INTERACTIVITY, SOCIAL CONSTRUCTIVISM, AND SATISFACTION WITH DISTANCE LEARNING AMONG INFANTRY SOLDIERS

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INTERACTIVITY, SOCIAL CONSTRUCTIVISM, AND SATISFACTION WITH

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Except where reference is made to the work of others, the work described in this dissertation is my own or was done in collaboration with my advisory committee. This dissertation does not include proprietary or classified information.

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DISSERTATION ABSTRACT

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The purpose of this study was to determine what relationships, if any, exist among interactivity, social constructivism, and satisfaction with distance learning in the target population of U. S. Army Infantry soldiers participating in college distance learning (DL) courses. It also provides data on relationships between soldiers' satisfaction with DL and demographic characteristics such as military rank, educational level, major field of study, subject areas in which DL courses had been completed, prior experience, computer and Internet expertise, and media used for course interaction.

Using a convenience sample of 131 Infantry soldiers at Fort Benning, Georgia, statistically significant relationships were found between satisfaction with DL and the variables of interactivity, social constructivist characteristics or outcomes, and some of the demographics. Specifically, the demographics for which statistically significant relationships were found with DL satisfaction were prior experience with web-based

learning, computer and Internet expertise, and number of media used for student-instructor interaction. These findings support the use of highly interactive social constructivist instructional approaches in computer-mediated and other learning environments.

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CHAPTER ONE

INTRODUCTION

Web-based distance learning (DL) promises to expand higher education access anytime, anyplace (Mayadas, 1997). Some predict that widespread use of the Internet will result in an educational revolution as students free themselves from the constraints of campuses, course schedules, and faculty office hours (Bates, 2001; Gates, Myhrvold, & Rinearson, 1995). Similar predictions, however, have also been made about other distance education media such as paper-based correspondence courses, radio and audiotapes, and television and videotapes (Arsham, 2003). The promise of web-based distance learning as an improvement over these technologies is that it allows teachers and students to interact more frequently and with more immediacy than was previously possible using print, audio, video, or interactive television (Kerka, 1996). This potential for interpersonal interaction led Bruckman (2002) to posit that the true value and future of computer-supported DL lies in computer-supported collaboration, both peer-to-peer and peer-to-expert.

Interpersonal interaction via the Internet is frequently referred to as computer-mediated communication (CMC) or computer conferencing. Romiszowski and Mason (1996) define CMC as “communication between different parties separated in space and/or time, mediated by interconnected computers” (p. 239). While CMC has existed in some form for the past 35 years (Romiszowski & Mason, 1996), the tremendous increase

in the availability, affordability, and use of personal computers over the past 10 to 15 years has propelled CMC to the forefront of advances in and research on distance education (Alexander, 1999; Althaus, 1997; Arbaugh, 2000d; Card, 2000; Davis & Schlais, 2000; Bates, 2001; Valenta, Therriault, Dieter, & Mrtek, 2001; Wilson, 2000). While acknowledging that access to CMC is far from universal, Sumner (2000) writes, "The development of computer conferencing as a two-way technology has the potential to change the field of distance education by fostering the conditions for communicative action" (p. 278). While we have not yet realized this potential promise of CMC, practitioners are already attempting to use CMC to address what Bork (2001) points to as one of seven overarching weaknesses in both traditional and distance education: the lack of adequate interaction between teacher and students and among students. One theory on which the use of CMC is based is social constructivism, which emphasizes the social and collaborative nature of learning (Vygotsky, 1978). Kaye (1989) writes, "Educational theorists and practitioners who emphasize the importance of debate, discussion, and group work in promoting meaningful learning…will argue strongly for the use of CMC for distance learners" (p. 11). Carr-Chellman and Duchastel (2000), for example, observed that online, asynchronous, student-to-student dialogues "lead to the formation of true learning communities, within which adult students share their real world experiences and learning outcomes" (p. 236). The use of CMC with adult learners is also consistent with Knowles' (1984) andragogical model, which emphasizes the importance of collaboration among adult students with teachers serving as facilitators of the group of learners.

Background of the Study

Implemented in 1996, The (sic) Army Distance Learning Program (TADLP) has the following as its vision, “Improve and sustain readiness by delivering standardized individual, collective, and self-development training to soldiers and units anywhere anytime using multiple delivery means and technologies” (U. S. Army Training and Doctrine Command [TRADOC], 2001, p. viii). TADLP plans for more than 500 courses to be converted to some DL format (Wisher, Champagne, Pawluk, Eaton, Thornton, & Curnow, 1999). In 2001, this plan was reported as being executed exactly as programmed (U. S. Army TRADOC, 2001), to include funding of the conversion to DL of 23 percent of basic noncommissioned officer courses and 49 percent of advanced noncommissioned officers courses and the emplacement of DL facilities within 50 miles of every active and reserve component soldier. But while many course conversions have been funded, few Army DL courses have been implemented long enough to generate data for analysis. Instead, Army DL course developers have attempted to merge best practices from higher education DL programs with their own institutionalized training development processes, and evidence to support the success of the Army’s DL courses is largely anecdotal.

The Campaign Plan for TADLP emphasizes the need for person-to-person interaction in Army DL courses. In doing so, it differentiates between synchronous coursework, in which the instructor and students are online at the same time, so they are separated by place but not by time, and asynchronous coursework, in which a participant

can access coursework at any time that fits his or her schedule and is never required to be online at the same time as the rest of the participants:

> Adult learners must be engaged in the learning process. This is accomplished by ensuring that the soldier does not just sit passively. In synchronous coursework the instructor can increase involvement by using questions and small group activities. In asynchronous instruction, requiring postings to message boards can increase learner involvement. Requiring soldiers to read and respond to other soldier postings keeps all class members engaged and increases the quality of the material posted (U. S. Army TRADOC, 2001).

Also mentioned in the Campaign Plan for TADLP is a program to encourage soldiers to pursue civilian educational opportunities through DL (U. S. Army TRADOC, 2001). Initiated in January 2001, the Army University Access Online program (commonly known as eArmyU) seeks to improve enlisted soldiers' access to post-secondary educational opportunities by capitalizing on distance education technologies. Through a web portal (www.eArmyU.com), soldiers participating in eArmyU can access a wide variety of post-secondary certificate and degree programs offered from more than 18 colleges and universities. eArmyU not only funds all tuition, fees, books, and Internet access charges for the soldiers participating but also provides each soldier with a personal computer and printer. Through eArmyU, more than 15,000 Army soldiers have enrolled in DL courses (Lorenzo, 2002 May/June).

In addition to eArmyU, for which only enlisted soldiers are eligible, the Army Continuing Education System (ACES) provides soldiers with access to and support for a

wide variety of educational opportunities. Each installation has an Army Education Center with counselors, computer labs, and testing offices to assist soldiers in completing civilian certificate and degree programs. The centralization of soldiers pursuing DL college courses through Army education centers provides a unique opportunity to survey soldiers' perceptions of educational programs across a variety of colleges and disciplines. This study capitalized on the availability of such a population by sampling soldiers at the U. S. Army Infantry Center's Army Education Center in Fort Benning, Georgia. Because of the growth of web-based higher education and the high participation of soldiers in the eArmyU program, most soldiers who use Fort Benning's Education Center are participating in web-based educational programs.

While both the Army and other educators (Sorensen, 1995) have emphasized the importance of interaction as a key to success in DL, all DL practitioners need more information on how best to build interaction into their courses. For example, Bonk and Wisher (2000) discuss the Army's efforts to leverage both web-based and collaborative learning techniques and the need for research on these efforts. Moreover, several researchers have pointed to the lack of multi-course, multi-disciplinary studies as a shortcoming in the body of literature on CMC and DL (Arbaugh, 2000c). Reports on military training discuss the need for research on the use and effectiveness of interactive and collaborative learning activities and on web-based learning activities (Bonk & Wisher, 2000). This study contributes to these efforts by analyzing the relationships among interactivity, social constructivism, and U. S. Army Infantry soldiers' satisfaction with DL across a variety of web-based learning environments. On a wider scale, it

contributes to the body of literature on interaction-related factors that contribute to students' satisfaction with DL.

Statement of the Problem

Bonk and Wisher (2000) discuss the "pressing need for more research on e-learning environments" (p. 41), specifically addressing the question of "What types of interactions, explorations, negotiations, and explanations … impact individual and group performance" (p. 41). In this study, the participation of U. S. Army Infantry soldiers in college DL programs provided a unique opportunity to assess two aspects of how interaction contributes to these soldiers' satisfaction with DL: the degree of interactivity in their most recent DL course, as measured by items adapted from Sorensen (1999), and the degree of social constructivism they have experienced, as measured by items adapted from Bonk and Wisher's Social Constructivism and Learning Communities Online (SCALCO) Scale (2000). The U. S. Army Infantry School is one of many Army schools currently in the process of developing DL programs. An important consideration in the design of such programs is the amount and types of interaction to include. While many institutions are implementing DL as a cost-saving measure, the inclusion of person-to-person online interaction is likely to reduce or even nullify any cost savings (Annand, 1999; Phelps, Wells, Ashworth, & Hahn, 1991). Before the Infantry School and other educational institutions invest deeply in the development of highly interactive DL programs based on a social constructivist approach, decision makers should consider the

results of this study to help them understand how students may or may not gain from such instruction.

Statement of the Purpose

This study was designed to address the need for more research on factors that contribute to student satisfaction with DL courses. The specific factors investigated were interaction among instructors and students, characteristics of a social constructivist approach to using computer-mediated communication, and a set of demographic variables that could mediate relationships among interaction, social constructivism, and satisfaction. The purpose of this study was to determine what relationships, if any, exist among interactivity, social constructivism, and satisfaction with distance learning in the target population of U. S. Army Infantry soldiers participating in college DL courses. This study also provides data on relationships between soldiers' satisfaction with DL and demographic characteristics such as military rank, educational level, major field of study, subject areas in which DL courses had been completed, prior experience, computer and Internet expertise, and media used for course interaction.

Significance of the Study

This study provides information to help those responsible for planning and evaluating Infantry DL programs to determine how interactivity and social constructivism contribute to soldiers' satisfaction with DL courses. On a wider scale, the study contributes to the body of literature on interaction-related factors that contribute to

students' satisfaction with DL by surveying soldiers with experience across a variety of web-based learning environments.

Research Questions

The following research questions were posed:

1. What relationship, if any, exists between students' satisfaction with distance learning and the degree of interactivity they experienced in a recent distance learning course?

2. What relationship, if any, exists between students' satisfaction with distance learning and the degree of social constructivism they have experienced in their distance learning courses?

3. What relationship, if any, exists between students' satisfaction with distance learning and their demographic data (military rank, educational level, major field of study, subject areas in which DL courses had been completed, prior experience, computer and Internet expertise, participation in the eArmyU program, and media used for course interaction)?

Instrumentation

The Distance Learning Interactivity Questionnaire (see Appendices A and B) was designed for use in this exploratory study. Items relating to interaction and satisfaction with DL were adapted from Sorensen's (1999) Interactive TV Course (ITV) Evaluation. Items relating to social constructivism in online discussions were adapted from Bonk and

Wisher's (2000) Social Constructivism and Learning Communities Online (SCALCO) Scale. Bonk and Wisher cite the work of Bonk, Malikowski, Angeli, and East (1998); Bonk, Oyer, and Medury (1995); and Kanuka and Anderson (1998) as sources for SCALCO. In addition to SCALCO, other questionnaire items were developed by the researcher to gather students' demographic information and information on the types of interaction they have experienced during DL courses. The researcher validated the content of the questionnaire using a Q-sort technique (Gay, 1980) with an expert panel of two professors and two graduate students from the fields of educational psychology and adult education. The researcher field-tested the questionnaire for clarity and readability with a group of three soldiers who met the criteria for participation in the study with the exception of having an Infantry military occupational specialty.

Population

The population was enlisted Infantry soldiers stationed at the U. S. Army Infantry Center (USAIC) in Fort Benning, Georgia. Because of the influence of eArmyU, most of these students were pursuing undergraduate degrees or certificates. All participants in this study were male because the Infantry is a combat arms military occupational specialty and females are prohibited from enlisting in U. S. Army combat arms specialties. The Chief of the USAIC Army Education Center estimated that the size of this population was 4,000 soldiers (E. M. Livingston, personal communication, January 8, 2003). The sample was a convenience sample built by administering questionnaires to soldiers who visited the USAIC Army Education Center's Army Learning Center during the data

collection period. A target sample size was set at 200, with a minimum of 100 completed questionnaires required for analysis.

Data Collection

The researcher collected data in August and September 2003 by placing questionnaires and announcements in the Army Learning Center at Fort Benning, Georgia. This method of data collection resulted in a nonrandom convenience sample, the results of which cannot be generalized to the population (Worthen, Sanders, & Fitzpatrick, 1997). Participation in this study was voluntary and anonymous.

