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**Students' Attitudes toward Interaction in Online Learning:
Exploring the Relationship between Attitudes, Learning Styles, and
Course Satisfaction**

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by

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Dedication

To My Parents

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Exploring the Relationship between Attitudes, Learning Styles, and
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This study sought to explore students' attitudes toward four types of interactions: instructional, affective, collaborative, and vicarious. One hundred and eighty-two students enrolled in online courses at a community college in the southwestern United States participated in the study. Data were collected through online questionnaires and interviews. Nine students participated in interviews that were conducted via online chats or phone calls. The results indicated students had significant differences in their attitudes toward the four types of interactions. Learning style was not a significant predictor of students' attitudes toward interaction. Learners' attitudes toward the four types of interactions were related to course satisfaction, and the four attitudes significantly predicted course satisfaction. The interviews explored reasons for students' attitudes toward interaction, and the interview results corresponded to the findings in the survey study.

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Chapter 1: Introduction

SIGNIFICANCE OF THE STUDY

In recent years, online learning has become part of the educational landscape (Lapadat, 2002) and has made an impact both on distance education and traditional classroom pedagogy (Hobbs, 2002). A survey made by the National Center for Education Statistics indicated that in three years (from 1995 to 1998) the percentage of institutions that used Internet-based courses grew from 22 percent to 60 percent. The survey result estimated that more than 1.6 million students were enrolled in distance education courses from 1997 to 1998 (National Center for Education Statistics, 1998). More and more higher education, K-12, and corporate trainers are turning to the World Wide Web as the vehicle for implementing instructional innovations (Khan, 1997).

For distance education, online learning utilizes the Internet and computer-mediated communications (CMC) technologies to deliver instruction and interaction among learners and instructors. For traditional classrooms, online learning provides more learning resources and more opportunities for interaction in different ways, which complements learners' individual differences (Hobbs, 2002). Online learning allows learners and instructors to "communicate, collaborate, and interact with and among each other without regard to temporal or physical location" (Hobbs, 2002, p.2).

Despite the view that online learning is an innovative way to deliver education, research suggests that online learning, in and of itself, does not guarantee its effectiveness. "A lot of e-learning courses are just 'A-to-B-to-C and D' or 'Tell, tell, tell, tell.' Then there are a few questions thrown in at the end... It may be presented vibrantly but it's essentially a passive activity and the learners will fall asleep," Ron Lubenski of

Click Craft, an e-learning developer and toolmaker said (Wilson, 2002). Many educators do not support online learning because they do not believe online learning is free from the challenging teaching and learning problems (Conlon, 1997), while other educators have concerns about barriers that may hinder effective online teaching and learning (Johnson, Aragon, Shaik, & Palma-Rivas, 2000). Examples of these barriers include the changing nature of technology, the complexity of networked systems, and the lack of stability in online learning environments (Brandt, 1996). Generally, most of the concerns are related to the online learning environment, an increasingly important topic in the online learning research. The term “online learning environment” has itself been interpreted broadly as any form of instructional delivery in which the Internet is included as a tool (Relan & Gillani, 1997; Smith, 1999).

Some researchers have highlighted the importance of the effectiveness of the online learning environment (Cohen & Ellis, 2003; Gunawardena & Zittle, 1995; Vrasidas, 2000). The real potential of online learning, as Miltiadou (2001) indicated, is not in its use of state-of-the-art technologies, but rather in creating an online learning environment in which learners are allowed more opportunities for various types of interactions among all the learners and the instructors. Furthermore, those learners for whom a traditional university setting does not work are offered appealing educational alternatives and provided lifelong learning opportunities in online learning environments (Miltiadou, 2001). New technologies create unique learning environments. However, as Moore (1993) suggested, we cannot simply add the new technological components to old ways of organizing teaching and learning. In order to avoid the pitfalls, it is essential to further investigate the online learning environment.

There have been a number of research studies about the effectiveness of online learning environments. Gunawardena and Zittle (1995) identified five areas related to

effectiveness of distance learning: learner-centered instruction, interaction, social presence, cognitive strategies, and collaborative learning. Interaction is the foundation for the other four areas (Bragg, 1999). As Bragg reasoned, if the learning environment is focused on interaction, it follows that it would most likely be a learner-centered approach (Bruner, 1966) that encourages interaction between learners. Learning environments with high interaction can encourage learners to develop cognitive strategies (Henri, 1992), and also encourages collaborative learning (Kaye, 1992).

Arbaugh (2000) identified a few factors influencing online learning: perceived usefulness and ease of use, course and program flexibility, interaction, and student engagement. Arbaugh observed that the significant learning variables are associated with classroom interaction. He concluded that the best pedagogical teaching style for online courses is the one with interaction (Arbaugh, 2000). Some researchers argue that interaction plays a primary role in determining the quality of distance education (Fulford & Zhang, 1993; Roblyer & Ekhaml, 2000). Therefore, interaction is a critical issue to probe if the quality of online learning is to be improved (Swan, 2003).

The terms interaction and interactivity have similar meanings, with the difference that interaction occurs in general instruction, while interactivity is used in the context of instruction using telecommunication technologies (Wagner, 1994). While keeping these distinctions in mind, one can recognize that interactivity is more related to the responsiveness of the media used to convey messages, and interaction is the interchange and communication between the participants who use the media (Monson, 2003). Since the focus of this study is on students' attitude toward the phenomena happening in the online learning environment, interaction is the most appropriate terminology, and the researcher centers on it as the construct of investigation.

There have been a few interaction categorizations in distance education or online learning. Moore (1989) categorized interaction into three types, 1) learner-to-instructor, 2) learner-to-learner, and 3) learner-to-content. Hillman, Willis, and Gunawardena (1995) later suggested a fourth type, learner-interface. On the basis of the time and context of the interactions, Bates (1995) categorized interactions into synchronous vs. asynchronous, and personal vs. social. Another type of categorization was based on the function of interaction, such as the one by Jung, Choi, Lim, and Leem (2002), which included 1) academic/instructional interaction, 2) collaborative interaction, and 3) interpersonal/social interaction. In addition, there was another type of interaction categorization based on learners' perceptions of interaction, which was named vicarious interaction (Yarkin-Levin, 1983). To better understand the function of interaction, based on the categorization of Jung, et al. (2002), the current study separated affective elements from social interaction, and investigated affective, collaborative, and instructional interactions. Because vicarious interaction is related to learners' perceptions of interactions, which can occur with other types of interactions concurrently, vicarious interaction was investigated in the study as well.

In spite of the widely held belief that interaction can influence the quality of online learning (Roblyer & Ekhaml, 2000), there has been relatively little empirical research investigating how online learners would view the different types of interactions. As Bozionelos (1997) indicated, negative attitudes toward computers have been considered one of the most important factors, which can inhibit effective use of computers in education. Therefore, to better understand effectiveness of online learning, the researcher investigated students' attitudes toward interaction by focusing on the function of interaction; four types of interactions (instructional, affective, collaborative, and vicarious) were investigated.

Online learning is “used by a population of learners who have far more heterogeneous backgrounds, in terms of their preferences, skills, and needs” (Chen & Paul, 2003, p.385). Normally, “individuals differ in their general skills, aptitudes, and preferences for processing information, constructing meaning from it, and applying it to new situation” (Jonassen & Grabowski, 1993, p.3). The issue of individual differences raised here is especially important to online learning (Merrill, 2000). Some researchers have studied how individuals deal with the non-linear interaction of online learning, and they found out that individual differences — including gender differences (Felix, 2001), prior knowledge (Holscherl & Strubel, 2000), and learning style (Sabry, 2003) — have significant effects on student learning in Web-based instruction (Kim, 2001). The researcher chose to focus on learning styles in the study.

The majority of empirical studies concerning learning styles in online learning have studied whether learning styles will significantly influence learners’ performance within the context of online learning (Aragon, Johnson, & Shaik, 2002; Kettanurak, Ramamurthy, & Haseman, 2001), and whether different learning style groups will favor different types of navigation strategies (Burwell, 1991; Ford & Chen, 2000). Few empirical studies about the relationship between learning styles and attitudes toward interaction were conducted. To better provide interaction for “maximum suitability and acceptability to the broadest group of learners” (Valenta, Therriault, Dieter, & Mrtek, 2001, p.53) in online learning, the researcher investigated the relationship between learning styles and students’ attitudes toward different types of interactions.

While the dropout rates seem to be higher for online courses (Cohen & Ellis, 2003), if students are satisfied with the online courses, they may continue to take subsequent courses in this format or with the same education provider (McGorry, 2003). As Thurmond, Wambach, and Connors (2002) stated, research studies have attempted to

link learner satisfaction, perceptions (Billings, Connors, & Skiba, 2001), or learning outcomes with the effectiveness of online courses (Ryan, Carlton, & Ali, 1998; Schoech, 2000; Woo & Kimmick, 2000). Some research studies also found that engaging in both synchronous and asynchronous forms of interaction, or person-to-person interaction, can enhance the learning experience, motivate online learners, and extend the degree of social interaction in the course (Northrup, 2002; Sherry, 2000). Those interactions may influence student outcomes, contribute to students' learning (Harasim, 1990; Miller & Webster, 1997; Waggoner, 1992; Miltiadou, 2001), and influence learner satisfaction (Zirkin & Sumler, 1995). Therefore, this study explored whether students' attitudes toward different types of interactions can predict course satisfaction.

There has been growing enthusiasm for investigating interaction in the online learning research, because interaction has been seen as being able to provide different types of support for learners. Interaction can promote active learning, it can facilitate adjusting to meet individual needs, and it can allow learner input in the learning process and enable learners to gain their own learner control (Fahy, 2003; Juwah, 2003; Muirhead, 2000). To gain a comprehensive view of interaction in the online learning environment, this study also investigated students' needs, to better understand the relationship between students' needs and different types of interactions. This understanding will be connected with the study of students' attitudes toward interaction to shed light on the reasons why students held the attitude toward the interaction.

In conclusion, this study examined students' attitudes toward the four types of interactions (instructional, affective, collaborative, and vicarious), investigated whether there were differences among students' attitudes toward the four types of interactions, determined whether learning styles can predict students' attitudes toward the four types of interactions, and examined the relationship between students' attitudes toward the four

types of interactions and their course satisfaction. Moreover, the needs of the students in the online learning environment were investigated. The results of this study should demystify students' attitudes toward interaction, and help educators who are interested in designing online learning to better understand interaction in the online learning environment, so that they can adjust the online learning environment in order to make online learning more efficient and successful.

PURPOSE OF THE STUDY

The main purpose of this study is to understand students' attitudes towards the four types of interactions (instructional, affective, collaborative, and vicarious) in the online learning environment. To meet the purpose, through the survey research method and interviews, this study sought to investigate students' attitudes toward the four types of interactions in online courses, to explore whether learning styles can predict students' attitudes toward the four types of interactions, to examine the relationship between course satisfaction and students' attitudes toward the four types of interactions, and to analyze online students' needs.

RESEARCH QUESTIONS

The research questions this study attempts to answer are:

1. What are students' attitudes toward the four types of interactions (instructional, affective, collaborative, and vicarious)?
2. Are there significant differences among students' attitudes toward the four types of interactions?
3. Can learning styles predict students' attitudes toward the four types of interactions?
4. Is there any relationship between course satisfaction and students' attitudes toward the four types of interactions?

5. Can course satisfaction be predicted by students' attitudes towards the four types of interactions?
6. What are students' needs in the online learning environment?

HYPOTHESIS

The null hypotheses constructed for the questions are as follows.

1. There is no significant difference in students' attitudes toward the four types of interactions.
2. Learning styles cannot predict students' attitudes toward the four types of interactions.
3. There is no relationship between students' attitudes toward the four types of interactions and course satisfaction.
4. Course satisfaction cannot be predicted by students' attitudes toward the four types of interactions.

Quantitative methods were used to answer the first five questions. Interview methods were utilized to answer the last question, and they complemented the quantitative methods to better understand the different types of interactions in the online learning environment. The data collected for analyzing students' attitudes toward the types of interactions were based on online questionnaires and interviews.

Chapter 2: Review of Literature

INTRODUCTION

In recent years online learning has become part of the educational landscape (Lapadat, 2002), and the potential of the Internet as a tool to influence education at all levels of the educational hierarchy is promising (Lee, Hong, & Ling, 2002). The reason for this is based on the benefits online learning may possibly bring to the learners. Online learning provides the learners with flexible learning, in which learners can progress at their own pace. Learning materials are available without limitations of geography and time (Graff, 2003). As Oliver, Herrington, and Omari (1996) stated, the potential of the hypermedia format used by the Internet as a learning tool is derived from the nature of the learning that hypermedia supports. Hypermedia facilitates student-centered approaches, creates a motivating and active learning environment (Becker & Dwyer, 1994) and can make learners responsible for their own learning (Graff, 2003). Furthermore, hypermedia can support and encourage the learner behaviors that are frequently associated with higher-order learning (Oliver, et al., 1996). The dynamic online learning environment incorporating hypermedia, activities, discussion and work groups allows students to get benefits from dynamic learning and to evaluate their performance against that of peers (Wonacott, 2002).

On the other hand, online learning has been used in “radically different ways by different people” (Jackson, Eye, Barbatsis, Biocca, Zhao, & Fitzgerald, 2003, p. 358). Generally speaking, online learning tends to fall into two categories. One category of online learning is situated in the traditional classroom, where the learners have frequent opportunities to meet face-to-face with the instructor. Typically, asynchronous

communication, implemented through either a Web editor or an asynchronous course management system (e.g. WebCT or Blackboard), is combined with traditional classroom, a practice known as blended learning (Jackson, et al., 2003). Some predicted that asynchronous communication may eventually become an integral part of on-campus instruction in higher education, while the line between traditional and distance education has been unclear (Spendlove, 2000).

The other category uses the course management systems to deliver a complete curriculum to the students who are geographically dispersed, which is also known as distance education or distance learning (Jackson, et al., 2003). The instructors and the students use the Internet platform to communicate with each other both synchronously (e.g. via online chat) or asynchronously (via e-mail). Usually, the instructors and the students do not meet; if they do, the number of meetings is minimal, instead of being on a regular basis. In this study, the term “online learning” or “online courses” refers to the second category.

ONLINE COURSE EFFECTIVENESS

Despite the view that online learning is an innovative way to deliver education, research suggests that online learning, in and of itself, does not guarantee its effectiveness. “A lot of e-learning courses are just ‘A-to-B-to-C and D’ or ‘Tell, tell, tell, tell.’ Then there are a few questions thrown in at the end.” “It may be presented vibrantly but it’s essentially a passive activity and the learners will fall asleep,” Ron Lubenski of Click Craft (Wilson, 2002), an e-learning developer and toolmaker said.

Efforts have been made in the field of online education and higher education to facilitate creative online learning activities that can support higher levels of learning. Also, the Internet has been used as a platform for transmitting course content and as a

communication medium for online discussions. However, the role of the Internet has remained limited (Kanuka, 2002). For example, Moiduser, Nachmias, Lahav, and Oren (2000) reviewed 436 Web sites and found that most of the Web sites are still text-based and did not demonstrate evidence of the current pedagogical approaches (e.g., use of inquiry-based activities, or application of constructivist learning principles). In addition, research has revealed that online discussions do not necessarily support the development of higher levels of thinking and learning (Kanuka & Anderson, 1998; Kanuka, 2002). As Oliver et al. (1996) stated, the instructional effectiveness of online courses has not been proven. There remains a need to investigate issues related to the effectiveness of online education if we are to get benefits from the Internet's unique attributes in the learning process (Kanuka, 2002).

Hijazi, Bernard, Plaisent, and Maguiraga (2003) summarized the effectiveness of distance education:

Since quality education is a concept that varies among individuals, it is hard to agree on a definition of quality in education. Aldag and Stearns (1991) suggest that quality is what a consumer wants from products and services and is willing to invest in. Moore and Kearsely (1996) discussed 'quality assessment' as an important factor in the process of managing a distance education project. The authors stated that a distance education project should be assessed based on several factors. These include 'quality of application and enrollment, student achievement, student satisfaction, faculty satisfaction, program or institutional reputation, and quality of course materials. Each of these factors reflects different aspects of quality. (p.182)

Some educators do not support online learning because they do not believe it is free of the challenging teaching and learning problems (Conlon, 1997). Other educators have concerns about some barriers in online learning that may hinder effective teaching and learning (Johnson, et al., 2000), examples of which include the changing nature of technology, the complexity of networked systems, and the lack of stability in the online

learning environment (Brandt, 1996). Thus, research studies concerning online learning have returned to the issue of teaching (Goldsmith, 2002):

Just as in a classroom, online learning can be a transforming experience for students. The technology can be used to help or hinder this transformation, but ultimately such transformations are a result of the combination of a student who appreciates and functions well in this environment, and above all a teacher who understands how to use the technology to create a positive, learning experience. (p.11)

Generally speaking, the main concerns about online learning research center on the online learning environment, which has become an important online learning topic (Cohen & Ellis, 2003; Gunawardena & Zittle, 1995; Vrasidas & McIsaac, 2000). Therefore, as Miltiadou (2001) stated, the real potential of online learning lies not in its use of state-of-the-art technologies, but rather in the ability to create online learning environments where learners are allowed more possibilities for various types of interactions with other learners and the instructors. Online learners are offered appealing educational alternatives and provided lifelong learning opportunities when a traditional university setting does not meet their needs (Miltiadou, 2001). The new technologies create the unique learning environment. However, as Moore (1993) suggested, we cannot just add the new technological components to old ways of organizing teaching and learning. To avoid the pitfalls, it is essential to further investigate online learning environments.

ONLINE LEARNING ENVIRONMENTS

Online learning environments tend to be broadly interpreted as involving any form of instructional delivery in which the Internet is used as a tool (Smith, 1999). Dringus and Terrell's (1999) explanation can help us to extend Smith's conception. They explained that one can imagine an online learning environment as a distinct,

pedagogically meaningful, and comprehensive learning environment where learners and faculty can participate in the learning and instructional process at any time and at any place.

Features of Online Learning Environments

Online learning environments have been regarded as learner-centered because learners have to take an active role, and the teacher becomes more of a facilitator for knowledge construction than a passive knowledge provider. The change of the role is thus well matched with the concepts of the constructivist theory of teaching and learning (McCoy, 2001; Savery & Duffy, 1995). In the online learning environment, the existence of a learning community and collaboration are indicated as the key factors for course satisfaction and for facilitating online learning. “The learning community is the vehicle through which learning occurs online” (Palloff & Pratt, 1999, p.29). Building a community to support learners is one strategy that has been recommended for increasing course satisfaction (Hill, 2001). A learning community can support learning by encouraging learners to work together as well as enhance learners’ cognitive development, according to socio-constructivism (Vygotsky, 1962).

