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An Examination of Cognitive Presence and Learning Outcome in an Asynchronous Discussion Forum

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ABSTRACT

AN EXAMINATION OF COGNITIVE PRESENCE AND LEARNING OUTCOME IN AN ASYNCHRONOUS DISCUSSION FORUM
by
Tan Minh Tran

Web-based learning progresses as access to the Internet grows. As learners and educators in virtual learning communities, we strive for ways to measure how well teachers teach and learners learn. While the literature is replete with articles and books discussing online learning from the perspective of social and teaching presence, there are few studies that examine the relationship between cognitive presence and learning effectiveness in an online environment. The purpose of this study was to examine the relationship between cognitive presence and learning outcome in an asynchronous discussion forum. Thus, this study examined performance in an online course in relation to student interaction and level of cognitive presence in the course.

The data were collected from students enrolled in 10 sections of an online class taught at a large public university in the Southeastern United States. The study was mixed-method in nature. It consisted both of qualitative content analysis and descriptive statistics with Pearson correlations between the dependent variable (student course module grades) and the independent variables (maximum levels of cognitive presence, number of messages and message lengths).

The study resulted in two key theoretical contributions. The first is that maximum level of cognitive presence is a better indicator of student learning than mean level of cognitive presence. The results of the study indicate that students achieved mastery of the subject matter over time. Typically cognitive presence has been measured as a mean

score for a course. This strategy is akin to giving the student a pre-test on a body of content at the beginning of the lesson, and a post test at the end, and then averaging these two to determine the student's grade. Doing so seems to ignore, or at least diminish the fact that learning occurs over time. Student mastery of a content is a better indicator of learning than student progress. Thus, this study suggests that a more appropriate measure of student learning, in terms of cognitive presence, is the maximum level reached by every student, rather than the mean level of all students. The second theoretical contribution is that in on-line learning, a student displaying the cognitive presence "Resolution" stage in a discussion may inhibit others from displaying that stage. When a student has posted a message at the resolution stage during a discussion other students are more likely to respond with messages like "I agree" than they are to restate the resolution stage message. The "I agree" type message would not be coded at the resolution stage, thus the student who posted that message would not be seen to have reached that stage, when in fact, he or she may well have done so. This leads to a faulty perception of the overall level of cognitive presence. It may be difficult to control for this inhibitory effect but some creative structuring of course content and assignments should make it possible. Future studies addressing cognitive presence in online learning environments should take both of these ideas into consideration.

AN EXAMINATION OF COGNITIVE PRESENCE AND LEARNING OUTCOME IN AN ASYNCHRONOUS DISCUSSION FORUM

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Tan Minh Tran

A Dissertation

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I want to also thank the Chair of my dissertation committee, Dr. Steve Harmon for his help, guidance and leadership during my pursuit of this doctoral degree.

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ABBREVIATIONS

5076_020	Summer 2007, section 020
5076_035	Summer 2007, section 035
5079_030	Fall 2007, section 030
5079_035	Fall 2007, section 035
5081_025	Spring 2008, section 025
5089_005	Fall 2008, section 005
5089_015	Fall 2008, section 015
5089_020	Fall 2008, section 020
5089_025	Fall 2008, section 025
5089_030	Fall 2008, section 030
ALN	Asynchronous Learning Network
CAI	Computer Assisted Instruction
DSL	Digital Subscriber Line
SCCI	Sense of Classroom Community Index
SLN	SUNY Learning Network

CHAPTER 1

INTRODUCTION

Education occurs at any time and at any place in our daily lives, whether we are at home with our families, or while we're at a market in a public setting. Thus education can be both a personal and public experience that can occur at any time or any place regardless of the setting. The emergence of *learning communities* has helped to enhance the quality of education. The idea of developing a learning community is rooted in the observation that knowledge and learning are a natural part of the life of communities that share values, beliefs, languages, and ways of doing things (Bransford, Brown, & Cocking, 1999). As access to the Internet and World Wide Web has continued to grow, Web-based learning has continued to expand. Millions of students all over the world and at various levels of education, whether in primary, secondary or higher education, participate in some form of web-based education (i.e., whether totally on-line or blended). In conjunction with the growth of the World Wide Web, virtual learning communities have begun to emerge. This growth forms the evolution of our field "instructional technology" which is defined as "the systemic and systematic application of strategies and techniques derived from behavior and physical sciences concepts and other knowledge to the solution of instructional problems (Anglin, 1995).