Data Analysis

Data were analyzed using descriptive statistics such as frequencies, percentages, means, and standard deviations, and Pearson Product-Moment Correlations (r) to determine what relationships exist. The descriptive statistics allowed the researcher to describe the demographics of the sample, creating a picture of the typical survey respondent. The correlational analysis enabled the researcher to answer the three research questions.

Assumptions

1. Responses reflect participants' true perceptions of their experiences.
2. Soldiers visiting the Army Learning Center during the administration of the study were representative of the population of U. S. Army Infantry soldiers engaged in DL college courses. While the use of nonrandom sampling prohibits the generalization of survey results to this population, results may be used to guide future research efforts.

Scope and Limitations

The scope of this study was limited to the convenience sample of Infantry soldiers who visited the Army Learning Center during data collection and agreed to participate. Thus, findings should not be generalized to those outside this sample. This study was useful, however, in that it developed and provided validation data on an instrument for research on interactivity and satisfaction with DL and suggested directions for future research on military distance learners.

Limitations of the Design

1. All survey respondents were male because all U. S. Army Infantry soldiers are male.

2. Results from self-reported data are limited to student perceptions of their experiences (Dillman, 1978). Actual amount, types, quality, or effectiveness of online interactions were not measured other than by self-report.

3. Nonrandom convenience sampling prevents generalization of results to those not surveyed.

Definitions of Terms

The following terms are used in this study:

Asynchronous Interaction: Interaction in which participants communicate over a separation of time, usually through a message system such as email or electronic bulletin board.

Computer-Mediated Communication: Communication between people separated by place and/or time that is mediated by interconnected computers.

Distance Learning: Learning environment in which learners and teachers are separated by place and/or time.

Social Constructivism: View of learning as a social process in which people make sense of their world by interacting with other people.

Synchronous Interaction: Interaction in which participants communicate in real-time, requiring all participants to be engaged in communication at the same time.

Web-Based Distance Learning: Learning environment in which learners and teachers separated by place and/or time use the Internet as their primary means of course-related interaction.

CHAPTER TWO

REVIEW OF LITERATURE

This study investigated the relationships among interactivity, social constructivism, and satisfaction with distance learning (DL) in the target population of Infantry soldiers participating in college DL courses. This literature review begins with a discussion of social constructivism and adult learning theory, which form the theoretical framework of this study. The rest of this chapter presents an examination of research on the use of computer-mediated communication (CMC) in DL, particularly as it relates to the importance of interactivity and social constructivism in DL and as it relates to the U. S. military.

Social Constructivism

As Merriam and Caffarella (1999) succinctly explain, "…a constructivist stance maintains that learning is a process of constructing meaning; it is how people make sense of their experience" (p. 261). This emphasis on the internal mental processes by which people learn distinguishes constructivist theory from the other primary approach to educational psychology: behaviorism. Originating with B. F. Skinner (1957), behaviorism deals only with external, observable behaviors, relying on techniques such as classical conditioning to change how people respond to stimuli. Applying behaviorism to education, Skinner recommended teachers clearly state lesson objectives, break tasks

down into small sequences of steps, encourage students to work individually at their own pace, and provide positive reinforcement for successful task performance (Williams & Burden, 1997). Constructivists criticize this model because it relegates the role of the learner to that of a passive participant, relies on drill-and-practice learning activities with no attention to the meaning or mental strategies behind them, allows no opportunities to negotiate shared meaning, and fails to acknowledge the value of making and learning from mistakes (Williams & Burden, 1997).

In contrast to behaviorism, constructivism focuses on the learner's innate, internal attempts to make sense of his or her world as the key to the learning process. Constructivist theory originated with Jean Piaget, whose interest lied primarily in how, from birth through adulthood, people make sense of the world as a result of their experiences. The implications for teachers include making students more active and creating learning environments rich with opportunities for meaningful experiences. Translating constructivist theory into the modern world of distance learning, Jonassen, Davidson, Collins, Campbell, and Haag (1995) describe four principles of constructivist learning environments: a real-world context, active construction of knowledge through articulation and reflection, collaboration among learners, and conversation in which learners negotiate solutions to problems.

The consideration of collaboration and conversations among learners as key to the learning process has its roots in an offshoot of constructivism: social constructivism, which emphasizes the social and collaborative nature of learning (Vygotsky, 1978). McLoughlin and Oliver (1998) write, "The constructivist view of learning does not fully

take into account how social processes, such as peer interaction, collaboration and language use, contribute to learning" (p. 126). From a social constructivist view, knowledge is "constructed when individuals engage socially in talk and activity about shared problems or tasks. Making meaning is thus a dialogic process involving persons-in-conversation, and learning is seen as the process by which individuals are introduced to a culture by more skilled members" (Driver, Asoko, Leach, Mortimer, & Scott, 1994, p. 7). According to Wells (1999), Vygotsky's theory "proposes a collaborative community in which, with the teacher as leader, all participants learn with and from each other as they engage together in dialogic inquiry" (p. xii). Thus, learning is not the teacher-directed solitary practice of creating and reinforcing specific responses to specific cues, as behaviorism would suggest. Nor is it the independent process of exploring one's world and making sense of one's experiences, as Piaget would seem to suggest. Instead, social constructivists view learning as a social process in which people make sense of their world by interacting with other people. A key element in the social constructivist learning process, therefore, is that of mediation. A mediator is someone more knowledgeable than the learner--usually a teacher or parent, but possibly a peer--who helps the learner make sense of his or her experiences in order to create new understanding of the world. Adding mediation or interpersonal interaction to the concepts of constructivism, educators such as Williams and Burden (1997) and Jonassen et al. (1995) highlight the influence of four key factors on learning: teachers, learners, tasks, and contexts. A social constructivist approach positions the teacher as facilitator and the

learners as a collaborative group working within a real-world context to make sense of problem-based tasks.

Adult Learning Theory

Knowles' (1984) model of adult learning, known as andragogy, includes aspects of social constructivism. The basis of his theory is a set of five characteristics of the adult learner:

- The adult learner is self-directed. A learning situation that asks adults to lapse into a position of dependence in which they are not allowed to participate in making decisions that affect them causes resistance and diverts their energy away from the learning process.
- The adult learner possesses life experiences that can be used as a resource for learning. Learning activities that capitalize on adults' life experiences include group discussion, role-playing, and problem-solving projects.
- The adult learner's readiness to learn is related to his or her social role. While developmental tasks and changes in life status such as job changes and divorce are likely to lead to a readiness to learn, adult educators can also encourage readiness to learn through techniques such as "exposing learners to more effective role models, engaging them in career planning, and providing them with diagnostic experiences in which they can assess the gaps between where they are now and where they want and need to be" (Knowles, 1984, p. 11).

- The adult learner is more problem-centered, task-centered, or life-centered than subject-centered. Knowles (1984) writes, “The chief implication of this assumption is the importance of organizing learning experiences (the curriculum) around life situations rather than according to subject matter units” (p. 12).
- The adult learner is motivated internally rather than externally.

Based on these characteristics, Knowles (1984) recommends a classroom climate in which students and teachers collaborate as co-learners. Because “for many kinds of learning in adult education, peers are the richest resources for learning” (p. 15), Knowles recommends designing courses and workshops to “put the participants into a sharing relationship from the outset” (p. 15).

Vella (2002) also advocates a social constructivist approach to adult learning. She identifies twelve principles that are “ways to begin, maintain, and nurture” dialogue for effective adult learning:

- Needs assessment: participation of the learners in naming what is to be learned.
- Safety in the environment and the process. We create a context for learning. That context can be made safe.
- Sound relationships between teacher and learner and among learners.
- Sequence of content and reinforcement.
- Praxis: action with reflection or learning by doing.
- Respect for learners as decision makers.

- Ideas, feelings, and actions: cognitive, affective, and psychomotor aspects of learning.
- Immediacy of the learning.
- Clear roles and role development.
- Teamwork and use of small groups.
- Engagement of the learners in what they are learning.
- Accountability: how do they know they know? (p. 4)

Citing Knowles (1970), Vella (2002) writes, “The approach to adult learning based on these principles holds that adults have enough life experience to be in dialogue with any teacher about any subject and will learn new knowledge, attitudes, or skills best in relation to that life experience (p. 3). Vella’s (2002) concept of dialogue education is “informed by quantum concepts--ideas that emerge from the worldview of quantum physics” (p. 30). These concepts include the following:

- Relatedness: All that we do in design and teaching is related. Each of the twelve principles is related to all the others.
- A holistic perspective: The whole is far more than the sum of its parts. Learners learn more than we teach!
- Duality: Embrace opposites, use both/and thinking. Open questions invite both/and thinking and dialogue.
- Uncertainty: Every theory is constantly being constructed by application to new contexts.

- Participation: The observer is part of what she observes. Each person's perception of any given reality is different, dependent on their context and culture. We evoke the world we perceive.
- Energy: Learning demands energy. Many of the principles and practices of dialogue education are designed to raise and sustain the energy of learners. (pp. 30-31)

Instructors planning to use Vella's (2002) dialogue approach to education predicted they would engage in activities such as "listening, observing, designing and using open questions, designing learning tasks, creating synthesis and summary papers that showed the cutting edge of research, facilitating group work, counseling resistant students, and setting personal tasks with individual learners" (p. 188).

Another theory that emphasizes the social aspects of constructivism is Mezirow's Transformational Theory, which draws upon the writings of Jurgen Habermas to describe the necessity of testing one's newly formed understandings, or meanings, by "seek[ing] the best judgment of the most informed, objective, and rational persons we can find" (Mezirow, 1995, p. 53). Mezirow calls the resulting dialogue *discourse*, which "involves an effort to set aside bias, prejudice, and personal concerns and to do our best to be open and objective in presenting and assessing reasons and reviewing the evidence and arguments for and against the problematic assertion to arrive at consensus" (p. 53). Mezirow goes on to describe ideal conditions for discourse, which include the participants' ability to "be able to weigh evidence and assess arguments objectively" and

to “be open to alternative points of view, that is, to care about the way others think and feel” (p. 54)

Research on Computer-Mediated Communication (CMC)

Applying the concepts of discourse and dialogue from the theories of adult learning described above to distance education, Holmberg (1999) writes:

> I assume that if a course consistently represents a communication process that is felt to have the character of a conversation, then the students will be more motivated and more successful than if it has an impersonal textbook character. The conversational character is brought about both by real communication (students’ assignments, comments on these, telephone, e-mail, fax and postal support), and by a conversational style in printed and recorded subject-matter presentation which attempts to involve the students emotionally, and engage them in a development and exchange of views. (p. 59)

The capability of a technology to replicate conversations among teachers and learners can be described by the term teacher immediacy. Arbaugh (2001) found that teacher immediacy factors such as classroom demeanor and name recognition were significant predictors of student satisfaction with their web-based courses using computer-mediated communication (CMC). The remainder of this chapter will describe research on CMC in DL and the connection of CMC to the theories of social constructivism and adult learning presented above. These theories suggest that DL courses that maximize use of CMC to facilitate social constructivist dialogue will produce better results among adult learners.

Comparing CMC and Face-to-Face Courses

Perhaps because of the dialogic nature of courses using CMC, studies comparing CMC-based distance courses to traditional, face-to-face courses have shown positive results. For example, the American Federation of Teachers (2001) writes, “Many practitioners maintain that in-depth interaction with students over the Web is actually stronger than in traditional classrooms” (p. 57). Phelps et al. (1991) found CMC students in the U. S. Army scored higher on end-of-course tests than those taking face-to-face courses. Hiltz (1994) reports, “Those students who experienced high levels of communication with other students and with their professor…were most likely to judge the outcomes of VC [Virtual Classroom] courses to be superior to those of traditionally delivered courses” (pp. 244-245). Coombs (1993) has observed that students share more, share more openly, and learn more about one another when using CMC. He suggests that CMC gives students more time to reflect on their ideas and overcomes the problem of stage fright that inhibits many students’ participation in face-to-face class discussions. Arbaugh (2000d) found that while students using CMC for the first time had more difficulty interacting online than face-to-face, the two groups showed similar interaction dynamics and no significant difference in achievement.

Importance of CMC to Success in Distance Learning

Moving beyond the comparison of CMC to face-to-face classroom interaction, other researchers have focused on the proposition that CMC is an essential factor for students to succeed in a DL environment. According to the American Federation of Teachers (2001), “Almost everyone agrees that the most important challenge facing

distance education is the need to develop a rich level of personal interchange between professor and student and among students themselves" (p. 57). Fredericksen, Pickett, Shea, Pelz, and Swan (2000) surveyed students enrolled in online courses through the State University of New York's Learning Network and found that the most significant factor in students' perceived learning is the amount of interaction they have with their teachers. Fredericksen et al. (2000) also found student-to-student interaction to be a significant factor in perceived learning. Moreover, in a study of technological, pedagogical, and individual factors in a distance education course, Arbaugh (2000b) found that the only factors significantly correlated with student learning were the instructor's efforts to foster interaction. Hiltz and Turoff (2002) similarly found distance education students who participated more actively in online class discussions both perceived the online courses as more effective and received higher grades than students with lower self-reported rates of participation. In the same study, interviews with faculty members showed that they also perceived a positive association between interaction and course outcomes. Pena-Shaff, Martin, and Gay (2001) suggest various forms of CMC can be used "to promote critical thinking skills, reflective thought, and in-depth analysis" (p. 66).

