content and orientation sessions can be a good method for improving satisfaction with interaction in virtual environments. Traditional learning assisted with

web-enhanced activities can be the good transition to virtual learning for students who have difficulty with technology.

Delimitation and Limitation

The research was delimitated by the undergraduate students enrolled in online, blended, and lecture courses at Midwest University in the fall semester of 2010. Participation was voluntary, so it was difficult to cover all categories in all sections, let alone generalize about a broader population. The study population comprised 18,254 undergraduate students at the university. This research was limited by the fact that there were 185 respondents from online, 90 from blended, and 641 from traditional settings. Sample distribution was not average in the three settings, so the respondents were not representative of the whole population. This could cause research results to be insignificant and affect reliability and credibility. Also, all participants were from different courses in different programs, so learning interaction and satisfaction in their courses varied. The instrument could measure general issues in three settings, but some survey questions might not be applicable in every setting. A qualitative approach could have been used to supplement some questions in the study.

Future Research

Student-content interaction is essential in learning, and learners had higher satisfaction with student-content interaction in not only three different settings but in the whole study as well. Traditional textbook publishers have started digitalizing their prints with textbook websites. These websites can be used for teaching and learning in online, blended, and traditional settings. How these electronic resources affect student satisfaction should be discussed in the future. On the contrary, virtual learning is content-

concentrated and independence-oriented. Online learners were highly satisfied with student-content interaction compared with student-instructor, student-student, and student-technology interaction in the study. However, the student-content interaction was not competitive with blended and traditional settings. Quality online content needs to be developed for advancing learner satisfaction and effective learning in the future. What learners' and instructors' perspectives are and what quality content should be designed to go with new instructional technologies to increase learner satisfaction should be studied further.

Technological innovations can transform teaching and learning. Use of instructional technology can cause anxiety for some populations, including females (He & Freeman, 2010), seniors (Wood, Lanuza, Baciu, MacKenzie, & Nosko, 2010), preservice teachers (Lambert & Gong, 2010), and new students, because they tend to learn less, practice less, and possess less computer self-efficacy compared to their counterparts. Instructional technology has matured and will be integrated into education even more in the future (Sener, 2010). Learner dissatisfaction, stress, or fear of computers can be still barriers to learning. The barriers can occur in online, blended, and traditional settings when new technology is further applied to teaching and learning. Future research may determine more about which populations or characteristics are associated with greater difficulty with computer technology and which instructional substitutions could be made for future technology novices to improve their satisfaction and completion in the three learning settings.

Blended learning has become the preferred format (Bacelar-Nicolau, Caeiro, Martinho, Azeiteiro, & Amador, 2009; Precel, Eshet-Alkalai, Alberton, 2009) since it is

able to transform instructional delivery and sustain equal education opportunities (Panga, 2010). Its face-to-face and online approaches have increased persistence and academic performance (Lopez-Perez, Perez-Lopez, & Rodriguez-Ariza, 2011) related to interaction, satisfaction (Wu, Tennyson, & Hsia, 2010), learning activities, age, background, and attendance rate (Bliuc, Ellis, Goodyear, & Piggott, 2011). To discuss blended-learner satisfaction, research has also emphasized the importance of interaction between student and content (Ginns & Ellis, 2009), student and instructor, student and student (Precel, Eshet-Alkalai, Alberton, 2009), and student and technology (Juma Shehab, 2007). More research on the relationships between student satisfaction, interaction, and student characteristics and personality should be conducted to advance retention and performance in blended learning.

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APPENDIX A

PERMISSION TO MODIFY AND USE STRACHOTA'S ONLINE SATISFACTION SURVEY

To: Elaine Strachota
Subject: Permission to use your survey
Date: February 25, 2010
From: Kuang-Yu Chang

Dr. Elaine Strachota,

I am a doctoral student at Illinois State University. My dissertation focuses on distance learning. I would like to investigate the factors affecting student satisfaction in learning at higher education level. Specifically, I am focusing on traditional, blended, and online learning. Your online survey on satisfaction done in 2002 will help me gather data for my dissertation. I am kindly asking for permission to use your survey with modifications. If there are procedures that I should follow in seeking permission, I would be glad to follow them.

Your help will be greatly appreciated.

Sincerely,

Kuang-Yu Chang

To: Kuang-Yu Chang
Subject: Re: Permission to use your survey
Date: February 25, 2010
From: Elaine Strachota

Kuangyu,

yes, feel free to use my survey instrument and revise it to fit your study. Be sure to reference my work however in your dissertation. Best of luck to you.

Elaine Strachota, Ph.D, MS., OTR.
Milwaukee Area Technical College
700 W. State St.
Milwaukee, WI 53233
Occupational Therapy Assistant Faculty
Liberal Arts & Sciences Faculty

APPENDIX B

INSTITUTIONAL REVIEW BOARD APPROVAL

June 11, 2010

Cheri Toledo
C&I 5330

Thank you for submitting the IRB protocol titled Factors Affecting University Student Satisfaction in Various Learning Deliveries for review by the Illinois State University Institutional Review Board (IRB). The IRB has reviewed this research protocol and effective 6/11/2010, has classified this protocol as Exempt from Further Review.

This protocol has been given the IRB number 2010-0218. This number should be used in all correspondence with the IRB.

