INTERACTION AS A PREDICTOR OF STUDENTS’ SATISFACTION AND
STUDENTS’ GRADES IN DISTANCE EDUCATION

A dissertation presented to
the faculty of
the College of Education of Ohio University

In partial fulfillment
of the requirements for the degree
Doctor of Philosophy

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June 2007
This dissertation titled
INTERACTION AS A PREDICTOR OF STUDENTS’ SATISFACTION AND
STUDENTS’ GRADES IN DISTANCE EDUCATION

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Abstract

ABDEL-MAKSOUD, NAHED F., Ph.D., June 2007, Instructional Technology

INTERACTION AS A PREDICTOR OF STUDENTS’ SATISFACTION AND

STUDENTS’ GRADES IN DISTANCE EDUCATION (158 pp.)

Director of Dissertation: Sandra V. Turner

This study examined the relationship between students’ perceptions of interaction, gender, age and students’ satisfaction with course and students’ grades. The data were collected using a Web-based survey from 65 students enrolled in an online humanities course in a Midwestern community college. Multiple regression analysis was used to analyze data. Results indicated that neither perceived personal interaction (participation) nor age accounted for a significant amount of variation in the dependent variable, satisfaction with the course. The most important predictor of students’ satisfaction was perceptions of overall interaction, followed by gender. The regression model with the two predictors was significant. Male students who perceived the overall interaction in the course to be high were more satisfied with the course.

No significant correlations were found between perceptions of interaction and course grades. Gender and age were not significantly correlated with course grades. The regression model with four predictors, perceptions of personal and overall interaction, gender, and age, was not significant.

The key predictor of students’ satisfaction with the course was not the extent to which students participated in the interaction that was occurring in the course, but rather their perception that there was much interaction in the course. This relationship between perceived overall class interaction and course satisfaction serves as an indicator of
“vicarious learning,” or learning that takes place when a student actively observes and benefits from interaction among the other students, or between students and the instructor. Students who would not initiate interaction on their own can still learn from observing class interactions.

Approved: _____________________________________________________________

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Acknowledgements

I would like to thank Dr. Sandra Turner, my advisor and dissertation chair, for her guidance and support throughout this process. I’m especially grateful to her for listening, encouraging, and editing. I could not have asked for a more outstanding mentor during this process. Dr. Turner, working with you has really enriched me in many ways.

I also wish to thank all my committee members for their time and patience with this project. I could not have done this without their help and guidance. I would like to thank Dr. George Johanson who provided a great deal of insight and advice not only with statistics and data analysis, but with the dissertation process as well. I am grateful for all that he helped me to learn.

Sincere appreciation is expressed to Dr. Marjorie DeWert, who has been extremely supportive and who has served as a mentor, confidant, friend and committee member. I would also like to say thank you to Dr. Greg Kessler, for his time and help during this study. And finally, I wish to acknowledge and give special thanks to the instructor who let me implement my study on his class, and to the students who participated in this study. Without their support, this study would not have been possible.
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>iii</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>v</td>
</tr>
<tr>
<td>List of Tables</td>
<td>x</td>
</tr>
<tr>
<td>List of Figures</td>
<td>xii</td>
</tr>
<tr>
<td>Chapter 1</td>
<td>1</td>
</tr>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Interaction</td>
<td>2</td>
</tr>
<tr>
<td>Background of the Study</td>
<td>5</td>
</tr>
<tr>
<td>Fulford and Zhang’s Study</td>
<td>6</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>8</td>
</tr>
<tr>
<td>Research Questions</td>
<td>9</td>
</tr>
<tr>
<td>Significance of the Study</td>
<td>9</td>
</tr>
<tr>
<td>Delimitations of the Study</td>
<td>10</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>11</td>
</tr>
<tr>
<td>Overview and Organization of the Study</td>
<td>12</td>
</tr>
<tr>
<td>CHAPTER 2</td>
<td>13</td>
</tr>
<tr>
<td>Literature Review</td>
<td>13</td>
</tr>
<tr>
<td>The Need for Interaction in Online Classes</td>
<td>14</td>
</tr>
<tr>
<td>Defining Interaction</td>
<td>16</td>
</tr>
<tr>
<td>The Importance of Interaction</td>
<td>18</td>
</tr>
</tbody>
</table>
Data Analysis .............................................................................................................. 48
Instrument Development ............................................................................................. 50
Fulford and Zhang’s (1993) Survey ........................................................................ 50
The Interaction Survey (Sherry, Fulford, & Zhang, 1998) ......................................... 51
The Pilot Study ............................................................................................................ 51
The Final Instrument .................................................................................................. 54
The Validity of the Scale .............................................................................................. 55
Sample Size Determination ....................................................................................... 55
Context of the Study .................................................................................................... 56
Research Procedures ................................................................................................ 58
Summary ..................................................................................................................... 59
CHAPTER 4 ..................................................................................................................... 61
Data Analysis ............................................................................................................. 61
The Reliability of the Scale ......................................................................................... 61
Participants’ Demographic Data ............................................................................... 62
Checking the Regression Assumptions ..................................................................... 63
Missing Data .............................................................................................................. 64
The Assumptions of Normality, Linearity, and Homoscedasticity ......................... 64
Outliers and Influential Points .................................................................................. 70
Multicollinearity ....................................................................................................... 72
Multiple Regression Analysis: Research Question 1 ............................................... 74
Multiple Regression Analysis: Research Question 2 ............................................... 80
Exploring the Role of Engagement in Learning ...................................................... 83
List of Tables

Table 1: Correlations among Personal Interaction, Overall Interaction, and Satisfaction ................................................................. 53

Table 2: The Demographic Data of Participants ................................................................................................................. 63

Table 3: Testing the Assumption of Normality .................................................................................................................. 66

Table 4: Residuals Statistics for the Dependent Variable Course Satisfaction ................................................................. 71

Table 5: Residuals Statistics for the Dependent Variable, Course Grades ........................................................................... 72

Table 6: Pearson Correlations between the Independent Variables ......................................................................................... 73

Table 7: Correlations between the Independent Variables and Dependent Variable, Satisfaction ................................................................. 75

Table 8: The Regression Model with four predictors (Dependent Variable: Satisfaction) ........................................................................... 77

Table 9: The Regression Coefficients of the Four Predictors (Dependent Variable: Satisfaction) ........................................................................... 77

Table 10: The Regression Model with Two Predictors (Dependent Variable: Satisfaction) ........................................................................... 79

Table 11: The Regression Coefficients for the Final Model (Dependent Variable: Satisfaction) ........................................................................... 79

Table 12: Correlations among Independent Variables and Dependent Variable, Course Grades ........................................................................... 81

Table 13: The Regression Model (Dependent Variable: Course Grades) ........................................................................... 82

Table 14: The Coefficients for the Regression Model (Dependent Variable: Course Grades) ........................................................................... 82

Table 15: Correlations between Engagement, Personal Interaction, Overall
Table 16: The Regression Model with three predictors (Dependent Variable: Satisfaction) .................................................................85

Table 17: The Regression Coefficients of Three Predictors (Dependent Variable: Satisfaction) ..................................................................................................86

Table 18: The Regression Model with Four Predictors (Dependent Variable: Engagement) ........................................................................................................87

Table 19: The Regression Coefficients of Four Predictors (Dependent Variable: Engagement) ......................................................................................................88
List of Figures

Figure 1: The Distribution of the Dependent Variable: Satisfaction ..................65
Figure 2: The Distribution of the Dependent Variable: Course Grades ..............65
Figure 3: The Residuals against the Predicted Values (Dependent: Satisfaction) ....67
Figure 4: The Residuals against the Predicted Values (Dependent: Grades) ..........67
Figure 5: The Bivariate Scatterplots (Dependent: Satisfaction) ..........................68
Figure 6: The Bivariate Scatterplots (Dependent: Grade) .......................................69
CHAPTER 1

Introduction

Distance education is “planned learning that normally occurs in a different place from teaching” (Moore & Kearsley, 2005, p. 2). Because in distance education teacher and student(s) are separated, technology is used to bridge the instructional gap (Willis, 1993). In the past, distance education delivery methods included correspondence courses, radio broadcasting, cable or satellite television, computers, teleconferencing, interactive and compressed video, and direct-beamed microwave signals. More recently, the creation of the World Wide Web has sparked a tremendous interest in using the Internet in delivering distance education courses (Thurmond, 2003).

In their report on online education in the United States, Allen and Seaman (2005) have noted that online education is now part of the mainstream of higher education. Sixty-five percent of schools offering graduate face-to-face courses also offer graduate courses online. Sixty-three percent of schools offering undergraduate face-to-face courses also offer undergraduate courses online. Among all schools offering face-to-face Master’s degree programs, 44% also offer Master’s programs online. Among all schools offering face-to-face Business degree programs, 43% also offer online Business programs.

Allen and Seaman (2004) also reported that the majority of all schools (53.6%) agreed that online education is critical to their long-term strategy. Regarding the quality of instruction in online courses, Allen and Seaman noted that a majority of academic leaders (over 50%) believed that online learning quality is already equal to or superior to face-to-face instruction. Chief academic officers at over 40% of schools offering online
courses agreed that “students are at least as satisfied” with their online courses, 56.2% were neutral and only 3.1% disagreed.

A variety of terms have been used for online learning, including Web-based learning, e-learning, networked learning and distributed learning (Ally, 2004). In this study the terms “online learning” and “Web-based learning” are used interchangeably. Ally (2004) defined online learning as the use of the Internet to “access learning materials; to interact with the content, instructor, and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience” (p. 5). Ally’s definition emphasized interaction as an important element in online learning.

Interaction

There is no consensual definition for interaction in the literature (Anderson, 2003a; Anderson, 2003b; Soo & Bonk, 1998). Some definitions describe the dimensions that comprise the concept of interaction, such as communication, collaboration, and active learning (Kenny, 2002). Other definitions highlight the social aspect of interaction (Gunawardena, 1995; Sutton, 2001; Wagner, 1994). Wagner’s (1994) definition of interaction is considered the most comprehensive definition that captures the key components and nature of interaction without limiting the wide range of possible types of interaction (Anderson, 2003a). Wagner (1994) defined interaction as:

Reciprocal events that require at least two objects and two actions. Interactions occur when these objects and events mutually influence one another. An instructional interaction is an event that takes place between a learner and the learner’s environment. Its purpose is to respond to the learner in a way intended to
change his or her behavior toward an educational goal. Instructional interactions serve two purposes: to change learners and to move them toward achieving their goals. (p. 8)

Kearsley (1995) argued that the concept of interaction as it applies to distance education is more complicated than it is in the traditional face-to-face settings, as it needs to be distinguished according to content versus teacher versus learner, synchronous (with no time delay) versus asynchronous (delayed), and according to the types of learners. Moore (1989) identified three types of interaction: learner-content, learner-teacher, and learner-learner. This basic distinction provides a basis for analyzing the relative significance of different types of interaction. Each type of interaction could have different effects on learners and on the effectiveness of a course. In traditional classrooms, the focus has been on learner-teacher interaction. On the other hand, in the development of self-study materials, especially computer-based, the focus has been on learner-content interaction. With the use of computer networks and recent interest in collaborative/cooperative learning, more attention has been devoted to learner-learner interaction (Kearsley, 1995).

A further distinction needs to be made between synchronous (real-time or immediate) and asynchronous (delayed) interaction. In distance education, interaction can be immediate or delayed. This distinction between immediate or delayed interaction is very important as it determines the logistics and “feel” of the distance learning experience. In the case of immediate interaction, learners must participate at a fixed time whereas with delayed interaction, participation is according to the learners’ schedule.
While immediate interaction has a sense of spontaneity and excitement, delayed interaction provides more flexibility and learner control (Kearsley, 1995).

The effectiveness of interaction may also vary across individuals or groups as they differ in their propensity for interaction depending upon their personality, age, and/or cognitive and learning styles. For example, students who are more self-directed or autonomous may want less interaction than others. Professionals tend to prefer less interaction, while young children tend to want a high level of interaction (Kearsley, 1995).

As for gender, Althaus (1997) found no significant difference in gender of learners in computer-mediated discussions. Women did not “flock” to online discussions any more than men. Participants in Althaus study were 142 undergraduate students. The fact that the participants in Althaus’ study met each week face-to-face may be a possible confound to this study. On the other hand, Kim and Moore (2005) who examined 82 graduate students who were taking at least one Web–based course from a public university in a Midwest university found that the level of interaction was related to the gender of students. Female students reported higher frequency of interaction with other learners and tended to be more actively involved in interaction than male students. Monson (2003) also found that gender was related to the perceptions of interaction in online learning. Males perceived discussion more positively than female learners, while females perceived feedback to be more important than males did. Participants in Monson’s study were 265 undergraduate students at a large private university.
Background of the Study

Interactions in online courses differ substantially from interactions that occur in traditional classrooms (Thurmond, 2003). The fact that online courses can be delivered completely asynchronously in the absence of face-to-face meetings creates challenges in developing the necessary interaction component of online classes (Berge, 1999; Muirhead, 2001). The lack of visual cues and the absence of non-verbal communication is one of the challenges to participants in online learning (Gunawardena, 1995; Monson, 2003; Wolcott, 1996). This lack of visual cues has even made some learners use “emoticons,” or a combination of punctuation marks such as :-) to communicate their emotions. Gunawardena (1995) explained this phenomenon in the light of the Equilibrium theory, which argues that people will use other means to achieve what they perceive to be absent from any setting.

Another loss in Web-based or online settings is the human voice, which is one of the most powerful and expressive mediums that can be used in instructional settings (Monson, 2003). Cafola and Knee (1999) highlighted the differences between traditional classroom settings and distance education settings, and noted that in a face-to-face class:

A quick glance, for example, reveals who is attentively taking notes, thinking about the lecture or a different concept, or trying to make a comment. The frustrated, confused, tired, or bored student is also evident via visual cues. When teaching in the classroom you can receive and analyze these. The [distance teacher] may never know if students are asleep, talking, or even in the room. (p. 1)
In text-based communication, as in the case of Web-based or online classes, “presence is manifest only when one is actively messaging: silence is indistinguishable from absence” (Donath, Karahalios, & Viegas, 1999, ¶ 8). In online learning settings, it may be assumed that learning correlates closely to what is visible (i.e., students’ postings), and as a result, “it may be concluded that if there is no visible online activity, then little or no learning is likely to occur” (Beaudoin, 2002, p. 148).

Because of the differences in interaction between the traditional and the Web-based pedagogical platforms, there has been a critical need to examine the concept of interaction in Web-based classes. Although the concept of interaction has been widely endorsed in the literature related to distance education, there have been relatively few studies that support the claims of the perceived importance of interaction with statistical evidence (Jiang & Ting, 1999). There is also a paucity of research that clearly indicates that increased interaction can improve students’ learning (Beaudoin, 2002). Saba (2000) also noted that only a few researchers have conducted rigorous studies that are based on theoretical foundations of distance education. Among them, Saba cited Fulford and Zhang’s study (1993). Fulford and Zhang studied learner perception of interaction in instruction and concluded that perception of overall class interaction is the critical predictor of learner satisfaction. The implication of this conclusion for instructional design is to devise strategies to increase and improve learner perception of overall interaction (Saba, 2000).

Fulford and Zhang’s Study

Fulford and Zhang’s (1993) study is particularly relevant to the topic of the perceptions of interaction. Fulford and Zhang examined adult students’ perceptions of
interaction and their satisfaction in a course delivered via interactive television, and found that the critical predictor of satisfaction was not the perceptions of personal participation, but the perception of overall class interaction. When students perceived the level of class interaction to be high, they were satisfied, regardless of how much personal interaction they had. Fulford and Zhang stated:

> Overall interaction dynamics may have a stronger impact on learners' satisfaction than strictly personal participation. Vicarious interaction may result in greater learner satisfaction than would the divided attention necessary to ensure the overt engagement of each participant. (p. 19)

Fulford and Zhang (1993) concluded that students’ perceptions of overall interaction might serve as an indicator of “vicarious interaction” or the type of interaction that “takes place when a student actively observes and processes both sides of a direct interaction between two other students or between another student and the instructor (Sutton, 2000, p. 4).

Fritsch (1997) coined the term “witness learners” to refer to students who are not actively participating through posting messages, but who nevertheless are still engaged in the learning process as observers (witnesses). Fritsch maintained that learning was still occurring even in this passive and mode. A parallel can be drawn to what happens in traditional classrooms, where instructors note that some students are passive, and nonparticipatory, yet many of these students manage to do quite well in tests and assignments (Beaudoin, 2002).

In a case study, Beaudoin (2002) examined whether or not students were still engaged and actually learning when not actively involved in online interaction with the
instructor and the other students. Beaudoin found that these “invisible” students did spend a significant amount of time in learning tasks, including logging on, even when not visibly participating, and they felt that they were still benefiting from this low-profile approach to their online learning. However, Beaudoin (2002) noted that the preliminary analysis of course grades indicated that the mean course grade is better for high-visibility learners than for no-visibility learners. Beaudoin concluded that further research in the area of the invisible learner is needed in order to better understand the dynamics of asynchronous learning and teaching.

Statement of the Problem

Based upon a review of the literature, there are several questions whose examination will be of practical and theoretical significance to the field. It is hypothesized that learners perceive interaction to be important in online learning, but the question is which type of interaction (personal or overall) is more important and is more related to students’ satisfaction with the course and the course grades. Additionally, are learners’ characteristics such as age and gender related to their satisfaction with the course and with their course grades?

While the findings of Fulford and Zhang’s study are of particular interest, the current study is justified for the following reasons: First, Fulford and Zhang examined learners’ perceptions of interaction in a course delivered via interactive television, where participants could see video images of the instructor and the other students and interact synchronously in real time. What can be said about the interaction in online courses where interaction is mostly asynchronous and mostly text-based?
Second, the participants in Fulford and Zhang’s study were 123 K-6 teachers enrolled in a two-credit in-service training course. Participants in the current study will be undergraduate students, and research has established that the needs of undergraduate students differ from those of independent, self-directed adults (May, 1993; Moore & Kearsley, 2005; Palloff & Pratt, 1999).

Third, Fulford and Zhang only examined the relationship between students’ perceptions of interaction and their satisfaction with the course. The current study will also examine the relationship between students’ perceived personal/overall interaction and their course grades. Although research in traditional classroom settings has established that increased interaction improves learning, there is still a paucity of research that clearly indicates that online interaction improves learning, or that limited interaction compromises learning (Beaudoin, 2002).

Research Questions

1. Are perceived personal interaction, perceived overall interaction, gender, and age significant predictors of students’ satisfaction with the course?

2. Are perceived personal interaction, perceived overall interaction, gender, and age significant predictors of students’ course grades?

Significance of the Study

The importance of interaction in online learning seems to be mostly based on intuitive assumptions or anecdotal observations rather than empirically supported evidence (Grooms, 2000). There are relatively few studies that support the claims of the perceived importance of interaction with statistical evidence (Jiang & Ting, 1999). As researchers strive to understand how interaction influences learning and satisfaction, this
study will provide additional insights by examining learners’ perceptions of interaction, and how they relate to students’ satisfaction with the course and to course grades. Learners’ perceptions are an important consideration for designers and instructors when making decisions about the selection of strategies and pedagogies employed in course design. Besides, it is believed that the potential findings of this study will help expand and challenge the findings of Fulford and Zhang (1993), with additional empirical evidence pertaining to learners’ perceptions and expectations in online classes. By broadening the original examination to include learners’ demographic traits, such as age, and gender, and by examining the role they play in both satisfaction and course grades, the findings of this study should be of value to researchers, instructional designers, and online instructors.