Similar studies, however, have found mixed or contradictory results regarding the importance of a highly interactive DL environment. Guzley, Avanzino, and Bor (2001) found no significant correlation between the frequency of CMC-based discussion about course content and students' satisfaction, motivation, or grades. Card (2000) reported that while students in both CMC and traditional, face-to-face sections reported satisfaction

with the course, two-way interactions between CMC group members were limited. She concluded that “the use of computer technologies does not always foster two-way interaction” (p. 243) and suggested the limited interaction results could have been due to a lack of structure for cooperative groups in CMC.

Factors Contributing to Successful Use of CMC

In addition to Card, other researchers have hypothesized that rather than being inherently effective or ineffective, CMC’s effectiveness depends on how it is used. One possible reason for mixed results in studies of CMC is that not all courses using CMC are created equal. In this vein, Bruckman (2002) compares asking how well the Internet can support learning to asking how well books can support learning—the answer being that it depends on the book and how it is used.

Tolmie and Boyle (2000) describe six factors that comprise an optimal CMC-based learning experience:

1. Small group size (approximately 6 students);
2. Students who know each other;
3. Students with prior task-related experience;
4. Students who know what they are supposed to do and how to go about it;
5. Students who have ownership or input into the task assigned to the group; and
6. A learning situation in which there is a clear need for CMC, meaning it is the most efficient means for the group to achieve the task.

While others have hypothesized that the students' prior experience with CMC (Arbaugh, 2001; Stewart, Shields, Monolescu, & Taylor, 1999; Whitley, 1997; Wilson, 2000) and the type of interface design or software used (Harasim, 1999; Turoff, 1995) also affect the success of CMC, Tolmie and Boyle (2000) suggest these are no longer salient factors because today's CMC interfaces are simple and intuitive to use and because prior experience with CMC among students is common. Most researchers and practitioners, however, agree that students need structure for their discussions and clearly communicated expectations about how they are supposed to interact online (Alexander, 1999; Archee, 1993; Davis & Schlais, 2000; Monahan, 2000; Pennell, 2000). Seale and Cann (2000) found mixed responses among students in their CMC study and suggest that four key factors affect the success of online reflection: "the way the learning technology is used, the nature of the student groups, the role of the tutor, and students' preferences for 'off-line' reflection" (p. 309).

Focusing on students' preferences and other individual differences, another possible explanation for the lack of consistent results regarding the success of CMC is variability in how individual students respond to CMC-based learning. Those exploring gender differences in CMC use have found mixed results, with some indicating CMC equalizes discussion participation by women (Arbaugh, 2000a; Dubrovsky, Kiesler, & Sethna, 1991; Gefen and Straub, 1997; and McConnell, 1997), while others maintain that CMC offers no gender equalization effect (Condravy, Skirboll, & Taylor, 1998; Postmes, Spears, & Lea, 1998; Spears & Lea, 1994; Stewart et al., 1999). Others have combined

studies of gender with studies of race, producing similarly mixed results (Wolfe, 2000; Schleiter, 1996).

Another approach to studying individual differences in CMC has been to examine differences among participants' learning styles. Using Smith and Kolb's (1996) learning style inventory, Federico (2000) reports, "Students with assimilating and accommodating learning styles demonstrated significantly more agreeable attitudes toward varied aspects of network-based instruction than students with converging and diverging learning styles" (p. 359). Carlisle (2002) also found a significant relationship between learning style and course satisfaction in a DL environment. Buell (2000), on the other hand, found no significant relationship for these variables but did find a significant relationship between satisfaction and a student's computer and Internet experience.

Similarly, Liang and McQueen (2000) found email-based interactive learning was better suited than face-to-face learning for introverts, and peer-oriented learners found email-based interactive learning more effective than did tutor-oriented learners. Age and experience are additional individual differences suggested as factors in the successful use of CMC. Kaye (1989) writes, "It can also be argued that the value of group interaction depends to a large extent on what the learners have to offer from their own store of knowledge and experience" (p. 11). This statement echoes Tolmie and Boyle's (2000) inclusion of students with prior task-related experience as a factor contributing to an optimal CMC-based learning experience.

CMC and Adult Learning

The idea of students bringing their own prior experience into CMC-based DL fits nicely with Knowles' (1984) support of andragogy as a model for adult learning. Theoretically, a CMC-based DL environment provides a space for adult learners to share and explore their own stories relating to course material. This capacity to elicit adult learners' input using CMC may be limited, however, by current adult learners' reluctance to use CMC technologies. Andrews, Preece, and Turoff (2001), for example, found "mid-life career changers" to be "reluctant to interact online with people they have not met face-to-face" (p. 64). CMC also supports the implementation of problem-centered learning activities in which adults can take active, self-directed roles in steering the dialogue while maintaining their social identities in a safe, collaborative environment.

CMC and Social Constructivism

Another predominant theme in CMC research and theory is the link between CMC and constructivism. Campbell and Ben-Zvi (1998) write, "…a choice to use CMC is a choice for collaborative, reflective, socially negotiated learning within a supportive … learning community" (p. 185). Jonassen et al. (1995) believe the power of CMC lies in its ability to support collaboration and conversation, but other practitioners believe CMC can also support articulation and reflection through techniques such as online student journals (Hammer, 1997). Garrison (1997) writes, "Computer conferencing is particularly supportive of constructivism…. It increases interaction, allows collaborative learning strategies to be used, and facilitates critical discourse and construction of new understandings" (cited in Annand, 1999, p. 47). Harasim (1990) identifies five attributes

of CMC that make it well-suited for collaborative learning: many-to-many communication, place-independent group communication, time-independent communication, text-based communication (learning by writing), and computer-mediated learning, which is "revisable, archivable, and retrievable" (p. 51) and increases the user's control of the learning process. Using CMC, a learner can reach out to many peers at once, even if those peers are in different locations or on different time schedules. The peers can respond as they are able, and the conversation can evolve from there. At any point, the entire learning community can review what was said and how the group's ideas developed because all dialogue is archived by the computer interface.

More specifically than with constructivism, CMC's capability for interpersonal interaction seems to fit best with social constructivism. Jonassen et al. (1995) describe an ideal CMC-based social constructivist learning model as follows:

> Dyads or groups can work together to solve problems, argue about interpretations, negotiate meaning, or engage in other educational activities including coaching, modeling, and scaffolding of performance. While conferencing, the learner is electronically engaged in discussion and interaction with peers and experts in a process of social negotiation. Knowledge construction occurs when students explore issues, take positions, discuss those positions in an argumentative format, and reflect on and re-evaluate their positions…. Sharing knowledge through an electronic medium also aids the overt exchange of naturally covert processes and strategies with other on-line learners in order to solve collective or individual

> problems…. Social negotiation of the structure of ideas represented in the written content may also induce knowledge construction (pp. 16-17).

Carr-Chellman and Duchastel (2000) echo this optimism about the potential for CMC to foster social constructivism. They have observed that online, asynchronous, student-to-student dialogues "lead to the formation of true learning communities, within which adult students share their real world experiences and learning outcomes" (p. 236).

Another proposed factor contributing to the success of CMC as a social constructivist approach to DL is the subject matter or content area in which it is used. Kaye (1989) writes, "Some academic disciplines lend themselves better to cooperative work, and to the use of discussion and debate as a teaching/learning strategy, than others" (p. 11). According to Kaye (1989) and Romiszowski and Mason (1996), CMC is better suited for content areas that lend themselves to constructivism. Carr-Chellman and Duchastel (2000) theorize that the usefulness of CMC may depend not only on the subject being studied, but also on the level of instruction:

> …increased interaction, particularly with fellow-students, may be particularly useful in grappling with information that is value-laden (often the case in applied settings, where the practical experience of different students can be profitably shared). In dealing with highly structured and consensual information (think of the typical introductory course in a field of study), open discussion is less crucial (p. 237).

CMC and the Military

Research has suggested that high levels of interactivity are particularly important for military students. Christian (1982) compared military and civilian personnel in mandatory training and found that the military personnel had a more andragogical orientation to learning than the civilians. Among the characteristics of andragogy he mentions are an assumption that students' prior experiences provide a resource from which to learn and a preference for a learning environment that is collaborative and immediately applicable.

An expectation of finding highly interactive online learning environments that use constructivist techniques among colleges serving U. S. Army Infantry soldiers comes from the Council of Academic Management (CAM), a partner involved in the Army University Access Online (eArmyU) program. CAM's mission is to "assist in establishing the framework standards, policies, and quality assurance procedures for selecting and managing higher education partners, thereby ensuring that leaders from higher education industry play a prominent role in the Army University Access Online initiative" (Lorenzo, 2002 January). CAM is sponsored by the Sloan Foundation (Lorenzo, 2002 May/June), which is also affiliated with the Asynchronous Learning Network (ALN). CAM advises the Army on best practices being used in ALN's Sloan Consortium (Sloan-C), a group of 78 higher education institutions offering DL degree programs. These best practices include five pillars of quality: learning effectiveness, access, student satisfaction, faculty satisfaction, and cost effectiveness (Sloan-C, n.d.). The Sloan Consortium includes interaction as a factor that contributes to three of these

principles: learning effectiveness, access, and student satisfaction. For learning to be effective, the Consortium's standard is that "the course or program provides for interaction between faculty and learners and among learners that is both quantitatively and qualitatively sufficient to support course objectives and that is in accordance with the pedagogy and subject matter of the course. Interaction encourages critical thinking, problem solving, analysis, integration and synthesis, as defined in the course objectives" (Sloan-C, n.d., Learning Effectiveness section, para. 2). The Consortium states that access includes "enhancing collaboration and communication among faculty and learners" (Sloan-C, n.d., Access section, para. 2). Concerning student satisfaction and interaction, the Consortium states:

> Online learners put a primary value on constructive, substantive interaction with faculty and, as appropriate, with classmates in classes that are the same size as equivalent face-to-face classes and are taught by the same kind of faculty. People-to-people interaction is key to constructive learning, and online programs engage distributed learning cohorts. Hence, online programs include asynchronous interaction in media such as e-mail, chats, boards, stored voice, archives, and so on. Occasionally, synchronous interactions may occur. (Sloan-C, n.d., Student Satisfaction section, para. 1)

Bonk and Wisher (2000) discuss the Army's efforts to leverage both web-based and collaborative learning techniques and the need for research on these efforts, and Arbaugh, 2000c have pointed to the lack of multi-course, multi-disciplinary studies as a shortcoming in the body of literature on CMC and DL. While both the Army and other

educators (Sorenson, 1995) have emphasized the importance of interaction as a key to success in DL, all DL practitioners need more information on how best to build interaction into their courses. Reports on military training discuss the need for research on the use and effectiveness of interactive and collaborative learning activities and on web-based learning activities (Bonk & Wisher, 2000).

Summary

This chapter provided an overview of literature in the areas of social constructivism, adult learning theory, and interaction via CMC in DL. A social constructivist approach to learning encourages the development of a collaborative and supportive community in which learners engage in dialogue to develop deeper understanding of course topics through negotiation with other learners, preferably in situations where the other learners communicate differing understandings, viewpoints, or perspectives. Similarly, adult learning theory recommends that interaction between students and teachers be collaborative in nature. Vella (2002) outlines the advancement of social constructivism within the context of adult learning theory, pointing out the need to acknowledge how different learners see the world from their own perspectives and how instructional techniques such as open questions encourage deeper understanding and consideration of course topics.

Researchers in the field of DL have applied these concepts from social constructivism and adult learning theory to the use of CMC in DL (Carr-Chellman & Duchastel, 2000; Holmberg, 1999; Jonassen et al., 1995; Sloan-C, n.d.). Researchers have

also found that the amount of interactivity with the instructor and with other students contributes to the success of DL (American Federation of Teachers, 2001; Fredericksen et al., 2000; Hiltz & Turoff, 2002). Other researchers have suggested demographic factors, such as prior college experience, field of study, educational level, and computer and Internet expertise, as contributing to the successful use of CMC in DL (Buell, 2000; Carr-Chellman & Duchastel, 2000; Kaye, 1989; Romiszowski & Mason, 1996). Other research presented in this chapter focused on the applications of CMC and andragogy to military training (Bonk & Wisher, 2000; Christian, 1982).