For purposes of this study, the instructional technology of interest is the virtual learning communities and they are defined to be either asynchronous or synchronous forms of communication. Asynchronous communication does not require that all parties involved in the communication are present and available at the same time. Examples of this include e-mail (the receiver does not have to be logged on when the sender sends the

message), discussion boards (which allow conversations to evolve and the community to develop over a period of time), and text messaging via cellular phones. Conversely, synchronous communication occurs when all parties involved in the communication are present at the same time (referred to as an event). Examples include a telephone conversation, a company board meeting, an online chat-room event, and instant messaging.

Furthermore in this study, asynchronous discussion forums are the learning medium that we're interested in further exploring. We have a lot to learn about the use of asynchronous technology for effective learning. Trying to integrate the properties of asynchronous online learning with the ability to create communities of learning and inquiry to meet the objectives of learning and promote effective student learning outcomes is a challenge in which educators are faced with. Central to this study is the model of the community of inquiry that constitutes three elements essential to the educational transaction. The three elements that make up the model of community of inquiry are: (1) teaching presence, (2) social presence, and (3) cognitive presence. These elements are necessary for developing an engaging online learning experience that will lead to the accomplishment of learning objectives (Garrison, Anderson, & Archer, 2000). Furthermore, we hope that the combination of these three elements will lead to effective student learning outcomes.

The first element in the community of inquiry model, teaching presence is the ability of the instructor to develop a close relationship with the learners in an online course while overcoming the lack of physical presence associated with the online learning medium (Garrison et al., 2000). In practice, one of the best and easiest ways for

a new online instructor to establish teaching presence is to be available and responsive to the learners, whether it is via email or through some form of face-to-face meeting.

Social presence, the second element in the community of inquiry model, is the ability to incorporate personality and humanness into an online course (Anderson, Rourke, Garrison, & Archer, 2001). Establishing an environment of comfort and trust is important in developing social presence in a community of inquiry. Social presence also supports the affective objectives by making group interactions appealing, engaging, and thus intrinsically rewarding, leading to an increased academic, social, and institutional integration and resulting in increased persistence and course completion (Tinto, 1993).

The third element in the community of inquiry model, cognitive presence is defined as the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained negotiation (Garrison et al., 2000). This third element also comes with it some depth and presents an area of interest for further research in this study. For this reason, I will spend a more time describing this third element in the community of inquiry model. Garrison et al. (2000) discuss a practical inquiry model comprised of four phases in depth. The first phase in the element of cognitive presence represents the initiation phase of critical inquiry and is considered the *triggering event*. In an educational context, the instructor often communicates learning tasks that become triggering events. The second phase of the model is *exploration*. In this phase, students are required to grasp the nature of the problem and then move on to a fuller exploration of relevant information. The third phase of the practical inquiry model is *integratio*n. In this phase, students are constructing personal meaning from the ideas generated in the exploratory phase. The final phase is

resolution. This is the phase in which students come up with the resolution of the dilemma or problem, thus being able to apply the concepts learned in this phase to other settings outside of the current context of the learning environment. In summary, the practical inquiry model of Garrison et al. (2000) reflects the critical thinking process and the means to create cognitive presence.

(An in-depth look at the community of inquiry model will be examined in the literature review section of this paper.)