Delimitations of the Study

This study will focus on the concept of interaction as it pertains to online courses. The study is limited to human interaction only, and focuses on perceptions of learner-teacher and learner-learner interaction. Issues surrounding learners’ interaction with the content or the interface were not addressed here. A prerequisite familiarity with the interface was assumed. Participants in this study were undergraduate students enrolled in one course in a midwestern community college during the spring and the summer quarters of 2006. Further testing using other populations would be necessary to confirm whether the relationships reported here are similar in other populations and under other conditions. In this study, data were collected over the Internet using the survey research method. So, all predictors and the criterion variable of student satisfaction with the course were subjective and self-reported by the participants.
Definition of Terms

*Asynchronous Interaction*

Asynchronous literally means delayed or “not at the same time, and thus communication with a delay that allows participants to respond at a different time from when the message is sent” (Moore & Kearsley, 2005, p. 328).

*Perceived Overall Interaction*

Perceived overall interaction is “the perceived involvement of other members of the class” (Fulford & Zhang, 1993, p. 12).

*Perceived Personal Interaction*

Perceived personal interaction is “the perceived individual involvement of each participant” (Fulford & Zhang, 1993, p. 12).

*Satisfaction*

Satisfaction is “the perceived value and quality of instruction” (Fulford & Zhang, 1993, p. 12).

*Synchronous Interaction*

Synchronous interaction refers to “interactive communication with no time delay” (Moore & Kearsley, 2005, p. 330).

*Vicarious Interaction*

Vicarious interaction is the type of interaction that “takes place when a student actively observes and processes both sides of a direct interaction between two other students or between another student and the instructor (Sutton, 2000, p. 4).
Vicarious Learning

Vicarious learning refers to the human ability to learn not only from direct experience, but also from the observation of others. Thus, one can develop an idea of how a new behavior is formed without actually performing the behavior oneself (Bandura, 1977). Vicarious learning is an antecedent type of learning that occurs through vicarious or symbolic processes as opposed to direct experience: An observer learns from the behavior and consequences experienced by a model rather than from outcomes stemming from his or her own performance attempts (Gioia & Manz, 1985, p. 528).

Overview and Organization of the Study

This chapter has set the stage of the rest of the work by providing an introduction, statement of the problem, research questions, scope, limitations, and significance of this study. Chapter 2 will provide a review of the literature related to interaction in online learning. Chapter 3 will address the methods utilized in conducting the research and collecting data. Chapter 4 will present the results of the analysis from this study. Finally, Chapter 5 will provide a discussion of the research findings, along with potential implications and considerations for course designers, instructors, and future researchers.
CHAPTER 2

Literature Review

This chapter will review the literature relative to interaction in distance education, including its definition, its importance, and the perceptions of interaction. A detailed examination of the different types of interaction will be undertaken, including learner-instructor, learner-learner, learner-content, learner-interface, and vicarious interaction. Vicarious interaction will be discussed and explained in the light of social learning theory. A thorough analysis will be undertaken of the various domains of interaction, the sociological (task-driven, and socio-emotional), and the psychological domain. Literature related to students’ satisfaction, and the factors that contribute to students’ satisfaction, learning, and grades will be presented.

Distance education is defined as “structured learning in which the student and instructor are separated by place, and sometimes by time” (Gunawardena & McIsaac, 2004, p. 355). According to Gunawardena and McIsaac:

Distance education is currently the fastest growing form of domestic and international education. What was once considered a special form of education using nontraditional delivery systems, is now becoming an important concept in mainstream education. Web-based and Web-enhanced courses are appearing in traditional programs that are now racing to join the “anytime, anyplace” educational feeding frenzy. (p. 355)

Web-based instruction or online instruction is the most common type of distance education (Scangoli, 2001). Distance learning and Web-based courses are becoming synonymous. Other formats of delivery at a distance are used less frequently, giving way
to the online format (Cahoon, 1998). Overall online enrollment increased from 1.98 million in 2003 to 2.35 million in 2004. The online enrollment growth rate is over ten times that projected by the National Center for Education Statistics for the general postsecondary student population (Allen & Seaman, 2005).

The progression of distance education from correspondence courses to online learning has increased the opportunities for interaction. Using the Internet, particularly email and the World Wide Web, made it possible to promote high degrees of interaction. “This progression has not only been driven by the myriad of interactive opportunities available in the online environment, but also by the belief that high levels of interaction, particularly those which promote social engagement, can have positive effects on the learning experience” (Woods & Baker, 2004, ¶2).

The Need for Interaction in Online Classes

In distance education contexts, Garrison (1990) argued that “the quality and integrity of the educational process depends upon sustained, two-way communication” (p. 15). Students who interacted regularly with their instructor and with other students were more motivated and had better learning experiences (Garrison, 1990). Merrill (2002) also observed that courses that lack interaction, and that are primarily “tell and ask” in nature and more informational than instructional provide little value to learning. “Without connectivity, distance learning degenerates into the old correspondence course model of independent study. The student becomes autonomous and isolated, procrastinates, and eventually drops out” (Sherry, 1995, pp. 344-345).

Interaction is at the heart of the online learning experience. One of the earliest theories in distance education is Moore’s transactional distance theory. Transactional
distance was conceived as a function of dialogue and structure. Moore proposed that
distance was a pedagogical phenomenon, rather than a function of geographic separation,
which existed in face-to-face classes as well as distance classes. There are two main
variables in the theory: structure and dialogue. The structure is determined beforehand
during the design of the course, whereas the dialogue is a function of the interaction
between the instructor and learner (Moore & Kearsley, 2005). In Moore’s theory,
distance is a concept defined in the relationship between structure and dialogue.
According to Gunawardena and McIsaac (2004), “education offers a continuum of
transactions from less distant, where there is greater interaction and less structure, to
more distant, where there may be less interaction and more structure” (p. 361).

Harasim (1989) differentiated interactions that distinguish traditional, distance,
and online education. Traditional face-to-face learning is time and place dependent and is
interactive. It also facilitates three types of interactions: one-to-many, as in the traditional
lecture method; one-to-one, as in the tutorial method; and many-to-many, as in the group
learning process. In contrast, distance learning is time and place independent and is
mediated by some form of technology. Distance education that is not delivered online,
usually utilizes the one-to-one and one-to-many interactive concepts. Online learning, on
the other hand, combines the best characteristics of both traditional and distance
education. Drawing from the distance learning advantages, the online classroom is both
time and place independent and mediated, allowing for flexibility and reflective response.
From the traditional face-to-face environment, the online classroom pulls the many-to-
many interactive concept. Grooms (2000) also noted that online learning “opens a host of
interactive options not traditionally available to the distance learner” (p. 8).
The concept of interaction has been widely endorsed in the literature related to online learning. Interactive possibilities in online education resulted in increased learner control, ability to tailor courses to learners’ needs based on their input, and opportunities for meaningful collaboration among learners (Anderson, 2003b). Several studies suggest a positive correlation between interactive online environments and cognitive learning (Gunawardena, 1995; Rovai, 2002a; Wegerif, 1998). Interaction with faculty and other students can be a strong motivating force for learning (Johnson & Johnson, 1999). Interaction can help increase student interest in content (Rodrigues, 1995). Palloff and Pratt (1999) urged online instructors to construct a positive social dynamic in parallel with the content delivery. Frequent communication between course participants can help decrease the feelings of isolation among students (Vrasidas & McIssac, 1999) and can also influence the instructional as well as the social aspects of the course (Gilbert & Moore, 1998; Roblyer & Ekhaml, 2000).

Palloff and Pratt (1999) noted, “In distance education, attention needs to be paid to the developing sense of community within a group of participants in order for the learning process to be successful” (p. 29). “Failure to fully consider the relational dynamics in the online setting may produce greater feelings of isolation among distance learners, reduced levels of student satisfaction, poor academic performance, and increased attrition” (Woods & Baker, 2004, ¶2).

Defining Interaction

Perhaps the most comprehensive definition of interaction is Wagner’s (1994). According to Anderson (2003a), Wagner’s simple and broad definition of interaction captures the key components and nature of interaction without limiting the wide range of
possible types of interaction. As noted in Chapter 1, Wagner (1994) defined interaction as:

Reciprocal events that require at least two objects and two actions. Interactions occur when these objects and events mutually influence one another. An instructional interaction is an event that takes place between a learner and the learner’s environment. Its purpose is to respond to the learner in a way intended to change his or her behavior toward an educational goal. Instructional interactions serve two purposes: to change learners and to move them toward achieving their goals. (p. 8)

Thurmond (2003) compiled the interaction descriptions offered by Moore (1989), Hillman (1994), and Wagner (1994) and defined interaction as:

The learner’s engagement with the course content, other learners, the instructor, and the technological medium used in the course. True interactions with other learners, the instructor, and the technology result in a reciprocal exchange of information. The exchange of information is intended to enhance knowledge development in the learning environment. Depending on the nature of the course content, the reciprocal exchange may be absent – such as in the case of paper printed content. Ultimately, the goal of interaction is to increase understanding of the course content or mastery of the defined goals. (p. 4)

Interactivity is a term that is often confused with interaction. Some researchers use the terms “interactivity” and “interaction” interchangeably. However, Wagner (1994) distinguished between human interaction and interactivity, which she described as a characteristic of the technology itself: “Interactivity may eventually be viewed as a
machine attribute, while interaction may be perceived as an outcome of using interactive instructional delivery systems” (p. 26). However, Roblyer (2000) argued that the distinction between interaction and interactivity is somewhat artificial, because the two terms, “interaction” and “interactivity” are so related and are both necessary to achieve the desired goals. Roblyer noted that, in distance courses, technologies that allow high interactivity also allow high person-to-person, person-to-group, and person-to-system interaction. Anderson (2003a) also saw it as “futile” to use two different words to refer to communication with human versus nonhuman actors in distance education.

The Importance of Interaction

Dewey (1938) described the educational experience as a “transaction taking place between an individual and what, at the time, constitutes his environment” (p. 43). Dewey’s definition emphasizes the value of interaction with both human and nonhuman actors. Garrison and Shale (1990) defined all form of education, including distance education, as interactions among teachers, students, and content. Garrison and Shale’s definition also stressed both human and nonhuman interactions as components of a quality educational experience. Laurillard (2000) called for a conversational approach to teaching and learning that is based on interaction between teachers and students. Laurillard argued that a university education must go beyond access to content and include “engagement with others in the gradual development of their personal understanding” (p. 137).

“It is widely held that a high level of interaction is desirable and positively affects the effectiveness of any distance education course” (Kearsley, 1995, p. 83). Interaction has long been considered “the key to success in traditional classrooms” (Fulford &
Zhang, 1993, p. 8). In distance education, Roblyer and Wiencke (2003) argued that “research yields consistent indications that increased interaction in distance courses is associated with higher achievement and student satisfaction” (p. 78).

In classroom settings, researchers have stressed the value of interaction. Three of the seven principles of good practice in undergraduate education identified by Chickering and Gamson (1987) involve interaction between and among students and between teachers and students. Interaction fulfills many critical functions in the educational process (Anderson, 2003a). Hannifin (1989) identified a number of functions of interaction in computer-mediated educational contexts. These functions are:

- **Pacing**: Prescribing the speed with which content is presented and acted on.
- **Elaboration**: Interaction serves to link new content to existing schema.
- **Confirmation**: Interaction serves to reinforce the acquisition of new skills.
- **Navigation**: Interaction helps prescribe and guide the way in which learners interact with each other and with the content.
- **Inquiry**: The more widely accessible context for inquiry now provided by the Internet opens the door to greater quantity and quality of inquiry.

To the previously mentioned functions of interaction, Anderson (2003a) added “study pleasure and motivation” that Holmberg (1989, p. 43) described as a result of interaction and relationships between teachers and learners.

Roblyer and Ekhaml (2000) mentioned two other functions that interaction serves in learning environments. One purpose is to encourage reflection and discussion on course topics and concepts. Much of the literature in this area focuses on instructional designs to increase this kind of participation and feedback. The other and equally
important purpose of interaction is establishing rapport and collaboration among class members and between class and instructor (Wolcott, 1996). Gilbert and Moore (1998) also proposed that establishing social rapport and collaboration can lead to greater levels of interaction that address instructional goals.

In Web-based learning, De Verneil and Berge (2000) argued that promoting student interaction through class discussion is integral to effective learning. They noted, “It is important in most Web-based instruction that a designer explicitly includes learning in social context… since the learning process takes place within a social framework” (p. 236). Harasim (1989) examined online courses and drew a similar conclusion about the value of student interaction and discussion. She added:

Knowledge building occurs as students explore issues, examine one another’s arguments, agree, disagree, and question positions. Collaboration [learner-learner interaction] contributes to higher order learning through cognitive restructuring or conflict resolution, in which new ways of understanding the material emerge as a result of contact with new or different perspectives. (p. 55)

Parker (1999) also stressed the pedagogical benefits of student interaction, but pointed out that it is less likely to occur without the careful orchestration by the instructor. Such refocusing might include the use of group projects, running dialogues about complex issues, and by making class discussion a significant part of one’s course grade. Kearsley (2000) argued that: “The most important role of the instructor in online classes is to ensure a high degree of interactivity and participation” (p. 78).

In a study by Hill, Raven, and Han (2002), learner-instructor, learner-learner, and learner-interface interactions were found to have an impact in online courses.
reported that reminder messages (things you should be doing and must be doing) sent by the instructor were particularly helpful with time management. Participants also mentioned that motivational statements of support and encouragement from their peers were valuable. Finally, the study indicated that the learners’ inability to successfully interact with the mediating technology had the potential of a significant source of frustration, leading to dissatisfaction with the online course.

Perceptions of Interaction

The perception of interaction may be as important as actual interaction (Kearsley, 1995). Perceived interaction difficulty, which was defined as the difficulty of generating, participating in, and following class discussions, was negatively correlated with student satisfaction, while perceived instructor emphasis on interaction was positively correlated with student satisfaction (Arbaugh, 2000). Roblyer and Ekhaml (2000) also found that students’ perceptions of the degree of interaction was an important factor determining course quality. Zirkin and Sumler (1995) concluded their annotated bibliography on interaction saying that interaction seemed to have an impact on student achievement, as well as satisfaction: “The weight of evidence from the research reviewed was that increased student involvement by immediate interaction resulted in increased learning as reflected by test performance, grades, and student satisfaction” (p. 101).

Examining distance education delivered via interactive television, Fulford and Zhang (1993) found that the perception of interaction was the critical predictor of student satisfaction. This finding strongly suggests that learner satisfaction may be attributed more to perceived overall interactivity than to individual participation.
The study of Fulford and Zhang suggests that the potential for interaction is an important design factor in distance education courses, even if most students do not take advantage of this potential (Kearsley, 1995, p. 88).

Interaction versus Independence

Although there has been much discussion in the literature about the importance of human interaction in online learning, many of these claims appear to be based on intuitive assumptions or anecdotal observations rather than empirically supported evidence (Grooms, 2000). Anderson (2003b) noted:

Despite the high degree of rhetoric from constructivist and feminist educational theorists of the value of interaction in creating interdependence in the learning sequence, there is also evidence that many students deliberately choose learning programs that allow them to minimize the amount of student-teacher and student-student interaction required. (¶ 9)

May (1993) also found that interaction as an educational issue, strategy, and process is not of primary concern to female distance learners. May observed that significantly less interaction occurred among students and tutors than was anticipated and the majority of students endorsed the relatively solitary nature of distance study as appropriate and useful for them. May recommended that distance educators should question their assumptions about the nature, prevalence, and utility of learner interactions and resist applying traditional classroom models to distance contexts.

Williams and Pury (2002) as well reported that many students found online discussion a waste of time and clearly didn’t enjoy online collaboration. Those who found the online discussion useful were the most likely to be active, posting participants.
Kramarae (2003) also reported that many online students were fervent in their wish to do their assignments independently. These findings made Beaudoin (2002) call for a re-examination of the value of interaction in distance education courses. Beaudoin stated:

In classroom venues, research over the last 30 years has demonstrated that increased interaction improves student achievement. However, there is still a paucity of evaluative data that clearly indicates that online interaction enhances the quality of learning in distance education courses, or that limited interaction compromises learning. (p. 148)

Kramarae (2003) and May (1993) both noted that “more is not necessarily better” and warned of potential dangers resulting from imposed interaction as it might interfere with student autonomy in managing time, place, and pace of learning. Ragoonaden and Bordeleau (2000) also found that problems emerged from blanket designs for collaborative interaction. Highly independent learners often preferred to work alone especially when group members worked at a different pace.

Again, Vandergrift (2002) found that restrained presence of the instructor might encourage self-directed learning and facilitates students’ personal responsibility for their own learning and for community building in an online learning environment.

Types of Interaction

In his editorial in The American Journal of Distance Education, Moore (1989) stated that: “Interaction is another important term that carries so many meanings as to be almost useless unless specific sub-meanings can be defined and generally agreed upon” (p. 1). Therefore, Moore specified three distinct types of interaction in distance education: learner-content, learner-instructor, and learner-learner. Learner-content
interaction is the process in which students examine, consider, and process the course information presented during the educational experience. According to Moore and Kearsley (2005), “Every learner has to construct knowledge through a process of personally accommodating information into previously existing cognitive structures. It is interacting with content that results in these changes in the learner’s understanding” (p. 140). Learner-instructor interaction is communication between the instructor and the student in a course. In the case of online learning, such interaction usually occurs via computer-mediated communication and is not strictly limited to instructional communication that occurs during the educational experience, but may include advising, offline communication, and personal dialogue. Finally, learner-learner interaction is communication between two or more students in a course. Such interaction often occurs via asynchronous computer-mediated communication, although it may include other forms of interpersonal and small group communication, online and offline, that occurs during the duration of a course.

This three-dimensional interaction construct has been expanded by subsequent researchers in the area of distance and Web-based learning. Hillman, Willis, and Gunawardena (1994) added learner-interface interaction to reflect the growing role of technology in the distance education process. They noted: “When dealing with any tool, it is necessary for the user to interact with the device in a specific way before it will do his or her bidding” (p. 34).

Burnham and Walden (1997) observed interactions within a distance education environment and concluded that learner-environment interaction should be added to the model. They defined learner-environment interaction as “a reciprocal action or mutual
influence between a learner and the learner’s surroundings that either assists or hinders learning” (¶15).

Anderson and Garrison (1998) added three other types of interaction: teacher-teacher interaction, teacher-content interaction, and content-content interaction. “Teacher-teacher interaction considers the professional development efforts of teachers to engage one another in order to enhance their own pedagogical abilities. Such interaction might occur at conferences, in seminars, or through informal electronic communication” (p. 105). Teacher-content interaction, generally viewed as a prerequisite to the distance course, is proposed as another component in the interactive model, because new technologies enable teachers to interact with the content far more easily and creatively than in the past. The authors note: “The opportunity for teachers to interact with the learning content provided by other teachers is increasing dramatically as a result of the WWW” (p. 108). Similarly, they noted the growing sophistication of online tools such as databases, search engines, and intelligent agents, and proposed content-content interaction. While they note that this is the most embryonic type of interaction, they maintained that more recent technologies such as blogs, wikis, and content syndication aggregators can increase the likelihood of content-content interaction actually occurring in a meaningful way.

**Learner-instructor interaction**

Learner-instructor interaction is the type of interaction that occurs between the learner and the instructor. This form of interaction is “regarded as essential by many educators and as highly desirable by many learners” (Moore, 1989, p. 2). In this form of interaction, the instructor is the expert who plans instruction to stimulate students’
interests in the content and their motivation to learn. Moore and Kearsley (2005) listed some of the ways instructors maintain interaction with students. Among these ways are planning instruction, giving feedback, formal and informal testing, providing support, encouragement, and counseling. The availability of the instructor and the intellectual engagement of learners are essential to the success of any educational experience (Zirkin & Sumler, 1995).