In terms of collaboration, research studies have shown that collaborative learning can promote learning and is essential to the effectiveness of the online learning environment (Harasim, 1990). A study conducted by Hiltz, Coppola, Rotter, and Turoff (2000) indicated that collaborative learning methods are more effective for learning than individualistic methods in the online learning environment. The results of the study indicated that simply requiring individual students to get online to interact with course materials may be less effective for learning than the traditional classroom (Hiltz, et al., 2000). Another study conducted by Murphy, Drabier, and Epps (1998), also indicated

that the asynchronous collaboration capabilities of the online learning environment increased the students' interaction, satisfaction and learning. To sum up, collaboration in online learning can significantly help groups of learners to construct knowledge (Spendlove, 2000).

Computer-mediated communication (CMC) has been promoted as a facilitator for the process of knowledge construction through collaboration (Collins, 1998) as well as for the building of online learning community. The factor that distinguishes third-generation distance education (online education) from traditional distance education is that the online learning process is social rather than individual (Benigno & Trentin, 2000). This has been brought about by the use of CMC, which allows the creation of virtual learning environments that foster interpersonal communication and collaborative learning (Benigno & Trentin, 2000). CMC is the use of networked computers for communication, interaction, and exchange of information between students and instructors (Berge & Collins, 1995; Miltiadou, 2001). CMC can be used by “simply providing students with electronic mail in an otherwise traditional class, to actually delivering instruction and supporting student-to-student and student-to-teacher interactions at a distance” (Santoro, 1995, p.12). The use of CMC can encourage high-quality interaction and sharing that is essential in education (Harasim, 1990). Furthermore, CMC technologies can offer efficient and motivating methods for engaging people (Choi, 2001; Waggoner, 1992).

Examples of CMC technologies include e-mail, online chat, discussion board, newsgroups, and computer conferencing (Miltiadou, 2001). CMC is characterized by a highly interactive, multi-way synchronous or asynchronous communication (Romiszowski & Mason, 1996). Synchronous interaction allows students and instructors to exchange ideas and discuss course topics by way of a virtual discussion area.

Asynchronous interaction provides opportunities for active input from all members of the online classroom with flexibility in place and time, so the learners have greater control over the learning environment (Carr, 1998).

Many researchers believe that asynchronous communication is preferable for online learning (Carr, 1998; Graham, Scarborough, & Goodwin, 1999). Asynchronous interaction has a greater potential for producing more in-depth reflection in learners, and can enhance the quality of learners' decisions (Benbunan-Fich & Hiltz, 1999; Carr, 1998; Spendlove, 2000). Research has demonstrated that interaction in an asynchronous computer-mediated course parallels that of a traditional classroom, while synchronous courses tend to produce less interaction than the traditional classroom (McDonald & Gibson, 1998). However, providing some synchronous activities in an online course can help motivate students (Mason, 1998). Synchronous interaction is a good supplement to an asynchronous delivery medium, but not as the principal medium of delivery (Carr, 1998).

Issues in Online Learning Environments

As Jonassen, et al. (1995) observed, the purpose of a learning environment is to engage learners and require them to construct knowledge in a way that is meaningful to them. Studies have found that interaction in the online learning environment may lead to positive educational outcomes (Lenning & Ebbers, 1999), greater retention rates (Lenning & Ebbers, 1999), and increased effectiveness of distance education (Flottemesch, 2000; Kearsley, 1995). Because online learners tend to feel isolated and unconnected (Hill, 1996; Moore & Kearsley, 1996), one important factor which may influence learner success in completing a distance course is the degree of interaction (Ruksasuk, 2000).

Other studies (Arbaugh, 2000; University of Illinois, 1999; McGorry, 2003) identified interaction as an essential issue to be investigated in online education research. Gunawardena and Zittle (1995) identified five areas which needed research relative to effectiveness of distance learning: learner-centered instruction, interaction, social presence, cognitive strategies, and collaborative learning. In terms of the five areas, interaction is the foundation for the other four areas (Bragg, 1999). As Bragg reasoned, if the learning environment is focused on interaction, it follows that it would most likely be a learner-centered approach (Bruner, 1966) that encourages interaction between learners. Learning environments with high levels of interaction encourage learners to develop cognitive strategies (Henri, 1992) and also encourage collaborative learning (Kaye, 1992).

The University of Illinois (Chicago, Springfield, and Urbana-Champaign campuses) conducted a yearlong faculty seminar to address their faculty's concerns about the implementation of technology for teaching (1999). It was concluded that high quality online teaching and learning can be achieved if new approaches are employed and if professors strive to create a human and personal touch for the students. The issues involved in these approaches would be innovation in teaching, student engagement, interaction, and technical support (McGorry, 2003).

Arbaugh (2000) surveyed technology adoption, computer-mediated communication, and general distance education research studies. Arbaugh identified a few general factors that may influence student learning and course satisfaction in the Internet-based courses. The factors are perceived usefulness of the course, flexibility, interaction, student experience, and engagement. In the same study, Arbaugh also examined the effects of technological, pedagogical, and student characteristics on student learning in online MBA courses. The findings indicated that the instructors' efforts to

create an interactive classroom environment were significantly associated with quality of student learning. Arbaugh concluded that the best pedagogical teaching style for online courses was an interactive one (Arbaugh, 2000).

Based on the studies, interaction and engagement are the common factors for quality online education. Engagement can thus be achieved if there is well-design interaction. Therefore, one can reach the conclusion that interaction is a key variable in the online learning environment (Northrup, 2002) and is a quality-indicator in an online course (Cohen & Ellis, 2003).

INTERACTION

Technology itself is not inherently interactive. As Sim (1997) stated, “Quality in an instructional resource is a function of the design effort, not the technology” (p.1). Some people fear that technology would “dehumanize” education, but actually, with proper design, technology can “humanize” education (Gates, 1995, p. 184, quoted in Hijazi, et al., 2003). To better understand communication in the online learning environment, it is necessary to clarify the definitions of the two words, interaction and interactivity. Besides, it is crucial to be aware of different types of interactions, to understand how interaction is related to learning theories, to recognize its significance, and to integrate it into instructional design.

Definition

While different types of interaction can happen in the online learning environment, the terms “interaction” and “interactivity” tend to be used interchangeably in most of the online learning literature, and the definitions have been unclear in literature on traditional distance education. As Muirhead (2000) stated, distance educators have struggled with how to describe these concepts clearly.

Interaction and interactivity have similar connotations, except that interaction is used in the context of general instruction, while interactivity occurs in connection with telecommunication technologies (Roblyer & Ekhaml, 2000). Wagner (1994) distinguished the two terms: “Interaction functions as an attribute of effective instruction, while interactivity functions as an attribute of contemporary instructional systems, particularly those that use telecommunications technologies” (Wagner, 1994, p.7). Interactivity describes the forms of communication that a medium supports enabling dialogue between the learner and the instructor (Jonassen, 1994), and interactivity is an important attribute of technology-supported educational environments (Oliver, et al., 1996). Roblyer and Ekhaml (2000) concluded:

Thus, interaction focuses on people’s behaviors, while interactivity focuses on characteristics of the technology systems...Even if one accepts this distinction, it is evident that these qualities are linked and that both are necessary to achieve the qualities students find so desirable. Also, it is clear that there is a relationship between these two qualities in distance courses. (p.2)

While keeping these distinctions in mind, one can recognize that interactivity is more related to the responsiveness of the media used to convey messages, and interaction is the interchange and communication between the participants who use the media (Monson, 2003). Since the focus of this study is on students’ attitudes toward phenomena happening in the online learning environment, interaction is the most appropriate terminology, and the researcher centers on it as the construct of investigation.

Types of Interactions

Online learners interact with their peers, instructors, and content experts in ways that allow students to develop their critical and problem solving skills. The systems that support interaction between students and instructors could generate a satisfactory learning environment (De Vries, 1996). Interaction for learning is “a necessary and fundamental

mechanism for knowledge acquisition and for the development of both cognitive and physical skills” (Barker, 1994, p.1). Since interaction tends to contribute the values to learning, in order to understand how to make the online learning environment more effective, it is necessary to study different types of interactions.

In distance education research and the current online learning literature, there have been different types of classifications enumerated. Moore (1989) categorized interaction into three types, 1) learner-to-instructor, 2) learner-to-learner, and 3) learner-to-content. Hillman, Willis, and Gunawardena (1995) later suggested a fourth type, learner-interface. On the basis of the time and context of the interaction, Bates (1995) categorized interaction into synchronous vs. asynchronous, and personal vs. social. Another type of categorization is based on the function of interaction, such as the one by Jung, et al. (2002), which includes 1) academic/instructional interaction, 2) collaborative interaction, and 3) interpersonal/social interaction. In addition, there is another type of interaction categorization based on learners’ perceptions of interaction, which is named vicarious interaction (Yarkin-Levin, 1991).

To better understand the function of interaction, based on the categorization in the above studies, the researcher investigated the basic elements of interaction, with regard to its function in the learning process. First, instructional interaction as it occurs in any learning mechanism, was investigated in the study. Second, the functions of collaborative and interpersonal interaction have certain features that overlap. To decompose the two entities, the common element of affect was highlighted, and affective interaction was investigated. As mentioned earlier, the existence of a learning community and collaboration are indicated as the key factors for course satisfaction and for facilitating online learning (Palloff & Pratt, 1999). Therefore, collaborative interaction was included in the study as well. Since not all learners will participate in or benefit from vicarious

interaction (Sutton, 2001), this study explored students' attitude toward the vicarious interaction to demystify this type of interaction. To help better understand the four types of interactions, a brief introduction of them (instructional, affective, collaborative, and vicarious interactions) follows.

Instructional interaction is content-centered and tends to overlap with learner-content interaction. It is a basic type of interaction, because it always occurs when the learner reads online materials, gets task-oriented feedback from the instructor or from more competent peers, or participates in task-oriented learning activities (Jung, et al., 2002). Some studies show that learners tend to interact with the instructor only regarding content-related matters (Jung, et al., 2002). Usually, the instructional interaction happens through the additional interaction between learners and information facilitators. The information facilitators can be teachers, content experts, or tutors (Moller, 1998).

Affective interaction is closely connected with the social factors such as the degree of support, connectedness, and peer feedback, which have been found to be powerful determinants of success and satisfaction in online courses (Barab, Thomas, & Merrill, 2001; McLoughlin & Luca, 2003; Wegerif, 1998). Studies (Gunawardena & Zittle, 1995; Kanuka & Anderson, 1998; McDonald & Gibson, 1998) have indicated that interpersonal interaction and social integration are prominent in asynchronous computer conferencing courses (McDonald & Gibson, 1998) and are among the most influential factors on success in online learning (Jung & Rha, 2000). Similar studies confirm that the online learners need to feel the human touch in online learning (Kearsley, 2000; McLoughlin & Luca, 2003). Overall, the most salient conclusions emerging from the literature emphasize the need to increase feedback, reciprocity and support for the interpersonal interaction (Gunawardena, 1995; McLoughlin & Luca, 2003). The affective

interaction occurs especially when learners get emotional or social feedback from the instructor or peers in the form of interpersonal and motivational encouragement.

Collaborative interaction occurs when learners are discussing issues on a bulletin board or solving problems by working together, for example, discussion activities, sharing of ideas and information, or working as a team. Collaborative interaction provides the learners with the opportunity to discuss, argue, negotiate and reflect upon their existing beliefs and knowledge (Agostinho, Lefoe, & Hedberg, 1997). Through the process of discussing and interacting with other learners and the instructors, the learner constructs new knowledge (Harasim, 1989). When a team-based structure is established in the classroom, promotion of positive interaction and increased student exchange of information fosters educational success (Johnson, 1981).

Sutton (2001) defined vicarious interaction as another category of interaction that has not been accounted for by Moore (1989) and Hillman et al. (1994). The interaction “takes place when a student actively observes and processes both sides of interaction between two other students or between another student and the instructor” (Sutton, 2001, p.227). The interaction refers to learners’ perceptions of interaction; in this interaction, a learner actively reads and processes the online interactions of others, but the learner does not directly participate in activities. Some studies (Fulford & Zhang, 1993; Yarkin-Levin, 1991) indicated that if the learners’ perceptions of interaction remain high through vicarious or anticipated interaction, these perceptions will promote positive feelings toward the instruction. Following the line of the positive feelings toward the instruction, Sutton (2001) investigated the principles of vicarious interaction in computer-mediated communications. Sutton’s study indicated that when participating in vicarious interaction, the student does participate in the most basic learning process, and the indirect interaction does enhance the learning process. However, not all learners participate in or benefit

from the vicarious interaction, and vicarious interaction will not achieve the same effects as direct interaction. Vicarious interaction is most appropriate for learners who are apprehensive about interacting directly. Finally, Sutton (2001) concluded if vicarious interaction can be recognized and actively pursued, the online learning environment will provide more choices for learners, and the benefits of achievement and satisfaction will be able to be equally experienced by different types of learners.

The Learning Strategies and Theories

Interaction is a fundamental component of the main schools of learning theories (Monson, 2003). Basically, interaction provides a way for learners to receive feedback. One means of providing feedback is error correction. Identifying errors engages the learner in recognizing inadequacies in their mental models and motivates the learner to develop a deeper understanding of the concept, skill, or attitude. Using private email, or online conferencing in online learning is a way to provide the feedback.

When learners read online materials, or when learners get task-oriented feedback from the instructor or more competent peers, instructional interaction occurs. The interaction between learner and the learning materials relates to cognitive learning theories by which the learners obtain cognitive information from texts, and other resource materials such as web pages, videos, or journal articles (Moore, 1989). Well-organized course contents can support learners' cognitive strategies and help them to process information. Cognitive load theory suggests effective instruction promotes learning by directing cognitive resources towards activities that are relevant to learning rather than to processes that are adjunct to learning. In online learning, chunking information into information bits, focusing attention to coincide with explanations, reducing information overload, and providing appropriate scaffolding all aid in the reduction of cognitive load

(Toporski & Foley, 2002).

Based on the social cognitive learning theory, people can learn new behaviors through observing others without necessarily interacting directly. Those observational learners usually go through four stages, according to Bandura (1986); they are attention, retention, production, and motivation, in that order. In the attention stage, the learner analyzes and absorbs the behavior of the model. In the retention stage, the learner mentally represents and processes the modeled behavior. In the production stage, the learner overtly expresses the modeled behavior. In the motivation stage, the learner anticipates reinforcement. As Sutton (2001) indicated, within the context of computer-mediated communication, when learners actively observe and cognitively process the interaction of other participants, they can still substantially benefit from observing others, without necessarily interacting directly.

Learner control has been defined as the level of control a learner has over his/her learning (Williams, 1996). The multimedia capabilities and the hyper-textual navigational tools embedded in online learning not only provide access to multiple perspectives but also provide some degree of control to learners as they try to make sense of the content. Learner control involves “students participating (to some extent) in the choice of content, method, medium, reward, assistance, feedback, quantity, pacing, sequencing, of difficulty of instruction” (Sutton, 2000, p.34). To have effective and valuable learning experiences, a learner should have learner control developed through effective learning strategies (Kinzie, 1990). To effectively exercise learner control, a learner must have self-regulation skills (Kinzie, 1990). Furthermore, a distance learner should have learner autonomy (Moore, 1994). In sum, online learners with self-regulation and learner autonomy would get more benefits when interacting vicariously.

A tenet or precept of socio-constructivism is that knowledge is created through communication and collaboration with others (Garrison, 1993). According to Jonassen, Davidson, Collins, Campbell, and Bannan-Haag (1995), one goal of learning is meaning-making. Meaning-making requires articulation and reflection related to what one knows, which involves simultaneous internal negotiation and social negotiation (Choi, 2001). Leo Vygotsky, the most prominent figure in the development of social constructivist theory, outlines the community, the tools (e.g. language) in the learning environment, and the Zone of Proximal Development (ZPD) as important elements in learning. ZPD refers to the tasks the learner cannot perform on his/her own but can with the help of a more knowledgeable person. ZPD promotes all learning activities that include collaboration and interaction. Internet software tools provide chat and discussion forums for building communities, which creates a human and personal touch for the students, and fosters the development of social, interpersonal and collaborative interaction in the process.

Design of Interaction

There are a variety of technologies, which can help interaction occur in the online learning environment. For example, e-mail can facilitate personal interaction between an instructor and a student. Computer conferencing facilitates class-wide interaction among students without any time or distance constraint. Collaborative technologies can support various degrees of interaction. However, the mere use of collaborative technologies in distance education does not guarantee that the technology will facilitate learning. Its effective incorporation into a distance education course requires careful design and the instructor's time and effort (Ruksasuk, 2000).

To make the online learning environment interactive, the issue of how to optimize instructional design to maximize learning opportunities and achievement becomes

important (Aragon, Johnson, & Shaik, 2002). Quality distance education depends on the interaction and participation of the learners, which is similar to traditional face-to-face instruction. Interaction does not simply occur; distance educators need to intentionally integrate this ingredient into the instructional program (Berge, 1999; Muirhead, 2001). Furthermore, effective interaction design that engages learners in active exploration of knowledge and experiences is the result of careful analysis of the learners and of the learning outcomes. Biggs (1999) calls such a process “constructive alignment” (p.11). Simple replication of the traditional classroom style of the teacher as a questioner and the students as respondents cannot match the constructivist characteristics of the online learning environment (Williams & Pury, 2002), and such an environment will not meet the needs of diverse online learners.

Today, the forms of activity that are often suggested as necessary and sufficient conditions for effective university learning are those with high degrees of interaction and engagement, and those providing a motivating environment based on a well structured knowledge base (Oliver & Omari, 1999). For example, Paulsen (1995) suggested that incorporating activities that are one-alone (activities that are structured for minimal interaction with others), one-to-one (activities that are done in pairs or through e-mail), one-to-many (the use of bulletin boards, where material can be assessed), or many-to-many (the use of computer conferencing techniques) can successfully address the different learning styles of the virtual students (Paulsen, 1995; Palloff & Pratt, 2003).

Team-learning techniques may serve best to achieve these goals. Working in teams, students are likely to form bonds with one another and become more likely to participate in other online conference activities (Batovsky, 2002). Integrating collaborative activities in the online learning environment is an obvious strategy for promoting group or collaborative learning. Johnson and Johnson (1994) suggested that

groups do not become collaborative just because the instructor assigns group work. An effective collaborative group requires positive interdependence, group and individual accountability, ongoing interaction, and interpersonal skills. Moreover, courses relying heavily on collaboration must indicate the requirement for collaboration prior to class, or alternative accommodations must be made for students unable to participate fully (Northrup, 2001; Trentin, 2000).