The theoretical framework presented in this chapter suggests that there may be significant relationships among the survey constructs of interactivity, social constructivism, and soldier satisfaction with their DL courses. It is also suggested that relationships may be found among soldier satisfaction with DL and their demographic characteristics, such as educational level, major field of study, subject areas in which DL courses were completed, prior experience, and computer and Internet expertise.

CHAPTER THREE

METHODS

The purpose of this study was to determine what relationships, if any, exist among social constructivism, interactivity, and student satisfaction among enlisted U. S. Army Infantry soldiers enrolled in DL courses. Specifically, this study was designed to determine (a) what relationship, if any, exists between students' satisfaction with distance learning and the perceived level of interactivity they experienced in a recent distance learning course; (b) what relationship, if any, exists between students' satisfaction with distance learning and the degree of social constructivism they have experienced in their distance learning courses; and (c) what relationship, if any, exists between students' satisfaction with distance learning and their demographic data (military rank, educational level, major field of study, subject areas in which DL courses had been completed, prior experience, computer and Internet expertise, participation in the eArmyU program, and media used for course interaction).

This chapter begins with a description of the institutional setting in which this study was conducted. Next, it provides a demographic portrayal of the population targeted for the study and the procedures used to sample and protect the subjects. This is followed by a description of instrument design and data analysis procedures.

Setting

A U. S. Army installation in southeast Georgia, Fort Benning has the mission to provide the nation with--

- The world's best Infantry soldiers and trained units.
- A power projection platform capable of deploying and redeploying soldiers, civilians, and units anywhere in the world on short notice.
- The Army's premier installation and home for soldiers, families, civilian employees, and military retirees. (Installation Strategic Plan, 2002-2006).

Fort Benning is home to the United States Army Infantry Center (USAIC), which has the following missions:

- To operate a major installation providing common support for authorized organizations and personnel.
- To operate a training center and service school to enhance the opportunity for success on the modern battlefield through doctrine, equipment and training development, and the training of military personnel.
- To maintain a high state of readiness in assigned FORSCOM units. (USAIC Regulation 10-10, 1988, p. 2-2)

The service school mentioned in the second mission above is the United States Army Infantry School (USAIS), whose mission is "to prepare selected officers, noncommissioned officers, and soldiers to perform Infantry duties required in peace and war with emphasis on the art of command and leadership" (USAIC Regulation 10-10, 1988, p. 23-3). USAIC Regulation 10-10 (1988) goes on to state, "The contemporary

mission of the United States Army Infantry School is to promote professionalism and military competence by:

- Development and Promulgation of Infantry Doctrine.
- Education and Training of Students in Residence.
- Extension of the School's Education and Training Capacity to Units and Individuals in All Components of the Army in the Field.
- Supporting Force Development Objectives with a Coordinated Combat Development Effort." (pp. 23-3 - 23-4)

The education and training component of this mission is further subdivided into not only the preparation and coordination of programs of instruction and training, but also the task to "Remain (sic) current with significant developments in instructional methodology throughout the armed services, industry, and civilian educational agencies" (USAIC Regulation 10-10, 1988, p. 23-3). USAIS conducts approximately 30 courses, ranging from general officer and noncommissioned officer education courses to highly specialized courses such as the Basic Airborne Course, the Javelin (weapon system) Course, and the Long Range Surveillance Leaders Course. Estimated student input in these courses, not including initial entry training, is approximately 32,000 soldiers per year (U. S. Army Infantry School, 2003).

The USAIC Education Center serves the entire military population of Fort Benning. It is part of the Army Continuing Education System (ACES), which has the mission "to vigorously promote lifelong learning opportunities to sharpen the competitive edge of the Army by providing and managing quality self-development programs and

services" (U. S. Army Education, 2002, p. 1). ACES provides soldiers with access to and support for a wide variety of educational opportunities. Each installation has an Army Education Center with counselors, computer labs, and testing offices to assist soldiers in completing civilian certificate and degree programs. One of the programs administered through ACES at Fort Benning is the Army University Access Online program, known most commonly as eArmyU. This program provides participants with a laptop computer, printer, Internet access, tuition, and books to encourage enlisted soldiers to enroll in one of the program's participating DL colleges.

Initiated in January 2001, the Army University Access Online program (commonly known as eArmyU) seeks to improve enlisted soldiers' access to post-secondary educational opportunities by capitalizing on distance education technologies. Its stated missions are—

- To enhance recruiting and retention by offering soldiers the opportunity to obtain higher education degrees and professional credentials anytime, anyplace and the option to learn while you serve.
- To increase the variety of existing education programs and services available at Army education centers to develop educated, information age-savvy soldiers who can succeed in the network-centric missions and battlefields of the 21st Century.
- To ensure all soldiers have the opportunity to fulfill their personal and professional educational goals while simultaneously building the

> technology-based, critical thinking, and decision-making skills required to fully transform the Army (U. S. Army Personnel Command, 2001).

Through a web portal (www.eArmyU.com), soldiers participating in eArmyU can access a wide variety of post-secondary certificate and degree programs offered from more than 18 colleges and universities. To remain eligible for tuition funding, the soldier must complete at least 12 semester hours of online course work within the first 24 months. If not, then he or she must reimburse the Army for the expense of both the courses and the computer. Regardless of course completion, however, the soldier is allowed to keep the computer and printer. Through eArmyU, more than 15,000 Army soldiers have enrolled in DL courses (Lorenzo, 2002 May/June).

Participants

The use of Fort Benning, Georgia, as a pilot site for the eArmyU program afforded the researcher access to a population of enlisted soldiers who had an Infantry military occupational specialty and who were engaged in distance learning college courses. Such soldiers formed the population for this study. This population was entirely male because females are prohibited from enlisting in the U. S. Army's combat arms specialties, including the Infantry. The size of this population was estimated at 4,000 (E. M. Livingston, personal communication, January 8, 2003). The sampling technique used was convenience sampling: the researcher administered questionnaires to soldiers who visited the USAIC Army Education Center during August and September 2003. The target sample size was 200, with a minimum of 100 completed questionnaires required

for analysis. The target sample size was not met due to a reduction in the population available to be sampled. The onset of Operation Iraqi Freedom in April 2003 resulted in the deployment of Fort Benning's largest unit, the Third Brigade of the Third Infantry Division. Consequently, soldiers in that unit were unable to complete any DL courses and were, therefore, not eligible to participate in this study. The minimum sample size was met, however, and 131 surveys were included in the analysis.

Instrument Development

The Distance Learning Interactivity Questionnaire (see Appendix A) was designed for use in this exploratory study. The questionnaire has four sections: (1) Demographic Information, (2) Experience with Distance Learning and Higher Education, (3) Distance Learning Outcomes, and (4) Most Recent Distance Learning Course. The researcher developed questionnaire items in Sections 1 and 2 to gather students' demographic information and information on the amount and types of interaction they have experienced during DL courses. This information included military rank, educational level, major field of study, subject areas in which DL courses had been completed, prior college experience both in traditional and various types of DL environments, ratings of the quality of courses completed in each environment, participation in eArmyU, subjects in which they had completed web-based DL courses, and media used for interaction in their web-based DL courses.

The inclusion of some demographic items in the survey was based on educational research, reviewed in Chapter 2, which suggests students' educational level, fields of

study, prior experience, and computer and Internet expertise are factors that contribute to their success and satisfaction with DL courses. Age, gender, and race are other factors that may contribute to DL success and satisfaction, but, in granting permission to conduct this study at USAIC, the Infantry Center representative requested these items be removed from the questionnaire. Instead, the item on military rank was included to place respondents within their career progression. Participation in eArmyU was included to determine how representative the sample was of students in that program. Media used for interaction was included to yield data on the extent to which respondents had used synchronous and asynchronous CMC. Finally, respondents were asked to rate the quality of courses completed in various types of learning environments to identify general attitudes toward college courses and DL in general.

Section 3 contained 20 items and used a five-point Likert scale: 1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree), and 5 (strongly agree). Items relating to social constructivism in online discussions were adapted from Bonk and Wisher's (2000) Social Constructivism and Learning Communities Online (SCALCO) Scale. Bonk and Wisher cite the work of Bonk, Malikowski, Angeli, and East (1998); Bonk, Oyer, and Medury (1995); and Kanuka and Anderson (1998) as sources for SCALCO. These items measured three outcomes or characteristics of a social constructivist approach to using CMC: collaboration and support (five items), awareness of multiple perspectives (five items), and development of deeper understanding of course topics (five items). Thus, the operational definition of social constructivism used was the presence of collaboration and support, awareness of multiple perspectives, and

development of deeper understanding of course topics. While these characteristics may be present in learning environments where the instructor may not have intended to employ a social constructivist approach, their presence still indicates a learning environment that reflects social constructivist principles. Also included in Section 3 were five items adapted from Sorensen's (1999) Interactive TV (ITV) Evaluation to measure overall satisfaction with DL courses. This instrument has reliability estimates ranging from .79 to .98 for the constructs of course satisfaction, overall class interaction, teacher/student communication, and peer communication (C. Sorensen, personal communication, January 28, 2003). Appendix B shows Section 3 survey items grouped by construct measured.

Section 4 contained 12 items using the same five-point Likert-type scale as Section 3. These 12 items asked the student to reflect on the degree of interactivity he experienced in his most recent DL course. While no literature was found to suggest that a student's experiences in his most recent course affects his satisfaction with DL more than any other course he has completed, these items were included to gain a sample of specific data on the level of interactivity participants have experienced. Asking about the most recent course put less of a mental burden on the participants to reflect on, collate, and report on many courses at once. To measure how well participants' responses in Section 4 represented the interactivity of all the courses they have experienced, the researcher asked how typical the interaction in the course considered was of other web-based DL courses. In response to this question, 24 percent of respondents indicated that

the amount of interaction varies greatly, but 59 percent indicated that the course they considered in answering the 12 items in Section 4 was typical of other courses completed.

For Section 4, four items relating to the amount of faculty-student interaction and four items on the amount of student-student interaction were adapted from Sorensen's (1999) Interactive TV Course (ITV) Evaluation. The other four items were developed by the researcher to measure satisfaction with the amount of interaction in the course being considered. Appendix B shows Section 4 survey items grouped by construct measured.

A Q-Sort Technique was used to examine the relationship of the survey questions in Sections 3 and 4 to the domains they purported to represent. A panel of four individuals was asked to apply the Q-sort Technique (Gay, 1980). The panel consisted of one professor of educational psychology, one advanced graduate student in educational psychology, one professor of adult education, and one advanced graduate student in adult education. With the potential of having 128 possible deviations from the expected question placement, an actual miss placement of only eleven items were without pattern and therefore considered random error. This panel established an approximation of 92 percent agreement demonstrated, sufficient convergent and divergent agreement to proceed with further study. Ideally, a confirmatory factor analysis would have been performed to provide further evidence of subscale validity. This study, however, failed to produce an adequate sample size (n = 132) to support this analysis (Cattell, 1978; Comrey & Lee, 1992; Guilford, 1954). Any follow-up study using the DLIQ should gather sufficient cases to perform confirmatory factor analysis.

Data Collection

The researcher collected data in August and September 2003 by placing questionnaires and announcements in the Army Learning Center at Fort Benning, Georgia. The Army Learning Center is a computer lab where students can check email or use the Internet. It also serves as a testing facility for college programs that administer proctored exams. This method of data collection resulted in a nonrandom convenience sample. Participation in this study was voluntary. Upon completion, the soldiers returned their questionnaires to the researcher. No list of participants or non-participants was compiled. Soldiers were instructed not to write their names or any other identifying information on the questionnaire so that data would be anonymous.

Data Analysis

Data analysis was performed using SPSS 10.0 for Windows. Descriptive statistics such as frequencies, percentages, and means were calculated to determine the demographic characteristics of the sample and their general experiences with and perceptions of DL and CMC. To answer the following research questions, Pearson Product-Moment Correlations (r) were calculated:

1. What relationship, if any, exists between students' satisfaction with distance learning and the degree of interactivity they experienced in a recent distance learning course?

2. What relationship, if any, exists between students' satisfaction with distance learning and the degree of social constructivism they have experienced in their distance learning courses?

3. What relationship, if any, exists between students' satisfaction with distance learning and their demographic data (military rank, educational level, major field of study, subject areas in which DL courses had been completed, prior experience, computer and Internet expertise, participation in the eArmyU program, and media used for course interaction)?

Summary

A review of literature suggested that highly interactive DL courses that use social constructivist techniques would produce better outcomes for students in these courses. This study was designed to determine what relationships exist among satisfaction with distance learning, experience with social constructivist techniques in distance learning courses, interactivity experienced in a recent distance learning course, and students' demographic data. To measure these variables, the Distance Learning Interactivity Questionnaire (DLIQ) was developed, validated, and administered to a sample of U. S. Army Infantry soldiers from Fort Benning who had completed college DL courses. Data were analyzed using descriptive statistics and correlations.