Sutton (1999) found interaction between the instructor and the learner to be particularly important to learners. Parker (1995) also highlighted the need for and the benefits of learner-instructor interaction. As Moore and Kearsley (2005) pointed out, interaction between learners and a distant instructor is now more readily available and more immediate and direct in the online context. Individualized instruction, which is a long-recognized advantage of correspondence instruction, extends to the online context, and the instructor responds individually to each student. “To some students, a misunderstanding is explained, to others elaborations are given, to others simplifications; to one analogies are drawn, and to another supplementary readings are suggested” (Moore & Kearsley, 2005, p. 141).

Youngblood, Trede, and DeCorpo (2001) identified essential tasks for an effective teacher in an online environment, these tasks are to: make students welcome, clarify expectations for contributing online, clarify grading of the online participation, monitor participation in online discussion, keep discussion on track, contact students offline, bring closure to discussion, use questions to stimulate discussion, move discussion forward, stimulate reflection on students’ comments, encourage students to build on others’ contributions, and divide students into groups for specific tasks. Findings of Youngblood
et al.’s study revealed that students felt clarification of grading and expectations were most important.

Learner-learner interaction

Learner-learner interaction is relatively new to distance education. It refers to the interaction that takes place between one learner and other learners. Students generally find interaction with their peer students valuable and motivating (Moore & Kearsley, 2005). Covey (1989) argued that interdependence is a higher order skill than independence and dependence. This idea is synergistic in nature, in that the sum of the parts is believed to be greater than the whole, and is grounded in the idea that students can learn from one another as much as they may learn from a textbook or from an instructor (Carr-Chellman & Duchastel, 2000). The concept of learner-learner interaction as the exchange of information, ideas, and dialogue that occurs between students about the course “would contribute immensely to a learner-centered view of learning, and provide the opportunity for the social negotiation of meaning and construction of knowledge between learners” (Gunawardena & McIsaac, 2004, p. 362).

Gunawardena, Lowe, and Anderson (1997) used the analogy of a quilt block to describe and explain the significance of interaction between learners in constructing knowledge. They noted:

A quilt block is built up by the application, one after another of small pieces of cloth, which when assembled form a bright and colorful pattern. The pieces, according to this analogy, are the contributions of the individual participants. Each participant contributes to the whole his or her own texture and color of thought, just as every scrap of fabric forms a distinctive element in the overall
pattern. The process by which the contributions are fitted together is interaction, broadly understood, and the pattern emerges at the end, when the entire gestalt of accumulated interaction is viewed, is the newly created knowledge or meaning. Interaction is the essential process of putting together the pieces in the co-creation of knowledge. (p. 410)

Grooms (2000) reported that learners indicated a desire for learner-learner interaction. However, interaction with other learners was found to be less important than interaction with the instructor (Grooms, 2000; Monson, 2003). Although learner-learner interaction has received much attention in the literature, “it may not be as important as some have thought in relation to the other types of interaction. Feedback from a peer is helpful in its proper place, but it is not as valuable as feedback from the instructor” (Monson, 2003, p. 130).

*Learner-content interaction*

Learner-content interaction refers to the interaction the learner has with the subject matter or the content. Every learner has to construct his or her knowledge through constantly interacting with the content and accommodating new information into previously existing cognitive schema. The teacher’s role is to support and assist each student as he or she interacts with the content (Moore & Kearsley, 2005). Interaction between the learner and content is “a defining characteristic of education. Without it there cannot be education, since it is the process of intellectually interacting with content that results in changes in the learner’s understanding, the learner’s perspective, or the cognitive structures of the learner’s mind” (Moore, 1989, p. 2).
Mason and Kaye (1990) noted that in order for effective learning to occur, the learner “must consciously interact with, and operate on, the learning material and resources at his/her disposal” (pp. 18-19). With the motivation issues usually associated with distance learning courses, Chen (1997) and Kerka (1996) stressed the need for carefully designed learning materials. Kerka espouses that carefully designed materials can not only maintain the learner’s motivation, but can also enhance interaction between the instructor and the learners and among learners.

**Learner-interface interaction**

Hillman et al. (1994) added a fourth type of interaction to the three types initially defined by Moore (1989). Hillman et al. introduced the concept of learner-interface interaction and described it as the interaction that takes place between the learner and the technology used to deliver education at a distance. Since distance education is mediated by technology, learners have no choice but interacting with this technology or interface. Learner-interface interaction has a literature base and unique research methodologies such as usability testing and user-centered design (Monson, 2003), but since this type of interaction is not central to this study, only a brief overview of it will be given here.

Learners’ inability to successfully interact with technology will hinder their learning (Hillman et al., 1994; Schneiderman, 2004). Literature on learner-interface interaction has examined two aspects; first the skills and abilities of the learner, and second, the design and functioning of the interface itself (Monson, 2003). Ross (1996) reported that the lack of computer skills impacted students’ abilities to access and function in group discussions. Tsui and Ki (1996) also found that students’ frequency of interaction increased as students became comfortable with technology. Installing a
simpler interface in an interactive television course was found to increase learners’ participation and communication (Barnes & Lowery, 1998). “User-friendly interface design is becoming extremely important. Instructional designers must include learner-interface interactions which enable the learner to have successful interactions with the mediating technology” (Gunawardena & McIsaac, 2004, p. 362).

Vicarious interaction

In both traditional and distance classes, there is the concept of the “lurker,” or one who chooses to watch and not actively participate in the discussion. The concept of the “lurker” is related to what is called vicarious interaction (Althaus, 1997). Sutton (2000) defined vicarious interaction as the type of interaction that “takes place when a student actively observes and processes both sides of a direct interaction between two other students or between another student and the instructor (p. 4). Sutton (2001) added: “Interaction in this sense is not first hand. But one level removed, hence the term vicarious” (p. 227).

Vicarious interaction often happens when a learner chooses to observe rather than actively participate in online discussions and debates” (Su, Bonk, Magjuka, Liu, & Lee, 2005). Devries (1996) pointed out that “vicarious interaction means that learners are participating internally by silently responding to questions” (p. 181) as in the case of large classes where it is practically impossible for everyone to participate. It “is often too time-consuming to provide occasion for every student to join the discussion –except where everyone’s input is critical. Therefore, in practice, general discussion only includes a small number of students” (Cheng, Lehman, & Reynolds, 1991, p. 16).
Fulford and Zhang (1993) argued that maintaining a high level of overall class interaction can result in positive effects for all students, whether they participate in class discussions or not. Fulford and Zhang maintained that overall class interaction “may keep all learners alert and involved whether they are personally contributing or not. The key may be what Kruh and Murphey (1990) described as “vicarious interaction,” that is, learners participating internally and silently responding to questions” (Fulford & Zhang, 1993, p. 10).

Zhang and Fulford (1994) noted that vicarious interaction “consistently contributes more to a person’s assessment of overall interactivity than his or her own observable participation in interaction” (p. 62). Sutton (2000) found that the vicarious interactors’ achievement and course satisfaction were not significantly different. Sutton concluded that those students who interacted vicariously had read, appreciated, and learned from the interactions of the other students, but felt no desire to interact themselves. Sutton (2001) also noted that “direct interaction is not necessary for all students, and that those who observe and actively process interactions between others will benefit through the process of vicarious interaction” (p. 223).

Moreover, Danchak (2002) argued that “the quiet student may be learning just as much as the vocal student but has a different learning or personality style. Forcing these students to interact may be counterproductive at best” (p. 17). Individual student characteristics, some of them social, cultural or psychological, might inhibit some students from participating in forms of direct interaction (Mattheos, 2004). Those who actively observe and cognitively process the interactions of other participants should benefit substantially from vicarious interaction. A vicarious learner can learn through
other students’ interactions with the content, the instructor, other learners or the interface. Interaction in this case is not direct, hence the term ‘vicarious.’ According to Mattheos (2004):

Vicarious interaction adds an interesting dimension to instructional interactions and might account for several, overlooked phenomena in learning. Under the scope of this theory, we should consider reexamining our traditional approaches of assessing and evaluating students’ activity in distance learning (DL) courses and how it relates to learning outcome. (p. 11)

The idea of vicarious interaction can be found in social learning theory, which argues that learning occurs within a social context, and that people learn from one another, through observation, imitation, and modeling (Bandura, 1977; Rosenthal & Zimmerman, 1978). Bandura (1977), the leading proponent of this theory, argued that people can learn by observing the behavior of others and the outcomes of those behaviors, and that what people learn may not necessarily be shown in their performance.

By introducing the idea that humans can learn by observing others, in addition to learning by participating in an act personally, social learning theory introduced the concept of vicarious learning. While most psychological theories have emphasized learning as an effect of one’s actions, Bandura (2001) proposed:

If knowledge and skills could be acquired only by response consequences, human development would be greatly retarded, not to mention exceedingly tedious and hazardous. A culture could never transmit its language, mores, social practices, and requisite competencies if they had to be shaped tediously in each new
member by response consequences without the benefit of models to exemplify the cultural patterns. (p. 270)

Bandura (2001) contended that shortening the acquisition process is essential for survival and self-development, not only because of the existence of hazards, and the high cost of errors, but also because of the constraints of time, resources, and mobility. Observational learning enables humans to expand their knowledge and skills rapidly through observing people’s actions and its consequences for them. “Unlike learning by doing, which requires altering the actions of each individual through repeated trial-and-error experiences, in observational learning a single model can transmit new ways of thinking and behaving simultaneously to countless people in widely dispersed locales.” (p. 270)

Bandura (1977) emphasized the importance of observing and modeling the behavior, attitudes, and emotional reactions of others. He described human learning behavior as attention (including modeled events and observer characteristics), retention (such as motor rehearsal, motor reproduction, including physical capabilities, or self-observation of reproduction), and finally, motivation (including external motivation and self-reinforcement).

“The failure of an observer to match the behavior of a model may result from any of the following: not observing the relevant activities, inadequately coding modeled events for memory representation, failing to retain what was learned, physical inability to perform, or experiencing insufficient incentives” (Bandura, 1977, p. 29).

Bandura’s social learning theory also emphasized the role played by cognition and cognitive processing in learning, because cognitive processes mediate social learning.
Although the social learning theory originally evolved from behaviorism, it now includes many of the ideas that cognitivists hold. As a result it is sometimes called social cognitive theory (Ormrod, 2004).

The social cognitive theory assigns a central role to cognitive, vicarious, self-regulatory, and self-reflective processes. Most external influences affect behavior through cognitive processes rather than directly. Cognitive factors partly determine which environmental events will be observed and what meaning will be conferred on them. It is with symbols that people process and transform experiences into cognitive models that guide their judgment and action (Bandura, 2001).

A central concept in social cognitive theory is that of vicarious learning. Social cognitive theory refers to the vicarious processes as the human ability to learn not only from direct experience, but also from the observation of others. Thus, one can develop an idea of how a new behavior is formed without actually performing the behavior oneself (Bandura, 1977; 1986). This information can then be coded (into symbols) and used as a guide for future action.

The cognitive processes that take place during vicarious interaction are in many ways very similar to that of observational learning and modeling (Sutton, 2000). Vicarious learners go through the four steps identified by Bandura (1977): attention, retention, production, and motivation. During the attention stage, the vicarious learner analyzes and absorbs the interactions that take place between learner-learner and learner-instructor. In the second stage, the vicarious learner cognitively processes the modeled interactions. Whether the learner will overtly express himself/herself and interact will
depend largely on the learner’s ability to do that, along with his/her motivation and anticipation of reinforcement.

Vicarious learning is important in that it enables humans to form patterns of behavior quickly, avoiding time-consuming trial and error, as well as avoiding costly and even fatal mistakes. In addition, vicarious capabilities allow one to explore situations and activities for the attainment of new knowledge that would normally be out of reach due to constraints on time, resources, and mobility (Bandura, 1986).

Domains of Interaction

Grooms (2000) identified three domains of interaction, the sociological, or the way in which the learner deals with the external environment; the psychological, which occurs within the individual; and the situational, which directly impacts the environment. Rafaeli and Sudweeks (1998) described interaction as an “intersection of the psychological and the sociological” (p. 3).

*The Sociological Domain of Interaction*

The sociological domain of interaction embraces task driven and socio-emotional behavior (Grooms, 2000). Hare (1960) has defined task driven behavior as “interaction directed toward the completion of group and individual tasks… [whereas] socio-emotional behavior [is] interaction directed primarily toward the relationships between group members” (pp. 211-212). Throughout the literature, task driven behavior has been described as behavior which is professional, informational, intellectual, and content related. Socio-emotional behavior, on the other hand is the type of behavior that is social, emotional, personal, and relationship-oriented (Grooms, 2000).
Task-driven interaction

Task-oriented behavior is consistently directed toward achieving certain goals, and it takes the form of discussing, commenting, correcting, agreeing, arguing, asking, telling, giving opinion or offering suggestions. Task driven interaction can fall into three categories: intellectual discussion, informational feedback, and corrective/evaluative feedback (Grooms, 2000).

Intellectual discussion. Though interactive pedagogy is more difficult in the distance learning environment, it is not impossible (Martin & Taylor, 1997). Intellectual discussion can take many forms and can transpire between the learner and the instructor and among the learners. Intellectual discussion can be simulated when the instructor or the facilitator synthesizes postings, weaves comments, focuses the discussion, makes the material relevant to the learners, asks probing questions, presents conflicting opinions, challenges ideas and negotiates meaning, raises new topics, and elaborates or confirms the ideas discussed (Grooms, 2000).

Intellectual discussion among learners can take the form of solving problems, weighing different interpretations, negotiating meaning (Jonassen, Davidson, Collins, Campbell, & Haag, 1995) or even the critical analysis of another’s contribution, and explicitly stating points of agreement and disagreement (Hiltz, 1994). Vrasidas and McIsaac (1999) described discussion among learners as the stimulating intellectual exchange of ideas, and Jonassen et al. (1995) argued that it is fundamental to knowledge construction: “Knowledge construction occurs when students explore issues, take positions, discuss those positions in an argumentative format, and reflect on and re-evaluate their positions” (p. 16).
Feedback: Informational and Corrective. Feedback refers to information that enables learners to judge the quality of their performance, and correct errors (Wagner, 1994). Feedback can be informational or corrective, and should be timely and accurate to avoid reinforcing misconceptions (Monson, 2003). Informational feedback includes responses and clarification to questions concerning the logistics of the course, the technical issues, or dialogue concerning course activities. Examples could include feedback to such questions as “when is the assignment due?” (Grooms, 2000).

Corrective or evaluative feedback is often considered the most common type of feedback. This feedback seeks to provide learners with information concerning the correctness of their response through correction, confirmation, or other guidance that seems appropriate (Grooms, 2000). Timely feedback has been linked directly to students’ satisfaction (Stevenson, Sanders, & Naylor, 1996). Immediacy of feedback is frequently cited as the reason why students prefer face-to-face instruction over online learning (Leasure, Davis, & Thievson, 2000).

Research has indicated the importance and the need of frequent feedback from the instructors and peers in online learning (Chickering & Ehrmann, 1993; Eastmond, 1995; Grooms, 2000; Vrasidas & McIssac, 1999). In spite of this well-documented need and importance of feedback, a study by Vrasidas and McIssac (1999) indicated that students in one class felt that there was not enough feedback from the instructor or the peers. This reported inadequate feedback is not an isolated incident (El-Tigi & Branch, 1997). This is due in part to the unforeseen amount of time that Web courses require of students, and to the fact that most feedback must be directed to individuals and not to the groups.
Graham, Cagiltay, Lim, Craner, and Duffy (2001) suggested that faculty give feedback to students in two forms; acknowledgement and informational, with the first to meet the needs for immediacy and the latter, though potentially delayed, being of higher quality feedback. Levin and Waddoups (2000) recommended a three-tiered approach to feedback: holding online office hours for issues needing immediate attention, responding to groups rather than individuals whenever possible, and giving detailed individualized feedback on major projects and assignments.

Feedback in any form is an essential aspect of learning and can have a reciprocal impact on communication, which can lead to dialogue and discussion (Monson, 2003).

*Socio-emotional interaction*

“Learning—although a very personal matter—must never be an individual matter—one learns best by and with others” (Nipper, 1989, p. 66). Harasim (1990) concurs that online education is “distinguished by the social nature of the learning environments that it offers” (p. 42). In online environments, socio-emotional interaction consistently emphasizes the social nature of learning. Miller (1994) stressed learners’ need for socio-emotional interaction. Grooms (1998) found that learners used online communication not only for class–related purposes, but also for social and spiritual interaction. Socio-emotional interaction can range from extending personal niceties to the resolution of personal interpersonal, or group problems, to offering social or academic support (Grooms, 2000). While acknowledging that much social interaction occurs around day-to-day activities such as the management of class logistics, Gilbert and Moore (1998) pointed out that “certain types of social interaction can directly foster instructional interaction. For example, small-group discussions in a class might have high social
interactivity at the same time that students are highly engaged in comparing opinions about key course content objectives” (p. 31).

Socio-emotional interaction clusters into two categories: socializing, and motivation and support (Grooms, 2000).

Socializing. Kearsley, Lynch, and Wizer (1995) noted that “because of the extensive and sustained interaction that online learning allows … assignments and class discussion tend to include social components, and social dynamics come to play an important part in student interaction within and across classes” (pp. 39-40). Socializing can take many forms such as exchanging emphatic messages, or self disclosure, and can occur between the learner and the instructor and among learners (Grooms, 2000). Gilbert and Moore (1998) note that “social interaction tends to have elements of mutuality, flexibility, and bidirectionality that are not as frequently found in purely instructional interaction” (p. 31). For example, “the more one discloses personal information, the more others will reciprocate, and the more individuals know about each other, the more likely they are to establish trust, seek support, and thus find satisfaction.

In a study that examined the email content of 700 undergraduates, McCormick and McCormic (1992) found that about half the students communicated with other students for social reasons. Gregor and Guskelly (1994) found that “social interaction amongst students and between students and the instructor was relatively low” (p. 168). This causes one to wonder whether socializing is important to online learners. Grooms (2000) also found that students desired socializing with the instructor and with peers far less and with less frequency than with any of the task interaction components. Monson (2003) reported that socializing was perceived as “not very important” (p. 121). Monson
concludes that “this finding runs contrary to the call in the literature for an increase in efforts relative to community building” (p. 121). Monson added: “if socializing is the only way to build community, the community may be in trouble......Of all the activities of interaction examined in this study, socializing was consistently ranked at the bottom of the pile, significantly lower than other activities” (p. 131).

Motivation and support. In distance education contexts, there is a critical need for support from the instructor (Stevenson et al., 1996). Stevenson et al. noted that “it is very possible that students working at a distance look on tutors to support their learning more so than traditional students” (p. 26). Students from the Open University echoed “a cry from the heart” (p. 27) for the acknowledgement of effort and good work.

Daniel and Marquis (1979) cited the need for motivation and support as particularly noticeable with the “busy adult, who always has good reasons for putting study off until tomorrow” (p. 42). Pratt (1988) stressed the need for support from the teacher which can manifest itself in the form of “encouraging, listening, appreciating feelings, and reinforcing effort and good work” (p. 166). Examples of these could include simple remarks as “good point,” “very well stated,” or “great synthesis and application.” This encouragement can emanate from both the faculty and peers (Grooms, 2000).