To achieve interaction, online discussion has been found to promote interaction between learners (Brown, 1997). Brown (1997) advocated that online discussion has a number of advantages over oral, real-time discussion. First, the asynchronous nature of online discussion allows learners to respond at the time that best suits them. Second, it allows students time to reflect on or do further research about the topic before responding. Third, it allows students to seek clarification or help from others when the need arises, or to learn from whatever discussion is taking place even though they themselves may not have initiated it. Fourth, it provides a more egalitarian learning environment. The physical anonymity of the contributors is a great equalizer. Learners can make a contribution to the discussion whenever they like, with the knowledge that will be heard by all class members. Finally, the text-based nature of online discussion has a significant impact on knowledge building (Vygotsky, 1962).

For online discussions to achieve beneficial interaction, facilitation of discussions needs to be implemented. Berge (1995) identified the facilitator's role in four areas: pedagogical, social, managerial, and technical. Not all of the roles need to be played by the same person (Berge, 1995). The pedagogical role requires that the facilitator use questions and explore student responses that focus discussion on content-related concepts, principles and skills. The social role requires the facilitator to promote human relationships, develop group cohesiveness, maintain the group as a unit, and help group

members to work together in a mutual cause. The managerial role requires the facilitator to set the agenda for the discussion forums to include: the objectives of the discussion, the timetable, procedural rules and decision-making norms. Finally, the technical role requires the facilitator to make participants comfortable with the online discussion systems and the software.

In addition, Faradouly (1998) listed some questions to be considered in interaction design: 1). Who are the learners? 2). What do they need or want to learn? 3). In what environment will the learning be applied? 4). What do they already know? 5). What is the teacher trying to achieve with the instruction? 6). What skills, attitudes and knowledge is the teacher trying to help the learners to develop? 7). How will content be structured?, and 8). What strategies might be used? Those questions can be used as a framework for interaction design.

To sum up, purposeful interaction in a specific and pre-determined way can increase the learner's knowledge (Ritchie & Hoffman, 1997). In encouraging learners to participate in interactive activities, interaction needs to be designed to provide the learning experiences that are appropriately balanced between success and difficulty and between control and discovery (Smith & Ragan, 1999; Seels & Glasgow, 1998). After all, as Dewey (1916) indicated, if a learning process does not have varieties of difficulty level of tasks integrated, it will not promote optimal learning. Conversely, if varieties of difficulty level of tasks never or seldom make a learning process a success, optimal learning will not occur either.

ATTITUDE

Although researchers have advocated that interaction plays a primary role in determining the quality of distance education or online learning (Fulford & Zhang, 1993;

Roblyer & Ekhaml, 2000), the special nature of interaction in the online learning environment is still not well understood (Rourke & Anderson, 2002). The role of learner's attitudes toward interaction should be examined if we are to create a learner-centered online learning environment. The significance that affective variables such as mood, motivation, attitude toward instruction, and attitude toward content can have in the learning process has been researched (Baylor & Ryu, 2003). Researchers believed that examining the affective factors has at least the same importance as direct measures of learning outcomes (Bardwell, 1984; Baylor & Ryu, 2003). Therefore, this study investigated learners' attitudes toward interaction.

The term "attitude" has been used interchangeably with "perception" and "preference" in the literature, although specifically each term has its own construct. Perception is the result of observing something that results in cognition as in "I can see that online learners needs different types of interactions." Attitude is a belief in or emotion toward a fact or state as in "I strongly agree (or believe) that the design of online courses should meet learners' needs for different types of interactions." Preference is to make a choice among alternatives as in "if I had a choice I would choose an online course with different types of interactions." The three terms do not consist of the same elements, but are interwoven with each other and difficult to separate from each other. In this study the researcher focused on students' attitudes toward interaction only.

Attitude has been viewed as a single-component, two-component, or multi-component construct by attitude researchers. Subramaniam and Silverman (2000) made syntheses as follows. Some researchers (Fazio & Zanna, 1981; Insko & Schopler, 1972) viewed attitude as uni-dimensional. When the use of the term is restricted to only the affective dimension, attitude is regarded as a uni-dimensional construct. Some researchers (Bagozzi & Burnkrant, 1979; Mohsin, 1990; Oppenheim, 1992; Zajonc &

Markus, 1982) contended that attitude should be regarded as a two-component construct. They emphasized that attitudes involve cognitive and affective aspects. The cognitive component contributes to the beliefs about the characteristics of the attitude object, and the affective component measures the degree of emotional attraction or feeling toward an attitude object (Gonzalez, 1992). Some researchers (Hilgard, 1980; Reddy & LaBarbera, 1985; Triandis, 1971) also indicated that attitudes involve three components: cognition, affect, and conation (the behavioral component). They suggested that feelings toward an attitude object and beliefs about the characteristics of the attitude object impact behavior. As Ajzen (1993) stated, in essence this multi-component view of attitude is a hierarchical model with cognition, affect, and conation as the first-order factors, and attitude as the single second-order factor (Ajzen, 1993; Subramaniam & Silverman, 2000). It is believed that attitude and behavioral intentions to participate in online learning are natural consequences of one another, as it is believed that positive attitudes will always lead to behavioral intentions (Lee, et al., 2002). Therefore, this study only investigated the students' feelings and their beliefs about types of interactions, and the attitude in this study should thus be understood as a two-component construct. By examining students' attitude toward interaction, the study will shed light on what students would choose to interact with in the online learning environment, and course designers and instructors could make their courses tailored for students' preferences.

LEARNING STYLES

Normally, “individuals differ in their general skills, aptitudes, and preferences for processing information, constructing meaning from it, and applying it to new situation” (Jonassen & Grabowski, 1993, p.3). The issue of individual differences is especially important to online learning (Merrill, 2000), because online learning is “used by a

population of learners who have far more heterogeneous backgrounds, in terms of their preferences, skills, and needs” (Chen & Paul, 2003, p.385). To fine tune interaction for the maximal suitability and acceptability to the broadest group of learners in online learning (Valenta, et al., 2001), one needs to find out what type of learners prefer what types of interaction. Some researchers have studied how individuals deal with the non-linear interaction of online learning, and they found out that individual differences — including gender differences (Felix, 2001), prior knowledge (Holscherl & Strubel, 2000), and learning styles (Sabry & Baldwin, 2003) — have significant effects on student learning in Web-based instruction (Kim, 2001). This study focused on learning styles.

Learning style is widely regarded as being a subset of cognitive style (Hayes & Allinson, 1993). Keefe (1979) defined learning styles as “the composite of characteristic cognitive, affective, and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment” (Keefe, 1979, p.4). Learners respond differently to learning situations. Their responses can be influenced by the way they think, past experience, the demands of the environment and the current task. This approach is generally regarded as the learner’s learning style (Atkins, Moore, Sharpe, & Hobbs, 2001).

Palloff and Pratt (2003) advocated that an instructor address all learning styles in an online course, and they offered some suggestions as to how the instructor might satisfy that responsibility. First of all, regardless of which approach an instructor takes, when designing an online course an instructor should recognize individual differences exist which should be considered. “A ‘one size fits all’ approach will not work. It is a mistake to assume that every virtual student looks and feels the same” (Palloff & Pratt, 2003, p.31) even though the Internet has been considered as the great equalizer. Some

accommodations still have to be made for individual differences, including learning styles, gender, culture, and various disabilities (Palloff & Pratt, 2003).

The majority of empirical studies in online education have investigated 1) whether learning styles will significantly influence learners' performance within online learning (Aragon, 2002; Kettanurak, et al., 2001), 2) whether different learning style groups favor the use of different types of navigation strategies (Ford & Chen, 2000), and 3) whether there is a connection between learning styles and success among online and traditional face-to-face students (Aragon, et al., 2002). Aragon, et al. (2002) compared the relationship between learning style preferences and learner success of students in an online course with an equivalent face-to-face course. Variables compared in the study, included maintenance of motivation, task engagement, and cognitive controls. Significant differences were found between the learning style preferences of the online students and those of the face-to-face students, but these differences were not significant when learning outcomes (success factor) were controlled. The findings suggested students can be equally successful in face-to-face and the online environment, regardless of their learning style preferences (Aragon, et al., 2002).

On the other hand, Ames (2003) indicated that computer-assisted instruction is appropriate for some learning styles. Ames used Gregorc's (1982) model of learning styles to assess learners' learning patterns. The model was based on Jungian typology that explained learning style on two bipolar dimensions: perception and ordering and defined four learning styles: Abstract Sequential, Abstract Random, Concrete Sequential, and Concrete Random. Those who were identified as having an Abstract Sequential learning style were significantly and uniformly more confident, less anxious and more favorably disposed to instruction via computer. Both Abstract Random and Concrete Random learning styles were less inclined to be receptive to instruction via computer.

Relatively little research has been done on learning styles and their relationship to attitude toward interaction in the online learning environment. Sabry and Baldwin (2003) investigated the learning styles and perceptions of a group of undergraduate and postgraduate learners in a university in UK in relation to using the Internet for learning. They explored the sequential/global learning style dimension, which is related to the process of understanding, in relation to three types of online interaction: learner-tutor, learner-learner, and learner-information. Sequential learners tend to gain understanding through step-by-step approaches. Global learners tend to learn with an overview of the topics in mind. Sabry and Baldwin's study indicated that learners had different perceptions of different types of interactions. The majority of the learners had a higher preference for sequential learning style, and a significant percentage of the learners had higher scores for learner-information interaction (Sabry & Baldwin, 2003). It also demonstrated that the learner-information interaction had the highest score of learners' perceptions compared with other types of interaction. Despite the relatively low scores in frequency of use of the three interactions, learners' perception of the usefulness and importance of the interactions remained high. Besides, Kearsley (1995) found that the learners' personality, age, and cognitive/learning styles influenced their needs for interaction. The findings indicated students who were more self-directed or autonomous might or need less interaction than others. To better understand the relationship between learning styles and learners' attitudes toward interaction, the researcher focused on four types of interactions to investigate the issue of relationship.

As Keefe (1982) indicated, no current learning style instrument provides a truly comprehensive assessment of the cognitive, affective, and physiological domains of learning styles. Because of proof of validity and reliability, ease of administration, and the relatedness to this study, Kolb's Learning Style Inventory (1985) was chosen in the

study. Kolb's Learning Style Inventory is an established and validated instrument known to be short and easy to administer and score (Hayes, & Allinson, 1993; Kettanurak, et al., 2001), and it has been extensively used by researchers and practitioners (Hayes, & Allinson, 1993). The instrument is based on Kolb's Experiential Learning Theory, which comes from John Dewey's (1938) emphasis on the need for learning to be grounded in experience, Kurt Lewin's (1951) work that stressed the importance of a person's being active in learning, and Jean Piaget's (1971) theory of intelligence as the result of the interaction of the person and the environment.

The Experiential Learning Theory (ELT) defines learning as the process in which knowledge is created through the transformation of experience and through the holistic engagement of affective, perceptual, cognitive, and behavioral processes (Kolb, 1984). In the ELT, each learning environment adopts its evaluation through observing five variables within the learning environment: purpose, primary source, rules guiding learner behavior, nature of feedback, and teacher's role (Rainey & Kolb, 1995).

The ELT divides the learning processes along four stages: 1). Concrete experience or feeling, 2). Reflective observation, 3). Abstract conceptualization or thinking, and 4). Active experimentation. The theory expects the existence of the four learning stages (modes) that combine to form two bi-polar dimensions- concrete-abstract and active-reflective dimensions. The concrete-abstract dimension runs horizontally and is based on the task. The left end of the dimension represents doing the task (Active Experimentation, or AE), while the right end represents watching the task (Reflective Observation, or RO). The active-reflective dimension runs vertically and is based upon one's thought and emotional processes. The top of the dimension represents feeling or sensing (Concrete Experience or CE), while the bottom of the dimension represents thinking (Abstract Conceptualization or AC). The variables constitute the features of Kolb's Learning Style

Inventory. The four categories represent the four styles of Kolb's model. The four styles are termed "converger", "diverger", "assimilator", and "accommodator". The Learning Style Inventory produces scores relating to the four characteristics.

According to Kolb, no single mode can entirely describe a learner's learning style, because almost every individual uses each learning mode to some extent, but has a preferred learning style because of heredity factors, previous learning experiences, and the demands of the learning environment (Kolb, 1985).

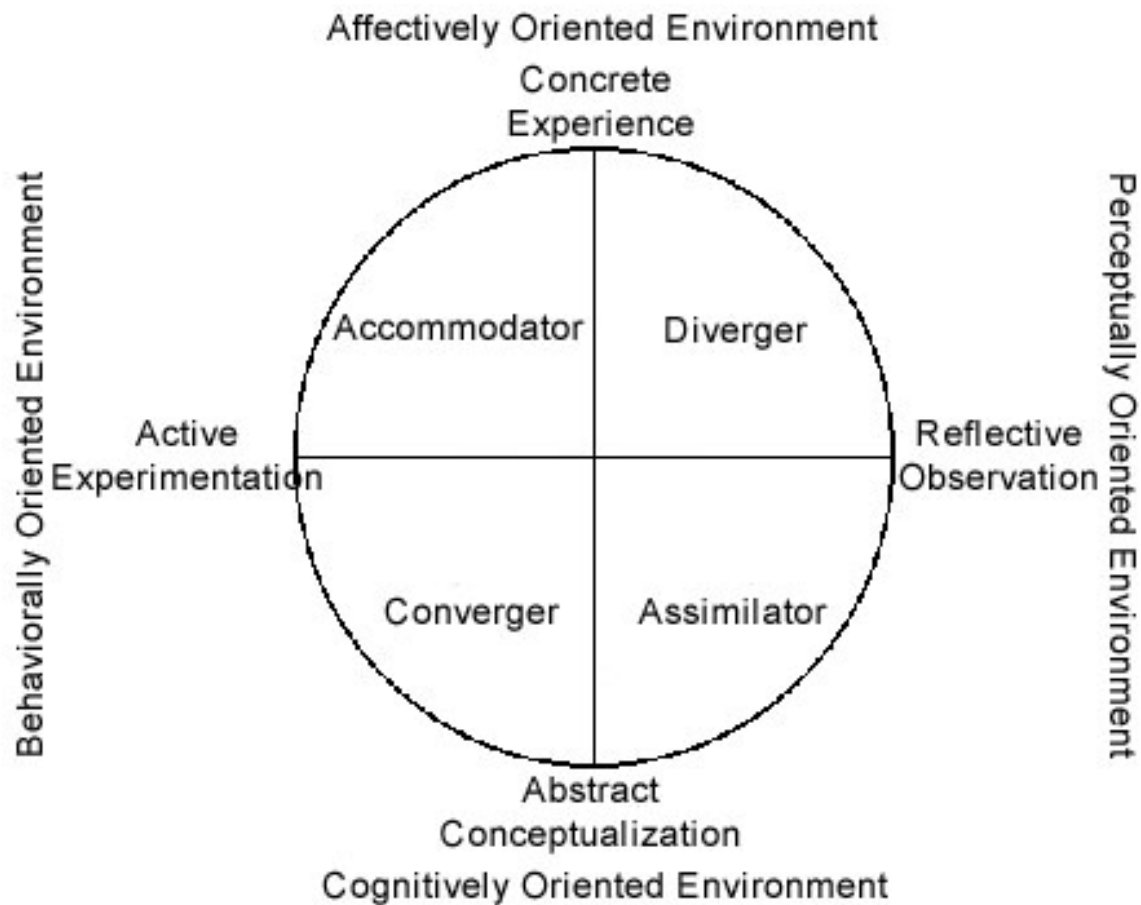


Illustration 1: The interaction of learning stages, learning styles and learning environments in Kolb's Experiential Learning Theory from Rainey and Kolb (1995)

It was believed particular learning styles were better suited for particular learning environments (Fry & Kolb, 1979). Four learning environments oriented to the four learning modes and four learning styles, were indicated by Rainey and Kolb (1995) and illustrated in Illustration 1. The affectively oriented environment corresponds to the learning mode of concrete experience, the cognitively oriented environment corresponds to abstract conceptualization, the perceptually oriented environment corresponds to reflective observation, and the behaviorally oriented environment corresponds to active experimentation (Rainey & Kolb, 1995).

There were some studies indicating the relationship between Kolb's Learning Style and learning. Kolb and Fry (1975) found in an experiential learning environment that convergers valued instructor or expert inputs most. Divergers valued self-diagnostic activities and preferred open-ended unstructured homework papers. Accommodators preferred a high degree of peer interaction, and prefer no authority figures in the classroom. Assimilators preferred structured homework, and value theory inputs and conforming to directions or rules.

Cordell (1991) investigated the effect of Kolb's Learning Styles and computer-based instruction (CBI) on the learning outcomes of 200 adult learners. Two types of CBI were developed as treatments: linear and branching. The linear format of CBI presents materials in a sequential way without options to change the schedule of learning. The branching format is more complex, because learners are not required to follow any sequence but are encouraged to branch to a level that matches their abilities. The results suggested that convergers and accommodators performed better with the linear format, while divergers and assimilators performed better with the branching format.

Notably, none of the studies had examined the relationship between Kolb's Learning Style and students' attitude toward interaction. The previous studies suggested

that there may be a relationship between learning style and perception of different types of interactions (learner-tutor, learner-learner, and learner-information). It is possible that a relationship may also exist between learning style and students' attitudes toward the four types of interactions (instructional, affective, collaborative, and vicarious). If this, in fact, is determined to be true, it will be able to predict the needs of a student for the types of interactions by knowing the student's learning style.

If relationships are found between students' learning styles and how these relate to their attitudes toward interaction, then instructors may feel fairly confident that they can use such instruments to appropriately gauge how to approach teaching a course with reference to the types of interaction. It was hoped that the information provided in this study would assist the instructors in their quest for achieving positive learning experience as well as stimulating the learning process of students. Furthermore, the results of the study may shed lights on which type of interaction appears to be the most effective in producing a positive impact on student learning with regard to particular learning styles.

SATISFACTION

Learner satisfaction and learning has been a focus in online learning (McGorry, 2003), and learner satisfaction has been identified as one of the factors for evaluating the effectiveness of online courses in evaluation studies (Palloff & Pratt, 1999; Walker, 2002). Research studies have found that engaging in both synchronous and asynchronous forms of interaction or in learner-learner or learner-instructor types of communication, can enhance the effectiveness of the learning while motivating the online learners and extending the social interaction of the course (Northrup, 2002; Sherry, 2000). It will turn out influencing student outcomes, contributing to their learning (Harasim, 1990;

Miltiadou, 2001; Waggoner, 1992), and influencing learner satisfaction (Zirkin & Sumler, 1995).