CHAPTER FOUR

RESULTS OF THE STUDY

To investigate the relationships among interactivity, social constructivism, demographics, and satisfaction with distance learning, the researcher developed and administered the Distance Learning Interactivity Questionnaire to a sample of 131 U. S. Army Infantry soldiers stationed at Fort Benning, Georgia. The resulting data were analyzed using two techniques: frequencies, percentages, and descriptive statistics to describe the sample and their general responses to survey items and Pearson Product-Moment Correlations to examine the relationships among the variables. This analysis answered the following research questions:

1. What relationship, if any, exists between students' satisfaction with distance learning and the degree of interactivity they experienced in a recent distance learning course?

2. What relationship, if any, exists between students' satisfaction with distance learning and the degree of social constructivism they have experienced in their distance learning courses?

3. What relationship, if any, exists between students' satisfaction with distance learning and their demographic data (military rank, educational level, major field of study, subject areas in which DL courses had been completed, prior experience,

computer and Internet expertise, participation in the eArmyU program, and media used for course interaction)?

This chapter begins with a discussion of the demographics of the sample in order to compile a description of the typical survey respondent. It then summarizes the responses to the measures of interaction, social constructivism, and satisfaction. The chapter ends with the results of the correlational analysis to answer the three research questions.

Demographics

Of the 131 participants, all were male because all were U. S. Army Infantry soldiers, a military occupational specialty that is open only to males. Other demographics measured were military rank, educational level, major field of study, subject areas in which DL courses had been completed, prior experience with college and with various modes of instruction (both traditional and DL), level of computer and Internet expertise, participation in the Army University Access Online program (eArmyU), and media used to interact with instructors and other students.

The mode for rank among the participants was that of E-7, or sergeant first class, at 44 percent. The second most common was E-6, or staff sergeant, at 26 percent. These two categories combined made up 70 percent of the respondents. The mode for educational level was associate's degree at 53 percent, followed by bachelor's degree at 31 percent, with these two categories comprising 85 percent of the sample. The most common major identified was criminal justice at 25 percent, followed by business at

20 percent and computer-related fields at 12 percent. These data paint a picture of the typical respondent as a career-minded student who has reached the rank of E-6 or E-7 and who has the goal of pursuing a two-year or four-year degree that will lead directly into a job after he retires from the Army. Furthermore, most respondents seem to be pursuing programs of study that capitalize on skills they already have. The weapons and security skills of an Infantry soldier will feed into a career in criminal justice, and the experience they have gained with computer technology in the Army will support careers in computer-related fields. The prevalence of criminal justice majors may also be explained by the tendency of careers in criminal justice and Infantry to attract the same occupational personality types (Holland, 1997). The most common subject areas in which respondents had completed DL courses were computers (44 percent), history (38 percent), and social sciences (29 percent).

On the questions of computer and Internet expertise, most respondents felt they were experienced in both areas. Only 21 percent rated themselves as beginners with computers, and only 18 percent rated themselves as beginners with the Internet. The rest placed themselves in the categories of experts or experienced users. For prior experience in traditional and DL college courses, respondents provided the number of courses they had completed in five types of learning environments: face-to-face, web-based, computer-based (no Internet connection required), video-teleconference, and paper-based correspondence. The number of respondents indicating they are or have been participants in eArmyU, which uses a web-based environment, was 114, or 87 percent. Respondents

also gave the number of eArmyU courses they had completed. The mean number of courses in each type of learning environment and for eArmyU is shown in Table 1.

Table 1

Mean Number of Courses Completed in Each Learning Environment

Environment	Mean Number of Courses	Standard Deviation
Traditional, Face-to-Face Classroom Environment	7.34	11.44
Web-Based Distance Learning Environment	6.25	7.72
Computer-Based Distance Learning Environment	0.43	1.15
Video-Based Distance Learning Environment	0.25	1.08
Paper-Based Distance Learning Environment	7.01	23.03
eArmyU	4.57	4.33

While these numbers show wide variability in the levels of experience, they also show a sample with a wealth of experience in web-based DL courses, traditional face-to-face courses, and paper-based correspondence courses. Greater confidence in the veracity of responses to questions that compare web-based learning outcomes to traditional learning outcomes results from the fact that 66 percent of the respondents reported experience in both web-based and traditional learning environments.

Measures of Interactivity

Section 4 of the DLIQ contained eight items to measure the respondents' perceptions of the degree of interactivity in a recent DL course. Table 2 shows the number and percentage of respondents agreeing or strongly agreeing with items indicating a high level of interaction.

Table 2

Rates of Agreement on Items Measuring Interaction

Statement	Number	Percent
Student-instructor interaction		
The instructor often asked questions of students.	70	61
The instructor generally answered questions from students.	96	73
Students generally responded to the instructor's questions.	91	70
Students often asked questions of the instructor.	89	68
Student-student interaction		
Students often responded to other students' questions.	77	59
Students often stated their opinions to each other.	67	51
Students often asked each other questions.	70	54
The level of interaction among students was high.	52	40
Satisfaction with student-instructor interaction		
I am satisfied with the amount of interaction with my instructor.	89	68
I would have preferred to spend more time discussing course material with the instructor.	50*	38*
Satisfaction with student-student interaction		
I am satisfied with the amount of interaction with other students.	82	63
I would have preferred to spend more time discussing course material with the other students.	30*	27*

*Reverse Coded

As Table 2 shows, respondents were more likely to report high levels of interaction with their instructors than with other students. Most respondents (63 to 68 percent), however, were satisfied with the amount of both student-instructor and student-student interaction in the course considered. To check for significant differences for experiences and satisfaction with student-instructor interaction compared to student-student interaction, the researcher calculated z scores as measures of the significance of the difference between two correlated proportions (Ferguson, 1981). This analysis showed that respondents were significantly more likely to report satisfaction with the amount of interaction with their instructors than with other students, $z = -6.51$, $p < .01$ (two-tailed), but there is no significant difference in the numbers reporting a preference for more student-instructor interaction compared to those preferring more student-student interaction, $z = -0.91$. It also shows significant differences in how many respondents agreed to statements indicating frequent student-instructor questioning compared to student-student questioning, $z = -6.52$, $p < .01$ (two-tailed), and statements indicating frequent student-instructor answering compared to student-student answering, $z = -6.56$, $p < .01$ (two-tailed).

Two additional items in Section 2 yielded data on the types of different media respondents had used to communicate with their instructors and classmates. By far, the most frequently indicated media for interaction was asynchronous CMC (such as e-mail or online bulletin board, in which messages are exchanged without both parties being online at the same time). The second most common was synchronous CMC (such as chat room or instant messaging, in which both parties must be online at the same time). Also

of note is the fact that 15 percent of the respondents checked none of the choices of media for interaction with other students. Table 3 summarizes the usage levels of each type of media, listed in descending order of frequency used for student-instructor interaction.

Table 3

Use of Various Media for Course Interaction

	Number		Percent	
Media	With Instructor	With Peers	With Instructor	With Peers
Asynchronous CMC	114	98	87	75
Synchronous CMC	47	48	36	37
Telephone	36	12	28	9
Postal Mail	7	0	5	0
FAX	5	0	4	0
Face-to-Face	5	11	4	8
Video teleconference	3	1	2	1
Other	0	1	0	1
None	0	20	0	15

Measures of Social Constructivism

Section 3 of the DLIQ contained 15 items to measure the respondents' perceptions of outcomes or characteristics of DL courses that are consistent with a social

constructivist instructional approach. Tables 4, 5, and 6 show the number and percentage of respondents agreeing or strongly agreeing with items indicating three characteristics of a social constructivist approach to DL.

Table 4

Rates of Agreement on Items Measuring Development of Deeper Understanding of Course Topics

Statement	Number	Percent
I have developed positions on issues.	64	50
I have clarified my ideas by sharing them with others.	71	54
I have clarified my ideas by reading other students' comments.	85	65
Online discussions have encouraged me to provide evidence to support my views.	77	59
Online discussions have enabled me to develop a deeper understanding of course topics.	69	53

Table 4 shows rates of agreement of 50 to 65 percent on items reflecting deeper understanding of course topics as an outcome of online discussions.

Table 5

Rates of Agreement on Items Measuring Awareness of Multiple Perspectives

Statement	Number	Percent
Online discussions have exposed me to other students' ways of looking at topics discussed.	94	72
Online discussions have fostered an environment where more than one answer may be correct.	74	57
Online discussions have fostered in me an appreciation for other people's opinions and perspectives.	67	51
Groups of students have discussed differences of opinion during online discussions.	87	66
During online discussions, my instructors have asked students to discuss their opinions with other students.	87	66

Table 5 shows rates of agreement of 51 to 72 percent on items reflecting awareness of multiple perspectives as an outcome of online discussions.

Table 6

Rates of Agreement on Items Measuring Collaboration and Support

Statement	Number	Percent
I have felt that I was an accepted member of the group.	59	45
I have developed friendships with other students.	33	25
I have felt I could count on my classmates to reply to my needs.	58	44
My classmates have acknowledged my contributions to discussions.	61	47
I have received useful feedback from online classmates.	71	54

As Tables 4 and 5 show, at least 50 percent of respondents agreed with all statements indicating that online discussions had fostered the development of a deeper understanding of course topics and an awareness of multiple perspectives. For statements indicating collaboration and support, however, Table 6 shows levels of agreement were below 50 percent for all but one statement.

Measures of Satisfaction

To gain a sense of how the sample viewed DL compared to face-to-face instruction in general, the questionnaire asked them to rate the quality of the courses they had completed in the five types of learning environments on a three-point scale labeled poor, fair, or good. Of particular interest was the fact that 61 percent rated their web-based courses as good, and 34 percent rated these courses as fair. Moreover, 49 percent of those with experience in both modes of instruction rated their web-based courses in the

same category as their face-to-face courses, and 5 percent rated their web-based courses higher than their face-to-face. Only 15 percent rated their web-based DL courses as being of a lower quality than their face-to-face courses.

Similarly, high levels of satisfaction were reported with web-based DL in Section 3 of the DLIQ. Table 7 shows the number and percentage of respondents agreeing or strongly agreeing with positive statements about web-based DL courses completed in general.

Table 7

Rates of Agreement on Items Measuring Satisfaction

Statement	Number	Percent
Overall, I am satisfied with my web-based distance learning courses.	108	83
I would take another web-based distance learning course.	114	87
I believe web-based distance learning is an effective way to learn.	104	79
I would tell my friends to take a web-based distance learning course.	109	83
I am learning as much in my web-based distance learning courses as I would in traditional, face-to-face courses.	70	53

Likewise, respondents also tended to be satisfied with the interaction they experienced in their most recent DL course, as shown in Table 2. In response to the statement, “I am satisfied with the amount of interaction I had with my instructor in this course,” 68 percent agreed or strongly agreed. In response to the statement, “I am

satisfied with the amount of interaction I had with other students in this course," 63 percent agreed or strongly agreed. Similarly, only 38 percent wanted more interaction with their instructor, while 27 percent wanted more interaction with other students.

Correlational Analysis

The researcher calculated a Pearson Product-Moment Correlation Coefficient to answer the following research questions:

1. What relationship, if any, exists between students' satisfaction with distance learning and the degree of interactivity they experienced in a recent distance learning course?

2. What relationship, if any, exists between students' satisfaction with distance learning and the degree of social constructivism they have experienced in their distance learning courses?

3. What relationship, if any, exists between students' satisfaction with distance learning and their demographic data (military rank, educational level, major field of study, subject areas in which DL courses had been completed, prior experience, computer and Internet expertise, participation in the eArmyU program, and media used for course interaction)?

Satisfaction and Interactivity

To answer the first research question, a Pearson Product-Moment Correlation Coefficient was calculated for the dependent variable of satisfaction, as determined by summating responses to items 6, 8, 13, 16, and 17 in Section 3 of the DLIQ, and the

independent variable of interaction, as determined by summating responses to items 22, 23, 28, and 30 (for student-instructor interaction) and items 24, 27, 31, and 32 (for student-student interaction) in Section 4 of the DLIQ. For satisfaction with DL and interaction in the most recent DL course, $r(126) = .199$, $p < .05$, so there is a positive relationship between these variables that is statistically significant.

Borg and Gall (1989) explain that a correlation coefficient between .20 and .35 indicates a slight relationship that may be statistically significant but is of little predictive value. A correlation of around .50 allows crude group prediction, and a correlation above .65 has predictive value that is useful for most purposes. For educational research, however, Borg and Gall (1989) differentiate between the strength of correlations necessary to have predictive value and those that indicate important relationships. They conclude, "Correlations in the range of .20 to .40 may be all we should expect to find for many of the relationships between variables studied by educational researchers" (p. 634). Thus, the correlation of $r(126) = .199$ for satisfaction and interactivity may be important but not predictive. Interactivity explains approximately 3 percent of the variance in satisfaction.