The Psychological Domain of Interaction

The psychological domain is “consistently aligned with the internal state or the thoughts, feelings, and attitudes of the individual” (Grooms, 2000, p. 49). Grooms emphasized the importance of the psychological domain of interaction as learners come to the online learning environments with “varying degrees of cognitive and emotional
need for interaction. Some enter with expectations for a great deal of interaction, while others have only minimal expectations” (pp. 49-50).

Given the importance of interaction in online learning environments, it seems important to both determine the degree to which learners expect interaction, and determine the degree to which they experience its antithesis, the lack of interaction, which often results in the psychological feelings of loneliness and isolation (Grooms, 2000).

In their study on intimacy and loneliness, Rubenstein and Shaver (1982) noted: Loneliness warns us that important psychological needs are going unmet. Loneliness is a healthy hunger for intimacy and community—a natural sign that we are lacking companionship, closeness, and a meaningful place in the world. Without intimacy, friendship, and community, psychological stability erodes. (p. 3)

Rubenstein and Shaver (1982) differentiated between some people’s temporary personal preference for solitude, and the feelings of loneliness, which occur when one is separated in proximity for a prolonged period of time. Loneliness can be more distressing than anxiety and “so terrible that it practically baffles clear recall” (Sullivan, 1953, p. 261). In an environment that by definition has the potential for social isolation and loneliness due to its time-place independence (Grooms, 2000, pp. 54-55), it is important to address the need for inclusion, connectedness, and community in online learning environments.
Students’ Satisfaction, Learning, and Grades

Although most research in distance education has examined the effectiveness of distance courses in the light of course grades and test scores, some researchers have contended that simply looking over grades was not sufficient to estimate the effectiveness of a course, since other factors such as student satisfaction might influence student achievement (Smith & Dillon, 1999). Student satisfaction was considered an important indicator of the effectiveness of a course (Keller, 1987). Dick and Reiser (1989) stressed the need to investigate the students’ satisfaction criterion in order to fully understand the online learning environment.

Although students’ satisfaction is not necessarily correlated with achievement (Moore & Kearsley, 2005), satisfaction contributes to motivation, and motivation is essential for student success (Bollinger & Martindale, 2004). In distance education settings, satisfied students learned more easily, were less likely to drop out of class for non-academic reasons, were more likely to take additional distance courses, and to recommend the course to others (Biner, Dean, & Mellinger, 1994). As Tallman (1994) noted, “If students are satisfied they will continue until their goals have been met and their course of study completed” (p. 52).

Simply asking students whether they would enroll in another distance education course could determine students’ satisfaction with the course they are taking (Biner et al., 1996; Tallman, 1994). Research on students’ satisfaction with a distance course has identified several factors that contribute to students’ satisfaction. Sener and Humbert (2002) found that students’ satisfaction with instruction was impacted by: the appropriateness of technology and support, and the level of interaction with the instructor.
and other students. Bollinger and Martindale (2004) reported that the most important factor in student satisfaction was the instructor. The instructor’s knowledge in the content area, communication ability, accessibility, and feedback all seem to impact student satisfaction with a course. The other two factors that can explain student satisfaction were technology and interaction. Students need to have access to reliable technology, and have more interaction in their online courses (Bollinger & Martindale, 2004).

Examining the factors that significantly contribute to perceived learning and student satisfaction in online courses, Fredericksen, Pickett, Shea, Pelz, and Swan (2000) found that interaction with the instructor was the most significant contributor to students’ satisfaction and perceived learning in these on-line courses. Students who reported the highest levels of interaction with the instructor also reported the highest levels of perceived learning in the course. Interaction with classmates was a significant contributor to students’ satisfaction in online courses as well. Students who reported higher participation levels also reported the highest levels of perceived learning.

Kim and Moore (2005) found that students who were actively interacting with their classmates and the instructor were more satisfied with their learning experience in Web–based courses, and were more willing to recommend Web courses to others. Kim and Moore explained the strong connection between students’ interaction, and their satisfaction with a course saying that those students who interact more are more likely to have a clear understanding of the learning materials and more likely to get more involved in learning. Students who interact more also develop a sense of community with classmates and the instructor, which is linked to greater satisfaction with their academic program and to a reduced feeling of isolation (Rovai, 2002b).
Studies that examined the relationships between satisfaction and student variables such as age and gender yielded inconsistent results. For example, Fredericksen et al. (2000) found that age played a role in student satisfaction and perceived learning. The youngest students (16-25) reported that they learned the least and that they were the least satisfied with on-line learning. Students in the 36-45 year old range reported that they learned the most and were the most satisfied with on-line learning. On the other hand, Hong (2002) found no relationship between age and student satisfaction in Web-based courses.

As for gender, Hong (2002) found no significant relationships between gender and both course satisfaction and achievement. Fredericksen et al. (2000), on the other hand, reported that females were more satisfied with their courses and with online learning in general than their male classmates. Females also reported higher levels of participation than men, felt that they learned more, that technical difficulties were less likely to impede their learning, and they were more likely to want to continue taking on-line courses than men.

Learning styles were not found to have any significant impact on students’ satisfaction with a course (Hong, 2002; Kearsley, 2000; Kim & Moore, 2005). Prior computer skill level did not seem to be a barrier to online learning, or to play a significant role in student satisfaction (Fredericksen et al., 2000; Hong, 2002).

As for course grades, Sutton (2000) found that students’ achievement in a graduate online course in social sciences was not related to how much students were interacting. Achievement of low visibility students was not significantly different from that of high visibility students. Hong (2002) also found that perceptions of interactions
were not related to learning outcomes. Those students who entered the course with better Cumulative Grade Point Average (CGPA) scores achieved higher final grades in the course.

Beaudoin (2002) divided an online class into three groups (high interaction, moderate interaction, and low interaction), and found that the high interaction students achieved the highest performance, the low interaction group performed higher than did the moderate interaction group. Beaudoin concluded that some students may not need to participate actively in the course to do well on a test or an exam.

Hong (2002) also found that perceptions of interactions were not related to learning outcomes. Those students who entered the course with better Cumulative Grade Point Average (CGPA) scores achieved higher final grades in the course. Thus we can conclude that the characteristics that students already have when they begin the class are by far the most important predictors of performance on the exam. These student characteristics have a strong to moderate relationship to exam scores. Those who enter a course with stronger skills will also learn more in the course. It is findings such as this that make the achievement gap in schools so difficult to overcome (Duffy et al., 2005)

In summary, neither computer skill nor learning styles were found to play a significant role in online learning settings. Research on the relationship between student satisfaction and student gender and age yielded inconsistent findings. Interaction with the course instructor and other students was invariably found to be the key factors in student satisfaction, which implies that “learners must have functional, usable tools for participation and interaction, and those tools should be used early and often. Online learners must be given plenty of opportunities to participate in discussions in order to feel
involved and stay engaged in online courses” (Bollinger & Martindale, 2004, p. 65). As for course grades or achievement, interaction was not found to be related to students’ grades. The characteristics that students already have when they begin the class are the most important predictors of performance or grades.

Summary

A review of the literature related to online interaction has been presented in this chapter, including, the need for interaction in online classes, the importance of interaction and of the perceptions of interaction, different types of interaction, and what is considered as interaction. For the purpose of this study, interaction has been defined as the reciprocal actions of two or more participants in an online course. A detailed description of the different types of interaction was provided. The concept of vicarious interaction was discussed and explained in the light of social learning theory. An analysis of the domains of interaction, and the factors contributing to students’ satisfaction in online courses was undertaken. In the following chapter the methodology and analyses that will be used to answer the research questions will be presented and discussed.
CHAPTER 3

Methodology

Based on the literature presented in previous chapters, one might conclude that interaction is perceived to be a very important component in distance education courses, but which type of perceived interaction is more important and which one will better predict learners’ satisfaction with the course and course grades? In an interactive TV context, Fulford and Zhang (1993) found that it is the perceived overall class interaction, not the perceived personal involvement of the learners that predicts learners’ satisfaction with the course. In asynchronous settings, interaction may not be occurring if learners are not actively participating in the course activities. In discussion forums, for example, true interaction may not be occurring depending on when and how often learners respond in these discussions (Muirhead, 2001).

This study used a descriptive correlational design to examine the relationships among the variables of the study as they exist in their natural settings. The study used the survey research method to collect data, as it is best suited for studies that describe the characteristics of a population, including attitudes and orientations (Babbie, 1989). In this study, the survey was administered online in a Web-based format. Regression analysis was conducted twice to determine how well the independent variables, perceived personal interaction, perceived overall interaction, gender, and age predict the dependent variables, students’ satisfaction with the course and course grades.
Research Questions

Two research questions have been presented:

1. Are perceived personal interaction, perceived overall interaction, gender, and age significant predictors of students’ satisfaction with the course?

2. Are perceived personal interaction, perceived overall interaction, gender, and age significant predictors of students’ grades?

Research Hypotheses

H₀: The independent variables, perceived personal interaction, perceived overall interaction, age, and gender are not significant predictors of the dependent variable, students’ satisfaction with the course.

The statistical hypothesis for Research Question 1 is stated as:

\[ H₀: R^2 = 0 \]
\[ Hₐ: R^2 \neq 0 \]

H₀: The independent variables, perceived personal interaction, perceived overall interaction, age, and gender are not significant predictors of the dependent variable, students’ course grades.

The statistical hypothesis for Research Question 2 is stated as:

\[ H₀: R^2 = 0 \]
\[ Hₐ: R^2 \neq 0 \]

Data Analysis

All data analyses were conducted using the SPSS 14.0 for Windows software package. The conventional level of .05 was used as the statistical level of significance for all the analyses. Cronbach’s Alpha was used to assess the reliability of the measures.
Descriptive statistics were conducted for demographic factors including age, gender, ethnicity, and the number of online courses previously taken. Before conducting the multiple regression for the two research questions, the data were evaluated to identify any violations of the key assumptions of multiple regression. The first assumption checked was that the variables are distributed normally and there is a linear relationship among the variables (Green & Salkind, 2005). To check the normality assumption, scatterplots and histograms were examined. Results were confirmed by the use of the One-Sample Kolmogorov-Smirnov Test. Linearity was examined by scatterplots between each of the independent variables and the dependent variables. The linearity assumption of regression model was examined by a scatterplot of standardized residuals versus standardized predicted values.

Data were also checked for outliers and influential points and appropriate measures were taken to make sure they did not affect the statistical analysis. Pearson Product Moment correlations between the predictors were also computed to identify any collinearity. Correlations among predictors of more than $\geq 0.60$ was considered problematic. Tolerance values and Variance Inflation Factor (VIF) were also examined to detect any collinearity problems. A tolerance value below 0.1, or a VIF above 10 were considered problematic.

(Myers, cited in Stevens, 1999; Stevens, 1999).

The sample of this study was a convenient, not a random sample, and one assumption of the regression analysis is that there is randomness in each case. However, regression analysis is generally robust to violation of this assumption (Green & Salkind, 2005).
To answer research Question 1, multiple regression was conducted to predict the dependent variable, student satisfaction with the course, using four independent variables: perceived personal interaction, perceived overall interaction, age, and gender. The equation for this model was:

$$\hat{Y_1} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + e$$

To answer the research Question 2, multiple regression analysis was conducted to predict the dependent variable, students’ course grades, using the four independent variables: perceived personal interaction, perceived overall interaction, age, and gender. The equation for this model was:

$$\hat{Y_2} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + e$$

All the independent variables were entered simultaneously into the regression model using the Enter method. Relationships were examined between the dependent variables and the independent variables as well as among the independent variables themselves. The significance of these relationships is discussed in Chapter 4.

Instrument Development

Based on the literature review presented in previous chapters and after a careful review of the available instruments, two instruments were identified that were relevant to the goals of this study. These instruments are:

- The Interaction Survey (Sherry, Fulford, & Zhang, 1998).

**Fulford and Zhang’s (1993) Survey**

This survey was developed by Fulford and Zhang (1993) to measure students’ perceptions in relation to three variables:
- Personal interaction – perceived individual involvement of each participant
- Overall interaction – perceived involvement of other members of the class
- Satisfaction – perceived value and quality of instruction

Fulford and Zhang used a six-point semantic differential scale to compel a forced choice of negative or positive answers. Redundant questions were asked using several bi-polar adjectives to increase the reliability of the scale. The bi-polar adjectives were never-often, low-high, ineffective-effective, 0%-100%, negative-positive, none of it-all of it.

*The Interaction Survey (Sherry, Fulford, & Zhang, 1998).*

In a more recent study, Sherry, Fulford, and Zhang (1998) designed a new scale of interaction, and examined the scale’s accuracy, utility, and feasibility. The Interaction Survey was intended to identify students’ perceptions of the “interactional climate” of a class in an efficient and reliable manner. This scale was originally tested in interactive television classes where it was judged to be distinct, stable, and adequate. This 14-item instrument employs a 7-point Likert-type scale, and has a reported reliability of 0.85. The first sub-scale, which deals with students’ perceptions of overall interaction, consists of three questions and has a reported reliability of 0.74 and 0.66 in two reported tests. The second sub-scale is comprised of seven questions dealing with interaction between the learners and the instructor and has a reported reliability of 0.64 and 0.77. The third sub-scale is made up of four items relative to the interaction among the learners, with a reported reliability of 0.84 and 0.85.

The Pilot Study

Because the original survey of Fulford and Zhang (1993) was designed to be used in an interactive TV setting, some changes were made to the questions to make the survey
relevant to online learning environments, and a more familiar Likert scale format was also used instead of the original semantic differential format (see Appendix A). Because Fulford and Zhang (1993) did not establish the reliability of the scale, and because the scale was modified, it was necessary to pilot the modified version of this scale. A pilot test was conducted to determine the reliability of the modified scale, to test the research procedures and to make any necessary revisions before full implementation of the study.

The sample in this pilot was 20 students enrolled in an online course in a large midwestern community college, not the institution of the final study. Sixteen participants (80%) completed the survey. An analysis of data collected during the pilot study was conducted to examine the reliability of the research instrument. The alpha of the instrument as a whole was 0.869. The subscale “personal interaction” had an alpha of 0.863. The subscale “overall interaction” had an alpha of 0.437. The sub-scale “satisfaction with instruction” had an alpha of 0.703.

While the alpha of the scale as a whole was good, of concern to the researcher was the low alpha level of the sub-scale “overall interaction.” Excluding any of the questions from that sub-scale would not increase the alpha. In an attempt to address this problem, this subscale was expanded and other questions related to the perceptions of overall interaction were added to the revised version of the instrument. Items 1 and 11 appeared to be flawed items. If deleted, Item 1 “I always answered the questions posted by the instructor” would slightly increase alpha from 0.869 to 0.871. However, it was determined not to delete this item, reserving the right to omit it if needed in the final study if the same pattern held true. Item 11 “There was much interaction between all other participants in the class” correlated negatively with the other items in the scale, and it was
modified to “There was much interaction among students in this course” for use in the revised version of the survey.

Pearson’s product-moment correlations were calculated on the data collected from the pilot. Table 1 shows the correlations among the research variables: perceived personal interaction, perceived overall interaction, and satisfaction with the course.

Table 1

*Correlations among Personal Interaction, Overall Interaction, and Satisfaction*

<table>
<thead>
<tr>
<th></th>
<th>Personal interaction</th>
<th>Overall interaction</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal interaction</td>
<td>Pearson Correlation</td>
<td>0.472</td>
<td>0.667**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.065</td>
<td>0.005</td>
</tr>
<tr>
<td>Overall interaction</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>0.315</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td>0.235</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed), n=16**

As expected, positive correlations were found between perceptions of personal interaction and overall interaction, indicating that students who see themselves as active participants tend to have a more positive perception of overall interaction than those who see themselves as inactive participants. Contrary to Fulford and Zhang’s findings, significant positive correlations were found between perceptions of personal interaction and satisfaction. The correlation between perceived overall interaction and satisfaction was found to be non-significant, suggesting that perception of overall interaction is unlikely to function as a sensitive predictor of satisfaction even if it is entered first into the regression model.
The Final Instrument

The final version of the survey (see Appendix B) is a 42-question, self report instrument that takes approximately 10 minutes to complete. The survey utilized a standard close-ended question and statement format with a 5-point Likert scale. Item number 42 was added to the scale to explore the relationship between students’ engagement in learning and their satisfaction with the course and their course grades. Five additional items (item numbers 43-47) were added to the scale to collect the demographics of the respondents, namely respondents’ age, gender, ethnicity, number of online courses they completed before this course, and the type of Internet connection they mostly used to access their online courses.

The questions in the survey, except for the questions on learners’ demographics, all employed a response category ranging from Strongly Disagree to Strongly Agree. Acquiescence responses were controlled for in the survey by listing several items negatively and others positively (Mueller, 1986). Items number 2, 4, 5, 7, 10, 12, 15, 19, 24, 26, 29, 33, and 38 were negatively phrased; and therefore the coding for these items was reversed prior to analysis. Questions on the final version of the instrument were listed in the following sections:

- Section I: The perceived personal interaction
  - The perceived personal teacher-learner interaction (Q1-Q6)
  - The perceived personal learner-learner interaction (Q7-Q15)

- Section II: The perceived overall interaction
  - The perceived overall teacher-learner interaction (Q16-Q23)
  - The perceived overall learner-learner interaction (Q24-Q31)
The Validity of the Scale

Content validity of the newly created instrument was based upon a careful review of the literature and feedback provided by several faculty and students who had experience in research, teaching, and participation in online courses. Evidence of content and construct validity was supported through a review of literature. Special attention was paid to ensure that the scale items cover all the aspects of interaction identified in the literature: intellectual discussion, feedback, socializing, motivation and support, and the psychological domain (see Appendix D).

Conducting the pilot and the final study adds to the validity of the new instrument. The context of this study is undergraduate students enrolled in an online course at a mid-sized Midwestern community college, very different from the original sample of K-6 teachers enrolled in a two-credit in-service training course at the University of Hawaii. Mueller (1986) wrote “…evidence for validity comes in small pieces, with no single piece of evidence being sufficient to ‘prove’ validity” (p. 71).

Sample Size Determination

In multiple regression, the main concern is to develop a prediction equation that has generalizability. Park and Duddycha (1974) found that about 15 subjects per predictor are needed to obtain a small amount of shrinkage (the loss in predictive power) (<0.05), with high probability (0.90), when the squared multiple correlation (\(R^2\)) is 0.50. Park and Duddycha provided several tables that determine the sample size needed in
order to get a reliable prediction equation. By checking these tables, it was found that a sample size of 66 was needed when there are 4 predictors, and when we set the squared population multiple correlation $R^2$ to 0.50, which is reasonable based on the results of the pilot study, and limit the loss in predictive power to less than 0.05 with probability of 0.90.

Context of Study

The context of this study is an online course taught during the spring quarter of 2006 at a midwestern community college. The course is a five-credit introductory course in humanities offered to undergraduate students and uses email, discussion boards, online chat, and virtual office hours as communication methods. The course syllabus aims at exploring the culture, ideas, and values of human civilization from their origins in the Ancient World through the 15th Century. The emphasis is on the intellectual and artistic achievements of the ancient Middle East, Classical Greece and Rome, the Christian and Arab/Islamic Middle Ages, and Renaissance Italy, and on how culture reflects and influences economic, social and political development. Students are exposed to the creative process by reading from primary works of literature and philosophy and critically reviewing works of art, music, theater and dance.