Studies have shown that learners experience greater levels of satisfaction in distance learning environments when they engage in meaningful and frequent interaction with the course instructor (DeBourgh, 1998). While the dropout rates seem to be higher for online courses (Cohen & Ellis, 2003), if students are satisfied with the online courses then they may continue to take subsequent courses in this format or with the same education provider (McGorry, 2003). As Thurmond, Wambach, and Connors (2002) stated, research studies have attempted to link learner satisfaction, perceptions (Billings, Connors, & Skiba, 2001), and learning outcomes with the effectiveness of an online course (Ryan, Carlton, & Ali, 1998; Schoech, 2000; Woo & Kimmick, 2000).

To help educators understand how to improve the effectiveness of online learning and become attuned to findings regarding learner satisfaction, it is important to investigate variables related to learner satisfaction. For example, Fulford and Zhang (1993) explored the relationship between learners' perceptions of interaction and their satisfaction with a course delivered by interactive videos. The participants were 123 K-6 teachers in a Developmental Approaches in Science and Health Program. Three sessions of the ten-session course were examined. The results indicated that learner's perception of interaction was the critical predictor of their satisfaction in the distance course. Overall, the dynamics in interaction may have a stronger impact on learner's satisfaction than self-study instruction.

Another study done by Friedel (1990) for the courses delivered by two-way interactive videos also indicated the significance of interaction on course satisfaction. Friedel (1990) investigated the students who had withdrawn from distance education courses, and found that interaction in the videos was one of the factors which explained

the students' withdrawal. As Garrison (1993) stated, if students have no connectivity achieved through sustained interaction, students will become autonomous and isolated, and in the end might drop out of the distance education courses.

Boverie, Nagel, McGee, and Garcia (1998) incorporated the Kolb Learning Style Inventory into their study of learning styles, emotional intelligence, social presence and their relationship to satisfaction with distance education. They concluded that only social preference exists as a significant predictor of course satisfaction. Strachota (2003) surveyed 849 students in 101 online courses offered in the University of Wisconsin-Milwaukee and the Midwest Technical College in fall 2002. Strachota examined the relationships of learner-content, learner-instructor, learner-learner and learner-technology to course satisfaction. The findings indicated learner-content interaction was the primary construct in predicting online satisfaction. Learner-instructor and learner-technology interaction played the second and third important roles in predicting online course satisfaction. Students in courses that had either a voluntary or required discussion group were significantly more satisfied than the students who had no discussion group in classes. Furthermore, some studies (Fulford & Zhang, 1993; Yarkin-Levin, 1991) indicated that if the learners' perceptions of interaction remain high through vicarious or anticipated interaction, these perceptions would promote positive feelings toward the instruction.

Learners tend to judge a distance education course based on how interactive the course is. More specifically, learners perceive the nature and quality of the interaction to be more critical in their satisfaction with the distance education course (Flottemesch, 2000). On the other hand, "It is important to recognize that different individuals may prefer different types of interaction" (Salzman, 1999, p.55). People's different propensities for interaction in educational settings may be based on such factors as

learning styles, age and personality (Kearsley, 1995). It is therefore meaningful to investigate the relationship between learners' attitudes toward interaction and their course satisfaction.

Jung, et al. (2002) researched the students' preferences with respect to interaction and found that different types of interactions in an online learning environment varied in terms of their effects on learner achievement, satisfaction, and participation in interaction. The results of Jung, et al.'s study demonstrated that the social interaction group outperformed the other groups (collaborative and academic groups), and the collaborative interaction group expressed the highest level of satisfaction with their learning process. The collaborative and social interaction groups participated more often in posting their opinions to the discussion board than did the academic interaction group. Regardless of the types of interactions, online learning experiences brought about a positive attitude change concerning the use of the Internet for learning (Jung, et al., 2002).

Taken together, this study focused on exploring students' attitudes towards the four types of interactions (instructional, affective, collaborative, and vicarious) in the online learning environment. Through survey research methods and interviews, the study 1) investigated students' attitudes toward the four types of interactions in the online learning environment, 2) determine whether there was a difference among the students' attitudes toward the four types of interactions, 3) examined whether learning styles can predict students' attitudes toward the four types of interactions, 4) described the relationships between students' attitudes toward the four types of interactions and their course satisfaction, 5) determined whether course satisfaction can be predicted by students' attitudes towards the four types of interactions, and 6) investigated students' needs in the online learning environment.

Chapter 3: Methodology

INTRODUCTION

The purpose of this study is to investigate students' attitudes toward interaction in the online learning environment. Specifically, in addition to investigating students' attitudes toward interaction, the researcher examined whether learning styles can predict students' attitudes toward four types of interactions. Furthermore, the researcher explored the relationship between students' attitudes toward interaction and course satisfaction. Finally, the researcher examined students' needs in the online learning environment. The research questions this study attempts to answer are:

1. What are students' attitudes toward the four types of interactions (instructional, affective, collaborative, and vicarious)?
2. Are there significant differences among students' attitudes toward the four types of interactions?
3. Can learning styles predict students' attitudes toward the four types of interactions?
4. Is there any relationship between students' attitudes toward the four types of interactions and course satisfaction?
5. Can course satisfaction be predicted by students' attitudes towards the four types of interactions?
6. What are students' needs in the online learning environment?

Quantitative methods were used to answer the first five questions. Interview methods were used to answer the last question, and they complemented the quantitative methods in order to better understand interaction in the online learning environment. The

data collected for analyzing students' attitudes toward interaction were based on online questionnaires and interviews.

PARTICIPANTS

The participants of the study came from a heterogeneous composition of about 2000 students registered in Spring 2004 online courses in a community college located in a southwestern state. The questionnaires were distributed online to all online students, and 182 students completed the three questionnaires. The students varied in terms of age, gender, and academic majors. Ages ranged from 18 to 55. More than three quarters of the participants were females in the survey study. Nine students (six females and three males) participated in the interviews. More than three quarters of the courses the student participants were enrolled in, came from Liberal Arts; other courses were randomly distributed among the disciplines of Natural Sciences, Business, and Language courses. Based on the data collected from the survey questionnaires, the main reasons the students took the online courses were because of the flexible schedule which online learning affords, or because the course was required in their field of study. All students participated in the study voluntarily.

The community college has been providing distance learning for 5 years. WebCT was the course management system utilized during the semester. The community college did not require computer skills for students who wanted to enroll in the online courses. However, the community college had an Internet Skills Self-Test that students could take to assess if they were ready for online learning. The community college also gave detailed information online on what to expect in an online course, so students could evaluate their readiness for online learning.

The instructors were given faculty support training related to online instructional design, pedagogy, and technical assistance. The instructors chose the learning materials and learning activities for their own courses and communicated with students through online discussion boards, e-mail, phone calls, or in-person meetings.

Hybrid courses being excluded, 89 online courses were provided during Spring 2004 at the community college. The online courses consisted of the following academic disciplines: mathematics, chemistry, biology, information science, statistics, psychology, history, sociology, philosophy, American literature, World literature, Freshman Composition, accounting, economics, American government, arts appreciation, and ESL (English as a Second Language) reading and writing. During the semester, there were 64 courses provided from Liberal Arts, 17 courses from Natural Sciences, 6 courses from Business, and 2 courses from ESL.

No more than 20 students can sign up for a single class at the community college. The average retention rate for the online classes at the community college was 75%. During the semester, most online students did not have face-to-face meetings, except for the orientation, the mid-term, and the final exam. Test locations were on campus. Exceptions were made for truly distant students, who took the test in a proctored environment near them (often a local college).

After receiving the IRB approval, the researcher distributed the three instruments to all online students of the community college via e-mail (Appendix E). All students were informed of the purpose of the study and advised of their right to withdraw at any time. The students completed the online surveys electronically via the web link to the researcher's web server, and participation was on a voluntary basis. Their participation was considered consent. At the same time, the researcher asked the students that participated in the surveys whether they were willing to participate in interviews via on-

chats or phone calls. Six females and three males responded. Next, the researcher conducted individual on-line chats or phone interviews with these nine students. The Consent Form (Appendix F) for interviews was mailed to these nine students and was signed by them.

INSTRUMENTATION

Three instruments were used in the study. A researcher-developed Attitude toward Interaction Survey was used to collect the demographics of the students and their attitudes toward interaction. Kolb's Learning Style Inventory (1985) was utilized to assess learning style. A researcher-developed Course Satisfaction instrument was used to assess the students' course satisfaction. The three instruments are in Appendix A, B, and C.

Kolb's Learning Style Inventory

The learning styles were measured through Kolb's Learning Style Inventory (LSI) (1985). Kolb's Learning Style Inventory was used, because the learning environments of LSI correspond to the types of interaction investigated in this study. The concrete-abstract dimension runs horizontally dividing the learning environment into the affectively oriented environment (upper) and the cognitively oriented environment (lower), which correspond to affective interaction and instructional interaction. The active-reflective dimension runs vertically dividing the learning environment into the perceptually oriented environment (right) and the behaviorally oriented environment (left), which correspond to vicarious interaction and collaborative interaction. Resulting from the correspondence between the learning environments and the types of interaction studied, Kolb's Learning Style Inventory was selected for use to explore whether learning styles can predict students' attitudes toward the four types of interactions. (Illustration 1)

This instrument was based on Kolb's Experiential Learning Theory and was used to measure a learner's preference for assimilating new information. It consists of 12 items, each of which has four possible answers, and the learners are asked to rank them in order. The responses to a rank ordering are one to four. A rank of four represents the choice that is perceived to enable the individual to learn best, while a rank of one indicates the other extreme. Each answer corresponds to one of the stages of Kolb's experiential learning mode: concrete experience (CE: learning from feeling), reflective observation (RO: learning by watching and listening), abstract conceptualization (AC: learning by thinking), and active experimentation (AE: learning by doing).

The four basic scales and the two combination scores have good internal reliability as measured by Cronbach Alpha and Tukey's Additivity Power Test (Kolb, 1995). Cronbach Alpha ranged from .73 to .88 and the Tukey's Additivity Power Test indicates almost perfect additivity (1.0). Validity studies found the LSI related to several variables such as personality. Kolb (1984) found a correlation between the LSI and the Myers-Briggs Type Indicator, a psychological self-report instrument, which is widely used to assess people's orientation toward personality types. CE was positively correlated with feeling (.34, $p < .01$), RO was positively correlated with introversion (.34, $p < .01$), AC was positively correlated with intuition (.23, $p < .01$), and AE was negatively correlated with introversion (.27, $p < .05$).

Attitude Toward Interaction Scale

The Attitude Toward Interaction Scale consists of three sections: demographic information, course information, and the 20 Likert-type items, which measure students' attitudes toward four types of interactions (instructional, affective, collaborative, and vicarious). The components of the questionnaire are described as follows.

The demographic components of the questionnaire include gender, age, title of the course, student location, reason for taking the online course, the number of times they previously took online courses, frequency of face-to-face meetings, student's comfort level with the online communication tools such as email, frequency of checking email, frequency of using the Internet, and the collaborative activities the student had in the online course. Several collaborative activities were listed for choice: 1). Exchange information with classmates; 2). Analyze information or data with classmates; 3). Create database with classmates; 4). You and your classmates are grouped in teams; 5). Have online-chat discussions with classmates; 6). Have discussions with classmates by posting messages on the discussion boards; 7). Solve problems with classmates; 8). Have role-playing activities; 9). Edit classmates' work; 10). Write team paper(s); 11). Do research projects with classmates; 12). Others. Please specify

The 20 items measure students' attitudes toward four types of interactions. For each type of interaction, there were 5 items measuring the attitude toward the type of interaction. Responses to each item were recorded on a five-point Likert type scale. The scale extends from strongly agree, agree, neutral, disagree, to strongly disagree.

For attitude toward instructional interaction, the students were asked to indicate their attitudes toward the subject learning in the online learning environment. The five items are as follows. 1) When I learn online, I like to learn by reading the course materials. 2). I learn online best when I have self-assessment activities (e.g., practices, exercises, or reviews) in the learning process. 3). When I am learning online, I like to have the feedback that can help me understand the content. 4). To meet my learning expectations, I like to have appropriate and organized information to learn the content. 5). To get satisfied with the online course, I like to have instructional or intellectual feedback from the instructor or more competent peers.

For attitude toward affective interaction, the students were asked to indicate their attitudes toward emotional and motivational support in the online learning environment. The five items are as follows. 1) When I learn online, I like to deal with my feelings and emotions. 2). I learn online best when I have emotional support in the learning environment. 3). When I am learning online, I like to feel a sense of community in the learning environment. 4). To meet my learning expectations, I like to have emotional support from class. 5). To get satisfied with the online course, I like to feel a sense of belonging to the class.

For attitude toward collaborative interaction, the students were asked to indicate their attitudes toward the process of collaboration in the online learning environment. The five items are as follows. 1) When I learn online, I like to collaborate with my classmates. 2). I learn online best when I have companions to work with. 3). When I am learning online, I like to discuss and solve problems with my classmates. 4). To meet my learning expectations, I like to collaborate with my classmates. 5). To get satisfied with the online course, I like to collaborate with my classmates.

For attitude toward vicarious interaction, the students were asked to indicate their attitudes toward perceiving interaction, but not participating in the online learning environment. The five items are as follows. 1) When I learn online, I like to spend time reading instead of posting messages in the online discussions. 2). I learn online best when I read instead of posting messages in the discussion forums. 3). When I am learning online, I am hesitant to post my message in the discussion forums. 4). To meet my learning expectations, I like to read instead of posting messages in the discussion forums. 5). To get satisfied with the online course, I like to read instead of posting messages in the discussion forums.

A pilot study using a 48-student sample of the population base was conducted in Fall 2003, before the official study, to determine the validity and reliability of the attitude scale and also to test the distribution process. To test the content validity of the Attitude Toward Interaction Scale, two online instructors and two graduate students reviewed the question items and confirmed the items measured the four types of interaction before the questionnaire was distributed to the participants. The reliability of all the items in the four sub-scales of Attitude Toward Interaction Scale according to a Cronbach Alpha was 0.84. Internal consistency was calculated for the four sub-scales: instructional (0.85), affective (0.74), collaborative (0.87), and vicarious (0.81) interaction. These coefficients indicated an acceptable level of reliability for the various attitude components.

Online Course Satisfaction Survey

The Online Course Satisfaction Survey compiled by the researcher was used for evaluating the general course satisfaction of the online students. The questionnaire employs a Likert-type scale with a list of 12 items. The range of the scale extends from strongly agree, agree, neutral, disagree, to strongly disagree.

Because the items directly pertain to student satisfaction toward an online course, pilot testing was not conducted, and the researcher performed a reliability analysis on the Online Course Satisfaction after data collection phase. The 12 items of the Survey are as follows. 1). I am satisfied with the interaction with the instructor. 2). I am satisfied with the interaction with my classmates. 3). I am satisfied with the course activities. 4). I am satisfied with the technologies being used (e.g., web site, video and/or audio materials). 5). I am satisfied with the intellectual support being provided. 6). I am satisfied with the emotional or motivation support being provided. 7). I am satisfied with the technical support being provided. 8). Overall, this online course effectively presented the subject

matter. 9). Overall, I am satisfied with this course. 10). I would like to take an online course again in the future. 11). If I had a choice, I would choose an online course over face-to-face instruction. 12). I have a positive attitude toward online learning.

DATA COLLECTION PROCEDURE

Quantitative Data Collection

The three instruments were placed on the researcher's web site with database-driven functions, and were distributed online to the students in 2004 between late March and early May. The researcher e-mailed the invitation message, which outlined the research objectives and the web site address to the administrators in the community college. Next, the administrators informed the instructors of the researcher's study, and then the instructors forwarded the researcher's invitation message to their online students. The researcher e-mailed and asked the administrators to distribute the invitation message to online students for three times: at the beginning, the middle, and the end of the data collection period. It was estimated that the three instruments would take the participants approximately 25~30 minutes to complete.

Interview Data Collection

The interview data were collected through online chats or phone calls. Before the official study, the interview guide and procedures were pilot-tested in Fall 2003 with a 3-student pilot sample in a community college through online chats, to ensure that the interview questions were easy to comprehend, in preparation for the official study. The researcher interviewed the three students with the prepared interview questions, and asked them to paraphrase the meanings of the interview questions to ensure that the meaning of interview questions was consistent with the researcher's intention. The

researcher also asked the 3-student group to check the wording of the interview questions, and the researcher revised them until the three students interpreted them in completely the same way. The interview questions are enclosed in Appendix D.

Nine students responded in the Attitude Toward Interaction Scale that they were willing to participate in interviews. The interview format was open-ended in order to allow the students to express their views in their own terms. The interview questions were focused on their needs in the online learning environment. Each student chatted online with the researcher twice. One student communicated a 3rd time with the researcher through a phone call, when the student did not express clearly through the online chats. Each online chat usually took 30 minutes until the researcher gathered sufficient information. The phone call took the researcher about 20 minutes to clarify unclear information.

DATA ANALYSIS

Quantitative Data Analysis

Kolb Learning Style Inventory

In the 12 items of Kolb's LSI, each choice in each item has a score rated by a student, and each choice is assigned to one of the four modes (AE, RO, AC, CE). (Table 1) In Table 1, the number represents the item, and the letter represents one of the choices in each item. By adding all the scores of each choice, one can have one score for each mode.

Table 1: Data Analysis of Kolb Learning Style Inventory

| Mode | Choice of Item |
|---------------------------------|---------------------------------------------------|
| Active Experimentation (AE) | 1C, 2D, 3B, 4B, 5D, 6B, 7D, 8A, 9C, 10C, 11D, 12D |
| Reflective Observation (RO) | 1D, 2A, 3C, 4C, 5B, 6A, 7A, 8C, 9A, 10A, 11B, 12C |
| Abstract Conceptualization (AC) | 1B, 2B, 3A, 4D, 5C, 6D, 7C, 8B, 9D, 10D, 11C, 12A |
| Concrete Experience (CE) | 1A, 2C, 3D, 4A, 5A, 6C, 7B, 8D, 9B, 10B, 11A, 12B |

The resulting four scores yield raw scores ranging from 12 to 48. The four scores measure the emphasis that the learners place on each of the four modes of the learning cycle. The four scores are used to generate two mean scores for learning dimensions.