Using asynchronous online learning as a medium to deliver instructional content, to achieve an active, social community of learners, to meet the objectives of learning and promote effective student learning outcomes is a challenge that educators of today face. For the purposes of this study, learning effectiveness and student performance will be described synonymously. Student performance is a term that is open to many definitions. Picciano (2002) perhaps has the most comprehensive definition and thus defines student performance as the following "the successful completion of a course, course withdrawals, grades, added knowledge, and skill-building are some of the ways that performance is measured, depending on the content of the course and the nature of the students. Courses may also have multiple performance outcomes, each of which might be measured separately through testing, written assignments, or the completion of individual and group projects. Many studies of student performance in face-to-face and online courses rely on student perceptions of their learning experiences including "how well" or "how much" they have learned. Ultimately, student perceptions of their learning may be as good as other measures because these perceptions may be the catalysts for continuing to pursue coursework and other learning opportunities. Student performance is well

understood to be a multivariable phenomenon affected by study habits, prior knowledge, communications skills, time available for study, teacher effectiveness, etc."

Purpose

The purpose of this study was to examine student performance in an online course in terms of student interaction and sense of cognitive presence. Data from multiple independent variables (measures of interaction and cognitive presence) and dependent variables (measures of performance) were collected and subjected to analysis. This study explored the online asynchronous postings of a course taught in a large public university in the Southeastern United States. This study adds to the current literature examining the relationship between cognitive presence and higher order learning effectiveness online.

Research Questions

This study sought to answer four questions pertaining to the cognitive processes. The first question was, "What are the levels of cognitive presence exhibited by online learners during the online discussion?" To answer the first question, I examined levels of cognitive presence.

The second question was, "What is the relationship between cognitive presence and student performance as assessed by the instructor?" More particularly, I looked at the students' performance on their Computer Ethics module assignments and correlated the students' grades with the students' levels of cognitive presence.

The third question was, "What is the relationship between message lengths and student performance as assessed by the instructor?" In examining the lengths of the message, I looked at the complete posts of each student and correlated them with the student's grades.

The final question was, “What is the relationship between cognitive presence and message lengths?” To examine this final question, I related the students’ levels of cognitive presence with the students’ entire posts. I used quantitative content analysis to address these questions.

Statement of the Problem

Web-based learning progresses as access to the Internet grows. So, as learners and educators in virtual learning communities, we strive for ways to measure how well educators teach and learners learn. While the literature is replete with articles and books discussing online learning from the perspective of social and teaching presence, there are few studies that examine the relationship between cognitive presence and higher order learning effectiveness online. The purpose of this study was to examine the impact of cognitive presence on learning outcome in an asynchronous discussion forum. Thus, this study examined performance in an online course in relation to student interaction and sense of cognitive presence in the course.

Ultimately, effective learning must take into consideration both the internal cognitive process as well as the external contextual elements that precipitate and shape thinking. Cognitive presence concerns the process of both reflection and discourse in the initiation, construction, and confirmation of meaningful learning outcomes (Garrison et al, 2000). If a deep and meaningful outcome is the goal of an educational experience, then an understanding of cognitive presence is essential. This study considered the importance of such constructed learning communities as critical to learning effectiveness within virtual learning environments and considers ways that such learning communities

may influence future strategies in the delivery of Web-based courses. The next chapter is a discourse on the literature that helped to enhance the value of this study.

CHAPTER 2

REVIEW OF THE LITERATURE

This literature review will examine five different areas. The first area focuses on the learning theories. The second area looks at existing literature on virtual learning communities/asynchronous discussion forums. The next area examines the research on the communities of inquiry model. Following that, the literature review examines the writings on learning effective/student performance. The final area looks at the research in one of the three elements of the communities of inquiry model, the element of cognitive presence. To start, the conceptual framework which binds these five areas of research will be discussed in the following section.

Contextual Framework

Becoming a "learning community" can be considered both a means and a goal for online classes and not all classes are able to realize the full potential of this endeavor. It is difficult to establish a sense of a learning community in all classes because as Garrison et al's research (2001) suggests it takes a community of inquiry and its three elements—teaching presence, cognitive presence, and social presence in order to achieve this. The following sections explore the literature, i.e., the theory and the research, dealing with social support for learning and the development of virtual learning communities in online educational environments. This is an important topic because of: (1) the continuing emphasis on social learning and (2) the historical questions concerning the ability of online learning environments to support effective communication and the development of social relationships. In addition, research on online learning has consistently identified asynchronous course discussion as one of its more unique and

promising features. This has led to considerable investigation into social interaction among discussion participants and its relationship to the development of learning communities in this medium.