The course is required; all students in different majors are required to take at least one course in the humanities, and it is usually this course because it is the first in a sequence. The course is offered totally online, there are no face-to-face meetings. Students mostly communicate with the instructor through the e-mail, although the instructor occasionally gets phone calls from students.
The instructor of the course has been teaching this course for twelve years. Because of the large size of this class (about 90 students per quarter), there are three adjunct faculty members who help the instructor with the grading of the assignments. Each adjunct faculty member is in charge of about 30 students, and they grade their assignments and give them the feedback on assignments. The lead instructor looks at the assignments and provides general comments, provides the content and monitors the quality control. Students are encouraged to contact the lead instructor for questions on course content and class policy.

The course has many built in opportunities for interaction both between the instructor (s) and learners, and among learners. For example, students get feedback from the instructor (s) on the weekly journal they write. Along with grading, the feedback usually specifies the areas that may need to improve. There is also a weekly discussion topic in which students work in groups of 4-5 to discuss a question or topic posted by the instructor. Each group has their own discussion board which they use to communicate with one another. Students take turns leading the discussion. The discussion leader for each week should write a thoughtful essay addressing the question that has been posted. The other members of the group will then respond with their views on the leader’s essay. For more information about the course, refer to the course syllabus (Appendix E).

After obtaining the course instructor’s approval, all the students enrolled in this course were sent an e-mail inviting to them to participate in this study (see Appendix F). Participation was voluntary and the study was carried out during the last three weeks of the quarter so that participants could have had enough time to experience all of the various course aspects.
Research Procedures

The final instrument used in this study was first created on paper, then a survey service (SurveyMonkey) was used to design the online survey. After obtaining permission to conduct the study from Ohio University Institutional Review Board (IRB), the potential participants (all students enrolled in one online course) were identified, and the instructor’s permission to implement the study on his class was obtained. A list of the students’ email addresses was obtained from the Blackboard administrator in the institution where the study was conducted. The e-mail lists were then uploaded to the mailing list in the survey software used to distribute the survey.

An e-mail message (see Appendix F for the text of the e-mail message) was sent to the potential participants, with a brief description of the study and invitation to participate in it by taking the survey, and allowing the researcher to get access to their grades in this particular course.

To address the issue of informed consent, it was noted in the e-mail that the completion and submission of the survey implies students’ consent to participate in this study. To address confidentiality, the information that students gave was kept confidential and secure, and was reported in aggregate form only. In the invitation e-mail message, students were assured that all the information they give would in no way be linked back to them. The link to the survey was provided in the e-mail message.

As an incentive, students were informed that students who complete the survey could win one of five $25 Amazon gift certificates. Students who participated in this survey were entered into a drawing, and five of them were selected to win $25 gift certificates to Amazon.com.
In an attempt to increase the response rate, three additional follow-up email messages inviting students to participate were sent at interval of one week. The same procedures were repeated for the summer quarter. However, to increase participation in the survey, each student who completed the survey was offered a $5 gift certificate to their bookstore. This helped to increase participation, though not to a high degree. The response rate went from 34% in the spring quarter to 40% in the summer quarter. Most of the responses both in the spring and the summer quarters came after the first e-mail invitation.

Students’ responses were recorded by the survey service, along with their names and e-mails, in order to identify participants to correlate their responses with their grades. Data were imported to SPSS in an Excel sheet format to avoid data entry errors. The grades of the students who participated in this study were then obtained from the instructor. All data analysis was conducted using SPSS 14 for Windows.

Summary

This chapter has outlined the methodology that was used for this survey research project designed to examine the relationship between the independent variables, perceived interaction (personal/overall), gender, age and satisfaction with instruction, and with course grades. Two research questions have been presented. First, how well do the perceived personal interaction, the perceived overall interaction, gender, and age combined predict learners’ satisfaction with the course? Second, how well do the perceived personal interaction, the perceived overall interaction, gender, and age predict learners’ grades? The sections dealing with the development of the research instrument, the pilot test, and the efforts undertaken to improve the instrument were addressed. A
brief description of the statistical tests that were used to analyze the data was provided, and the procedures for conducting the study were outlined.
CHAPTER 4

Data Analysis

This study used the multiple regression analysis to predict students’ satisfaction with the course and students course grades using four predictors: students’ perceptions of their own personal interaction, the perceived overall interaction in the courses, their age, and gender. This chapter presents an analysis of data collected using a Web-based survey, over two consecutive quarters from two different groups of students who were enrolled in the same online course taught by the same instructor in a midwestern community college during the spring and the summer quarters of 2006. During the data collection period, 65 students participated in the study, yielding a return rate of 37% (34% response rate in the spring quarter, and 40% response rate in the summer quarter). Data collected through the survey included: perceptions of personal interaction, perceptions of overall interaction, course satisfaction, along with demographic data. Course grades were obtained from the instructor at the end of each quarter.

The Reliability of the Scale

Cronbach’s alpha was calculated for the scale as a whole, and for each of the subscales to estimate the internal consistency of the scale. According to Mueller (1986), a well-constructed scale should have a reliability coefficient of 0.80 or higher. All alpha coefficients of the scale used in this study were greater than 0.80. The alpha coefficient of the survey as a whole was 0.937. The subscale “personal interaction” had an alpha of 0.877. The subscale “overall interaction” had an alpha of 0.857. The sub-scale “satisfaction with instruction” had an alpha of 0.886. Alpha coefficients, calculated by deleting each item from the scale, were also examined, but none of the increases in the
alpha coefficients were significant enough to justify the removal of any of the items (see Appendix C). Data collected were used to answer the following questions:

1. Are perceived personal interaction, perceived overall interaction, gender, and age significant predictors of students’ satisfaction with the course?

2. Are perceived personal interaction, perceived overall interaction, gender, and age significant predictors of students’ grades?

Participants’ Demographic Data

Demographics of the respondents revealed that 76.9% of them were females (50) and 23.1% were males (15). Ages of the respondents ranged from 19 to 45. The mean age was 27 (median= 24, mode= 24). Respondents were primarily white (80%); the other 20% were African Americans (5), Hispanic, Asian, and other ethnicities (8). Of the respondents, 26.2% were new to online education, with this being their first course. Specifically, 27.7% of the respondents had previously completed one or two online courses; 26.2% had completed three to five courses, and only 7.6% of the respondents had completed more than ten online courses before this course. A large majority (86.2%) of the respondents used the high speed Internet to access course materials. Only 13.8% of the respondents used a dial-up connection to access course materials. Demographic data of the participants are summarized in Table 2.
Table 2

_The Demographic Data of Participants_

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>%</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>50</td>
<td>76.9%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>15</td>
<td>23.1%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>65</td>
<td></td>
<td>27.02</td>
<td>7.019</td>
<td>19-45</td>
</tr>
<tr>
<td>Ethnicity</td>
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<td></td>
</tr>
<tr>
<td>White</td>
<td>52</td>
<td>80.0%</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>African/American</td>
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<td>7.7%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>1</td>
<td>1.5%</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>3</td>
<td>4.6%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>6.2%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online courses</td>
<td>65</td>
<td></td>
<td>3.51</td>
<td>4.012</td>
<td>0-20</td>
</tr>
<tr>
<td>Internet Speed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dial-up</td>
<td>9</td>
<td>13%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSL</td>
<td>49</td>
<td>75.4%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other high-speed</td>
<td>7</td>
<td>10.8%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Checking the Regression Assumptions

Prior to the execution of the multiple regression analysis, an examination of missing data, multicollinearity, outliers and influential points was performed. The purpose of using multiple regression is to create an equation that can be used for
predicting the dependent variable from the independent variables. Missing data, outliers and influential points, and high intercorrelation among the independent variables can all affect the accuracy of estimated coefficients and the fitness of the regression model.

**Missing Data**

Because the online survey used in this study was designed so that respondents were required to answer all the questions on a page before they could proceed to the next page with the next set of questions, there was no problem with missing data in this study. In the case when a respondent skipped a question, he/she got a message saying: “You have not answered all the questions on this page.” All students who started the survey completed it, so, there were no missing data in this study.

**The Assumptions of Normality, Linearity, and Homoscedasticity**

Normality, linearity, homoscedasticity, and independence of observations are the assumptions important to the use of multiple regression (Noursis, 2002). Before conducting the multiple regression, the data were examined to determine if the assumptions of normality, linearity and homoscedasticity of the residuals and errors were met. Figures 1 and 2 show the normal distribution of the two dependent variables: satisfaction, and grades respectively.
Figure 1: The Distribution of the Dependent Variable: Satisfaction

Figure 2: The Distribution of the Dependent Variable: Course Grades
The One-Sample Kolmogorov-Smirnov Test was also conducted to test the normality assumption in the linear regression model. As Table 3 demonstrates, the One-Sample Kolmogorov-Smirnov Test shows that the assumption of normality was met.

Table 3

*Testing the Assumption of Normality*

<table>
<thead>
<tr>
<th></th>
<th>Personal interaction</th>
<th>Overall interaction</th>
<th>Satisfaction</th>
<th>Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td><strong>Normal Parameters (a,b)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>51.72</td>
<td>52.40</td>
<td>76.94</td>
<td>35.00</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>9.363</td>
<td>8.794</td>
<td>13.198</td>
<td>7.703</td>
</tr>
<tr>
<td><strong>Most Extreme Differences</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>.073</td>
<td>.095</td>
<td>.096</td>
<td>.118</td>
</tr>
<tr>
<td>Positive</td>
<td>.057</td>
<td>.051</td>
<td>.055</td>
<td>.063</td>
</tr>
<tr>
<td>Negative</td>
<td>-.073</td>
<td>-.095</td>
<td>-.096</td>
<td>-.118</td>
</tr>
<tr>
<td><strong>Kolmogorov-Smirnov Z</strong></td>
<td>.588</td>
<td>.768</td>
<td>.949</td>
<td>.775</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.879</td>
<td>.597</td>
<td>.329</td>
<td>.586</td>
</tr>
</tbody>
</table>

a Test distribution is Normal.

The linearity assumption of the regression models was examined by scatterplots of standardized residuals versus standardized predicted values. Linearity was examined by looking at the bivariate scatterplots between each of the independent variables and the dependent variables. The plots in Figures 3 through 6 showed varying degrees of linearity, and the assumption of linearity appeared to be violated to some extent due solely to the independent variable, *Age*. This variable had a nonlinear relationship with each of the dependent variables, satisfaction with course, and course grades (see Appendix H).
Figure 3: The Residuals against the Predicted Values (Dependent: Satisfaction)

Figure 4: The Residuals against the Predicted Values (Dependent: Grades)
Figure 5: The Bivariate Scatterplots (Dependent: Satisfaction)
Figure 6: The Bivariate Scatterplots (Dependent: Grade)
Although the variable, Age contributed so little to the predictability of each of the two dependent variables, and was not really much correlated with anything, and thus could have been removed from the regression equation, the researcher tried to transform this variable using a number of methods including squaring it, and taking the square log, but this did not eliminate the nonlinearity. The ANOVA test of linearity (the deviation from linearity component) calculated for each pair of variables: Age and Satisfaction with course (F = 0.915, p = 0.566) and Age and course grades (F = 0.988, p = 0.489), was not significant, which suggests that the deviation from linearity was not serious. As a result, a decision has been made to keep this variable in the regression equation.

The scatterplots of standardized residuals versus standardized predicted values in Figures 3 and 4 were also examined to see if the assumption of homoscedasticity (the variance of residual error is constant for all values of the independent variables) was met. The dots in the scatterplot array randomly dispersed around a horizontal line of zero, which means that the assumption of homoscedasticity was met.

**Outliers and Influential Points**

Multiple regression analysis can be very sensitive to outliers or influential cases, because they can affect the interpretation of the results (Stevens, 1999). To detect the outliers in the data, two values were examined: standardized residuals, and Cook’s Distance. Stevens (1999) noted that the standardized residuals can be used to identify outliers. If the model is correct, then standardized residuals will have a normal distribution with mean of 0 and a standard deviation of 1, and thus about 95% of the cases should lie within two standard deviations of the mean and 99% within three standard deviations. Any standardized residual greater than about 3 in absolute value is
unusual and should be carefully examined (Stevens, 1999, p. 281). The case summary in Table 4 shows that with regard to the dependent variable, satisfaction with the course, there were no cases with a standardized residual greater than 3 in absolute value.

Table 4

*Residuals Statistics for the Dependent Variable, Course Satisfaction*

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted Value</td>
<td>18.69</td>
<td>46.18</td>
<td>35.00</td>
<td>5.763</td>
<td>65</td>
</tr>
<tr>
<td>Residual</td>
<td>-11.530</td>
<td>11.375</td>
<td>.000</td>
<td>5.112</td>
<td>65</td>
</tr>
<tr>
<td>Std. Predicted Value</td>
<td>-2.831</td>
<td>1.939</td>
<td>.000</td>
<td>1.000</td>
<td>65</td>
</tr>
<tr>
<td>Std. Residual</td>
<td>-2.166</td>
<td>2.136</td>
<td>.000</td>
<td>.960</td>
<td>65</td>
</tr>
</tbody>
</table>

a Dependent Variable: Satisfaction

As for the dependent variable, course grades, Tables 5 shows that there was a standardized residual absolute value greater than 3 (-3.717), by checking the casewise diagnostics table, it was found that only case number 29 has a course grade of 26, the grade was verified to be accurate.
Table 5

*Residuals Statistics for the Dependent Variable, Course Grades*

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted Value</td>
<td>69.46</td>
<td>83.99</td>
<td>76.94</td>
<td>3.234</td>
<td>65</td>
</tr>
<tr>
<td>Residual</td>
<td>-49.116</td>
<td>23.966</td>
<td>.000</td>
<td>12.795</td>
<td>65</td>
</tr>
<tr>
<td>Std. Predicted Value</td>
<td>-2.312</td>
<td>2.181</td>
<td>.000</td>
<td>1.000</td>
<td>65</td>
</tr>
<tr>
<td>Std. Residual</td>
<td>-3.717</td>
<td>1.814</td>
<td>.000</td>
<td>.968</td>
<td>65</td>
</tr>
</tbody>
</table>

a Dependent Variable: Course Grades

To address this problem, the multiple regression analysis was run with and without this case, and the results were not affected (see Appendix G). Therefore, responses from all the respondents, a total of 65, were included for the statistical analyses.

The value of Cook’s Distance was also examined to determine the possible influential data points. Cook and Weisberg (cited in Stevens, 1999) pointed out that a Cook’s Distance > 1 would be considered large, and thus identifies an influential point. The residuals statistics of the regression models showed that Cook’s distance values were below 1 (see Appendix H).

*Multicollinearity*

Multiple regression examines the relationship between a dependent variable and a number of independent variables. When two independent variables are highly correlated, they both suggest the same information. As a result, one of them will not contribute significantly to the model after the other one is included. Multicollinearity becomes a problem when we try to understand how each of the independent variables impacts the
dependent variable. Multicollinearity also can cause the confidence intervals on the regression coefficients to be very wide, which threatens the validity of the regression equation. According to Field (2000), a researcher should be concerned with collinearity if correlations between two predictors are $\geq 0.70$. Allison (1999) used the more conservative correlation $\geq 0.60$ to diagnose collinearity.

To diagnose multicollinearity, Pearson correlations were calculated for each pair of the independent variables. Table 6 presents the values of the Pearson correlations between the independent variables. As shown in the correlation matrix in Table 6, the correlation between perceptions of personal interaction and overall interaction was significant at the 0.01 level ($r = 0.588$, $P < .01$). However, the correlation coefficient was not large enough to suggest a problem with collinearity.

Table 6

*Pearson Correlations between the Independent Variables*

<table>
<thead>
<tr>
<th></th>
<th>Personal Interaction</th>
<th>Overall interaction</th>
<th>Gender</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal interaction Pearson Correlation</td>
<td>1</td>
<td>.588(**)</td>
<td>-.067</td>
<td>.023</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.594</td>
<td>.856</td>
<td></td>
</tr>
<tr>
<td>Overall interaction Pearson Correlation</td>
<td>1</td>
<td>.046</td>
<td>-.006</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.716</td>
<td>.963</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender Pearson Correlation</td>
<td>1</td>
<td>.017</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.893</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age Pearson Correlation</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed). N=65
In the regression models, Variance Inflation Factor (VIF) and Tolerance statistics values were also examined to assess multicollinearity in the data. Myers states that “it is generally believed that if any VIF exceeds 10, there is reason for at least some concern” (as cited in Stevens, 1999, pp. 254-255). Some authors use the more conservative cutoff of 5.0 or even 4.0 to signal a problem with multicollinearity. A tolerance value below 0.1 also indicates a serious problem with collinearity (Stevens, 1999). In the regression model conducted in this study, the VIF values were all around 1.05, and the tolerance values ranged between 0.645 and 0.998, which confirms that collinearity was not a problem for the regression model.

Multiple Regression Analysis: Research Question 1

A multiple regression was conducted to answer Research Question 1: Are perceived personal interaction, perceived overall interaction, gender, and age significant predictors of students’ satisfaction with the course? This analysis was intended to determine if the independent variables, perceived personal interaction, perceived overall interaction, age, and gender were significant predictors of the dependent variable, satisfaction with the course. Perceived personal interaction, which is a measure of the perceived individual involvement of each participant, was compiled from a set of 15 questions. Another set of questions (16-31) was used to determine the measure, perception of overall interaction, or the perceived involvement of other members of the class. A third set of questions (32-41) was used to measure students’ satisfaction with the course, or their “perceived value and quality of instruction.” A single dummy variable (0 for male and 1 for female) was used to code gender. As discussed earlier in this chapter, the data collected were examined to see if the assumptions for multiple
regression were met. The data were found to meet the assumptions of linearity, normality and homoscedasticity of residuals and errors.

Pearson product-moment correlation coefficients were calculated to determine the correlations between perceived personal interaction, perceived overall interaction, gender, age, and satisfaction. Table 7 shows the correlations between the independent variables and the dependent variable, satisfaction with the course.

Table 7

Correlations between the Independent Variables and Dependent Variable, Satisfaction

<table>
<thead>
<tr>
<th></th>
<th>Personal</th>
<th>Overall</th>
<th>Satisfaction</th>
<th>Gender</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.588(**)</td>
<td>.475(**)</td>
<td>-.067</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.594</td>
<td>.856</td>
</tr>
<tr>
<td>Overall</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.709(**)</td>
<td>.046</td>
<td>-.006</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.716</td>
<td>.963</td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>-.167</td>
<td>.010</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.183</td>
<td>.934</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.017</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.893</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Pearson Correlation</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
N=65

As shown in Table 7, positive correlations were found between perceptions of personal interaction and overall interaction: \( r = 0.588 \) (N = 65, p < 0.01), which may be
explained by the fact that students who actively participate in the course activities seem to have a more positive perception of the overall interaction that took place in the course more than those who see themselves as having participated less in the interactions that occurred in the course. The value $r = 0.588$ indicates that about 34% of the variance in the perceptions of overall interaction can be accounted for by the perceptions of personal interaction.

The correlation between perceived personal interaction and satisfaction was $r = 0.475$ ($N = 65, p < 0.01$), which indicates that only 22% of the variance in satisfaction was accounted for by the perception of personal interaction. The correlation between perceived overall interaction and satisfaction was $r = 0.709$, which signifies that the perceptions of overall interaction accounted for a noticeably larger proportion of variance (about 50%) in satisfaction than did the perceived personal interaction.

Knowing that the perceived overall interaction has a higher correlation with satisfaction in online courses, and is thus a better predictor of it, the question was: What improvement in the prediction would result from including the other predictors, perceived personal interaction, gender, and age into the regression model? Perceived overall interaction, perceived personal interaction, gender, and age were entered simultaneously into the regression model through means of forced entry using the Enter method.