The two learning dimensions are depicted as being on one horizontal line and one vertical line. The horizontal line represents the opposites of active experimentation (AE) and reflective observation (RO). The vertical line represents the opposites of abstract conceptualization (AC) and concrete experience (CE).

The researcher calculated the horizontal point by subtracting the AE score from the RO score. The vertical point was calculated by subtracting the CE score from the AC score. Two intersecting lines were drawn to determine the learner's learning style quadrant. Finally the students were categorized into one of the four learning style quadrants: Converger, Diverger, Assimilator or Accommodator.

Attitude toward Interaction Scale

In the Attitude toward Interaction Scale, Strongly Agree is coded as 5, Agree as 4, Neutral as 3, Disagree as 2, and Strongly Disagree as 1. By calculating the mean scores for the five items for each type of interaction, one can learn the state of a student's attitude toward each type of the interaction.

Online Course Satisfaction Survey

In the Survey, Strongly Agree is coded as 5, Agree as 4, Neutral as 3, Disagree as 2, and Strongly Disagree as 1. By calculating the mean scores for the 12 items, one can learn the state of a student's course satisfaction.

Analysis of each research question

Descriptive statistics were used to present the data gathered from the Attitude Toward Interaction Scale. This information answered the research question: What are students' attitudes toward four types of interactions (affective, collaborative, instructional, vicarious) in the online learning environment. A similar descriptive analysis was utilized to explain the data from the Kolb's Learning Style Inventory.

Second, one-way repeated measures analysis of variance (ANOVA) was performed to answer the research question: Is there a significant difference in students' attitudes toward the four types of interactions? The dependent variables were students' attitudes toward the four types of interactions. If significantly different, pair-wise comparisons were performed to examine which attitude is significantly different from one another.

Third, four one-way analyses of variance (ANOVA) were performed to answer the research question: Can learning styles predict students' attitudes toward the four types of interactions? Through testing the group difference, ANOVA was used to identify whether further prediction analysis is needed. The dependent variable was student attitude toward each type of interaction; the independent variable was learning style (divergers, accommodators, convergers, and assimilators).

Fourth, correlations between learners' attitudes toward the four types of interactions and course satisfaction were computed to answer the research question: What

is the relationship between students' attitudes toward the four types of interactions and course satisfaction? Because the Attitude Toward Interaction Scale and Online Course Satisfaction Scale were defined as continuous data, the relationship was measured with the Pearson Product Moment Correlation Coefficients for each interaction and with a multiple correlation for all four attitudes toward interaction simultaneously.

Fifth, a multiple regression model was computed to create a regression equation to answer the research question: Can course satisfaction be predicted by students' attitudes toward the four types of interactions? The model included all four predictor variables (attitudes toward the four types of interactions) simultaneously to determine the joint effect (course satisfaction) of these variables.

Interview Data Analysis

These findings were used to support the quantitative studies and provide a rich understanding of learners that cannot be obtained through the Likert scales. To begin the data analysis, the data of on-chats were collected, and the phone interview was transcribed. The researcher coded the data following the procedures described below.

A starting list of themes was generated from the research question. Then, the students' statements were coded and nested under an existing theme. Once all statements were grouped in this manner, statements within each theme were grouped into sub-categories. Finally, patterns and relationships between themes and sub-categories throughout the data were examined for findings.

Chapter 4: Results

The results of the study are organized by first presenting the demographic data of the students, followed by the quantitative data and then the interview data. The results are grouped with the information by the research questions.

DEMOGRAPHIC DATA

There were 182 students completing all three surveys, rendering a participation rate of 9%, with the population of 2000 online students. These data are broken down by categories in Table 2 to 6. With the exception of female to male ratio, and the heavy concentration of local students, this population is fairly representative of the college student population.

Table 2

Frequency Distribution of Gender, Age, Location and City of the Students

| Variables | Frequency | Percent % |
|-------------|-----------|-----------|
| Gender | | |
| Female | 141 | 79 |
| Male | 38 | 21 |
| Age | | |
| 22 or less | 63 | 35 |
| 23 ~ 29 | 55 | 31 |
| 30 or more | 61 | 34 |
| Location | | |
| Off campus | 103 | 58 |
| On campus | 75 | 42 |
| City | | |
| San Antonio | 151 | 83 |
| Others | 31 | 17 |

Table 3

Frequency Distribution of Discipline, Meeting, and Collaborative Activities

| Variables | Frequency | Percent % |
|-------------------------------------------------------------------------------|-----------|-----------|
| Discipline | | |
| Liberal Arts | 138 | 76 |
| Natural Sciences | 14 | 14 |
| Fine Arts | 9 | 5 |
| ESL | 7 | 4 |
| Business | 1 | 1 |
| Face-to-face meeting | | |
| At least one face-to-face meeting | 32 | 18 |
| No face-to-face meeting | 147 | 82 |
| Collaborative Activities | | |
| Exchange information with classmates | 76 | 42 |
| Analyze information or data with classmates | 52 | 29 |
| Create database with classmates | 7 | 4 |
| You and your classmates are grouped in teams | 18 | 10 |
| Have online-chat discussions with classmates | 51 | 28 |
| Have discussions with classmates by posting messages on the discussion boards | 93 | 51 |
| Solve problems with classmates | 24 | 13 |
| Have role-playing activities | 2 | 1 |
| Edit classmates' work | 18 | 10 |
| Write team paper(s) | 12 | 7 |
| Do research projects with classmates | 11 | 6 |

Table 4

Frequency Distribution of Course Experience and Reason for Taking it

| Variables | Frequency | Percent % |
|-------------------------------------|-----------|-----------|
| Online Course Experience | | |
| Took online courses before | 139 | 76 |
| Never took | 43 | 24 |
| Reason for taking the online course | | |
| Flexible schedule | 82 | 46 |
| Required | 64 | 36 |
| To experience | 15 | 8 |
| Less time-consuming | 9 | 5 |
| Easy | 7 | 4 |
| Not applicable | 2 | 1 |

Table 5

Frequency Distribution of Comfort Level of Tools, Frequency of Checking and Using

Internet

| Variables | Frequency | Percent % |
|------------------------------------------------|-----------|-----------|
| Comfort level of using the communication tools | | |
| Very comfortable | 123 | 68 |
| Comfortable | 44 | 24 |
| Neutral | 2 | 1 |
| Uncomfortable | 2 | 1 |
| Very uncomfortable | 10 | 6 |
| Frequency of checking e-mail | | |
| Three or more than three times a day | 92 | 51 |
| Once a day | 65 | 36 |
| Less than once a day | 25 | 14 |
| Frequency of navigating the Internet | | |
| More than 5 hours a day | 20 | 11 |
| 3~5 hours a day | 50 | 28 |
| 1~3 hours a day | 100 | 55 |
| Less than one hour a day | 12 | 7 |

Table 6 provides the learning style characteristics of the students. Based on the Kolb's Learning Style Inventory, the students were categorized into 4 learning styles; divergers, accommodators, convergers, and assimilators respectively accounted for 22%, 25%, 25%, and 28% of all participating students.

Table 6

Frequency Distribution of Learning Style of the Students

| Variables | Frequency | Percent |
|--------------|-----------|---------|
| Diverger | 40 | 22 |
| Accommodator | 46 | 25 |
| Converger | 45 | 25 |
| Assimilator | 51 | 28 |

The reliability of the use of Attitude Toward Interaction Scale in the current study with a Cronbach Alpha was 0.75. Internal consistency was calculated for each of the attitude components: instructional (0.66), affective (0.74), collaborative (0.85), and

vicarious (0.84) interactions. The reliability of the use of Course Satisfaction Survey with a Cronbach Alpha was 0.94. These coefficients indicate an acceptable level of reliability in the study for the various attitude components and course satisfaction.

QUANTITATIVE RESULTS

Research Question 1: What are students' attitudes toward the four types of interactions (instructional, affective, collaborative, and vicarious)?

In order to answer the research question, descriptive statistics were used to present the data gathered from the Attitude Toward Interaction Scale. Table 7 and Figure 1 show that students had the highest mean scores for instructional interaction ($M=4.09$, $SD=0.53$); the second highest for affective interaction ($M=3.66$, $SD=0.67$); the next highest for collaborative interaction ($M=3.25$, $SD=0.78$); and the least mean score for vicarious interaction ($M=2.74$, $SD=0.84$). All of the attitudes toward interaction, except the attitude toward vicarious interaction, were above the neutral level and indicated as positive attitude.

Table 7

Mean and Standard Deviation for the Four Types of Interactions

| Interaction | N | Mean | Standard Deviation |
|---------------|-----|------|--------------------|
| Instructional | 182 | 4.09 | .53 |
| Affective | 182 | 3.66 | .67 |
| Collaborative | 182 | 3.25 | .78 |
| Vicarious | 182 | 2.74 | .84 |

Codes: 5 (Strongly Agree), 4 (Agree), 3 (Neutral), 2 (Disagree), 1 (Strongly Disagree). See Appendix B for the items.

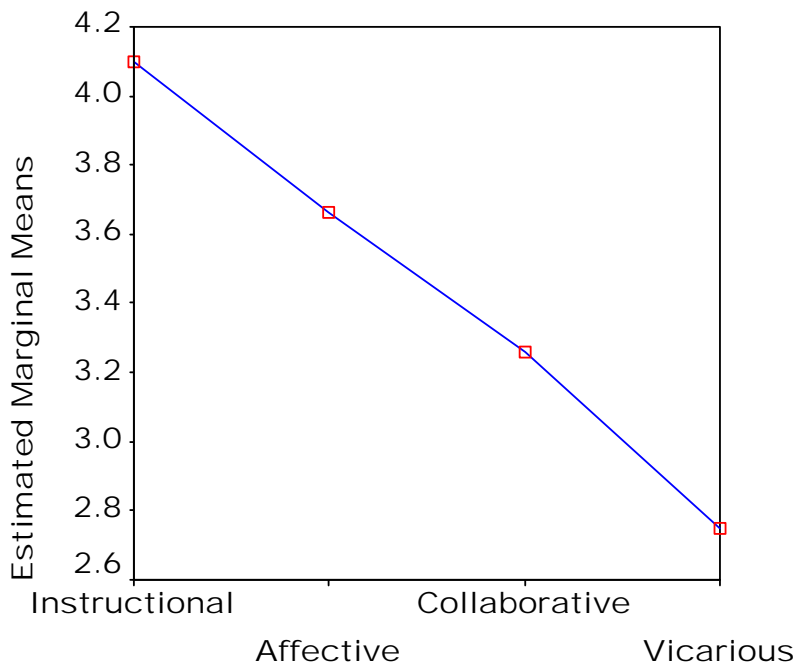


Figure 1. The Mean Scores of Attitudes toward the Four Types of Interactions

Research Question 2: Are there significant differences among students’ attitudes toward the four types of interactions (instructional, affective, collaborative, and vicarious)?

In order to answer the research question, the component analysis of differences between responses on the four types of interactions in the Attitude Toward Interaction Scale was calculated using a one-way repeated measures analysis of variance (ANOVA). The four attitudes were measured on the same students with a five-point Likert scale. The results for the one-way repeated measures ANOVA indicated a significant difference on the attitude among the four types of interactions, $F(3, 173)=189.83, p<.001$. Therefore, the hypothesis was affirmed; the students’ attitudes toward the four types of interactions were significantly different. Table 8 summarizes the results.

Table 8

Multivariate Tests among the Four Types of Interactions

| F | Hypothesis df | Error df | <i>p</i> | Partial Eta Squared |
|--------|---------------|----------|----------|---------------------|
| 189.83 | 3.000 | 173.000 | <.001 | .75 |

Because the ANOVA yielded a significant result, six pair-wise comparisons among affective, vicarious, collaborative, and instructional interactions were conducted to assess which means significantly differed from each other. The results of the analysis showed that all differences between the means for any two types of interactions were significant. In conclusion, the students had the most positive attitude toward instructional interaction, and then affective interaction and collaborative interactions. The students had the least positive (slightly negative) attitude toward vicarious interaction. Table 9 summarizes the results of the six pair-wise comparisons.

Table 9

Paired Samples Test for Four Types of Interactions

| Paired Differences | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | <i>t</i> | df | <i>p</i> |
|------------------------------------|-------|----------------|-----------------|-------------------------------------------|-------|----------|-----|----------|
| | | | | Lower | Upper | | | |
| | | | | Pair 1 Affective – Vicarious | .78 | | | |
| Pair 2 Affective – Collaborative | .34 | .63 | .046 | .25 | .43 | 7.26 | 181 | <.001 |
| Pair 3 Affective – Instructional | -.39 | .69 | .051 | -.49 | -.29 | -7.65 | 181 | <.001 |
| Pair 4 Vicarious – Collaborative | -.44 | 1.20 | .089 | -.61 | -.26 | -4.94 | 181 | <.001 |
| Pair 5 Vicarious – Instructional | -1.16 | .79 | .06 | -1.28 | -1.05 | -20.00 | 181 | <.001 |
| Pair 6 Collaborative-Instructional | -.73 | .89 | .07 | -.86 | -.60 | -10.97 | 181 | <.001 |

Research Question 3: Can learning styles predict students' attitudes toward the four types of interactions?

Four one-way analyses of variance (ANOVA) were used to evaluate the hypothesis that learning styles can predict students' attitudes toward the four types of interactions. The four ANOVAs were not significant for learning styles to predict students' attitudes toward the four types of interactions. $F(3, 178)=1.15, p=.33$ (instructional interaction), $F(3, 178)=1.08, p=.36$ (affective interaction), $F(3, 178)=1.61, p=.19$ (collaborative interaction), $F(3, 178)=0.29, p=.83$ (vicarious interaction), indicating the differences among the four learning styles for students' attitudes toward the four types of interactions were all non-significant. The hypothesis that learning styles can predict students' attitudes toward the four types of interactions was rejected. Table 10 summarizes the results.

Table 10

Analyses of Variance of Learning Styles and Attitudes toward the Four Types of

Interaction

| Interaction | Diverger | Accommodator | Converger | Assimilator | <i>F</i> | <i>p</i> |
|----------------------|----------|--------------|-----------|-------------|----------|----------|
| Instructional | | | | | | |
| Mean | 4.02 | 4.03 | 4.11 | 4.20 | 1.15 | .33 |
| SD | .64 | .54 | .44 | .49 | | |
| N | 40 | 46 | 45 | 51 | | |
| Affective | | | | | | |
| Mean | 3.81 | 3.59 | 3.58 | 3.67 | 1.08 | .36 |
| SD | .71 | .75 | .60 | .61 | | |
| N | 40 | 46 | 45 | 51 | | |
| Collaborative | | | | | | |
| Mean | 3.45 | 3.31 | 3.13 | 3.15 | 1.61 | .19 |
| SD | | | | | | |
| N | 40 | 46 | 45 | 51 | | |
| Vicarious | | | | | | |
| Mean | 2.66 | 2.68 | 2.77 | 2.80 | .29 | .83 |
| SD | .76 | .95 | .79 | .87 | | |
| N | 40 | 46 | 45 | 51 | | |

Research Question 4: Is there a relationship between students' attitudes toward the four types of interactions and course satisfaction?

To answer the research question, the Pearson Product-Moment Correlation was used to evaluate the hypothesis that there is a relationship between students' attitudes toward the four types of interactions (instructional, affective, collaborative, and vicarious) and course satisfaction. Table 11 shows the results of the correlations among students' attitudes toward four types of interactions and course satisfaction.

Table 11

Correlations among the Attitudes towards Interaction and Course Satisfaction

| Pearson Correlation | Instructional | Affective | Collaborative | Vicarious |
|------------------------|---------------|-----------|---------------|-----------|
| Course satisfaction | .30(**) | .29(**) | .21(**) | -.15(*) |
| Sig. (2-tailed) | <.001 | <.001 | .004 | .04 |

N = 182

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 11 indicates that the relationships between course satisfaction and the attitudes toward the four types of interactions were all significant beyond the .05 level. The highest correlations (positive) with course satisfaction were .30, resulting in a coefficient of determination (r squared) of .09, indicating that students' attitudes toward instructional interaction explained nine percent of the variance in course satisfaction. The lowest correlations (negative) with course satisfaction were -.15, resulting in a coefficient of determination (r squared) of .02, indicating that students' attitudes toward vicarious interaction explained two percent of the variance in course satisfaction.

The researcher examined where there was difference between the mean score of each item and the mean score of all 12 items together. The results indicated there was no significant difference between each mean score and the total mean score. Therefore, the researcher chose to collapse the 12 items together and calculated the mean scores of 12 items for each student to evaluate course satisfaction.

In conclusion, the statistical analysis revealed significant correlations between course satisfaction and students' attitudes toward affective, vicarious, collaborative, and instructional interactions at or beyond the .05 level. Hence, the hypotheses which stated students' attitudes toward interaction (instructional, affective, collaborative, and vicarious) were significantly correlated with course satisfaction, was affirmed.

Research Question 5: Can course satisfaction be predicted by students' attitudes toward the four types of interactions?

To answer the research question, a standard multiple regression analysis was conducted to distinguish whether course satisfaction can be predicted by students' attitudes toward interaction (instructional, affective, collaborative, and vicarious). A multiple regression equation was computed that included all four predictor variables simultaneously to determine the joint effect of these variables on course satisfaction.

The R-squared (R^2) value indicates how well a set of variables explains variation in the dependent variable. A strong model (high R^2) indicates a large percentage of variation in a dependent variable. The R^2 value for this dataset was .18. This indicated that 18% of the students' course satisfaction was explained by the independent variables of students' attitudes toward the four types of interactions. The statistical significance of the predication equation was analyzed by looking at the ANOVA table (Table 12). The data showed significance at the $p < .001$ level ($F=9.261$). The hypothesis that students' attitudes toward the four types of interactions can predict course satisfaction was affirmed.

Table 12

Analysis of Variance: Regression

| | Sum of Squares | df | Mean Square | <i>F</i> | <i>p</i> | R^2 |
|------------|----------------|-----|-------------|----------|----------|-------|
| Regression | 15.781 | 4 | 3.945 | 9.261 | < .001 | .18 |
| Residual | 72.847 | 171 | .426 | | | |
| Total | 88.628 | 175 | | | | |

a Predictors: (Constant), instructional, collaborative, vicarious, affective

b Dependent Variable: Course satisfaction

To further investigate the findings that showed significance, the Beta weights (standardized coefficients) were analyzed. The standardized Beta coefficients provide a measure of the contribution of each variable to the model (See Table 13). These values

represent the contribution of each independent variable to the dependent variable. The t and p values provide an indication of the impact of each attitude toward the interaction on course satisfaction. A large absolute t value and small p value suggests that a predictor variable is having a large impact on the criterion variable. The highest Beta weight was .41 (instructional), and was significant at the $p < .001$ level. The second highest Beta weight that was significant was -.14 (vicarious), and was significant at the $p < .05$ level. The alpha level determined a priori by the researcher to be used for significance was $p = .05$. Therefore, the variables (students' attitudes toward instructional and vicarious interactions) were regarded as contributing significantly to course satisfaction. The other two variables did not have significant Beta weights and therefore did not contribute to course satisfaction significantly.