Further correlational analysis was conducted to compare the relationship between satisfaction with DL courses and the two types of interaction measured: student-instructor and student-student. This analysis showed a weak but statistically significant, $r(128) = .182$, $p < .05$, relationship between satisfaction with DL courses and student-student interaction in a recent DL course. Student-student interaction explains approximately 3 percent of the variance in satisfaction. The relationship between DL satisfaction and

student-instructor interaction, however, is not statistically significant, $r(127) = .164$, $p = .063$.

Bearing in mind the possibility that a student's experience in a recent DL course might not be the most salient factor in their attitude toward DL in general, the researcher also explored the relationship between interaction in the most recent course and satisfaction with the interaction in that course. Satisfaction with student-instructor interaction was calculated by combining responses to items 21 and 26 on the DLIQ. A Pearson Product-Moment Correlation Coefficient was then calculated to determine the relationship between this variable and student-instructor interactivity. The result was a correlation coefficient of $r(127) = .458$, $p < .01$, indicating a statistically significant positive relationship between these two variables. Approximately 20 percent of the variance in satisfaction with student-instructor interaction is explained by student-instructor interactivity.

Likewise, satisfaction with student-student interaction was calculated by combining responses to items 25 and 29. A Pearson Product-Moment Correlation Coefficient was then calculated to determine the relationship between this variable and student-student interactivity. The result was a correlation coefficient of $r(128) = .407$, $p < .01$, indicating a statistically significant positive relationship between these two variables. Approximately 16 percent of the variance in satisfaction with student-student interaction is explained by student-student interactivity.

Satisfaction and Social Constructivism

The researcher also calculated a Pearson Product-Moment Correlation Coefficient to answer the second research question, "What relationship, if any, exists between students' satisfaction with distance learning and the degree of social constructivism they have experienced in their distance learning courses?" As for the first research question, satisfaction was determined by summating responses to items 6, 8, 13, 16, and 17 in Section 3 of the DLIQ. The degree of social constructivism was determined by summating the remaining 15 items in Section 3. These 15 items were further subdivided into three subscales: development of deeper understanding of course topics (items 2, 9, 10, 14, and 20), awareness of multiple perspectives (items 1, 3, 7, 11, and 12), and collaboration and support (items 4, 5, 15, 18, and 19). When all items measuring social constructivism were summated, the resulting correlation coefficient with satisfaction was $r\ (121) = .293$, $p < .01$, a statistically significant positive relationship that is stronger than that found for interaction and satisfaction. Approximately 8 percent of the variance in satisfaction is explained by social constructivism.

To further explore the relationship between satisfaction with DL and social constructivist techniques, correlation coefficients were also calculated for each subscale of the variable. All of these relationships were statistically significant: for satisfaction and development of deeper understanding, $r\ (128) = .307$, $p < .01$; for satisfaction and awareness of multiple perspectives, $r\ (128) = .267$, $p < .01$; and for satisfaction and collaboration and support, $r\ (123) = .250$, $p < .01$.

Satisfaction and Demographics

The third research question was, “What relationship, if any, exists between students’ satisfaction with distance learning and their demographic data (military rank, educational level, major field of study, subject areas in which DL courses had been completed, prior experience, computer and Internet expertise, participation in the eArmyU program, and media used for course interaction)?” ANOVA was used to check for statistically significant relationships between satisfaction and the independent variables of military rank, educational level, major field of study, subject areas in which DL courses had been completed, and eArmyU participation. No statistically significant differences in satisfaction were found for these five demographic variables. Recognizing that some subject areas, such as mathematics, might not foster high levels of interaction, the researcher also used ANOVA to check for a relationship between subject area and interaction in the respondent’s most recent DL course. No statistically significant differences in levels of interaction were found.

To determine whether there was a relationship between prior experience with college courses in a traditional, face-to-face learning environment and satisfaction with DL courses, a Pearson Product-Moment Correlation Coefficient was calculated for DL satisfaction and the number of traditional courses completed. The results show a negligible negative relationship that is not statistically significant, $r(126) = -.097$, $p = .267$. For prior experience in a web-based learning environment, a Pearson Product-Moment Correlation Coefficient was calculated for satisfaction and the number of web-based DL courses completed. Not surprisingly, the more web-based courses a respondent

had completed, the more likely they were to be satisfied with DL, r (124) = .242, p < .01, explaining approximately 5 percent of the variance in satisfaction. A statistically significant relationship was also found between satisfaction with DL and computer expertise, r (129) = .266, p < .01, and web expertise, r (128) = .197, p <.05. Computer expertise explained approximately 6 percent of the variance in satisfaction; web expertise explained approximately 3 percent of the variance in satisfaction.

For media used for course interaction, respondents checked all media by which they had communicated with their instructors and classmates. To determine whether there was a relationship between satisfaction with DL and use of a variety of communication media, the researcher calculated a Pearson Product-Moment Correlation Coefficient for satisfaction and the number of media used for student-instructor interaction and another for satisfaction and the number of media used for student-student interaction. For student-instructor interaction, there was a slight relationship between number of communication media used and satisfaction with DL, r (129) = .195, p < .05, explaining approximately 3 percent of the variance in satisfaction. For number of media used for student-student interaction, however, there was no statistically significant relationship with satisfaction.

Summary

This chapter presented the findings from the study to create a picture of the typical survey respondent and his general ratings concerning satisfaction with DL courses. Results of the correlational analyses were presented in order to answer the three research questions. Some statistically significant relationships were found in response to

all three research questions. The conclusions made from these findings and their implications for future research are discussed in the next chapter.

CHAPTER FIVE

CONCLUSIONS, IMPLICATIONS, AND FUTURE RESEARCH

A review of educational literature suggested that interactivity and use of social constructivist techniques would be related to satisfaction with DL courses. It also suggested satisfaction would be related to students' demographic data such as courses of study and prior experience. The purpose of this study was to investigate the relationships among interactivity, social constructivism, demographics, and satisfaction with DL among U. S. Army Infantry soldiers stationed at Fort Benning, Georgia. The specific research questions were--

1. What relationship, if any, exists between students' satisfaction with distance learning and the degree of interactivity they experienced in a recent distance learning course?

2. What relationship, if any, exists between students' satisfaction with distance learning and the degree of social constructivism they have experienced in their distance learning courses?

3. What relationship, if any, exists between students' satisfaction with distance learning and their demographic data (military rank, educational level, major field of study, subject areas in which DL courses had been completed, prior experience, computer and Internet expertise, participation in the eArmyU program, and media used for course interaction)?

This chapter begins with a discussion of the demographics of the sample. The findings on measures of interactivity, social constructivism, and satisfaction are presented, followed by the findings concerning the relationships among these variables in answer to the three research questions. Conclusions, implications, and recommendations for further research and study are presented.

Demographics

As discussed in Chapter 4, the typical survey respondent in this study was an Infantry soldier with the rank of E-6 or E-7 pursing an associate's or bachelor's degree in criminal justice, business, or a computer-related field. The three subject areas in which respondents most commonly reported having completed DL courses were computers, history, and other social sciences. Most survey respondents also rated themselves as experienced users of computers and the Internet. Most respondents (87 percent) were participants in the Army University Access Online program known as eArmyU, and a good proportion (66 percent) had completed courses in both traditional and web-based learning environments.

While the use of nonrandom convenience sampling prohibits generalizing the results of this study to the population, the results may be used to guide future research efforts. Thus, the low sample size and lack of participation from the Third Brigade, Third Infantry Division, must be considered. Because of overseas deployments, most soldiers in the 3rd Brigade had been unable to complete any DL courses in the year preceding data collection. Therefore, they were unable to participate. This constrained the sample

primarily to noncommissioned officers (NCOs) who are members of the U. S. Army Infantry School cadre of instructors rather than a deployable unit. As instructors, these NCOs may have a different viewpoint from which to reflect on their DL courses. Since all instructors must complete a two-week instructor training course, all have some knowledge of instructional techniques and learning theory. This factor may have caused this sample to differ from the population of all Infantry soldiers stationed at Fort Benning who are engaged in DL.

Measures of Interactivity and Social Constructivism

Analysis of frequency data showed generally high levels of interactivity in the most recent DL course and DL outcomes consistent with a social constructivist approach. On the measures of interactivity in the most recent DL course, more respondents indicated high levels of interaction with their instructors than with other students, and more reported satisfaction with the amount of student-instructor interaction than with student-student interaction. On the measures of social constructivist outcomes, respondents indicated greater levels of development of deeper understanding of course topics and awareness of multiple perspectives than of collaboration and support. These data suggest that while respondents have experienced interactivity and use of constructivist learning techniques in their DL courses, they have less experience with learning environments that emphasize peer interaction, collaboration, and support.

Measures of Satisfaction

Overall, this study showed positive attitudes toward DL among the Infantry soldiers surveyed. The majority of respondents reported being satisfied with their DL courses and with the interaction they had experienced in their most recent DL course. While many respondents had completed courses in both traditional, face-to-face environments and web-based environments, only 15 percent rated the quality of their traditional courses higher than their web-based courses. Eighty-seven percent of the sample indicated they would take another web-based course, but only 53 percent indicated they were learning as much in their web-based courses as they would in traditional courses. This difference may reflect the fact that for many respondents, the eArmyU program or other web-based courses are their only option. Because of the limitations of time and availability imposed by their jobs and other obligations, they intend to take more DL courses even though some may believe that face-to-face courses would be more effective.

The DLIQ included a space in which respondents could make any comments they cared to make with no specific questions asked. In this comments section, many respondents made overarching positive comments about the eArmyU program, such as, “I feel eArmyU is a very effective way to learn and earn a degree for soldiers that really do not have time to go to a regular college. It has helped me a lot.” Others expressed how much they appreciated the educational opportunities provided by the program. In other words, a halo effect may be present in that respondents gave high ratings for their satisfaction with DL based primarily on their satisfaction with the accessibility of DL

courses as compared to traditional courses. They may also have answered positively because DL is the only way they feel they can obtain a college degree and because they want programs like eArmyU to be continued.

Relationship between Satisfaction and Interactivity

Correlational analysis provided answers to the three research questions posed in this study. The first research question was what relationship, if any, exists between students' satisfaction with distance learning and the degree of interactivity they experienced in a recent distance learning course. Analysis showed a weak but statistically significant positive relationship, $r\ (126) = .199$, $p < .05$, between interactivity and satisfaction. Further analysis of the two subscales for interaction showed a weak but statistically significant positive relationship, $r\ (128) = .182$, $p < .05$, between satisfaction with DL courses and student-student interaction and a positive relationship between satisfaction with DL courses and student-instructor interaction that is not statistically significant, $r\ (127) = .164$, $p = .063$.

The weakness of these relationships may be explained by the weak relationship between experience in one recent course and DL attitudes in general. To support this explanation, the researcher checked for and found statistically significant relationships between student-instructor interaction and satisfaction with student-instructor interaction in the most recent DL course. She also checked for and found a statistically significant relationship for student-student interaction and satisfaction with student-student interaction in the most recent DL course. Specifically, the Pearson Product-Moment

Correlation Coefficient for student-instructor interactivity and satisfaction with that interaction was $r(127) = .458$, $p < .01$. The Pearson Product-Moment Correlation Coefficient for student-student interactivity and satisfaction with that interaction was $r(128) = .407$, $p < .01$.

From these findings, the researcher surmised that the greater the interactivity respondents perceived in their most recent DL course, the more likely they were to be satisfied with the interaction in that course. These findings, however, provide only weak support for the proposition that greater interactivity in a recent DL course leads to greater satisfaction with DL courses in general. A question for exploration in future research efforts is whether greater interactivity in a DL course leads to greater overall satisfaction and success within that course, as previous research efforts, noted in Chapter 2, have suggested.

Relationship between Satisfaction and Social Constructivism

The second research question asked what relationship, if any, exists between students' satisfaction with DL and the degree of social constructivism they have experienced in their DL courses. Analysis showed a positive and statistically significant relationship, $r(121) = .293$, $p < .01$, between social constructivism and DL satisfaction. Further analysis showed statistically significant positive relationships between satisfaction with DL courses and each of the three characteristics or outcomes that suggest the use of social constructivist techniques: development of deeper understanding of course topics, awareness of multiple perspectives, and collaboration and support. Of

these, development of deeper understanding of course topics had the strongest correlation coefficient, $r (128) = .307$, $p < .01$. The coefficient for satisfaction with DL courses and awareness of multiple perspectives was $r (128) = .267$, $p < .01$. The coefficient for satisfaction and collaboration and support was $r (123) = .250$, $p < .01$.

These results show support for the idea that students will be more satisfied with their DL courses if the instructor creates a social constructivist learning environment in which online discussions help students better understand course topics, develop awareness of multiple perspectives, and form learning communities that are collaborative and supportive. Of these goals, respondents in this study seemed to place the most importance on the development of deeper understanding. This may reflect an emphasis placed on learning outcomes rather than social outcomes. In other words, respondents may value the content being learned more than the social nature of the techniques used to learn that content.