Table 8 shows that the regression model with all the four predictors was significant $F(4, 60) = 17.948, p < .001$. The value of multiple correlation ($R$), which indicates how well the independent variables combined predict the dependent variable was $R = 0.738$, which means that all the predictors accounted for about 54% of the variation in the dependent variable, satisfaction with the course.
Table 8

*The Regression Model with four predictors (Dependent Variable: Satisfaction)*

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R^2</th>
<th>Adj. R^2</th>
<th>R^2</th>
<th>Std. Error of Estimate</th>
<th>Change Statistics</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.738 (a)</td>
<td>0.545</td>
<td>0.514</td>
<td>0.536</td>
<td>5.368</td>
<td>0.545</td>
<td>17.948</td>
<td>4</td>
<td>60</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

(a Predictors: (Constant), Personal, Overall, Age, Gender)

The regression coefficients in Table 9 show the individual contribution of each predictor as indicated by part correlation, which is the correlation between a predictor and the dependent variable partialling out the effects of all other predictors (Green & Salkind, 2005).

Table 9

*The Regression Coefficients of the Four Predictors (Dependent Variable: Satisfaction)*

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
<th>Partial</th>
<th>Part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>3.348</td>
<td>5.212</td>
<td>.642</td>
<td>.523</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Personal</td>
<td>.050</td>
<td>.089</td>
<td>.061</td>
<td>.561</td>
<td>.577</td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>.597</td>
<td>.095</td>
<td>.682</td>
<td>6.295</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>-3.533</td>
<td>1.593</td>
<td>-.195</td>
<td>-2.218</td>
<td>.030</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>.018</td>
<td>.096</td>
<td>.016</td>
<td>.188</td>
<td>.852</td>
</tr>
</tbody>
</table>

As indicated in Table 9, among the four predictors, the overall interaction had the highest part correlation with the dependent variable, satisfaction, which suggests that
overall interaction was the most important variable in predicting students’ satisfaction with the course. The next important predictor was gender. Personal interaction and age contributed very little to the predictability of the dependent variable. The regression equation for the model can be written as follows:

\[ \hat{Y} = 3.348 + 0.050 \text{ (Personal)} + 0.597 \text{ (Overall)} - 3.533 \text{ (Gender)} + 0.018 \text{ (Age)} \]

\[ \hat{Y} = \text{ predicted value for the dependent variable, students’ satisfaction with the Course} \]

Personal = Perceptions of Personal Interaction Score

Overall = Perceptions of Overall Interaction Score

Gender = Gender (0 = male, 1 = female)

Age = Age of respondent

Because neither perceived personal interaction \((t = 0.561, p = 0.577)\) nor age \((t = 0.188, p = 0.852)\) accounted for a significant amount of variation in the dependent variable, satisfaction with course, the multiple regression analysis was run again after the exclusion of these two variables. The resulting regression model (Table 10) with only two predictors: perceived overall interaction, and gender, was significant, \(R^2 = 0.542, F (2, 62) = 36.689, p < .000\). Results demonstrated that excluding the two predictors, perceptions of personal interaction and age from the model didn’t decrease its predictive power. On the contrary, the adjusted \(R^2\) increased from \(R^2 = 0.514\) to \(R^2 = 0.527\).
Table 10

*The Regression Model with Two Predictors (Dependent Variable: Satisfaction)*

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adj. R Square</th>
<th>Std. Error of Estimate</th>
<th>Change Statistics</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.736(a)</td>
<td>.542</td>
<td>.527</td>
<td>5.297</td>
<td>.542</td>
<td>36.689</td>
<td>2</td>
<td>62</td>
<td>.000</td>
</tr>
</tbody>
</table>

a Predictors: (Constant), Gender, Overall interaction

Table 11 shows the coefficients of the regression model with only two predictors, overall interaction and gender.

Table 11

*The Regression Coefficients for the Final Model (Dependent Variable: Satisfaction)*

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
<td>Partial</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>4.849</td>
<td>4.127</td>
<td>1.175</td>
<td>.245</td>
</tr>
<tr>
<td>Overall</td>
<td>.629</td>
<td>.075</td>
<td>.718</td>
<td>8.342</td>
<td>.000</td>
</tr>
<tr>
<td>Gender</td>
<td>-3.633</td>
<td>1.561</td>
<td>-.200</td>
<td>-2.327</td>
<td>.023</td>
</tr>
</tbody>
</table>

As shown in Table 11, the beta weights of gender and perceived overall interaction have changed, and hence the interpretation of the importance of these two independent variables, after removing the other two variables from the regression model. The new regression coefficients attached to these two factors were used in the prediction equation of the new model. The unstandardized regression coefficients (B) signified the
slope weight for each predictor in the model, the regression equation can be written as follows:

\[ \hat{Y} = 4.849 + 0.629 \text{ (Overall)} - 3.633 \text{ (Gender)} \]

\[ \hat{Y} \] = predicted value for the dependent variable, students’ satisfaction with the Course

Overall = Overall interaction Score

Gender = Gender (0 = male, 1 = female)

The regression equation indicated that the perceptions of overall interaction and gender influence students’ satisfaction with course. Males with higher perceptions of overall interaction seemed to be more satisfied with the course.

Multiple Regression Analysis: Research Question 2

Research Question 2: Are perceived personal interaction, perceived overall interaction, gender, and age significant predictors of students’ course grades? To answer Research Question 2, a multiple regression analysis was conducted to determine if the independent variables, perceived personal interaction, perceived overall interaction, gender, and age, were significant predictors of the dependent variable, course grades. As Table 12 indicates, there were no significant correlations between any of the independent variables and the dependent variable, course grades.
Table 12

*Correlations among Independent Variables and Dependent Variable, Course Grades*

<table>
<thead>
<tr>
<th></th>
<th>Grade</th>
<th>Gender</th>
<th>Age</th>
<th>Personal</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.062</td>
<td>.022</td>
<td>.198</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.623</td>
<td>.864</td>
<td>.114</td>
<td>.846</td>
</tr>
<tr>
<td>Gender</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.017</td>
<td>-.067</td>
<td>.046</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.893</td>
<td>.594</td>
<td>.716</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.023</td>
<td>-.006</td>
<td></td>
</tr>
<tr>
<td>Personal</td>
<td>Pearson Correlation</td>
<td>1</td>
<td></td>
<td>.588(**)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>Pearson Correlation</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
N=65

To examine the relationship between the independent variables combined and course grades, a multiple regression analysis was run. All the independent variables were entered into the regression model simultaneously using the Enter method. Table 13 displays the results of the regression model analysis.
Table 13

*The Regression Model (Dependent Variable: Course Grades)*

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adj. R Square</th>
<th>Std. Error of Estimate</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.245(a)</td>
<td>.060</td>
<td>-.003</td>
<td>13.215</td>
<td>.060</td>
<td>.958</td>
<td>4</td>
<td>60</td>
<td>.437</td>
</tr>
</tbody>
</table>

a Predictors: (Constant), Personal, Overall, Gender, Age

Table 13 shows that the regression equation with all the predictors was not significant, $R^2 = 0.060$, $F(4, 60) = .958$, $p = 0.437$. In other words, all the predictors combined did not account for any significant variation in the dependent variable, course grades. Table 14 displays the correlation coefficients of the predictors of the regression model.

Table 14

*The Coefficients for the Regression Model (Dependent Variable: Course Grades)*

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>64.755</td>
<td>12.830</td>
</tr>
<tr>
<td></td>
<td>Personal</td>
<td>.413</td>
<td>.220</td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>-.227</td>
<td>.234</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>2.754</td>
<td>3.922</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>.024</td>
<td>.236</td>
</tr>
</tbody>
</table>
Exploring the Role of Engagement in Learning

*Engagement as an independent variable*

Item Number 42 in the scale, which assessed whether students perceived themselves engaged in learning in the course, was added to the scale to explore the relationship between engagement in learning and students’ satisfaction with the course and with students’ course grades. The relationship between the variables: personal interaction, overall interaction, gender, age and engagement in learning both as an independent variable and as a dependent variable was examined. Table 15 presents the Pearson product-moment correlation coefficients between engagement in learning, satisfaction, gender, course grades, perceived personal interaction, and perceived overall interaction.
Table 15

Correlations between Engagement, Personal Interaction, Overall Interaction, Satisfaction, Gender, and Grade

<table>
<thead>
<tr>
<th></th>
<th>Engagement</th>
<th>Personal</th>
<th>Overall</th>
<th>Satisfaction</th>
<th>Gender</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>0.558(**)</td>
<td>0.559(**)</td>
<td>0.755(**)</td>
<td>-0.115</td>
<td>0.264(*)</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.361</td>
<td>0.033</td>
<td></td>
</tr>
<tr>
<td>Personal</td>
<td>0.000</td>
<td>1</td>
<td>0.588(**)</td>
<td>0.475(**)</td>
<td>-0.067</td>
<td>0.198</td>
</tr>
<tr>
<td>Sig.</td>
<td></td>
<td>0.000</td>
<td>0.000</td>
<td>0.594</td>
<td>0.114</td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>0.000</td>
<td>0.000</td>
<td>1</td>
<td>0.709(**)</td>
<td>0.046</td>
<td>0.024</td>
</tr>
<tr>
<td>Sig.</td>
<td></td>
<td></td>
<td></td>
<td>0.000</td>
<td>0.716</td>
<td>0.846</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>0.000</td>
<td></td>
<td></td>
<td>0.000</td>
<td>-0.167</td>
<td>0.098</td>
</tr>
<tr>
<td>Sig.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.183</td>
<td>0.435</td>
</tr>
<tr>
<td>Gender</td>
<td>0.062</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.623</td>
<td></td>
</tr>
<tr>
<td>Grade</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
N=65

As Table 15 shows, statistically significant correlations were found between engagement in learning and perceived personal interaction; perceived overall interaction; satisfaction with the course; and course grade.

The correlation between engagement in learning and satisfaction was $r = 0.755$.

Given this high correlation between engagement in learning and satisfaction with the
course, this variable was entered into the regression model to see whether adding it as a predictor will improve the predictive power of the final model with the two independent variables, perceived overall interaction and gender. The three variables were entered into the regression model using the Hierarchical method. Table 16 shows the regression model, and the $R^2$ change.

Table 16

*The Regression Model with three predictors (Dependent Variable: Satisfaction)*

<table>
<thead>
<tr>
<th>Model</th>
<th>$R$</th>
<th>$R^2$</th>
<th>Adj. $R^2$</th>
<th>Std. Error of Estimate</th>
<th>$R^2$ Change</th>
<th>$F$ Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.736(a)</td>
<td>.542</td>
<td>.527</td>
<td>5.297</td>
<td>.542</td>
<td>36.689</td>
<td>2</td>
<td>62</td>
<td>.000</td>
</tr>
<tr>
<td>2</td>
<td>.840(b)</td>
<td>.705</td>
<td>.691</td>
<td>4.283</td>
<td>.163</td>
<td>33.840</td>
<td>1</td>
<td>61</td>
<td>.000</td>
</tr>
</tbody>
</table>

a Predictors: (Constant), Overall interaction, Gender
b Predictors: (Constant), Overall interaction, Gender, Engagement in learning

As shown in Table 16, the regression model with the three predictors: engagement in learning, perceptions of overall interaction, and gender, was significant and that the three predictors accounted for about 70% of the variance in the dependent variable, satisfaction with course, while the regression model with the two predictors (perceived overall interaction, and gender) accounted only for 54% of the variance in students’ satisfaction with the course. These results demonstrate that adding engagement in learning as a third predictor to the regression equation changed $R^2$ by 0.163. Table 17 displays the correlation coefficients of the predictors of the regression model.
Statistically significant correlations were also found between engagement in learning and perceptions of personal interaction, \( r = 0.558, p < 0.001 \), which may be explained by the fact that students who are more engaged with learning tend to participate more in the course activities. Small, yet statistically significant correlations were found between engagement in learning and course grades, \( r = 0.264, p < 0.05 \). The small correlation might be due to the fact that engagement in learning was only measured by one question in the scale. The significant correlations between engagement in learning and course grades suggests that further research is needed to further examine the relationship between students’ engagement with learning and their grades.
Engagement as a dependent variable

To explore the relationship between the independent variables: perceptions of personal interaction, perceptions of overall interaction, gender, age and the dependent variable, engagement in learning, a multiple regression analysis was run. All the independent variables were entered into the regression model simultaneously using the Enter method. Table 18 displays the results of the regression model analysis.

Table 18

The Regression Model with Four Predictors (Dependent Variable: Engagement)

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R²</th>
<th>Adj. R²</th>
<th>Std. Error of Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R² Change</td>
</tr>
<tr>
<td>1</td>
<td>.637(a)</td>
<td>.405</td>
<td>.366</td>
<td>.803</td>
<td>.405</td>
</tr>
</tbody>
</table>

a Predictors: Constant, Personal Interaction, Overall Interaction, Gender, Age

As shown in Table 18, the regression model with four predictors: perceptions of personal interaction, perceptions of overall interaction, gender, and age, was significant, \( R^2 = 0.405, F(4, 60) = 10.217, p < .000 \). In other words, the four predictors accounted for about 40% of the variance in the dependent variable, engagement in learning. Table 19 displays the correlation coefficients of the predictors of the regression model.
Table 19

*The Regression Coefficients of Four Predictors (Dependent Variable: Engagement)*

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>-.077</td>
<td>.779</td>
</tr>
<tr>
<td></td>
<td>Personal Interaction</td>
<td>.036</td>
<td>.013</td>
</tr>
<tr>
<td></td>
<td>Overall Interaction</td>
<td>.042</td>
<td>.014</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>-.259</td>
<td>.238</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>-.003</td>
<td>.014</td>
</tr>
</tbody>
</table>

As indicated in Table 19, among the four predictors, the perceptions of overall interaction had the highest part correlation with the dependent variable, engagement in learning, which suggests that perceived overall interaction was the most important variable in predicting students’ engagement with learning. The next important predictor was personal interaction. Neither gender nor age was a significant predictor of students’ engagement with learning.
Summary

This chapter presented the results of data analysis from 65 participants. Important findings of this study are summarized as follows:

Research Question 1: Are perceived personal interaction, perceived overall interaction, gender, and age significant predictors of students’ satisfaction with the course?

- The multiple regression conducted with all four predictors was significant, $R = 0.738$, $R^2 = 0.545$, $F(4, 60) = 17.948$, $p < .001$. In other words, all the predictors combined accounted for about 54% of the variation in course satisfaction.

- Because neither the perceived personal interaction nor age was a significant predictor, the multiple regression analysis was run again after excluding these two variables. The resulting regression model was significant, $R = 0.736$, $R^2 = 0.542$, $F(2, 62) = 36.689$, $p < .001$. Excluding the perceptions of personal interaction and age from the regression equation increased the adjusted $R^2$ from 0.514 to 0.527

Research Question 2: Are perceived personal interaction, perceived overall interaction, gender, and age significant predictors of students’ grades?

- The multiple regression conducted with all the four predictors was not significant, $R^2 = 0.060$, $F(4, 60) = .958$, $p = .437$, which means that all the predictors combined did not account for any significant variation in the dependent variable, course grades.

Additional findings: Engagement

The following findings are tentative, because they are based on one exploratory item:

- Statistically significant correlations were found between engagement in learning and satisfaction with the course. When engagement in learning
was added as a third predictor to predict satisfaction, along with perceived overall interaction and gender, the predictive power of the regression model considerably increased, $R^2$ went from 0.542 to $R^2 = 0.705$. The new regression model was significant, $F (3, 61) = 48.695, p < .001$.

- Statistically significant correlations were also found between engagement in learning and both perceived personal interaction, $r = 0.558, p < 0.01$, and perceived overall interaction, $r = 0.559, p < 0.01$.

- To explore the relationship between the independent variables: perceptions of personal interaction, perceptions of overall interaction, gender, age and the dependent variable, engagement in learning, a multiple regression analysis was run. All the independent variables were entered into the regression model simultaneously using the Enter method.

- The regression model with four predictors: perceptions of personal interaction, perceptions of overall interaction, gender, and age, was significant, $R^2 = 0.405, F (4, 60) = 10.217, p < .000$. In other words, the four predictors accounted for about 40% of the variance in the dependent variable, engagement in learning. Table 19 displays the correlation coefficients of the predictors of the regression model.

- Among the four predictors, the perceived overall interaction had the highest part correlation with the dependent variable, engagement in learning, which suggests that overall interaction was the most important variable in predicting students’ engagement with learning. The next
important predictor was perceived personal interaction. Neither gender nor age was a significant predictor of students’ engagement with learning.

- A small, yet statistically significant correlation was found between engagement in learning and course grades, $r = 0.264, p < 0.05$. This significant correlation suggests that further research is needed to examine the relationship between students’ engagement with learning and their course grades.
CHAPTER 5

Findings

This chapter will provide a summary of the findings from the data analysis. Results will be presented and discussed in the light of the current literature. Practical implications, limitations and recommendations for further research will follow.

The current study used a descriptive correlational design to examine how well the perceptions of personal interaction, perceptions of overall interaction in the course, gender, and age predict students’ satisfaction with the course and students’ course grades. The data were collected using a Web-based survey, which was sent via an e-mail invitation to two different groups of students who were enrolled in the same online course and taught by the same instructor in a Midwestern community college during the spring and the summer quarters of 2006. During the data collection period, 65 students participated in the study, yielding a return rate of 37%.

The purpose of this study was to answer two overarching questions: 1) Are perceived personal interaction, perceived overall interaction, gender, and age significant predictors of students’ satisfaction with the course? 2) Are perceived personal interaction, perceived overall interaction, gender, and age significant predictors of students’ course grades?

Multiple regression analysis was used to answer Research Question 1: Are perceived personal interaction, perceived overall interaction, gender, and age significant predictors of students’ satisfaction? All variables were entered simultaneously into the regression method using the Enter method. The regression model with the four predictors: perceived personal interaction, perceived overall interaction, gender, and age
was significant, $R=0.738$, $R^2=0.545$, $F(4, 60)=17.948$, $p<.001$. All four predictors accounted for about 54% of the variation in the dependent variable, satisfaction with the course.

An examination of the contribution of each of the four predictors revealed that the perceived overall interaction was the most important among the four predictors, followed by gender. Neither perceived personal interaction nor age accounted for a significant amount of variation in the dependent variable, satisfaction with the course. Therefore, these two variables were removed from the regression model. The regression model with only two predictors, perceived overall interaction and gender, was significant, $R=0.736$, $R^2=0.542$, $F(2, 62)=36.689$, $p<.001$, which indicates that male students who perceived the overall interaction in the course to be high were more satisfied with the course. Removing age and perceived personal interaction from the regression model increased the value of adjusted $R^2$ from 0.514 to 0.527.

Multiple regression analysis was also used to answer Research Question 2: Are perceived personal interaction, perceived overall interaction, gender, and age significant predictors of students’ course grades? The regression equation with all the predictors was not significant, $R=0.245$, $R^2=0.060$, $F(4, 60)=.958$, $p=.437$. In other words, all the predictors combined did not account for any significant variation in the dependent variable, course grades.

An exploratory question was added at the end of the survey to investigate the relationship between engagement in learning and students’ satisfaction with the course, and between engagement in learning and course grades. Pearson product-moment correlation coefficients revealed that there are statistically significant correlations
between engagement in learning and satisfaction with the course; perceived personal interaction; perceived overall interaction, and course grades.