Table 13

Multiple Regression Analysis: Coefficients

| | Unstandardized Coefficients | | Standardized Coefficients | t | p |
|---------------|-----------------------------|------------|---------------------------|-------|------------|
| | B | Std. Error | Beta | | |
| (Constant) | 2.06 | .46 | | 4.47 | <.001 |
| Instructional | .41 | .11 | .30 | 3.82 | <.001 (**) |
| Affective | .17 | .11 | .15 | 1.56 | .12 |
| Collaborative | .13 | .09 | .03 | .29 | .78 |
| Vicarious | -.14 | .06 | -.16 | -2.14 | .03(*) |

- a. Dependent Variable: Course satisfaction
- b. * Beta weight is significant at the 0.05 level.
- c. ** Beta weight is significant at the 0.001 level.

Additional findings:

Beyond the above hypotheses testing, a few variables relating to students' attitudes toward the four types of interactions were found to be significant. First of all, when the online courses were grouped into two groups, natural science vs. social science (business, liberal arts, and language courses), there was a significant attitude difference between

students from natural science and social science for affective and collaborative interaction, $t(179)=3.39, p<.01$ (affective interaction) and $t(179)=2.43, p<.05$ (collaborative interaction). Students taking social science courses had significantly more positive attitude toward affective and collaborative interactions. Table 14 displays the results of mean comparisons between disciplines.

Table 14

Mean and Standard Deviation for Students' Attitude toward Affective and Collaborative Interactions in Natural Science and Social Science

| | N | Mean | SD | <i>t</i> | <i>p</i> |
|-------------------------------------------|-----|------|-----|----------|----------|
| Attitude toward affective interaction | | | | | |
| Social Science | 155 | 3.72 | .63 | 3.39 | <.01 |
| Natural Science | 26 | 3.25 | .77 | | |
| Attitude toward collaborative interaction | | | | | |
| Social Science | 155 | 3.31 | .78 | 2.43 | <.05 |
| Natural Science | 26 | 2.91 | .72 | | |

Next, gender showed significant differences on students' attitude toward instructional interaction, $t(177)=3.43, p<.01$. Females had more positive attitude toward instructional interaction than males. Table 15 displays the results of mean comparisons between males and females.

Table 15

Mean and Standard Deviation for Attitude toward Instructional Interaction in Males and Females

| | N | Mean | SD | <i>t</i> | <i>p</i> |
|--------|-----|------|-----|----------|----------|
| Female | 141 | 4.16 | .51 | 3.43 | <.01 |
| Male | 38 | 3.84 | .54 | | |

Third, amount of online experience had significant differences on attitude toward instructional interaction, $t(180)=2.90, p<.01$. Students who had taken prior online courses had more positive attitude toward instructional interaction than those who never took an

online course. Table 16 displays the results of mean comparisons between students with and without online course experience.

Table 16

Mean and Standard Deviation for Attitude toward Instructional Interaction in Online

| Course Experience | | | | | |
|----------------------------|-----|------|-----|----------|----------|
| | N | Mean | SD | <i>t</i> | <i>p</i> |
| Took online courses before | 139 | 4.15 | .48 | 2.90 | <.01 |
| Never took online courses | 43 | 3.89 | .61 | | |

Fourth, students who felt comfortable or uncomfortable with the communication tools (i.e., e-mail) had significant differences on their attitude toward instructional interaction, $t(177)=2.78$, $p<.01$. Students who felt comfortable with the communication tools had more positive attitude toward instructional interaction than those who felt uncomfortable with the tools. Table 17 displays the results of mean comparisons between the students.

Table 17

Mean and Standard Deviation for Attitude toward Instructional Interaction in Comfort

| Level for Communication Tools | | | | | |
|-------------------------------|-----|------|-----|----------|----------|
| | N | Mean | SD | <i>t</i> | <i>p</i> |
| Feel comfortable | 167 | 4.12 | .47 | 2.78 | <.01 |
| Feel uncomfortable | 12 | 3.69 | .96 | | |

Finally, on-campus and off-campus students had significant differences in their attitude toward instructional interaction, $t(176)=2.27$, $p<.05$. Students who were off campus had more positive attitude toward instructional interaction than those who were on campus. Table 18 displays the results of mean comparisons between on-campus and off-campus students.

Table 18

Mean and Standard Deviation for Attitude toward Instructional Interaction in Location

| | N | Mean | SD | <i>t</i> | <i>p</i> |
|------------|-----|------|-----|----------|----------|
| Off-campus | 103 | 4.17 | .55 | 2.27 | <.05 |
| On-campus | 75 | 3.99 | .48 | | |

INTERVIEW RESULTS

All of the interviewed students lived in the city where the community college was located; four of them were on-campus students; five of them were off-campus students that took the course at a distance and did not go to campus regularly. Excluding the meetings for the orientation and testing, six students never had other face-to-face meetings in their classes throughout the whole semester; three students had one face-to-face meeting on campus. Most of them took online courses before the spring 2004 semester; only one student had not previously taken an online course.

Research Question 6: What are the needs of students in the online learning environment?

To answer the question, the data retrieved from the interviews showed that the basic dimensions of learner support matched with the types of interactions investigated in the quantitative study. The following section is the report of the data analysis based upon interviews addressing students' needs from each dimension (instructional, affective, collaborative, and vicarious interactions).

Instructional Interaction

Support from the instructor: Statements by students indicated that the students liked a prompt response from their instructor. "The only support I might have needed was from the instructor, which was prompt and helpful. The support I needed sometimes was

an immediate response, rather than wait two or even three days later.” Students were eager to know whether they were on the right track as reflected in the statements such as “I’d like the teacher responding to our posts, not only the students. It let us know if we were going in the right direction with our understanding of the text,” or “Sometimes it felt like we just talked to each other without knowing if we were on the right path that the instructor wanted us to work towards.” Moreover, students preferred the feedback from their instructor focusing on assignment and discussion forums as reflected in statements such as “Instructor’s feedback on at least the initial assignments would have helped just to make sure we were on the right track.” The discussion forums usually did not involve right or wrong answers, but if that is the case, the instructor input would be necessary to make sure everyone is on the same page and has understood the material. For example, one student stated, “I think an analysis of how I did on the assignment would be needed. It would help me to know how I did and what I could do better.”

The students also pointed out that the online instructor, in particular, needed to be consistent and organized. One stated, “I think that quizzes and tests need to be worded in the same format that the notes are given. You can't call apples "apples" and then call apples "pears" and expect a student to know that it is the same thing.” Another student also stated that the instructor’s ability to be descriptive about what the subject is was important, because, “If you are learning something new and the teacher is not right in front you, it is important for the instructor to know how to word things.” A few students mentioned the importance of the syllabus, and the instructor needs to follow the syllabus and the class schedule. The syllabus should be to the point. Besides, as one student mentioned, “A good syllabus with deadlines for assignments helped complete the course.”

One student further mentioned the instructor needed to set up expectations especially for the first assignment, which was reflected in statements such as “She was fair in grading and set the expectations and I knew what I needed to do at all times to keep up with the class and maintain an A for a grade,” and “For courses where conversation in the form of essays are required, I think the first assignment should be set up to help the student become familiar with the expectations of the instructor.”

Furthermore, some students emphasized detailed and straightforward instructions and examples of assignments would be of big help as mirrored in statements such as “I liked the instructor’s format so much. The keyword is STRAIGHTFORWARD. She spelled out everything that we needed to do, ” and “The only thing my instructor could have done to be a better teacher is when she actually gave out the assignments, no one could understand her instructions. She would have to go over them with us because we weren't really sure on what she was asking us to do.” One student also suggested the instructor should provide a good source of information, because it “helps discussions and understanding.”

Support from peers: Some students expected the peers who took the course before to provide help. As one stated, “Maybe a student who has taken the class could help or be available to answer questions when the instructor was not.”

Affective Interaction

The need for affective support was obviously indicated in a few interviews. As one student stated “I think many students need the kind of support from either friends or parents like I do. More people would stay in school, if they had supportive people around them.” Another student stated “I think positive reinforcement from the teacher would have helped motivate me more.” And some students mentioned they needed someone to

be there and reminded them to participate and to work to the best of their abilities. “I needed someone to tell me that I was doing a good job and interesting assignments really helped me. This form of support can help me to stay motivated.”

Support from instructors: Students indicated the active involvement of their instructors in the online class would have made their classes much better. A few students indicated their instructors were detached and uncaring, because they did not understand “any” situation and were not involved in class. And some instructors minimally participated, making the situation very mechanical or technical. Students emphasized they needed the feeling that it was a real class. One stated, “Instructors who participate and become at least somewhat involved make the online student stay on course because there is a sense that this is a real class and that the instructor on the other side is watching and is interested.”

For first-time online students, emotional support was emphasized as the most important thing. One stated “Once again, as a first time online student my English professor was instrumental in me staying the course, as she was supportive and made herself available, in addition her comments on our graded papers were extremely helpful. Second time around the support was not extremely necessary.”

An updated account on their progress in the class can encourage the learners as well. One student stated, “A couple of one-to-one responses to the assignments, encouraging the exploration of certain aspects or comments on the thoroughness of the work would make me feel motivated to learn,” and “Even though we didn't get one-to-one responses from the instructor, we were able to view our grades. That was enough to keep me going.” Students need to know how they are doing in the classes and they wanted to know what other people thought of their participation, which was indicated in statements such as “This is one of the most important kinds of support I expect to get in

the online class, because it is very tempting to drop.” Besides, one student stated the feedback on their "current" averages would be of some help. “There were times when I did not know what my grade was average-wise and it was a little discouraging. The grades are posted but it is just a bunch of numbers in some classes, the ones that grade on a 1-5 scale for example.”

One student mentioned the concern of not knowing if anybody read his/her message and the concern for exposing personal information in the virtual learning environment. One said, “Sometimes I wondered if anyone read my postings. How would I know? Did the class receive my thoughts or suggestions at all? Another concern I had was logging in using my social security number. I hated feeding my personal info into the computer.”

Support from peers: To make the learning experience better, students indicated they needed to know how other people were doing, because “I like the way all the students would share their thoughts/messages (etc.), and all the problems I had were shared by other students in all classes. This can help by easing my mind on what the teacher has assigned and even helping me do a better job.” Furthermore, they thought it was good when they got positive comments from their classmates, when their classmates answered the questions that they had, and when they really connected with other students and helped each other.

Collaborative Interaction

Among the interviewed students, only one student had group work in class. Most of the students were grouped in teams and they sometimes exchanged opinions with each other. They never made any decision as a group; it was more for the individual person to decide. They never conducted tasks together. As one stated, “We were expected in class

to make discussion postings on the bulletin board, but never really had any other form of interaction with other students. So there wasn't really any group work.”

The only student who did group work mentioned they needed the instructor to get the teammate responding to email and participating in discussions. The student stated, “Sometimes it was hard to get another classmate to reply to a posted message or an email and it got frustrating. Sometimes I needed to tell the instructor that a certain student was not participating and that it might affect my grade. That’s a pain!” On the other hand, the student further emphasized, when team members were cooperative, support was not necessary.

This student also indicated, “We got to know each other through our likes and dislikes of art, and that’s a unique way to know someone.” All their communication went in an asynchronous way. And “In this particular class we wrote essays and the following week our team members critiqued them. We basically corresponded by e-mail, not chatting or face to face.”

With regard to posting and responding to messages to the class, quality mattered to the students more than quantity. Besides, the quality of the posted messages needed to be monitored. As one student stated, “At times I thought a lot of the discussions were not worth a response because they did not consist of enough information or were too much opinion without facts.” Students also mentioned they were required to respond to at least two classmates per discussion, at times they struggled to find two discussions that they had something to say about, and they did not believe the activity benefited them. Even if some interaction happened in discussion forums, the effects were limited as reflected in the statement, “I did not get very involved with my classmates. I did interact with our classmates as best I could, but I might not have been very successful with it.” The students mentioned that most of the time they thought many of their answers were not

really targeted to what they thought they read in the text. “I did not feel support from them very much either,” one student commented.

Vicarious Interaction

Support for observers in the online learning environment: Students stated that they learned what everyone else thought, and learned to apply different observations to their own which can be reflected in the statement, “Well it was best if people were discussing things with one another and that happened a lot in my class.”

To facilitate the observations, the quality of the instructional design was indicated as most important. Students suggested there be scaffolding tools to support learning, such as summaries, handouts, study guides or power point presentations as reflected in statements such as “Maybe for the more difficult chapters provide a handout with easier examples,” or “I enjoyed having a study guide prior to the reading. It helped to know what parts to focus on for the test,” or “If I did not understand what I was reading or get the idea of the content then maybe a summary would be good or something like that,” or “In my economics class, we had Power Point presentations that went over the material and that really helped me understand the material.” One student further suggested some face-to-face meetings as necessary for the class when the majority students are having a difficult time. “To prevent dropping out of class, maybe a midterm gathering of the students is necessary. It would have been nice for the students to meet with the teacher at least once in the middle of the semester.”

With regard to cognitive transition, it was difficult for students to jump from knowledge comprehension to analysis, application, or even to synthesis and evaluation. One student stated, “To me, many of her discussion questions were based on “what if” situations and not based solidly from the textbook. I know the student must learn to think

independently from what they read in the text and to try to use the information in a real world situation, but students are just learning the information for the first time and are not necessarily ready to use the information in abstract ways.”

One student indicated flexibility was the main reason for him to take the online course, and the feature of flexibility should be applied to the choice of books. The student stated, “Give us a choice of books to read rather than tell us we had to read the list given. I didn't particularly like the selection of reading materials. Some were insightful others were extremely left wing liberalistic if you will.”

In addition, to be aware and conscious of their learning, when observing ongoing discussions on the bulletin board, students should know course objective and purposes; and those objectives need to be specific and concrete. As one student indicated, “It is very important in an online course to stress what we need to learn and why it's important, so we'd know why we need to do that.”

The interview results were summarized into key themes, which are included in Table 19.

Table 19

The support students needed in the online learning environment

| Learner Support | |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Instructional Interaction | <p>Instructors should:</p> <ol style="list-style-type: none"> 1. Provide prompt and specific feedback. 2. Provide updated progress report; ensure students they are on the right track. 3. Be involved in instruction. 4. Be consistent with wording. 5. Be organized with the syllabus and class schedule. 6. Be descriptive about what the subject content is; explain clearly. 7. Be straightforward with instruction. 8. Set up expectations (especially for the first assignment). 9. Provide good resources. <p>Peers should:</p> <ol style="list-style-type: none"> 10. Help answer questions. |
| Affective Interaction | <p>Instructors should:</p> <ol style="list-style-type: none"> 1. Be involved in class activities. 2. Provide updated progress reports; ensure students they are on the right track. 3. Motivate students: Remind deadlines and participation; be encouraging. 4. Prevent creating fear (i.e., require students to log in by their SSN). <p>From Peers:</p> <ol style="list-style-type: none"> 5. Share thoughts with peers. |
| Collaborative Interaction | <p>Instructors should:</p> <ol style="list-style-type: none"> 1. Support for getting teammate to participate. 2. Monitor the quality of postings. |
| Vicarious Interaction | <p>Course design should:</p> <ol style="list-style-type: none"> 1. Provide scaffoldings (i.e., summaries, handouts). 2. Provide at least one face-to-face meeting. 3. Provide appropriate cognition transition (i.e., based on Bloom's taxonomy). 4. Provide flexibility for choices of books. 5. Provide clear course objectives. |

Chapter 5: Discussion

AN OVERVIEW OF THE SIGNIFICANT FINDINGS

Constructivist and socio-constructivist perspectives have emphasized the importance of interaction in learning (Duffy & Cunningham, 1996; Vygotsky, 1962). In the online learning environment (especially in the frequently adopted learning management systems), online instructors and instructional designers should consciously integrate different types of interactions into their courses. The virtual learning environment should provide and generate appropriate interaction where students can work on authentic tasks. Learning must be effective and should be individualized. And finally, students should have sufficient learner support, get satisfaction from their courses, and then achieve optimal and meaningful learning. These considerations guided the investigation of interaction elements in this study.

This chapter discusses the findings around the specific research questions and connects the findings with the existing research studies. The findings that failed to support or only partially supported the author's hypotheses are examined. The implications of the study for professional practice or applied settings are indicated as well. The limitations of the study that may affect the validity or the generalizability of the results are discussed. Finally, recommendations for future research are presented. The details are as follows.

This study addressed the following questions:

1. What are students' attitudes toward the four types of interactions (instructional, affective, collaborative, and vicarious)?
2. Are there significant differences among students' attitudes toward the four types

of interactions?

3. Can learning styles predict students' attitudes toward the four types of interactions?
4. Is there a relationship between students' attitudes toward the four types of interactions and course satisfaction?
5. Can course satisfaction be predicted by students' attitudes towards the four types of interactions?
6. What are students' needs in the online learning environment?

Students' attitudes toward the four types of interactions

First, the results indicate students strongly agreed or agreed they liked instructional, affective and collaborative interactions, when they learned online. On the other hand, positive attitude was less strongly expressed for vicarious interaction. There were significant differences in students' attitudes toward the four types of interactions. This finding supports Sabry and Baldwin's (2003) findings that students indeed have different perceptions for different types of interactions. The finding of the researcher's study is also consistent with Jung, et al.'s study (2002) and Yarkin-Levin's (1991) study. Their studies also found differences on student perception of academic, social, and collaborative interactions in online courses.

Given the pair-wise comparisons, the researcher discovered the students' preferences for each type of interaction. The findings suggest that students prefer instructional interaction that is content-oriented and has instructional functions. The finding supports Sabry and Baldwin's (2003) study that the students have highest preferences for learner-information interaction. That is, when the interaction can provide the students specific feedback/ information on tasks, they have the most positive attitude toward it.