This classification of this protocol as Exempt from Further Review is valid only for the research activities, timeline, and subjects described in the above named protocol. IRB policy requires that any changes to this protocol be reported to, and approved by, the IRB before being implemented. You are also required to inform the IRB immediately of any problems encountered that could adversely affect the health or welfare of the subjects in this study. Please contact Kathy Spence, J.D., Assistant Director of Research, at 438-2520 or myself in the event of an emergency. All correspondence should be sent to:

Institutional Review Board
Campus Box 3330
Hovey Hall, Room 307

It is your responsibility to notify all co-investigators (Kuang-Yu Chang), including students, of the classification of this protocol as soon as possible.

Thank you for your assistance, and the best of success with your research.

Gary Creasey, Chairperson

Institutional Review Board

cc: Ryan Brown, Department Rep, C&I

APPENDIX C

LETTER OF CONSENT

Letter of Consent

Dear Participant:

This research is being conducted by Kuang-Yu Chang, a doctoral student in the Department of Curriculum and Instruction at Illinois State University. The purpose of this study is to explore the factors influencing learner satisfaction within online, blended, and traditional learning. You are being asked to complete a survey questionnaire that will take approximately 20 minutes. This is an anonymous survey, so your responses will not include your name. No names or identifiers will be used if the data are used for conference presentations, publications, or for teaching purposes.

After reading the statements, please indicate your willingness to be involved by signing and returning this consent form. Also, by completing and returning the survey, you are providing consent and agreeing to participate in this study. You are free to end your participation at any time without penalty.

You might not directly benefit from this study. However, the results could contribute to the improvement of student satisfaction and course preparation, and it could eventually lead to the enhancement of teaching and learning with technology in higher education.

You can contact Dr. Cheri Toledo, the Principal Investigator, prior to, during, or after participation if any questions or concerns arise regarding this study. You also can contact the Research Ethics & Compliance Office at Illinois State University at (309) 438-2520 if you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk.

I certify that I have read and understand this consent form and agree that known risks to me have been explained to my satisfaction, and I understand that l will receive no compensation for participating in this research. I certify that I am 18 years of age or older. My participation in this research is given voluntarily. I understand that I may discontinue participation at any time without penalty or loss of any benefits to which I may otherwise be entitled.

_____
Signature

_____
Date

APPENDIX D

LEARNER SATISFACTION SURVEY

Learner Satisfaction Survey

Please fill in the blank or circle one answer

Learning settings

_____

Course number and section: e.g. ABC 123-001

_____

Demographics

1. Gender:

   Female

   Male

2. Age:

   18-25

   26-35

   36-45

   >45

3. Ethnicity:

    African American

    American Indian or Alaskan Native

    Asian and Pacific Islander

    Caucasian

    Hispanic

    Hispanic/Latino

    Other (please provide _____)

4. Marital status:

    Single

    Married

5. Class level:

    Freshman

    Sophomore

    Junior

    Senior

    Second Bachelor's

6. Student status:

    Full-time

    Part-time

7. Employment:

    Unemployed

    Part-time

Full-time

8. How far do you live from the university:

   0-5 miles

   6-10 miles

   11-20 miles

   21-30 miles

   31-40 miles

   Over 40 miles

   Out of Illinois

9. Previous Internet use experience:

   Never

   Rarely (less than 5 hours a month)

   Periodically (5-10 hours a month)

   Often (11-20 hours a month)

   Daily

Satisfaction Survey: please circle one answer of each of the following questions.

Student-content interaction

1. The course notes, lessons, or lecture used in this course have facilitated my learning.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

2. The assignments or projects in this course have facilitated my learning.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

3. Preparation for quiz/exams in this course has facilitated my learning.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

4. The learning activities in this course have required application of problem solving skills which facilitated my learning.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

5. The learning activities in this course have required critical thinking which facilitated my learning.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

Student-instructor interaction

1. In this course the teacher has been an active member of discussion group offering direction to our discussion.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

2. I have received timely feedback from my teacher.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

3. I have been able to get individualized attention from my teacher when needed.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

4. In this course the teacher has functioned as the facilitator of the course by continuously encouraging communication.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

5. When I have attended the course, the teacher knew I was present.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

Student-student interaction

1. In this course the discussion activities have provided opportunity for problem solving with other students.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

2. This course has created a sense of community among students.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

3. In this course I have been able to share my viewpoint with other students.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

4. In this course I have received timely feedback from other students.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

5. In this course I have been encouraged to discuss ideas and concepts covered with other students.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

Student-interface interaction

1. I enjoy working with computers.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

2. Computers make me much more productive.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

3. I am very confident in my abilities to use computers.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

4. Some computer software packages definitely make learning easier.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

5. Computers are good aids to learning.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

General satisfaction

Consider your current learning setting-traditional learning, and please answer the following questions.

1. I am very satisfied with this course.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

2. I would like to take another course with the same learning setting.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

3. This course definitely meets my learning needs.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

4. I would definitely recommend this course to others.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree

5. I feel this course is as effective as other courses with different learning settings—online or blended (combination of online and lecture but reduced classroom hours) learning.

(1) Strongly Disagree (2) Disagree (3) Agree (4) Strongly Agree