When interpreting the findings of this study related to social constructivism, the operational definition of social constructivism as a learning environment exhibiting collaboration and support, awareness of multiple perspectives, and development of deeper understanding of course topics must be considered. These characteristics could be present in a variety of learning environments, to include those in which the instructor did not intend to employ a social constructivist approach. The implication, however, is that the relationships between these characteristics and student satisfaction found in this study provide evidence that use of techniques to foster these qualities may lead to greater student satisfaction.

Relationship between Satisfaction and Demographics

The third research question asked what relationship, if any, exists between students' satisfaction with DL and their demographic data, which included military rank, educational level, major field of study, subject areas in which DL courses had been completed, prior experience, computer and Internet expertise, participation in the eArmyU program, and media used for course interaction. Analysis showed no statistically significant relationships for rank, educational level, major field of study, subject areas for DL courses, and eArmyU participation. This could be because there was little variability in any of these variables.

A statistically significant positive relationship was found between DL satisfaction and prior experience with web-based courses, $r\ (124) = .242$, $p < .01$, but not for prior experience with traditional courses, $r\ (126) = -.097$, $p = .267$. Those who had completed more web-based courses tended to be more satisfied with them. This relationship might be partially explained by the tendency of those who are satisfied to continue their DL coursework while those who are not satisfied with DL are less likely to continue. However, it is also noteworthy that those with the most web-based experience know the most about the quality of DL in a variety of courses and were more likely to report satisfaction with DL. This supports the finding of generally positive attitudes toward DL revealed by this study.

Statistically significant positive relationships were also found between DL satisfaction and self-ratings of both computer expertise, $r\ (129) = .266$, $p < .01$, and

Internet expertise, r (128) =.197, $p < .05$. This supports an idea from the review of literature that those students with better computer skills achieve better DL outcomes. For practical application, it also supports the use of measures of computer and Internet expertise to predict success in DL courses and the practice of requiring computer and Internet orientation courses for DL students who lack such expertise.

In regard to media used for course interaction, analysis showed no statistically significant relationship between satisfaction with DL and number of different communication media used for student-student interaction. A statistically significant relationship, r (129) = .195, $p < .05$, was found, however, for satisfaction with DL and number of media used for student-instructor interaction. This finding suggests that DL instructors and leaders should design courses and programs to provide many different media for communication between students and instructors. This is likely to alleviate the effects of any technical problems that may occur with CMC, in particular, and may also address individual preferences for text-based versus oral communication.

Implications

Because of the sample used, the implications of this study apply primarily to distance learning programs designed for a military student population, but the implications may be useful in other populations as well. For those engaged in the design and development of DL courses for Infantry soldiers, one implication is that the use of interactive CMC technologies and social constructivist instructional techniques is likely to lead to greater learner satisfaction. Historically, the U. S. Army Infantry School's

(USAIS's) approach to DL has been to develop asynchronous, self-paced courseware that does not allow interpersonal interaction with either an instructor or other students. While this approach may be appropriate for some subject-matter content, USAIS should develop the capability to provide student-student and student-instructor interaction as part of its DL course offerings. This is based on the finding in this and other studies (Arbaugh, 2000b; Carr-Chellman & Duchastel, 2000; Fredericksen et al., 2000; Hiltz, 1994; Hiltz & Turoff, 2002) that there is a positive relationship between perceived course interactivity and learner satisfaction and between social constructivist course outcomes and learner satisfaction. Providing the capability for interpersonal interaction in USAIS courses will require not only infrastructure, such as network servers and CMC software, but also a change in the way course developers approach DL. Although further research is needed to determine how best to design USAIS courses to foster a collaborative learning environment grounded in social constructivist theory, this research suggests that the development of such a learning environment is key to meeting distance learners' needs.

The findings also suggest that using multiple types of media for interaction may enhance learner satisfaction. Specifically, this research found a positive relationship between learner satisfaction and number of media used for student-instructor interaction. The implication is that DL instructors and leaders should design courses and programs to provide many different media for communication among students and instructors. Use of multiple means of communication is also likely to reduce learner frustration resulting from any technical problems that may occur with CMC. Multiple means of

communication can also help address individual preferences for text-based versus oral communication.

The findings concerning relationships between demographic data and DL satisfaction also have implications for USAIS and other schools implementing DL. This research found positive relationships between learner satisfaction and the demographic variables of prior web-based DL experience and levels of computer and Internet expertise. The implication is that by assessing a student's prior experience with web-based courses and his general levels of computer and Internet expertise, one might predict his likelihood of success with DL courses. To increase the likelihood of success with DL courses, those students who lack such prior experience and expertise might be required to complete an orientation course focused on basic computer and Internet skills and strategies for success in web-based courses.

In addition to USAIS course developers, other educators engaged in providing DL courses, particularly those who administer the programs of study available through eArmyU, should consider the findings and implications of this study. Their programs are also likely to benefit from increased student-student and student-instructor interaction, use of social constructivist techniques, use of a variety of media for interaction, and the assessment and teaching of basic computer, Internet, and web-based DL skills and strategies.

In a more general sense, this study supports the use of highly interactive social constructivist instructional approaches in computer-mediated and other learning environments. Regardless of technologies used, instructors should use a variety of

approaches to engage their adult students and should ensure their instructional techniques are suited not only to their target audience but also to the content being learned. Interaction and social constructivism are likely to lead to greater student satisfaction not only in DL environments but also in traditional learning environments. Those evaluating DL programs should likewise be mindful that the success of such programs may be determined by the quality and appropriateness of the instructional techniques, not simply the merits of the technologies being used. One cannot assert that DL is inherently good or bad, effective or ineffective. Instead, one must consider the use of technology as one of many factors to be evaluated as contributors to effective learning.

Summary

A review of the educational literature suggested students' satisfaction with DL courses would be affected by amount of interaction, creation of a social constructivist learning environment, and demographics such as educational level, major field of study, areas of DL study, prior experience with traditional and DL courses, computer and Internet expertise, and media used for course interaction. Since the target population for this study was U. S. Army Infantry soldiers, additional demographic variables included in the analysis were military rank and participation in eArmyU, a program that provides tuition, books, and computer equipment for enlisted soldiers at Army installations including Fort Benning, Georgia.

Based on the convenience sample of 131 Infantry soldiers at Fort Benning, statistically significant relationships were found between satisfaction with DL and the

variables of interactivity, social constructivist characteristics or outcomes, and some of the demographics. Specifically, the demographics for which statistically significant relationships were found with DL satisfaction were prior experience with web-based learning, computer and Internet expertise, and number of media used for student-instructor interaction. This suggests that those involved in the design and development of web-based educational programs for this population should ensure that their courses allow for high levels of interactivity among students and instructors and that they are designed to foster a collaborative learning environment grounded in social constructivist principles. The research also suggests that courses should feature a variety of means of interaction, to include not only asynchronous and synchronous CMC, but also telephone, video teleconference, and face-to-face interaction if possible. Finally, it suggests that prior experience with web-based DL and levels of expertise in computers and the Internet can be used to predict DL satisfaction. Institutions can then provide those who lack such experience and expertise with orientation courses to increase the likelihood that these students will be satisfied with and succeed in their DL courses.

Areas for Future Research

This study used a new instrument, the Distance Learning Interactivity Questionnaire, to measure satisfaction with DL courses, experience with social constructivist techniques in DL courses, and degree of interactivity in a recent DL course. It would be useful to refine this instrument and validate it using a larger sample of DL students. Gathering a larger sample would allow the instrument to be validated using

confirmatory factor analysis. In this study, the researcher wanted to capitalize on the availability of a sample who, because of their participation in the eArmyU program, had experiences with a wide range of DL courses in many subject areas and from different institutions. The instrument could be refined, however, to measure interactivity, social constructivism, and satisfaction specifically for an individual DL course or program of study. Use of such an instrument would yield findings that could be used by instructors and leaders to improve the interactivity and use of social constructivist techniques in their courses and programs. If such an instrument were then administered for many different courses using random sampling, this would produce more generalizeable findings about the relationships among these three variables.

A follow-up study focusing on Infantry or other soldiers participating in eArmyU should be conducted to see whether the findings of this study are replicable and whether use of other types of data collection, such as focused interviews of participants and monitoring of actual online interactions for data on interactivity and social constructivist techniques, could deepen the DL community's understanding of the findings of statistically significant relationships. Other measures of DL outcomes should also be considered, such as course grades and course and program attrition rates. While respondents in this study showed positive attitudes about web-based learning, their high ratings of satisfaction could be a result of their gratitude to the Army for providing them with the tools and resources needed to earn a degree rather than of the quality of the DL courses themselves. Studies using measures of effectiveness other than self-report are needed to determine actual DL outcomes.

Another area for further research is how demographic factors might mediate the relationships among interactivity, social constructivism, and DL satisfaction. Based on the gender-based literature, for example, it is possible that interactivity and use of social constructivist techniques might correlate with learner satisfaction more strongly for females than for males. Course content might also mediate the relationships. The demographic variables in this study did not provide sufficient variability to explore such questions.

Finally, further research is needed to determine how best to implement the findings of this study. A possible research question is what specific strategies can be used to foster greater levels of interaction and the development of collaborative learning environments that exhibit characteristics of social constructivism. These might include an analysis of questioning strategies and group development techniques. Another is how can DL programs and instructors best support those students who lack prior DL experience or expertise with computers and the Internet. Here, an experimental approach could be used to compare the outcomes of groups of novice DL learners who receive different forms of support as they begin DL courses. Examples of interventions or forms of support might include a face-to-face computer and Internet orientation course, a similar course administered via the Internet, and the availability of DL mentors via CMC, telephone, or an on-campus, face-to-face technical support center.

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APPENDIX A

DISTANCE LEARNING INTERACTIVITY QUESTIONNAIRE

DISTANCE LEARNING INTERACTIVITY QUESTIONNAIRE

Please answer the following questions regarding your experiences as a distance learning student enrolled in college courses. This should take no more than 20 minutes. When you are finished, return the completed questionnaire in its sealed envelope to Dara Dozier, Building 4, Room 430, or you can FAX it to 545-3712.

Section 1. Demographic Information

1. Military Occupational Specialty (MOS): _____

2. Rank: _____

3. Current Program of Study: *(check one)*

___ Certificate ___ Associates ___ Bachelors ___ Masters ___ Doctoral ___ Other/ Undecided

4. Major field of study: _____

Section 2. Your Experience with Distance Learning and Higher Education

5. How much experience do you have in each of the following types of learning environments? In each blank, write the number of college courses in which you have been enrolled. *(If you are unsure of the exact number, please write your best approximation.)*

ENVIRONMENT	NUMBER OF COURSES
Traditional, Face-to-Face Classroom Environment	_____
Web-Based Distance Learning Environment (computer and network connection required)	_____
Computer-Based Distance Learning Environment (no network connection required)	_____
Video-Based Distance Learning Environment (television or teleconference)	_____
Paper-Based Distance Learning Environment (correspondence course)	_____

6. How would you rate the quality of the college courses you have had in each of these types of learning environments?

ENVIRONMENT	RATING		
Traditional, Face-to-Face Classroom Environment	___ Poor	___ Fair	___ Good
Web-Based Distance Learning Environment (computer and network connection required)	___ Poor	___ Fair	___ Good
Computer-Based Distance Learning Environment (no network connection required)	___ Poor	___ Fair	___ Good
Video-Based Distance Learning Environment (television or teleconference)	___ Poor	___ Fair	___ Good
Paper-Based Distance Learning Environment (correspondence course)	___ Poor	___ Fair	___ Good

7. How would you rate your current level of computer expertise?

___ Beginner ___ Experienced User ___ Expert

8. How would you rate your current level of Internet expertise?

___ Beginner ___ Experienced User ___ Expert

9. Have you been enrolled in any college courses as a participant in the Army University Access Online program (also known as AUAO or eArmyU)?