The students ranked affective interaction as the second preferred interaction. It indicates when the students learned online, in addition to the content-oriented feedback, students liked to have motivational and emotional support. It implies content and instruction were still considered by the students to be the most important elements in the learning process. Furthermore, collaborative interaction was ranked as the third preferred interaction. On the other hand, the analyses of interview data indicated some courses were integrated with varieties of individual and collaborative activities, and the instructors were responsive and involved in class all the time. Some courses were static, and the students read materials most of the time and did not have activities in class. That implies some students may have judged their attitudes toward collaborative interaction based on their limited experiences in collaboration in class. Therefore, this lower attitude toward collaborative interaction may be due to students' limited exposure to collaborative activities and ineffective design of collaborative activities.

Students had less agreement that they liked vicarious interaction when they learned online. This finding may imply that students did not like observing class, or they had expected to participate more in the online activities or discussions. It may also imply observations would be the "last" choice they would make. As Sutton (2001) suggested, not all learners like to participate in or can benefit from the vicarious interaction, and vicarious interaction will not achieve the same effects as direct interaction.

Learning styles and students' attitudes

After students were categorized into four groups of learning styles, it was indicated that students' with different learning styles did not significantly differ on their attitudes toward the four types of interactions. The attitude scores among learning styles were so similar that no effect on attitude was found. Unlike Kearsley's (1995) findings,

the current study found that learning styles does not predict students' attitudes toward interaction. The non-significant result may be due to the fact that all types of students have similar needs for interaction, regardless of whether the student is a diverger, an accommodator, a converger, or an assimilator. Whether the student learns from thinking or feeling, the student has the same needs for affective and cognitive interaction or support. Whether the students learns by doing, or watching or listening, the student expects some interaction through collaborative activities and expects some support through perceiving and observing online discussions.

The non-significant result may be also due to the fact that the sample size was not big enough to detect the difference. Furthermore, students with different learning styles were exposed to different levels of interaction and they experienced different types of interactions in their classes. That diversity issue may have confounded the prediction effect and may have caused learning styles to fail to predict students' attitudes toward the four types of interactions.

An alternative interpretation may be that there is no fixed learning style for each student in online learning environments. Learning styles tend to be defined and conceptualized differently, because students learn differently in different contexts and situations. A student's learning style is contextual and functional, which depends on how much effective support for learners and how many high-quality learning resources and materials the student is provided with in the online learning environment. Students may have adapted themselves to their learning contexts and developed their own ways to "survive" in the learning process. In a word, students may have developed different strategies or styles for different learning contexts. Therefore, there may be no existence of fixed learning styles, which may explain why the current study indicates there was no

difference of students' attitudes toward interaction, in terms of students with different learning styles.

Course satisfaction and students' attitudes

Fourth, the relationships between course satisfaction and students' attitudes toward the four types of interactions were all significantly correlated. The attitudes toward instructional ($r=.30$), affective ($r=.29$), and collaborative ($r=.21$) interactions had positive relationships with course satisfaction. The attitude toward vicarious interaction had negative relationships ($r=-.15$) with course satisfaction. It indicates that the more a student liked instructional, affective, collaborative interactions (when students chose to receive more instructional feedback, motivational or emotional support, or to participate in collaborative activities), the higher course satisfaction the student had. It also indicates that the more a student liked vicarious interaction (when a student chose to participate indirectly and did more observation), the lower course satisfaction the student had. The result corresponds with the findings of several studies (Friedel, 1990; Garrison, 1993; Liaw & Huang, 2000; Strachota, 2003; Zirkin & Sumler, 1995), which indicated interaction is related to students' course satisfaction.

Nevertheless, while the relationships between course satisfaction and students' attitudes toward collaborative interaction and vicarious interaction were significant, the relationships were weak. The weak relationships may be due to the various levels of interaction occurring in different classes and therefore resulting in the weak relationships. Students' attitudes toward instructional interaction had highest correlation ($r=.30$) with course satisfaction. The instructional attitude explained nine percent of variance in course satisfaction. The attitude toward affective, collaborative and vicarious interactions respectively explained eight, four and two percent of variance in course satisfaction,

which corresponded to the previous findings that students had different attitudes toward different types of interactions, and therefore those attitudes had different relationships to course satisfaction.

Fifth, students' attitudes toward the four types of interactions significantly predicted course satisfaction. The attitudes toward the four types of interactions explained 18% of the students' course satisfaction. The low level of prediction may be due to the confounding variables of course satisfaction (i.e., instructor personality, instructor's pedagogical values, the level of instructor involvement in discussions, student circumstances). Furthermore, students came with different expectations for the courses. For example, "Who is participating?" "What they expect to gain from the course" were all not taken into consideration. It was difficult to control all variables that contributed to course satisfaction. Therefore, the complication of course satisfaction may have contributed to the result of course satisfaction, and made the attitude toward the four types of interactions account for the small percentage of course satisfaction.

Among the four types of interactions, only students' attitudes toward instructional interaction (positive direction) and vicarious interaction (negative direction) significantly predicted course satisfaction. Unlike Jung, et al.'s (2002) findings, which indicated that the collaborative activities caused the highest level of satisfaction, the current study found that the students' attitude toward instructional interaction causes the highest level of satisfaction. The finding of the current study also corresponds with a recent study of Strachota's (2003), which compared the impact of learner-content, learner-learner, learner-instructor, and learner-technology interactions on online course satisfaction. The result of Strachota's showed learner-content interaction accounted for the highest level of course satisfaction. The instruction variable is the most important factor when it comes to student satisfaction in online courses (Bolliger & Martindale, 2004).

In the current study, the lack of significance of affective and collaborative interactions for predicting course satisfaction may be due to the fact that students experienced different levels of motivational support and collaborative activities, therefore the results did not demonstrate the effects. The findings of the lack of significance differ from the findings of Boverie, Nagel, McGee, and Garcia's (1998). In their study, social preference was a significant predictor of course satisfaction. The current study did not investigate "social preference." Because affective, social and collaborative interactions have some commonalities, the present study replaced social interaction with affective interaction, and investigated affective and collaborative interactions separately. In the current study, students' attitudes toward instructional and vicarious interactions can stand alone as an independent variable to predict course satisfaction. However, students' attitudes toward affective and collaborative interactions cannot stand alone as an independent variable to predict course satisfaction. The result may be due to the fact that students' attitudes toward affective and collaborative interactions were closely related but they were not measured as they were supposed to be measured, and finally the attitudes toward affective and collaborative interactions influenced each other, which resulted in the insignificance of the two variables (affective and collaborative interactions) to predict course satisfaction.

The current study indicates that students' attitude toward vicarious interaction can predict course satisfaction in an opposite direction. Unlike Fulford and Zhang's study that discovered when students' perceptions of interaction remained high through vicarious or anticipated interaction, the perceptions would promote course satisfaction, the current study indicates when a student observes rather than participates, the student is less satisfied with the course. The result of the current study suggests that when students participate more and directly (rather than just observing), they are more satisfied with

their courses. On the other hand, the finding of this study confirms that positive course satisfaction occurs when a student participates actively. This result corresponds with Kawachi's (2003) study. Kawachi conducted experimental studies on 56 Japanese students in two classes, and judged the quality of learning by an end-of-course academic assessment, and level and quality of participation in class. Kawachi's finding showed no evidence for vicarious interaction leading to improved quality of learning. Kawachi concluded that active participation is the essential factor in achieving learning.

Some students mentioned in the interviews that they were willing to participate in course activities. However, when they were uncertain of the instructors' expectation for assignments, or because they did not have an opinion to give, they would rather observe without participating in activities. In a word, students did observations when they were in an uncertain or uncontrolled situation. At that moment, when they felt uncertain, they tended to be dissatisfied with the course. It may be inferred that the more they observed in class (the more positive attitude toward vicarious interaction), the less they felt satisfied with their courses (less course satisfaction).

Students' needs in online learning environments

Finally, the assumptions in the quantitative studies can be linked with the interviews. The results of the analyses of interview data indicated the students' needs in the online learning environment. The analyses indicated that the dimensions of learners' needs correspond with the types of interactions (instructional, affective, collaborative, and vicarious interactivity), and the interviews indicated the reasons behind the quantitative results; namely, why students held the attitudes toward the four types of interactions. The details are as follows.

To meet learners' needs and provide the support, four types of interactions were found as essential units in the online learning environment. Instructional support was mentioned most frequently in interviews. The result corresponded with the quantitative result that students held the most positive attitudes toward instructional interaction (learners liked instructional feedback most), and students' attitude toward instructional interaction can significantly predict course satisfaction. In general, students expected prompt and specific feedback from their instructors. They expected experienced peers be an alternative to the instructor if the instructor was not available. Students wanted to know if they were on the right track. Students assumed instructor involvement in discussion forums would have improved the quality of online discussion. They thought if their instructors had been consistent and clear with words, organized, straightforward, and descriptive, confusion and frustration would have decreased.

The next frequently mentioned support was affective support, matching with the quantitative result that students held the second high attitude toward affective interaction (the second favored interaction). The students mentioned updated progress reports could have motivated them in class. They liked more active instructor involvement in discussions, because this involvement can provide the sense of a real class being there and they would feel less lonely. As Xiaoru (2002) suggested, "A continual presence of the instructors should be guaranteed throughout the learning process," (p.83). Furthermore, sharing positive and especially negative thoughts with peers could make them feel they were not the only ones who were suffering. Finally, some students mentioned logging into the class web site with a social security number made the participant feel uncomfortable. This fear that could have been avoided by using a different, and less socially loaded, student identification process.

Collaborative support was seldom mentioned. The main reason was due to the fact that few classes were integrated with collaborative activities. In the interviews, only one student acknowledged the existence of collaborative learning in class. The student emphasized when a teammate was not cooperative, there was nothing they can do. The student also suggested the online postings should have been moderated by the instructor for quality assurance.

Most of the students agreed they observed when they were not sure if their remarks were appropriate or when they had nothing to share with class. They all agreed if the discussion topics had been interesting or they had known what to say, they would prefer to participate in discussions. Considering the support for students to observe in the online learning environment, one can assert that most of the issues were related to course design. Use of scaffolding tools (i.e., summaries, handouts, PowerPoint presentations), at least one face-to-face meeting during the semester, reasonable cognitive transition (through Bloom's taxonomy), flexibility of choices of books, and clear course objectives were important issues related to learner support and course satisfaction.

Additional findings

There were also discoveries, not related to research questions, in this study, and further research is needed in these areas. Factors (disciplines, gender, online course experience, comfort levels of communication tools, and location) were found to significantly predict students' attitudes toward some types of interactions.

Discipline was found to be a predictor of students' attitudes toward affective and collaborative interactions. Students who took social science courses significantly expressed more fondness for the two types of interactions, than those who took natural science courses. For affective interaction, it may be due to the fact that when students

came to a social science class, they expected more human-touch from the course and expected to establish a human network with peers and/or the instructor. While students came to a natural science course, they may more focus on objects and facts, the factor of human touch may not be an issue for them to consider, which reflected their lower attitude toward affective interaction. The result of this study indicated students who took natural science courses did not like collaborative interaction as much as students who took social science courses. This result may be due to the fact that natural science students tend to be task-oriented and did not care about having collaboration or not. This result may also be due to the fact that the natural science students did not sufficiently experience collaborative learning in their online courses, and they may not understand the true meaning of collaborative learning. They may have misinterpreted collaborative learning as a type of learning, as simple group work. Therefore, the students were unable to accurately judge their attitude toward collaborative learning.

Gender and online course experience were found to be predictors of students' attitude toward instructional interaction. Females, or those who took online courses before, had more positive attitudes toward instructional interaction. These findings corresponded to other research studies. For example, Monson (2003) conducted a study with 265 undergraduate students, from different disciplines, at a university and found that gender and prior experience of online learning were related to student perceptions of importance of interaction. Some studies found females tended to have lower levels of self-efficacy for complex tasks across different computer applications than males (Murphy, Coover, & Owen, 1989; Torkzadeh & Koufteros, 1994). Those findings may explain why females in this study liked instructional interaction more than males, because female students may have had lower levels of self-efficacy for the virtual learning. As for the students with online course experience, they experienced online learning and they

may have known what they would need in class, so they liked instructional interaction more than those without online course experience. That may explain why online course experience was a predictor for students' attitude toward instructional interaction.

Students who felt comfortable with the online communication tools had more positive attitudes toward instructional interaction than those who felt uncomfortable with these tools. Perhaps when a student felt comfortable with the tools, the student was able to focus on learning and did not need to struggle with the tools. As a result, the students liked instructional interaction more than those who were still struggling with the online communication tools.

As Schuster, Collins, Hall, and Giffen (1999) stated, a learner's perception and expectation of a course's interaction may vary between on-site and off-site locations in online learning. This study indicated that the students who took the course at a distance, and did not go to campus regularly, had more positive attitude toward instructional interaction than the on-campus students. This finding may be due to the fact that those off-campus students had less accessibility to resources, and that they expected they would need more instruction. Therefore, they expressed the higher level of attitude toward instructional interaction.

IMPLICATIONS OF THE STUDY FOR PRACTICE

The implications of the findings surface a few indicators of effective instruction in online learning for professional practice or applied settings. First of all, instructional designers and instructors need to keep in mind that facilitating interaction is necessary for online learning, and integrating different types of interactions into online courses is essential. Although not all attitudes toward the types of interactions (only instructional and vicarious interactions can predict course satisfaction) were indicated as significant

predictors, the model with the four types of interactions all together can predict course satisfaction significantly. Those interested in online interaction may infer that in order to improve course satisfaction, one cannot afford to neglect any type of interaction.

Online educators can improve instructional interaction by enriching the course contents through organizing the learning materials, and by providing students with timely and specific feedback. Sufficient learner support and scaffolding tools should be available to learners at all times. To improve affective interaction and to develop students' positive emotions, instructors should provide encouragement and use strategies to motivate students; learners look forward to some human touch added to the virtual learning environment. When emotions are aroused, they are usually not turned off automatically. If someone has an emotional encounter, the person might not express it outwardly, but the feeling can last for some time. In that situation, it is impossible for the person to override his or her feelings and be receptive to learning (Weiss, 2000). Therefore, to help students learn effectively, it is important for instructors to help learners develop positive emotions.

Collaboration facilitates higher developmental levels in learners and involves critical social and motivational factors, which contribute to educational effectiveness at the cognitive and social levels (Harasim, 2002). One of the most promising approaches to improving learning and instruction that the modern information and communication technologies have brought to the educational sector is the computer supported collaborative learning (CSCL) (Lehtinen, Hakkarainen, Lipponen, Rahikainen, & Muukkonen, 1999). To improve collaborative interaction, CSCL can be integrated into online courses, and the instructors should put emphasis on process, rather than product, which will further engender the interactive learning (Salmon, 2000). Furthermore, the instructor needs to reward/encourage collaboration, and products can be developed within

the online community/ teams, instead of through individual work. Both process and product of collaboration need to be assessed to stimulate interaction and then to activate constructivist learning.

Active participation is essential to achieve learning (Kawachi, 2003). Although not all students can benefit from vicarious interaction, doing observations in online discussion is most appropriate for students who are apprehensive about interacting directly (Sutton, 2001). If vicarious interaction can be recognized and actively pursued by the instructor, the online learning environment will provide more choices for students, and most of the achievement and satisfaction benefits may be equally experienced by the different types of students.

Furthermore, the finding of this study indicated that students' attitudes toward instructional, affective, and collaborative interactions were related with their course satisfaction. At some universities, students have been discontented with online course initiatives (Jaffee, 1998), and the dropout rates are still high in online courses (Cohen & Ellis, 2003). Although students' course satisfaction is not correlated with actual student achievement (Moore & Kearsley, 1996), if students are satisfied with their online courses, they will be more motivated to learn. After all, motivation is a predictor factor of student success (Bolliger & Martindale, 2004). From that point of view, course satisfaction will be reason enough to be concerned about achieving effective learning, and variables related to course satisfaction should be an issue to consider for effective teaching.

LIMITATIONS OF THE STUDY

There are a few limitations of this study. First, subject effects were a possible threat to the internal validity. The study was restricted to the adult students enrolled in

online courses offered at a community college during one semester, and the study was limited to the use of self-reporting data. Findings of this study were based on the assumption that the students responded honestly and interpreted the instruments as intended. Furthermore, while almost 80% of the students were females, what the study generalized might have been a better representative for females than males. Another possible threat to internal validity was whether those students who did not participate or who dropped the course were not different from those who did participate in the study; that limited the generalization of the study.

There was data “noisiness” coming from the differences of students’ experience, regarding the types and the intensity of interaction they experienced in their online courses. It may not be legitimate to generalize the state of students’ attitudes toward interaction, especially toward affective and collaborative interactions. Some courses were dynamic and integrated with various learning activities; some courses contained read-only materials. Furthermore, the degree of the instructors’ involvement in class varied. Students’ attitude toward the four types of interaction would have depended on how much of each type of interaction was present in each class. All made evaluation of students’ attitudes more difficult.

With regard to course satisfaction, because of the lack of valid measurement of students’ attitudes toward affective and collaborative interaction, the two variables (affective and collaborative interactions) cannot represent stand-alone predictors to predict course satisfaction in the current study. Another limitation of this study was the inability to analyze satisfaction within individual courses. All online courses could not be reviewed for quality content by the researcher. Discussion boards could not be evaluated for quality discussion by the researcher. Simply having discussion boards does not equate to richness of discussion and depth of problem solving or critical thinking. Lack of that

inquiry made this study of course satisfaction imperfect, and therefore the researcher was unable to precisely map the variety of interactions for a satisfying online learning environment in order to adapt and customize interactions for any given student.

RECOMMENDATIONS FOR FUTURE RESEARCH

This study is exploratory, since there are limited empirical studies available for direct support. Future studies should replicate by using a different population and by controlling more variables. An interesting avenue for future research is to determine the degree to which a student needs the four types of interactions in online courses. The main feature the online learning environment differs is the amount of interaction students receive during the learning process. Each type of interaction representing one continuum has two opposite ends, in response to the issue of individualized learning environments. The urgent call is not only to find out what combination of interaction is the most effective learning environment for general students but also to find out what combination of interaction is the most effective for what types of students in their learning context. Therefore, future research should include a larger sample with varying levels and types of interactions integrated in class. The data could include a rating of the level of interaction within the course to investigate the effects of the interaction levels on students.

Because the students in the study were not exposed to the collaborative interaction to a significant level, future research needs to investigate students' preference on collaborative interaction in the population with sufficient collaborative activities integrated in their classes. With regard to vicarious interaction, since it is better suited for limited students, future research should investigate in which type of learning context, for what type of learning task, and what type of student will favor vicarious interaction. The issue of how students can benefit through vicarious interaction, should be investigated as

well. Recognizing the difficulty of observing vicarious interaction, one may use the features of course management systems to track students' reading of messages, and require students to write journals for the instructor in order to monitor the learning process.