Social Learning Theories

Social learning theory is one type of learning theory that is relevant to this study. Similarly, constructivism is a theoretical framework or an intellectual view which states that learning is an active and constructive process. Vygotsky's (1962) Social Development Theory provides one of the foundations for constructivism. According to Vygotsky the learner constructs knowledge for themselves and that new information constructed is linked to previous knowledge. Furthermore in the learning environment, the instructor serves as a facilitator to the learning process. Vygotsky's Social Development Theory posits that learning is social in nature, which is generally accepted by most contemporary educational researchers and theorists (Bransford, Brown, Cocking, 1999). These authors believed that education is both a personal and public learning experience (Bransford, Brown, Cocking, 1999). In their view, l*earning communities* have emerged to enhance the value of education. Furthermore, the notion of developing a learning community is rooted in the observation that knowledge and learning are a natural part of the life of communities that share values, beliefs, languages, and ways of doing things (Bransford, Brown, & Cocking, 1999). These authors also stated that knowledge is inseparable from practice, and practice is inseparable from the communities in which it occurs.To them social learning theories, therefore, must be addressed in any discussion of learning online. The fundamental basis for social learning theories maintains that learning is social in nature because it involves people who learn

constructively. Such theories are dated, as early as the 1930s, starting with theorists Dewey (1938) and Vygostky (1962) as they both argued for a social view of learning. In Vygotsky, there was the previously discussed Social Development Theory where he theorized that learning is social in nature. This view supports Dewey's older research and in fact Dewey posited that in a learning environment everyone experiences social control in life. Dewey saw that the instructor should be a member of the group, the most mature and also the most experienced member. The learners should be social and active participants in the group learning process.

Situated learning is a type of social learning theory present in educational environments. Lave (1998) argues that learning is situated in that it should be presented in authentic contexts, i.e., settings where there is social interaction and collaboration. This is different from most classroom learning activities today which involve abstract knowledge or learning that occurs out of context. Furthermore, in a situated learning environment the learners become involved in a "community of practice" where beliefs, knowledge, and behaviors are shared and acquired (Wenger, 1997). Often times, situated learning is regarded synonymously with constructivism learning or collaborative learning. Also in this learning environment or learning community, a beginner evolves and becomes more active and participatory within the learning community and assumes the role of an expert Lave (1998). Additionally the role of the instructor is primarily to serve as a facilitator of the learning experience.

Other researchers have built on the theory above. The notion of learning communities is rooted in the observation that knowledge and learning are a natural part of the life of communities that share values, beliefs, languages, and ways of doing things

(Bransford, Brown, & Cocking, 1999). These authors assert that knowledge, in this view, is inseparable from practice, and practice is inseparable from the communities in which it occurs. Wenger (1997) explores the topic of communities and speaks specifically of learning communities in terms of "communities of practice." He bases his ideas on extensive study of various workplaces as well as classroom communities. He believes that: (1) authentic communities of practice are characterized by mutual engagement, joint enterprise, shared repertoire, and negotiated meaning, (2) authentic learning environments share such characteristics, and (3) all learning environments should work to develop them (Wenger,1997). An important part of Wenger's communities of practice is the idea that all learning is situated in practice and that all practice is essentially social in nature.

In summary, social theories of learning, while generally focusing on cognition and learning as situated and constructivist in activities, interactions, practice, and knowledge construction, generally recognize all these characteristics as both essential to learning and fundamentally social in nature. This recognition of social learning theories in this light makes it particularly intriguing for online educators as a research topic because it helps researchers come up with questions regarding the capacity or quality of online environments to support social activities and interactions and/or the development of learning communities. These kinds of questions have typically been explored and investigated in what has come to be called “social presence” research, which transitions to the next section of discussion in this chapter.