The correlations between engagement in learning and satisfaction were \( r = 0.755 \). When engagement in learning was entered into the regression model, along with overall and gender, the new model was significant, \( R^2 = 0.705, F (3, 61) = 48.695, p < .001 \). Adding engagement in learning as a third predictor to the regression model significantly improved its predictive power, \( R^2 \) went from \( = 0.542 \) to \( R^2 =0.705 \). In other words, the regression model with the three predictors: engagement in leaning, perceived overall interaction, and gender accounted for about 70% of the variance in the students’ satisfaction with the course.

Statistically significant correlations were also found between engagement in learning and both perceived personal interaction, \( r = 0.558, p < 0.01 \), and perceived overall interaction, \( r = 0.559, p < 0.01 \). A small but significant correlations were found between engagement in learning and course grades, \( r = 0.264, p < 0.05 \).

To explore the relationship between the independent variables: perceived personal interaction, perceived overall interaction, gender, age and the dependent variable, engagement in learning, a multiple regression analysis was run. All the independent variables were entered into the regression model simultaneously using the Enter method. The regression model with four predictors: personal interaction, overall interaction, gender, and age, was significant, \( R^2 = 0.405, F (4, 60) = 10.217, p < .000 \). In other words, the four predictors accounted for about 40% of the variance in the dependent variable, engagement in learning.
Among the four predictors, the perceived overall interaction had the highest part correlation with the dependent variable, engagement in learning, which suggests that overall interaction was the most important variable in predicting students’ engagement with learning. The next important predictor was perceived personal interaction. Neither gender nor age was a significant predictor of students’ engagement with learning.

Conclusions

Personal versus Overall Interaction

The results of the data analysis in this study indicated that the perception of the overall interaction that took place in the course was a better predictor of students’ satisfaction with the course than their perceptions of personal interactions. When the perceptions of personal interaction were removed from the predictive model, the model was not affected. This suggests that the perceptions of personal interaction were almost superfluous addition. This finding confirms the findings of Fulford and Zhang’s study (1993) which found that perceived overall interaction was the critical predictor in students’ satisfaction. This finding implies that a key factor in students’ satisfaction with the course was not the extent to which students visibly participated in the interaction that was occurring in the course, but rather their perception that there was much interaction in the course. The potential for interaction should be carefully considered when designing distance education courses, even if students do not take advantage of this potential (Kearsley, 1995).

Perceived overall interaction was also a better predictor of students’ engagement in learning than the perception of personal interaction. Perceived overall interaction had a higher part correlation with the dependent variable, engagement in learning, than
perceived personal interaction. This suggests that perceived overall interaction was the most important variable in predicting students’ engagement with learning.

The relationship between perceptions of overall interaction and both students’ satisfaction with the course and students’ engagement in learning suggests that students learn and benefit from observing their peers interacting with one another or with the instructor. Individuals who would not initiate interaction on their own can benefit from observing class interactions. This exposure to new ideas can help students learn as if they initiated or participated in the interaction themselves. This finding can be explained in the light of social cognitive learning theory which proposes that people can learn by observing the behaviors of others. While behaviorists viewed learning largely as a matter of trial and error—people learn by making a variety of responses and then modifying behavior based on the consequences that their responses bring—social learning theorists propose that most learning take place not through trial and error but instead through watching the behavior of other individuals.

Bandura makes a distinction between learning through observation (something he called vicarious learning) and the actual performance of what has been learned. What people learn may not necessarily be reflected in behavior exhibited at the same time, at a later time, or never. As noted earlier, people can learn by watching others without necessarily imitating the behaviors they have seen. At least two sources of evidence indicate that this is true. First, people can verbally describe a behavior they have observed without actually performing it. Second, people who observe a model perform a behavior may not demonstrate the behavior until some later time when they have a reason for doing so (Ormrod, 2004).
According to Bandura (1977), many of the behaviors that people exhibit have been acquired through observing and modeling what others do. Likewise, students can learn a great deal only by observing others. Students can learn many academic skills by seeing others demonstrating those skills. For example, they may learn how to solve division problems or write a cohesive paragraph or story partly by observing how their teachers and peers do these things. In discussions, students may adopt one another’s strategies for conducting discussions, for example soliciting one another’s strategies, voicing agreement or disagreement, and justifying their points of view (Ormorod, 2004).

Gender Differences in Online Learning

No statistically significant differences in the perceptions of personal interaction were found between males and females in this study. This corroborates Althaus’ (1997) findings that gender does not affect interaction. Participants in Althaus study were 142 undergraduate students. On the other hand, this finding is different from Kim and Moore’s (2005) who examined 82 graduate students who were taking at least one Web–based course from a public Midwest university, and found that interaction was related to the gender of students. Female students reported higher frequency of interaction with other learners and tended to be more actively involved in interaction than male students. Examining 265 undergraduate students at a large private university, Monson (2003) also found that gender was related to the perceptions of interaction in online learning. Males perceived discussion more positively than female learners, while females perceived feedback to be more important than males did.

The current study did not find significant differences between males and females in the perceptions of overall interaction. Gender was also found to be unrelated to course
grade or students’ satisfaction with the course. Research on the relationship between gender and course satisfaction and grades in online settings has yielded unequivocal results. For example, Hong (2002) who examined 26 graduate students enrolled in a mandatory online course in the Master of Science program, found no significant relationships between gender and both course satisfaction and achievement. On the other hand, Frederickson et al. (2000) reported that women were more satisfied with their courses and with online learning in general than their male classmates. Women also reported higher levels of participation than men, and felt that they learned more. Participants in Frederickson’s et al. study were 1,406 undergraduate students enrolled at the State University of New York (SUNY) Learning Network (SLN) on-line instructional program, who represent approximately 42% of enrollees for the spring 1999 semester. Because of the inconsistent findings in the research, gender should be examined more thoroughly in online courses in further research. Caution must be used in accepting this finding as a sweeping generalization.

*Interaction and Course Grades*

This study found no relationship between perceived interaction (personal and overall) and students’ course grades. This confirms the findings of Sutton (2000) who found that the students’ achievement in a graduate online course in social sciences was not related to how much students were interacting. Achievement of low visibility students was not significantly different from that of high visibility students. Hong (2002) also found that perceptions of interactions were not related to learning outcomes. Those students who entered the course with better Cumulative Grade Point Average (CGPA) scores achieved higher final grades in the course.
After dividing an online class into three groups (high interaction, moderate interaction, and low interaction), Beaudoin (2002) found that the high interaction students achieved the highest performance, the low interaction group performed higher than did the moderate interaction group. Beaudoin concluded that some students may not need to participate actively in the course to do well on a test or an exam.

When we look at all the variables impacting grades, it is clear that the characteristics that students already have when they begin the class are by far the most important predictors of performance on the exam. These student characteristics have a strong to moderate relationship to exam scores. Those who enter a course with stronger skills will also learn more in the course (Duffy et al., 2005).

*Engagement in Learning*

Engagement in learning is how involved students are in the material they study and in the learning process itself (Kearsley & Shneiderman, 1998). Kearsley and Shneiderman argued that students must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks. This study found that students’ engagement in learning was significantly related to students’ satisfaction which suggests that students who perceived themselves to be engaged and actively involved in learning were more satisfied with the course than the others. Engagement in learning was also significantly related to students’ grades. Students who were more engaged in learning achieved better and got higher grades than the others.

The findings of this study substantiate the findings of prior research which established that students’ engagement in learning is linked to valued outcomes of college (Chickering & Gamson, 1987; Kuh, 2001, 2003), and that students who are more
engaged learn more (Finn & Rock, 1997; Fredricks, Blumenfeld, & Paris, 2004; Pascarella & Terenzini, 2005).

The current study also found that interaction, both personal and overall was related to students’ engagement in learning. Students who reported higher levels of interaction were more engaged in learning than their classmates. This supports the findings of Zhao and Kuh’s (2004) study which found that interaction and participating in learning communities was positively linked to engagement as well as student self-reported outcomes and overall satisfaction with college.

Implications

Prior research has shown that interaction is important in both traditional and distance education settings (Anderson, 2003a; Chickering & Gamson, 1987; De Verneil & Berge, 2000; Fulford & Zhang, 1993; Garrison, 1990; Hannifin, 1989; Gunawardena, 1995; Harasim, 1989; Kearsley, 2000; Laurillard, 2000; Roblyer & Ekhaml, 2000; Roblyer & Wiencke, 2003; Rodrigues, 1995; Rovai, 2002a; Wegerif, 1998; Zirkin & Sumler, 1995). The findings of this study have confirmed the importance of interaction in online courses.

This study has confirmed Fulford and Zhang’s (1993) findings that perceptions of overall interaction dynamics have a stronger impact on learners' satisfaction than the perceptions of personal participation. Therefore, vicarious learning should be considered when designing online courses. Instead of striving to ensure the overt participation of all learners in the course’s interactions and discussions, online courses should be designed to accommodate different learning and personality styles. Forcing participation could substantially lower the overall quality of online discussions (Danchak, 2002). Imposing
mandatory participation in online discussion does not intrinsically motivate students to engage in the discussions. Students reported that their required discussion contributions simply restated others work and lacked insight (Bullen, 1998). Imposed interaction also has potential dangers as it might interfere with student autonomy in managing time, place, and pace of learning (Kramarae, 2003; May, 1993).

Given the importance of vicarious learning (Beaudoin, 2002; Danchak, 2002; Fulford & Zhang, 1993; Mattheos, 2004; McKendree, Stenning, Mayes, Lee, & Cox, 1998; Monson, 2003; Sutton, 2001), online instructors should use modeling more often in their teaching, since modeling can offer a faster and more efficient way of teaching. Online courses should be designed to increase the opportunities of vicarious learning. Possibilities of increasing the opportunities of vicarious learning include sharing responses to questions asked by one student with the entire group of students, posting model answers and study guides to potential exam questions, using model dialogues and discussions as resources for students.

In online courses, students benefit from observing their peers participating in online discussions (McKendree et al., 1998). Even in the passive mode, learning can still occur (Beaudoin, 2002; Fritsch, 1997). Therefore, instructors should recognize that students can participate not only by posting their own comments, but also by reading the others’ postings and comments. Swan (2004) suggested using tracking mechanisms to reward reading as well as responding to messages. Mattheos (2004) called for a reexamination of the traditional approaches of assessing and evaluating students’ activity in distance learning to accommodate vicarious learners.
Instructors integrating online discussions into their courses should offer other alternatives for students who do not feel comfortable participating in online discussions. For example, instructors can have students write journals, or read a discussion which has already taken place and is no longer active.

Although learners should be given the choice as how to interact, instructors can provide incentives to students to encourage them to participate in the discussions and the other course activities (Sutton, 2000). Students are more likely to interact and demonstrate what they have learned if these activities or actions will result in outcomes they value.

Limitations of the Study

This study is descriptive and correlational and dealt only with one group of undergraduate students at one educational institution, so findings from this one class may not necessarily be generalizable to other settings. The course examined in this study was a required, not elective course; all students regardless of their major were required to take the course, this may be a potential confound to the findings of this study. Another potential confound is the disproportionate number of males (23%) and females (77%) in the sample.

Recommendations and Further Studies

1. This study has focused on a specific group of students enrolled in one course in a community college, who may have different characteristics from students in the other colleges due to the fact that community colleges do not have selective admission policies. Interesting areas of future research would involve participants
in different educational settings and at different educational levels, graduate and undergraduate.

2. Because the participants in this study were enrolled in programs that required them to take both online and on campus classes, a replication of this study with students enrolled in entirely online programs may be relevant.

3. This study used the survey research method to examine the relationship between perceived interaction and satisfaction and course grades. Future studies may consider using other methods such as experimental and quasi-experimental designs to confirm the findings of this study.

4. Given the importance of vicarious learning, future research should examine the most effective strategies and techniques that maximize its benefits, this is especially important for students who are apprehensive of direct personal interaction.

5. Though not originally intended as a component of this study, the additional exploratory question asked at the end of the survey provided further insightful results. Engagement in learning was found to be correlated not only with satisfaction with the course, but also with course grades. This finding may be more important than any other finding in this study given the high correlation found between engagement in learning and satisfaction. Given the importance of engagement, more research is needed to confirm this relationship and identify effective strategies and methods that help boost students’ engagement in learning.

6. It is assumed that students learn vicariously from observing their peers interacting with one another or interacting with the instructor. This is particularly relevant in
large online classes, where it’s impractical for everyone to participate, but will
this hold in small classes where everyone’s input is critical to maintain a high
level of interaction that learners can observe and benefit from? The pilot study
which used a 20–student class as a sample (16 of them completed the survey)
found perceived personal interaction more related to the satisfaction than the
perceived overall interaction. Future research should examine the impact of class
size on the perceptions of overall interaction and on vicarious learning.

Summary

This study found perceived overall interaction a key predictor of students’
satisfaction with the course. The fact that perceived overall interaction, rather than the
perceived personal interaction was the key predictor in determining students’ satisfaction
with the course suggests that in interaction, the whole is greater than the sum of its parts.
This relationship between perceived overall interaction and course satisfaction serves as
an indicator of “vicarious learning,” or learning that takes place when a student actively
observes and benefits from interaction among the other students, or between students and
the instructor.

This study found no significant relationships between gender and both perceptions
of personal interaction, and perceptions of overall interaction. There was also no
relationship between gender and course grades. No significant differences were found
between males and females in course satisfaction. However, gender moderated the
relationship between perceived overall interaction and satisfaction. Male students who
perceived overall interaction to be high were more satisfied with the course. As for age,
this study found no significant relationship between age and any of the variables of the
study. Engagement in learning was linked to students’ satisfaction with the course and students grades. Students who reported higher degrees of engagement in learning were more satisfied with the course and achieved better than their classmates. Interaction was correlated with students’ engagement in learning. Students who perceived interaction to be high were more engaged with learning than the others. Several implications of this study’s findings were discussed, and recommendations for future research were given.
References


Hong, K. (2002). Relationships between students’ and instructional variables with satisfaction and learning from a Web-based course. *Internet and Higher Education. 5*, 267-281.


Kerka, S. (1996). Distance learning, the Internet, and the world wide Web. ERIC Digest. (ERIC Document Reproduction Service No. ED 395 214)


Rodrigues, D. E. (1995). *Interaction in the ITESM’s distance education system*. Paper presented at the invitational Research Conference in Distance Education: Towards Excellence in Distance Education: A Research Agenda. The American Center for the Study of Distance Education, Pennsylvania State University, College Station, PA.


Thurmond, V. A. (2003). *Examination of interaction variables as predictors of students' satisfaction and willingness to enroll in future Web-based courses*. Doctoral dissertation, University of Kansas Medical Center, Kansas City, KS.


APPENDIX A–The Survey Used in the Pilot Study

Dear student, this survey is designed to measure your perceptions of interaction that occurred in this online class. Your answers will help us design learning environments that assist learners in Web-based courses. Your cooperation in this matter is greatly appreciated!

1. I always answered the questions posted by the instructor.
   - Strongly Agree
   - Agree
   - Undecided
   - Disagree
   - Strongly Disagree

2. I never e-mailed the instructor with the questions I have.
   - Strongly Agree
   - Agree
   - Undecided
   - Disagree
   - Strongly Disagree

2. I actively participated in all the course activities.
   - Strongly Agree
   - Agree
   - Undecided
   - Disagree
   - Strongly Disagree
3. I never volunteered my opinion.
   - Strongly Agree
   - Agree
   - Undecided
   - Disagree
   - Strongly Disagree

4. There was much interaction between me and the instructor in this course.
   - Strongly Agree
   - Agree
   - Undecided
   - Disagree
   - Strongly Disagree

5. There was little interaction between me and my classmates in this class.
   - Strongly Agree
   - Agree
   - Undecided
   - Disagree
   - Strongly Disagree

6. The instructor motivated me to interact in this class.
   - Strongly Agree
   - Agree
   - Undecided
   - Disagree
7. The level of interaction that occurred in the class as a whole was high.
   o Strongly Agree
   o Agree
   o Undecided
   o Disagree
   o Strongly Disagree

8. There was little interaction between the instructor and the class.
   o Strongly Agree
   o Agree
   o Undecided
   o Disagree
   o Strongly Disagree

9. There was much interaction between all other participants (students) in class.
   o Strongly Agree
   o Agree
   o Undecided
   o Disagree
   o Strongly Disagree

10. The instructor was effective in motivating interaction in general.
    o Strongly Agree
    o Agree
    o Undecided
11. The instructor and students in this class were interacting most of the time.
   - Strongly Agree
   - Agree
   - Undecided
   - Disagree
   - Strongly Disagree

12. I am very satisfied with the level of interaction that occurred in this class.
   - Strongly Agree
   - Agree
   - Undecided
   - Disagree
   - Strongly Disagree

13. The discussion part of this class was ineffective.
   - Strongly Agree
   - Agree
   - Undecided
   - Disagree
   - Strongly Disagree

14. The feedback I got from the instructor was very useful for me.
   - Strongly Agree
   - Agree
15. The material I learned in this class was valuable to me.
   - Strongly Agree
   - Agree
   - Undecided
   - Disagree
   - Strongly Disagree

16. My knowledge of the content after this class has dramatically increased.
   - Strongly Agree
   - Agree
   - Undecided
   - Disagree
   - Strongly Disagree

17. I feel positive about the class as a whole.
   - Strongly Agree
   - Agree
   - Undecided
   - Disagree
   - Strongly Disagree

18. What is your gender?
   - Male
• Female

19. What is your age?

20. What is your ethnicity?

21. How many online courses have you had before?

22. How would you describe your computer skills in general?
   • Limited
   • Average
   • Above average
APPENDIX B – The Online Personal/Overall Interaction Survey

The Online Personal/Overall Interaction Survey

1. Instructions:

This survey is designed to ascertain your perceptions of interaction that occurred in the introductory course to humanities. Your answers will help us design learning environments that assist learners in online courses. Your cooperation in this matter is greatly appreciated!
Please read and respond to each question or statement carefully and select the answer that most reflects your expectations, opinions or beliefs.

Next >>

The Online Personal/Overall Interaction Survey

2. Personal Interaction

Page 1 of 6

1. I have always tried to answer the questions posted by the instructor.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. I have never e-mailed the instructor with the questions I have.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. There was much interaction between the instructor and me.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. I rarely volunteered my opinion in the discussion board.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. I rarely shared my ideas or concerns with the instructor of this course.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7. I rarely shared my ideas and opinions with other students in this course.

8. I occasionally provided feedback to other students in the course through the discussion board.

9. I have always tried to answer the questions posted by my peer students.

10. I rarely commented on other students' opinions and ideas.

11. I was committed to contributing to the online discussion forums.
16. The instructor frequently posted questions for students to discuss in the discussion board.

17. Most students replied to messages from the instructor.

18. The instructor always responded to students’ queries in a timely fashion.

19. Interaction between the instructor and the class was low in general.

20. The instructor encouraged students to question ideas and perspectives.
24. The students seldom directed their questions to their peers.