Both affective and collaborative interactions have affective components, and they are so closely related with each other that one may have difficulty conceptually measuring students' attitudes toward them separately. Future study is recommended to study affective, social and collaborative interactions together in order to examine their commonalities and differences, and to create the survey items, which can validly measure students' attitudes toward the types of interactions. Afterwards, it is suggested to replicate the study in order to investigate the relationship between course satisfaction and students' attitudes toward the four types of interactions.

Finally, future research should determine if the Attitude toward Interaction Scale is valid with other populations. Kolb's Learning Style Inventory, based on information processing theories, may not be an appropriate measurement to distinguish students' attitudes toward the four types of interactions. Future research may use other learning style instruments to distinguish whether the use of a different learning style instrument will produce similar findings. Or, one may accept the non-existence of learning styles in online learning environments, and create a preference instrument to replicate the study.

CONCLUSION

The results of this study indicated that instructional, affective, collaborative, and vicarious interactions had different effects on students' attitudes. Students liked instructional interaction most and liked vicarious interaction least. Learning styles were found as not being able to predict students' attitude toward interaction, but it was found

that attitudes toward the four types of interactions were all related with course satisfaction. Students' attitudes toward the four types of interactions all together can predict course satisfaction; especially, the students' attitudes toward instructional and vicarious interactions, can significantly predict course satisfaction. The interviews further indicated that the basic dimensions of learner support corresponded with the types of interactions (instructional, affective, collaborative, and vicarious), and the interviews explored the reasons why the students held the attitude toward the interaction.

As Kearsley (1995) indicated, interaction is a complex variable with many different facets. Interaction is a multi-dimensional concept where each dimension (type) is embedded within each other. This study contributed to fields of practice by exploring students' attitudes toward interaction from different dimensions (instructional, affective, collaborative, and vicarious). The dimensions of interaction can be considered for future study to construct a framework to build an optimal online learning environment and to foster online learning effectiveness. Cutting and pasting lecture notes and learning materials to the Web site does not make an online course. A common complaint made by students in the online learning environment is they feel disconnected (Hill, 1996). Students need to be connected and need communication and interaction in the learning process; otherwise a student will be only a receiver of information that tends to result in passive learning (Moller, 1998). While educational researchers have been opposing passive learning and advocating active and meaningful learning, online courses must feature ongoing and substantive interaction among instructors and students with well-organized and collected learning materials and with motivational strategies through collaboration and the modern technologies. Then, real and meaningful thinking will arise and possibly equip students with the critical thinking skills for preparation of present and future careers (Jonassen & Reeves, 1996).

Appendix A: Kolb Learning Style Inventory

Please remember to leave your email address:

The Learning Style Inventory describes the way you learn and how you deal with ideas and day-to-day situations in your life. Below are 12 sentences with a choice of endings. Rank the endings for each sentence according to how well you think each one fits with how you would go about learning something. Try to recall some recent situations where you had to learn something new, perhaps in your job or at school. Then, using the spaces provided, rank a "4" for the sentence ending that describes how you learn best, down to a "1" for the sentence ending that seems least like the way you learn. Be sure to rank all the endings for each sentence unit. Please do not make ties.

Example of completed sentence set:

When I learn: (2) I am happy. (1) I am fast. (3) I am logical. (4) I am careful.

- | | | | | |
|------------------------|--------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------|
| 1. When I learn: | <input type="checkbox"/> I am happy. | <input type="checkbox"/> I am fast. | <input type="checkbox"/> I am logical. | <input type="checkbox"/> I am careful. |
| 2. I learn best when: | <input type="checkbox"/> I listen and watch carefully. | <input type="checkbox"/> I rely on logical thinking. | <input type="checkbox"/> I trust my hunches and feelings. | <input type="checkbox"/> I work hard to get things done. |
| 3. When I am learning: | <input type="checkbox"/> I tend to reason things out. | <input type="checkbox"/> I am reasonable about things. | <input type="checkbox"/> I am quiet and reserved. | <input type="checkbox"/> I have strong feelings and reactions. |
| 4. I learn by: | <input type="checkbox"/> feeling. | <input type="checkbox"/> doing. | <input type="checkbox"/> watching. | <input type="checkbox"/> thinking. |
| 5. When I learn: | <input type="checkbox"/> I am open to new experiences. | <input type="checkbox"/> I look at all sides of issues. | <input type="checkbox"/> I like to analyze things, break them down into their parts. | <input type="checkbox"/> I like to try things out. |
| 6. When I am learning: | <input type="checkbox"/> I am an observing person. | <input type="checkbox"/> I am an active person. | <input type="checkbox"/> I am an intuitive person. | <input type="checkbox"/> I am a logical person. |

7. I learn best from: observation. personal relationships. rational theories. a chance to try out and practice.

8. When I learn: I like to see results from my work. I like ideas and theories. I take my time before acting. I feel personally involved in things.

9. I learn best when: I rely on my observations. I rely on my feelings. I can try things out for myself. I rely on my ideas.

10. When I am learning: I am a reserved person. I am an accepting person. I am a responsible person. I am a rational person.

11. When I learn: I get involved. I like to observe. I evaluate things. I like to be active.

12. I learn best when: I analyze ideas. I am receptive and open-minded. I am careful. I am practical.



Appendix B: Attitude toward Interaction Scale

If you are taking more than one online course, please consider your experiences in one of the online courses when answering the following questions.

Which online course are you answering for:

Please choose your course

Please click the choice(s) if your course has the activity/activities related to collaboration with classmates:

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Exchange information with classmates <input type="checkbox"/> Create database with classmates <input type="checkbox"/> Have online-chat discussions with classmates <input type="checkbox"/> Solve problems with classmates <input type="checkbox"/> Edit classmates' work <input type="checkbox"/> Do research projects with classmates <input type="checkbox"/> Others. Please specify: <input style="width: 300px;" type="text"/> | <input type="checkbox"/> Analyze information or data with classmates <input type="checkbox"/> You and your classmates are grouped in teams <input type="checkbox"/> Have discussions with classmates by posting messages on the discussion boards <input type="checkbox"/> Have role-playing activities <input type="checkbox"/> Write team paper(s) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Except the orientation, how many times of the face-to-face meeting will happen during the whole semester?

Your primary reason for taking this online course:

- | | | | | |
|------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------------------|
| <input type="radio"/> It is a required course. | <input type="radio"/> It fits into my schedule. | <input type="radio"/> I want to experience online learning. | <input type="radio"/> I thought online learning is easier. | <input type="radio"/> I thought online learning is less time consuming. |
|------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------------------|

On the 5 point scale below, rate the degree to which you like the choices shown. Select the number "1" if you strongly disagree with the choice and the number "5" if you strongly agree with that choice. Use the numbers 2 to 4 to indicate intermediate degrees of the agreement.

1. When I learn online:

| | | | | |
|--------------------------|-----------------|----------------|--------------|-----------------------|
| Strongly Disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly Agree (5) |
|--------------------------|-----------------|----------------|--------------|-----------------------|

I like to deal with my feelings and emotions.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

I like to spend time reading instead of posting messages in the online discussions.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

I like to collaborate with my classmates.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

I like to learn by reading the course materials.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

2. I learn online BEST when:

| | | | | |
|-----------------------|--------------|-------------|-----------|--------------------|
| Strongly Disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly Agree (5) |
|-----------------------|--------------|-------------|-----------|--------------------|

I have emotional support in the learning environment.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

I read instead of posting messages in the discussion forums.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

I have companions to work with.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

I have self-assessment activities (e.g., practices, exercises, or reviews) in the learning process.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

3. When I am learning online:

| | | | | |
|-----------------------|--------------|-------------|-----------|--------------------|
| Strongly Disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly Agree (5) |
|-----------------------|--------------|-------------|-----------|--------------------|

I like to feel a sense of community in the learning environment.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

I am hesitant to post my message in the discussion forums.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

I like to discuss and solve problems with my classmates.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

I like to have the feedback that can help me understand the content.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

4. To meet my learning expectations, I like to:

| | | | | |
|-----------------------|--------------|-------------|-----------|--------------------|
| Strongly Disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly Agree (5) |
|-----------------------|--------------|-------------|-----------|--------------------|

Have emotional support from class.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

Read instead of posting messages in the discussion forums.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

Collaborate with my classmates.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

Have appropriate and organized information to learn the content.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

5. To get satisfied with the online course, I like to:

| | | | | |
|--------------------------------------|-------------------------|------------------------|----------------------|-------------------------------|
| Strongly Disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly Agree (5) |
|--------------------------------------|-------------------------|------------------------|----------------------|-------------------------------|

Feel a sense of belonging to the class.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

Read instead of posting messages in the discussion forums.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

Collaborate with my classmates.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

Have instructional or intellectual feedback from the instructor or more competent peers.

| | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|

General Information about You

Gender: Male

Female

Age:

Status: On-campus student

Off-campus student (who takes the course at a distance and doesn't come to campus regularly)

In which city do you live?

What is your native language?

Comfort level of use of online communication tools (e.g., email, online chat, discussion board):

| | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Very Uncomfortable | Uncomfortable | Neutral | Comfortable | Very Comfortable |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Frequency of checking email at work, home, and/or school:

| | | | | |
|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| More than 5 times a day | 3~5 times a day | 3 times a day | Once a day | Less than Once a day |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Hours spent on Internet on average per day:

| | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Greater than 7 hour | 5~7 hours | 3~5 hours | 1~3 hours | Less than 1 hour |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Did you take online course(s) before this semester? Yes No

Are you willing to participate in interviews (by online chats or phone)? Yes No

Please remember to leave your email address. Thank you!

Appendix C: Online Course Satisfaction Survey

Your email address:

Rate the degree to which you agree with the choices shown.

| | Strongly Disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly Agree (5) |
|-----------------------------------------------------------------------------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| 1. I am satisfied with the interaction with the instructor. | | | | | |
| | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
| 2. I am satisfied with the interaction with my classmates. | | | | | |
| | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
| 3. I am satisfied with the course activities. | | | | | |
| | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
| 4. I am satisfied with the technologies being used (e.g., web site, video and/or audio materials). | | | | | |
| | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
| 5. I am satisfied with the intellectual support being provided. | | | | | |
| | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
| 6. I am satisfied with the emotional or motivation support being provided. | | | | | |
| | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
| | Strongly Disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly Agree (5) |
| 7. I am satisfied with the technical support being provided. | | | | | |
| | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
| 8. Overall, this online course effectively presented the subject matter. | | | | | |
| | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
| 9. Overall, I am satisfied with this course. | | | | | |
| | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
| 10. I would like to take an online course again in the future. | | | | | |
| | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
| 11. If I had a choice, I would choose an online course over face-to-face instruction. | | | | | |
| | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |
| 12. I have a positive attitude toward online learning. | | | | | |
| | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 |

Appendix D: Interview Questions

1. What support did you need when completing your assignments? Why do you think the support can help you?
2. What support did you need when collaborating with the virtual classmates? Why do you think the support can help you?
3. What support did you need when you read the learning materials? Why do you think the support can help you?
4. What support did you need to stay and not drop out of the class? Why do you think the support can help you?
5. What support did you need when participating in the discussion forums? Why do you think the support can help you?

Appendix E: Consent Form

You are invited to participate in a doctoral dissertation study. My name is Yung-Wei Hao and I am a doctoral student in Instructional Technology in the Department of Curriculum and Instruction at The University of Texas at Austin. I'd like to explore your attitudes toward interactivity in your online course. You are being asked to participate in the study because you are taking the online course(s) in Northwest Vista Community College in Spring 2004.

You will participate in three-time interviews through e-mail, on-line chat, telephone, and/or face-to-face meeting at your convenience. Each interview will take less than one hour. The interview questions will be about your attitude toward interactivity in your online course. The research results will be posted on the web site <http://teachnet.edb.utexas.edu/~hao/dissertation.html> by August 2004. You can benefit from the result whether your attitude toward interactivity and your learning style can influence your course satisfaction. The research will impose a minimal risk of loss of the confidentiality of your scores on the survey questionnaires. I will avoid the confidentiality problem by using anonymous names or numbers to represent the participants. Otherwise, there is no potential risk involved.

Any information that is obtained in connection with this study and that can be identified with you, will remain confidential and will be disclosed only with your permission. Your responses will be aggregated, and your responses will not be linked to your name in any written or verbal report of this research study.

Your decision to participate or not to participate will not affect your present or future relationship with Northwest Vista Community College. Your course grade will not be influenced by whether you participate in the research study or not.

If you have any questions about the study, please e-mail me (hao@mail.utexas.edu) or call me at 1-512-479-6962. Or you may call my dissertation supervisor, Professor Min Liu at 1-512-471-5211. If you have any questions or concerns about your treatment as a research participant in this study, call Professor Clarke Burnham, Chair of the University of Texas at Austin Institutional Review Board for the Protection of Human Research Participants at 232-4383.

You will be given a copy of this consent form for your records.

You are making a decision whether or not to participate. Your signature below indicates that you have read the information provided above and have decided to participate in the study. If you later decide that you do not want to participate in the study, simply tell me. You may discontinue your participation in this study at any time.

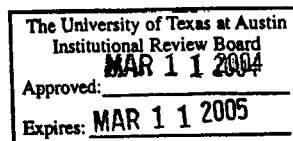
Printed Name of Participant

Signature of Participant

Date

Signature of Investigator

Date



Appendix F: E-mail Recruitment

You are invited to participate in a doctoral dissertation study. My name is Yung-Wei Hao and I am a doctoral student in Instructional Technology in the Department of Curriculum and Instruction at The University of Texas at Austin. I'd like to explore your attitudes toward interactivity in your online course. You are being asked to participate in the study because you are taking the online course(s) in Northwest Vista Community College in Spring 2004.

You can decide not to participate in this dissertation study. If you decide to participate, please go to <http://uts.cc.utexas.edu/~hao/attitude.htm> and fill out the three survey questionnaires. I will collect your scores on the questionnaires, find out your attitude toward interactivity, your learning styles and your course satisfaction level, and will do statistical analysis to determine whether your attitude and learning styles have relationships with your course satisfaction level. The research result will be posted on the web site <http://teachnet.edb.utexas.edu/~hao/dissertation.html> by August 2004. You can benefit from the result whether your attitude toward interactivity and your learning style can influence your course satisfaction. The research will impose a minimal risk of loss of the confidentiality of your scores on the survey questionnaires. I will avoid the confidentiality problem by using anonymous names or numbers to represent the participants. Otherwise, there is no risk.

Any information that is obtained in connection with this study and that can be identified with you, will remain confidential and will be disclosed only with your permission. Your responses will be aggregated, and your responses will not be linked to your name in any written or verbal report of this research study.

Your decision to participate or not to participate will not affect your present or future relationship with Northwest Vista Community College. Your course grade will not be influenced by whether you participate in the research study or not.

If you have any questions about the study, please e-mail me (hao@mail.utexas.edu) or call me at 1-512-479-6962. Or you may call my dissertation supervisor, Professor Min Liu at 1-512-471-5211. If you have any questions or concerns about your treatment as a research participant in this study, call Professor Clarke Burnham, Chair of the University of Texas at Austin Institutional Review Board for the Protection of Human Research Participants at 1-512-232-4383.

You are making a decision whether or not to participate. Your participation in the part of the questionnaires will be considered consent. Your participation indicates that you have read the information provided above and have decided to participate in the study. If you later decide that you do not want to participate in the study, simply tell me. You may discontinue your participation in this study at any time.

If you decide to participate, please go to <http://uts.cc.utexas.edu/~hao/attitude.htm> and fill out the three survey questionnaires. Thank you very much for participation in the study.

Best Regards,
Yung-Wei Hao

PhD student
Department of Curriculum and Instruction
The university of Texas at Austin

Appendix G: Conditional Use Agreement

For good and valuable consideration, the receipt and legal sufficiency of which are hereby acknowledged, I hereby agree that the permission granted to me by the Hay Group ("Hay") to receive and utilize, without charge, the Kolb Learning Style Inventory ("LSI") is subject to the following conditions, all of which I hereby accept and acknowledge:

1. I will utilize the LSI for research purposes only and not for commercial gain.
2. The LSI, and all derivatives thereof, is and shall remain the exclusive property of Hay; Hay shall own all right, title and interest, including, without limitation, the copyright, in and to the LSI.
3. I will not modify or create works derivative of the LSI or permit others to do so. I will however, create an online version of the LSI for data collection purposes only. This online version will be password protected and only accessible to the sample population. Once data has been collected this online version will be destroyed.
4. I will provide Hay with a copy of any research findings arising out of my use of the LSI and will cite Hay in any of my publications relating thereto.
5. Hay will have no obligation to provide me with any scoring services for my use of the LSI other than the Algorithm used to score results.
6. Hay will not be deemed to have made any representation or warranty, express or implied, in connection with the LSI, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.
7. My rights under this Agreement are non-transferable and non-exclusive and will be limited to a period of two (2) years from the date of this Agreement.
8. Hay may immediately terminate this Agreement by giving written notice to me in the event I breach any of this Agreement's terms or conditions.
9. This Agreement will be construed in accordance with the laws of Massachusetts without recourse to its conflict of laws principles.
10. This Agreement may not be assigned by me without the prior written consent of Hay.
11. Failure by Hay to enforce any provisions of this Agreement will not be deemed a waiver of such provision, or any subsequent violation of the Agreement by me.

12. This is the entire agreement with Hay pertaining to my receipt and use of the LSI, and only a written amendment signed by an authorized representative of Hay can modify this Agreement.

Agreed and understood:

Signature

Yung-Wei Hao
Print Name

2/4/2004
Date

Glossary

The following are key terms used throughout this study and their operational definitions within the context of this investigation.

Asynchronous: Asynchronous online learning happens when communication between people does not occur simultaneously. Some examples of asynchronous online learning include taking a self-paced course, exchanging e-mail messages with a mentor, and posting messages to a discussion group.

Synchronous: Synchronous, or live online learning, means that communication occurs at the same time between individuals and information is accessed instantly. Examples of synchronous online learning include real-time chat, and video/audio conferencing.

Computer-mediated communication (CMC): the communication that is exchanged over a computer network. Here, the Internet provides the platform and a computer conferencing system software provides the structure and tools.

Online learning community: the term used to describe the group of students on a particular online learning network.

Online learning environment: a distinct, pedagogically meaningful and comprehensive learning environment by which learners and faculty can participate in the learning and instructional process at any time and any place.

Interaction: an attribute of instruction; used in the context of general instruction.

Interactivity: an attribute of contemporary instructional systems, particularly those that use telecommunications technologies.

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Vita

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