___ No ___ Yes **If YES**, in how many eArmyU courses have you been enrolled? _____

10. In what subject areas have you completed college courses in a web-based distance learning environment in the past 12 months? *(check all that apply)*

___ Business
___ Computer Science/Computer Applications
___ Education
___ English
___ Foreign Languages
___ History
___ Appreciation or History of Fine Arts (Visual Art, Music, etc.)
___ Mathematics
___ Natural Sciences (Biology, Chemistry, Geology, etc.)
___ Social Sciences (Psychology, Sociology, etc.)
___ Other: _____
___ None **(If NONE, stop here. Thank you for completing this survey.)**

11. In what ways have you interacted with your instructors as part of your web-based distance learning college courses over the past 12 months? *(check all that apply)*

___ Synchronous text-based computer-mediated communication (such as chat room or instant messaging, in which both parties must be online at the same time)
___ Asynchronous text-based computer-mediated communication (such as e-mail or online bulletin board, in which messages are exchanged without both parties being online at the same time)
___ Video teleconference or web-cam
___ Telephone
___ FAX
___ Postal Mail
___ In Person (Face to Face)
___ Other: _____

12. In what ways have you interacted with your classmates as part of your web-based distance learning college courses over the past 12 months? *(check all that apply)*

___ Synchronous text-based computer-mediated communication (such as chat room or instant messaging, in which both parties must be online at the same time)
___ Asynchronous text-based computer-mediated communication (such as e-mail or online bulletin board, in which messages are exchanged without both parties being online at the same time)
___ Video teleconference or web-cam
___ Telephone
___ FAX
___ Postal Mail
___ In Person (Face to Face)
___ Other: _____

Section 3. Distance Learning Outcomes

INSTRUCTIONS: For each of the following statements, please circle the abbreviation (SD - Strongly Disagree, D - Disagree, N - Neither Agree Nor Disagree, A - Agree, or SA - Strongly Agree) to indicate how strongly you agree or disagree that the statement describes your experience with the web-based distance learning courses you have completed over the past 12 months.

(NOTE: For the purposes of this questionnaire, an online discussion is defined as any two-way web-based communication such as e-mail, chat room, online bulletin board, or instant messaging.)

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. During online discussions, my instructors have asked students to discuss their opinions with other students.	SD	D	N	A	SA
2. Online discussions have encouraged me to provide evidence to support my views regarding topics discussed.	SD	D	N	A	SA
3. Online discussions have fostered in me an appreciation for other people's opinions and perspectives.	SD	D	N	A	SA
4. I have developed friendships with other students online.	SD	D	N	A	SA
5. I have felt that I was an accepted member of the group during online discussions.	SD	D	N	A	SA
6. Overall, I am satisfied with my web-based distance learning courses.	SD	D	N	A	SA
7. Online discussions have fostered an environment where more than one answer may be correct.	SD	D	N	A	SA
8. I would take another web-based distance learning course.	SD	D	N	A	SA
9. During online discussions, I have developed positions on issues that I did not have before the discussions.	SD	D	N	A	SA
10. I have clarified my ideas by reading other students' comments online.	SD	D	N	A	SA
11. Online discussions have exposed me to other students' ways of looking at topics discussed.	SD	D	N	A	SA
12. Groups of students have discussed differences of opinion during online discussions.	SD	D	N	A	SA
13. I believe that web-based distance learning is an effective way to learn.	SD	D	N	A	SA
14. Online discussions have enabled me to develop a deeper understanding of course topics.	SD	D	N	A	SA
15. I have received useful feedback from online classmates.	SD	D	N	A	SA
16. I would tell my friends to take a web-based distance learning course.	SD	D	N	A	SA
17. I am learning as much in my web-based distance learning courses as I would in traditional, face-to-face courses.	SD	D	N	A	SA
18. I have felt I could count on my classmates to reply to my needs.	SD	D	N	A	SA
19. My classmates have acknowledged my contributions to online discussions.	SD	D	N	A	SA
20. I have clarified my ideas by sharing them with others online.	SD	D	N	A	SA

Section 4. Your Most Recent Distance Learning Course

INSTRUCTIONS: For this section of the questionnaire, please think about the web-based distance learning college course you completed most recently. *(If you completed more than one course on the same day, choose one of them to consider in answering this part of the questionnaire.)*

In what subject area was your most recent distance learning course? *(check one)*

___ Business
___ Computer Science/Computer Applications
___ Education
___ English
___ Foreign Languages
___ History
___ Appreciation or History of Fine Arts (Visual Art, Music, etc.)
___ Mathematics
___ Natural Sciences (Biology, Chemistry, Geology, etc.)
___ Social Sciences (Psychology, Sociology, etc.)
___ Other: _____

Was the interaction in this course typical of the other web-based distance learning courses you have completed? *(check one)*

___ Yes ___ No ___ Varies Greatly by Course

For each of the statements below, please circle the abbreviation (SD - Strongly Disagree, D - Disagree, N - Neither Agree Nor Disagree, A - Agree, or SA - Strongly Agree) to indicate how strongly you agree or disagree that the statement describes your experience in the web-based distance learning course you completed most recently.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I am satisfied with the amount of interaction I had with my instructor in this course.	SD	D	N	A	SA
The instructor in this course often asked questions of students.	SD	D	N	A	SA
The instructor generally answered questions from students in this course.	SD	D	N	A	SA
Students in this course often responded to other students' questions.	SD	D	N	A	SA
I am satisfied with the amount of interaction I had with other students in this course.	SD	D	N	A	SA
I would have preferred to spend more time discussing course material with the instructor in this course.	SD	D	N	A	SA
Students in this course often stated their opinions to each other.	SD	D	N	A	SA
Students in this course generally responded to the instructor's questions.	SD	D	N	A	SA
I would have preferred to spend more time discussing course material with the other students in this course.	SD	D	N	A	SA
Students in this course often asked questions of the instructor.	SD	D	N	A	SA
Students in this course often asked each other questions.	SD	D	N	A	SA
The level of interaction among students in this course was high.	SD	D	N	A	SA

You may add any comments you would like to make here: _____

_____

_____

_____

_____

This concludes the Distance Learning Interactivity Questionnaire.

Please return your completed questionnaire to Dara Dozier
(Building 4, Room 430) in the sealed envelope provided, or FAX to 545-3712.

NOTE: We sincerely appreciate your participation in this study. If you would be willing to participate in a one-hour interview about your experiences as a distance learner, please complete and return the Interview Volunteer Form attached to your information letter.

Thank You!

APPENDIX B

QUESTIONNAIRE ITEMS GROUPED BY CONSTRUCT

Survey Items Grouped by Construct, Distance Learning Outcomes

Construct	Questionnaire Items
Satisfaction with DL (Items adapted from Sorenson, 1999)	17. I am learning as much in my web-based distance learning courses as I would in traditional, face-to-face courses. 16. I would tell my friends to take a web-based distance learning course. 8. I would take another web-based distance learning course. 6. Overall, I am satisfied with my web-based distance learning courses. 13. I believe that web-based distance learning is an effective way to learn.
Development of Deeper Understanding of Course Topics (Items adapted from Bonk & Wisher, 2000)	9. During online discussions, I have developed positions on issues that I did not have before the discussions. 20. I have clarified my ideas by sharing them with others online. 10. I have clarified my ideas by reading other students' comments online. 2. Online discussions have encouraged me to provide evidence to support my views regarding topics discussed. 14. Online discussions have enabled me to develop a deeper understanding of course topics.
Awareness of Multiple Perspectives (Items adapted from Bonk & Wisher, 2000)	11. Online discussions have exposed me to other students' ways of looking at topics discussed. 7. Online discussions have fostered an environment where more than one answer may be correct. 3. Online discussions have fostered in me an appreciation for other people's opinions and perspectives. 12. Groups of students have discussed differences of opinion during online discussions. 1. During online discussions, my instructors have asked students to discuss their opinions with other students.
Collaboration and Support (Items adapted from Bonk & Wisher, 2000)	5. I have felt that I was an accepted member of the group during online discussions. 4. I have developed friendships with other students online. 18. I have felt I could count on my classmates to reply to my needs. 19. My classmates have acknowledged my contributions to online discussions. 15. I have received useful feedback from online classmates.

Survey Items Grouped by Construct,
Most Recent Distance Learning Course

Construct	Questionnaire Items
Satisfaction with Interaction (Items developed for this study)	21. I am satisfied with the amount of interaction I had with my instructor in this course. 25. I am satisfied with the amount of interaction I had with other students in this course. 26. I would have preferred to spend more time discussing course material with the instructor in this course. (Reverse coded) 29. I would have preferred to spend more time discussing course material with the other students in this course. (Reverse coded)
Student-Instructor Interaction (Items adapted from Sorenson, 1999)	22. The instructor in this course often asked questions of students. 23. The instructor generally answered questions from students in this course. 28. Students in this course generally responded to the instructor's questions. 30. Students in this course often asked questions of the instructor.
Student-Student Interaction (Items adapted from Sorenson, 1999)	24. Students in this course often responded to other students' questions. 27. Students in this course often stated their opinions to each other. 31. The students in this course often asked each other questions. 32. The level of interaction among students in this course was high.

APPENDIX C

AUBURN UNIVERSITY INSTITIONAL REVIEW BOARD (IRB) APPROVAL

AUBURN UNIVERSITY

Auburn University, Alabama 36849

Office of Human Subjects Research
307 Samford Hall

Telephone: 334-844-5966
Fax: 334-844-4391

May 21, 2003

MEMORANDUM TO: Dara Dozier Padgett
EFLT

PROTOCOL TITLE: "Interactivity, Social Constructivism, and Satisfaction with Distance Learning (DL) Among Infantry Soldiers"

IRB File: #03-088 EX 0305

The referenced protocol was approved "Exempt" from further review under 45 CFR 46.101 (b)(2) by IRB procedure on May 11, 2003. You should retain this letter in your files, along with a copy of the revised protocol and other pertinent information concerning your study. If you should anticipate a change in any of the procedures authorized in protocol #03-088, you must request and receive IRB approval prior to implementation of any revision. Please reference the above IRB File in any correspondence regarding this project.

If you will be unable to file a Final Report on your project before May 10, 2004, you must submit a request for an extension of approval to the IRB no later than April 30, 2004. If your IRB authorization expires and/or you have not received written notice that a request for an extension has been approved prior to May 10, 2004, you must suspend the project immediately and contact the Office of Human Subjects Research for assistance.

A Final Report will be required to close your IRB project file.

If you have any questions concerning this Board action, please contact the Office of Human Subjects Research at 844-5966.

Sincerely,

E. N. (Chip) Burson, Executive Director
Office of Human Subjects Research

cc: Dr. William Spencer
Dr. Cynthia Reed

APPENDIX D

INSTITUTIONAL CONSENT LETTER FROM

U. S. ARMY INFANTRY CENTER

Auburn University
Auburn University, Alabama 36849-5221

Educational Foundations,
Leadership, and Technology
4036 Haley Center

Telephone: (334) 844-4460
FAX: (334) 844-3072

INSTITUTIONAL CONSENT
FOR
Interactivity, Social Constructivism, and Satisfaction with Distance Learning among Infantry Soldiers

The US Army Infantry Center's Army Education Center is invited to participate in a research study of Interactivity, Social Constructivism, and Satisfaction with Distance Learning among Infantry Soldiers. This study is being conducted by Dara Dozier Padgett, a graduate student from Auburn University's Department of Educational Foundations, Leadership, and Technology, under the supervision of Dr. Cindy Reed, Associate Professor at Auburn University. We hope to learn how interactivity and online discussions that show characteristics of social constructivism are related to Infantry soldiers' satisfaction with distance learning. Soldiers surveyed will be Infantry soldiers who are participating in a college distance learning course.

Soldier participation will take no more than 20 minutes and will be completely voluntary. For those who decide to participate, I will ask that they complete the attached questionnaire and return it to me either in person or via FAX. There will be no risks associated with participation in this study. While the US Army Infantry Center will not receive any direct benefits from this study, the information gleaned may be used to improve the delivery of distance learning to Infantry soldiers.

Any information obtained in connection with this study will remain anonymous. Information collected may be used in Ms. Padgett's dissertation to fulfill the requirements for the degree of Doctor of Education, published in a professional journal, and/or presented at a professional meeting.

Your decision whether or not to allow this study to be conducted at the US Army Infantry Center will not jeopardize your future relations with Auburn University or its Department of Educational Foundations, Leadership, and Technology.

If you have any questions, we will be happy to answer them. You may contact Ms. Padgett in Building 4, Room 430, (706) 545-7324, or email dara.padgett@benning.army.mil. You may also contact Dr. Reed at (334) 844-4488 or reedcyn@auburn.edu.

For more information regarding research participants' rights you may contact the Office of Human Subjects Research by phone or e-mail. The people to contact there are Executive Director, E.N. "Chip" Burson, (334) 844-5966 (bursoen@auburn.edu) or IRB Chair, Dr. Peter Grandjean, at (334) 844-1462 (grandpw@auburn.edu).

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER OR NOT YOU WILL ALLOW THIS RESEARCH STUDY TO BE CONDUCTED AT THE US ARMY INFANTRY CENTER'S ARMY EDUCATION CENTER. YOUR SIGNATURE INDICATES THAT YOU HAVE DECIDED TO ALLOW STUDENTS AT THE ARMY EDUCATION CENTER TO PARTICIPATE. YOU WILL RECEIVE A COPY OF THIS LETTER TO KEEP.

Elaine M Livingston 17 Apr 03 — Dara Dozier Padgett 17 Apr 03

USAIC Representative's Signature — Date — Investigator's signature — Date