25. There was much interaction among students in this course.

26. Students seldom responded to their peer students’ queries.

27. Students occasionally provided feedback to their peers through the discussion board.

28. Most students tried to answer the questions posted by their peers.
<table>
<thead>
<tr>
<th>32. The material I learned in this course was valuable to me.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
</tr>
<tr>
<td>133</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>33. The discussion part of this course was ineffective.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
</tr>
<tr>
<td>133</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>34. I am satisfied with the level of interaction that occurred in this course.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
</tr>
<tr>
<td>133</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>35. The feedback I got from the instructor was very useful for me.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
</tr>
<tr>
<td>133</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>36. This course has increased my knowledge of the content.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
</tr>
<tr>
<td>133</td>
</tr>
</tbody>
</table>
7. Demographics

Page 6 of 6

Please enter the following demographic information:

43. Your gender:
   • Male
   • Female

44. Age on your last birthday:

45. Your ethnicity?
   • American Indian/Alaskan Native
   • African-American
   • Asian/Pacific Islander
   • White
   • Hispanic/Latino
   • Other

46. How many online courses have you completed before this course?

8. Thank you!

Thank you for your participation.
APPENDIX C – The descriptive statistics of the Individual Items of the Subscales

### Subscale (Personal Interaction)

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach's Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have always tried to answer the questions posted by the instructor.</td>
<td>47.32</td>
<td>81.535</td>
<td>.377</td>
<td>.875</td>
</tr>
<tr>
<td>I have never e-mailed the instructor with the questions I have.</td>
<td>47.71</td>
<td>80.273</td>
<td>.413</td>
<td>.874</td>
</tr>
<tr>
<td>There was much interaction between the instructor and me.</td>
<td>48.85</td>
<td>77.382</td>
<td>.495</td>
<td>.871</td>
</tr>
<tr>
<td>I rarely volunteered my opinion in the discussion board.</td>
<td>47.74</td>
<td>78.384</td>
<td>.482</td>
<td>.871</td>
</tr>
<tr>
<td>I rarely shared my ideas or concerns with the instructor of this course.</td>
<td>48.66</td>
<td>74.634</td>
<td>.585</td>
<td>.866</td>
</tr>
<tr>
<td>I usually communicated with the instructor on an individual basis through the e-mail or the virtual office hours.</td>
<td>48.25</td>
<td>76.907</td>
<td>.477</td>
<td>.872</td>
</tr>
<tr>
<td>I rarely shared my ideas and opinions with other students in this course.</td>
<td>48.46</td>
<td>75.690</td>
<td>.617</td>
<td>.865</td>
</tr>
<tr>
<td>I occasionally provided feedback to other students in the course through the discussion board.</td>
<td>48.35</td>
<td>78.670</td>
<td>.430</td>
<td>.874</td>
</tr>
<tr>
<td>I have always tried to answer the questions posted by my peer students.</td>
<td>48.14</td>
<td>77.934</td>
<td>.538</td>
<td>.869</td>
</tr>
<tr>
<td>I rarely commented on other students' opinions and ideas.</td>
<td>48.17</td>
<td>75.174</td>
<td>.608</td>
<td>.865</td>
</tr>
<tr>
<td>I was committed to contributing to the online discussion forums.</td>
<td>48.00</td>
<td>75.375</td>
<td>.669</td>
<td>.863</td>
</tr>
<tr>
<td>I only participate in the discussion forums if it is part of the course grade.</td>
<td>49.28</td>
<td>76.328</td>
<td>.479</td>
<td>.872</td>
</tr>
<tr>
<td>I had a voice within the discussion board.</td>
<td>48.08</td>
<td>77.822</td>
<td>.604</td>
<td>.867</td>
</tr>
<tr>
<td>Item</td>
<td>Scale Mean if Item Deleted</td>
<td>Scale Variance if Item Deleted</td>
<td>Corrected Item-Total Correlation</td>
<td>Cronbach's Alpha if Item Deleted</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>----------------------------</td>
<td>--------------------------------</td>
<td>----------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>I felt isolated in this online course.</td>
<td>48.28</td>
<td>76.953</td>
<td>.490</td>
<td>.871</td>
</tr>
<tr>
<td><strong>Subscale (Overall Interaction)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The instructor frequently posted questions for students to discuss in the discussion board.</td>
<td>48.09</td>
<td>73.804</td>
<td>.223</td>
<td>.859</td>
</tr>
<tr>
<td>Most students replied to messages from the instructor.</td>
<td>49.02</td>
<td>67.547</td>
<td>.500</td>
<td>.848</td>
</tr>
<tr>
<td>The instructor always responded to students' queries in a timely fashion.</td>
<td>48.57</td>
<td>70.937</td>
<td>.372</td>
<td>.854</td>
</tr>
<tr>
<td>Interaction between the instructor and the class was low in general.</td>
<td>49.26</td>
<td>71.227</td>
<td>.304</td>
<td>.858</td>
</tr>
<tr>
<td>The instructor encouraged students to question ideas and perspectives.</td>
<td>48.55</td>
<td>69.001</td>
<td>.458</td>
<td>.850</td>
</tr>
<tr>
<td>In general, the instructor was effective in motivating the students to interact in this course.</td>
<td>49.12</td>
<td>64.078</td>
<td>.686</td>
<td>.837</td>
</tr>
<tr>
<td>The students often shared their ideas and opinion with the instructor.</td>
<td>49.48</td>
<td>69.816</td>
<td>.533</td>
<td>.847</td>
</tr>
<tr>
<td>The instructor provided mentoring and feedback to students.</td>
<td>48.82</td>
<td>69.590</td>
<td>.441</td>
<td>.851</td>
</tr>
<tr>
<td>The students seldom directed their questions to their peers.</td>
<td>49.72</td>
<td>68.422</td>
<td>.468</td>
<td>.849</td>
</tr>
<tr>
<td>There was much interaction among students in this course.</td>
<td>49.51</td>
<td>65.816</td>
<td>.672</td>
<td>.839</td>
</tr>
<tr>
<td>Students seldom responded to their peer students' queries.</td>
<td>49.31</td>
<td>67.966</td>
<td>.510</td>
<td>.847</td>
</tr>
<tr>
<td>Item</td>
<td>Scale Mean if Item Deleted</td>
<td>Scale Variance if Item Deleted</td>
<td>Corrected Item-Total Correlation</td>
<td>Cronbach's Alpha if Item Deleted</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>---------------------------</td>
<td>-------------------------------</td>
<td>---------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Most students tried to answer the questions posted by their peers.</td>
<td>49.23</td>
<td>66.805</td>
<td>.588</td>
<td>.843</td>
</tr>
<tr>
<td>Only a few students contributed to the discussion forums.</td>
<td>49.45</td>
<td>66.126</td>
<td>.528</td>
<td>.846</td>
</tr>
<tr>
<td>Most students shared and discussed their ideas and answers with their peers.</td>
<td>49.32</td>
<td>64.347</td>
<td>.651</td>
<td>.839</td>
</tr>
<tr>
<td>Students in this course felt that they belong to a community.</td>
<td>49.68</td>
<td>67.910</td>
<td>.601</td>
<td>.843</td>
</tr>
</tbody>
</table>

### Subscale (Satisfaction with the Course)

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach's Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>The material I learned in this course was valuable to me.</td>
<td>31.43</td>
<td>46.655</td>
<td>.687</td>
<td>.870</td>
</tr>
<tr>
<td>The discussion part of this course was ineffective.</td>
<td>32.00</td>
<td>50.938</td>
<td>.427</td>
<td>.889</td>
</tr>
<tr>
<td>I am satisfied with the level of interaction that occurred in this course.</td>
<td>31.74</td>
<td>49.915</td>
<td>.630</td>
<td>.875</td>
</tr>
<tr>
<td>The feedback I got from the instructor was very useful for me.</td>
<td>31.60</td>
<td>49.713</td>
<td>.639</td>
<td>.874</td>
</tr>
<tr>
<td>This course has increased my knowledge of the content.</td>
<td>31.05</td>
<td>47.826</td>
<td>.769</td>
<td>.865</td>
</tr>
<tr>
<td>I feel positive about this course as a whole.</td>
<td>31.62</td>
<td>45.084</td>
<td>.811</td>
<td>.860</td>
</tr>
<tr>
<td>I was rarely happy with the quality of postings in the discussion forums.</td>
<td>31.85</td>
<td>53.945</td>
<td>.291</td>
<td>.896</td>
</tr>
<tr>
<td>I did not have problems using the technology to access this course.</td>
<td>30.75</td>
<td>53.938</td>
<td>.300</td>
<td>.895</td>
</tr>
<tr>
<td>I would recommend this course to others.</td>
<td>31.52</td>
<td>44.910</td>
<td>.797</td>
<td>.861</td>
</tr>
<tr>
<td>Overall, I am satisfied with this course.</td>
<td>31.45</td>
<td>43.845</td>
<td>.863</td>
<td>.855</td>
</tr>
</tbody>
</table>
# APPENDIX D – Distribution of the Survey Questions

<table>
<thead>
<tr>
<th>Topic</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Interaction</td>
<td>1-15</td>
</tr>
<tr>
<td>Intellectual Discussion</td>
<td>1, 2, 4, 7, 11, 12, 13, 14, 16</td>
</tr>
<tr>
<td>Feedback</td>
<td>7, 9, 10</td>
</tr>
<tr>
<td>Motivation and Support</td>
<td>10, 12</td>
</tr>
<tr>
<td>Psychological domain</td>
<td>15</td>
</tr>
<tr>
<td>Personal interaction in general</td>
<td>3, 5, 6</td>
</tr>
<tr>
<td>Overall Interaction</td>
<td>16-31</td>
</tr>
<tr>
<td>Intellectual Discussion</td>
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<td>Motivation and Support</td>
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<td>Psychological domain</td>
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<td>Overall interaction in general</td>
<td>19, 21, 25</td>
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<td>Satisfaction</td>
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<tr>
<td>The Content</td>
<td>32, 36</td>
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<td>The level of interaction</td>
<td>33, 35, 38</td>
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<td>The feedback</td>
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<td>The technology</td>
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<td>Satisfaction in general</td>
<td>37, 40, 41</td>
</tr>
<tr>
<td>Demographics</td>
<td>43-47</td>
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</table>
APPENDIX E – The Course Syllabus

Humanities 111
Western Civilization I
Spring Quarter 2006
-----------Community College
E-Mail: ------------------

Professor --------------------------
Department of Humanities
Office Hours: T-TH 3:00 – 5:00
Friday all day by appointment

Course Description
The course is a survey of western civilization from its origins in the ancient world to the beginning of the Renaissance. Emphasis is on the historical development of western civilization. Topics covered include the foundations of ethical monotheism in the ancient near east; classical civilization of Greece and Rome; late antiquity and the heirs of the Roman empire (Byzantium, Islam and Latin Europe); the Christian middle ages, and the Renaissance. Students are also exposed to the major styles of Western art; students will analyze art in terms of its formal, cultural, historical, and iconographic contexts, and apply critical thinking to the interpretation of art.

Goals of the Course
The course aims at developing an awareness of the evolution of Western society from the ancient world to the Renaissance. Students should understand the major intellectual, religious, social and economic trends that have produced the institutions and cultural values of the western civilization. The course also aims at developing critical thinking skills that allow students to engage in critical analysis of both the historical and contemporary issues.

- Apply critical thinking to the analysis of primary and secondary sources, and interpret primary sources within the historical context of the society that created them.
- Explain the cause, effect, and the relevance of specific historical events within the broader historical context of the western civilization.
- Understand and articulate diverse historical interpretations.
- Appreciate and critically discuss works of art (painting, sculpture, architecture, music and theatre) both as individual art objects and as expressions of cultural values within a historical context.
- Critically analyze and compare ethical viewpoints from cultures other than the students own.

Required texts
Marvin Perry, Western Civilization
Primary Source Reader for Humanities 111 (Available at the bookstore)

Student Responsibilities
Homework – The Board of Regents that governs the awarding of academic credit for college courses has set the following standards: one credit awarded should equal three hours per week. For a 5-credit hour course such as this, students are expected to spend at
least 15 hours per week reading and working on the assignments. Please budget your time accordingly. The reading assignments include approximately 50-70 pages per week. You will need to read carefully and thoughtfully to be successful. Keep in mind; this is not a self-paced course. Each week’s work must be completed by the dates indicated on the syllabus. The syllabus includes a list and detailed description of each assignment, along with a suggested study plan to help students structure their time and organize their effort. The study plan is a 5 day plan that will allow students to complete all assignments by the end of the week. Some students may have to tailor a schedule to their own needs, but it is important that you have a plan.

While Web courses provide certain flexibility, this should not be exaggerated. You will not be successful if you attempt to save all your work for the weekends or do it in five-hour chunks. The nature of the course materials does not lend itself to quick memorization. Rather, it must be assimilated thoughtfully in smaller installments. I strongly recommend that you devote two hours per day to the course. Please budget your time accordingly”.

Assignments
A weekly essay
A weekly discussion topic
A weekly quiz
Two art papers
Two exams throughout the quarter

Assessment
The weekly essay (journal): Each week, you will answer a question in an essay of about 300 words and submit the essay in a word document through the assignment page. After your instructor receives your journal submission, they will assess them and return them to you. Because it is impractical for the instructor to write extensive comments on each student’s assignment, the instructor will only make short comments indicating areas in which the student may need to improve. The criteria for grading the journals are as follows:
A- Excellent: Essay shows careful reading of the source, thoughtful analysis of the issue/s, demonstrates sound understanding of the historical contexts and makes appropriate connections and specific references.
B- Good: Essay shows careful reading of the sources, reasonable analysis of the issue/s, good understanding of the historical context.
C- Average: Essay shows careful reading of the source, some attempt at analysis, some reference to historical contexts.
D- Poor: Essay shows superficial reading of the source, little or no analysis of the issue/s, little reference to the historical context of the source.
F- Failing: Essay shows little or no familiarity with the source, no analysis of the issue/s, no awareness of historical contexts.

The weekly discussion topic (Thinking beyond the facts): Everyone in the class is assigned discussion partners (4-5), and every week you will be presented with a question
and asked to discuss with your group. Each group has their own discussion board that will be used to communicate with one another. Students take turns leading the discussion. The discussion leader for each week should write a thoughtful essay addressing the question that has been posted. The other members of the group will then respond with their views on the leader’s essay. The discussion leader’s essay should be 250-300 words and is worth 25 points. The responses of the other members of the group should be about 100 words and are worth 10 points.

Because this assignment asks for students’ opinions, there may be no right or wrong answers. However, there certainly are good and bad ones. Good discussion essay should be based on sound thinking backed up by the appropriate fact and specific references to course material.

While students can criticize another student’s observations, students are asked to be courteous, and make sure that their comments are about the issue, and not personal. More detailed explanation of the assignment can be found on the orientation page.

The weekly quiz: There will be 10 reading comprehension quizzes over the material in the textbook. These will help you keep up with class and improve your command of the pertinent facts. Each week, you will receive a study guide that includes a list of 45 multiple choice questions that you should complete while reading the assignment. When you have completed the reading and the study guide questions, you may take the online quiz. The quiz is made up of 10 multiple choice questions randomly selected from the study guide, so they are questions that you’ve already answered. You will have only ten minutes for each quiz, so you’ll have to know your stuff. There will be no time to look it up. Important Note: Do not open a quiz to preview it. Once you open the quiz you must take it. The program will not let you re-open it.

Exams: There will be two exams throughout the quarter, which will be taken online with a two hour limit. They are essay exams and should be taken during the assigned dates. See Assignment Deadlines.

Arts papers: Each student will write two short art papers. These will be reviews of visual arts such as painting, sculpture, or architecture. I will give you several options to choose from. You may also suggest a project of your own, that must be approved by me in advance. You will find the directions for the papers in the Art papers section on the orientation page.
Grading
Grades will be assigned as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Essays (journals)</td>
<td>80</td>
</tr>
<tr>
<td>10 Quizzes</td>
<td>100</td>
</tr>
<tr>
<td>8 Discussions</td>
<td></td>
</tr>
<tr>
<td>1 Group leader assignment</td>
<td>25</td>
</tr>
<tr>
<td>7 Group assignments</td>
<td>70</td>
</tr>
<tr>
<td>2 Art papers</td>
<td></td>
</tr>
<tr>
<td>Architecture paper</td>
<td>25</td>
</tr>
<tr>
<td>Museum</td>
<td>10</td>
</tr>
<tr>
<td>2 Exams</td>
<td>200</td>
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</table>

Communication with the instructor: You must use your Columbus State email for this class. We will be communicating with you via the e-mail that is generated through the Blackboard. Please feel free to contact your instructor for assistance at anytime. Keep in mind that your instructors are full time professionals. They have set aside time throughout the week to grade and answer e-mails. You may have to wait a day or two for a reply. I do not check my e-mail between Friday afternoon and Monday afternoon. Additionally, when you have a question or problem, please make sure that you contact the appropriate party. Please do not contact your instructors about computer or access issues.......If you experience any technical difficulty, please call the help desk at 287-5050. A more specific list of who to contact about particular issues may be found under the FAQ button”. Please consult the orientation and the FAQ section for more details.

Exam Policy
Make-up exams may be granted at the discretion of the instructor if a convincing case can be made for the necessity of such an arrangement. Serious illness, family emergencies, and other unusual events outside the control of the student will receive consideration. I will not consider make-up exams for frivolous reasons (i.e. to accommodate vacation plans) or because of work conflicts. Under certain circumstances a student may arrange to take an exam early. However you must contact me beforehand to discuss the matter.

Note: It is the College policy to provide reasonable accommodations to students. If you would like to request such accommodations because of physical, mental, or learning disability, please contact the department of Disability Services, 228 Franklin Hall. This department also offers tutoring. Since your ability to write a well constructed essay is crucial in this course, I strongly advise anyone who has a problem in this area to take advantage of this service.

Caveat Discipulos: Civilization courses are college level courses. Unlike most private and state colleges, community colleges do not have selective admission policies. Anyone can attend. However the humanities transfer credit courses are no different in content or difficulty than those offered by colleges with selective admissions. This is why the credits you earn are accepted by institutions throughout the country.
As with any college course, it is assumed that students enrolling in humanities courses have certain basic conceptual and technical skills. For students in Civilization courses it is assumed that: (1) Students are capable of reading carefully, and articulating ideas in writing in college-level English. (2) Students have a basic understanding of world history, geography, and cultural history. Students entering Civilization courses without the appropriate background can still be successful, but must necessarily be prepared to apply themselves even more diligently to the course materials.
APPENDIX F – Letter to Participants

Dear Student,

My name is Nahed Abdel-Maksoud; I am a student in the College of Education at Ohio University, and I would really appreciate your help with my doctoral dissertation. As an online student, your recent experiences will be very insightful as my study focuses on the relationship between students’ perceptions of interactions in online courses and their satisfaction with instruction and their grades. I am requesting your participation, which will involve the anonymous use of the following: A survey, and your grades in this course (The introductory course to humanities).

Your participation in this study is voluntary (and most appreciated). If you choose not to participate, there will be no penalty, and it will not affect your grade. This study is being done online by a short survey that should take only 10 minutes to complete. You must be 18 years or older to complete the survey. As a token of my appreciation, those who will participate in this survey have the chance to win one of five $25 gift certificates to Amazon.com.

All information that you give is kept confidential and secure. Information will be stored in a secure location and destroyed upon completion and publication of this study. The information supplied will be reported in aggregate form only, and in no way will your responses be able to be linked back to you.

If you have any questions concerning the study, please call me at (740) 592-3051 or e-mail me at: na114403@ohio.edu

Your completion and submission of the survey implies your consent to participate in this study. To start the survey, please click on or enter the following address into your Web browser:
APPENDIX G– The Regression Model with Case 29 removed

The Regression Model with Case 29 removed
Model Summary (b)

<table>
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<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
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<td>1</td>
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<td>.001</td>
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a Predictors: (Constant), Personal, Overall, Gender, Age
b Dependent Variable: Grade

The Regression Coefficient after deleting Case 29

<table>
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<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
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<td>Age</td>
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a Dependent Variable: Grade
APPENDIX H – The Residuals Statistics for the Regression Models

Residuals Statistics (a)

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a Dependent Variable: satisfaction

Residuals Statistics (a)

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a Dependent Variable: Grades