Virtual Learning Communities/Asynchronous Discussion Forums

As access to the Internet and World Wide Web has continued to grow, Web-based learning has continued to expand. Instruction in the tradition classroom moves to instruction via the Internet. Traditional learning communities become virtual learning communities. Virtual learning communities emerge from a blending of traditional learning communities and social learning theories. Theoretically, the idea of a virtual learning community grows from research on social presence and Wenger's (1997) studies of communities of practice. The research on social presence informs us that students perceive themselves as interacting socially in online courses and that they relate such perceptions to learning. These findings suggest that online courses might be better understood and investigated as communities of practice.

Other researchers have further explored the relationship between social presence or social interaction and the development of learning communities. Swan & Shea's (2005) literature review delves into this area. In this article these authors, among other literature cited, referenced the research conducted by Wegerif (1998), Brown (2001) and Rovai (2002) as the prominent research conducted in the area of social presence and the development of learning communities. I will now further examine these research articles.

As an example Shea & Swan (2005) cited Wegerif's (1998) research where Wegerif argued that social interaction is important to the effective of a course delivered in an asynchronous learning environment. He further posited that social interaction is an important element needed in the design of online courses. As a result, Wegerif (1998) specifically found that that students gained success in online courses after they became socially adapt in the learning community and became a part of a community of practice.

Furthermore, Wegerif found that the individual success or failure of students enrolled in an online course at the Open University depended on their ability to cross a threshold "from feeling like outsiders to feeling like insiders" in that community. The research conducted by Wegerif (1998) on social interaction can be best summed by this quote of his "In this paper I show, through an ethnographic study of a computer-mediated course, how social factors impacted upon the learning of students. I argue from this evidence that social factors, how participants in an ALN relate to each other, need to be taken into account in the design and development of computer-mediated courses."

Shea & Swan (2005) also mentioned Brown's (2001) research where Brown studied the processes through which community was formed in graduate courses in educational administration. He analyzed historical online course records and interviewed students and instructors to determine how community is formed in online courses. He found that the community building was formed in three stages. The first stage was making friends online because students needed to first become comfortable with responding to their classmates Brown (2001). The second stage was students had to become more involved in participating in thoughtful discussions together Brown (2001). The third and final stage was camaraderie which was achieved when students incorporated personal discussion into their communication Brown (2001).

Brown (2001) also found that as students progress through each of these stages, they exhibited a greater degree of engagement in both the class and the online interactions. For students that did not progress through these stages Brown provided explanations as to why. The explanations for this lack of response were found to include that: (1) a participant did not even think about community or defined community in a way

that could include online learning, (2) a participant did not prioritize the class at a level that would allow the development of community or was for some reason "out of sync" with it, or, (3) a participant did not want to be part of the community (Brown, 2001).

Among the participants who did experience a sense of community, Brown (2001) identified three levels or stages in the development of feelings of belonging to a class community. The first level involved making online acquaintances usually through discovered similarities. The second level, community conferment, resulted from engagement in a long-threaded discussion after which participating students felt a kinship with each other. The third level of community, camaraderie, was achieved after long-term and intense association with others through personal communication and also generally found only among students who had been through multiple classes together. .

Brown (2001) argues that his findings suggest ways in which the development of community can be supported by online course developers and facilitators. Such an argument is reiterated in the work of Rovai (2002). Shea & Swan (2005) highlighted Rovai's (2002) research where Rovai developed a Sense of Classroom Community Index (SCCI) to measure students' sense of community in both traditional face-to-face courses and those enrolled in asynchronous learning network (ALN) courses. SCCI instrument was a 20 item classroom, community scale that measured a sense of community in a learning environment. The data was collected from 375 students enrolled in 28 different courses. The findings of the research indicate the instrument is a valid and reliable measure of classroom community and that the instrument yields factors of connectedness and learning. Thus Rovai's work provides evidence that it is the method and not the

media that matters the most in learning effectiveness. Rovai (2002) posited that "members of strong classroom communities have feelings of connectedness."

This section cited examples of research where social presence contributes to the formation of communities of practice. Swan & Shea's (2005) research was noted as the contributing literature into this area. However, social presence is not the only variable essential in the formation of communities of practice. The community of inquiry model posits that social presence is just one of the three elements required, which transitions to the next section of discussion in this chapter.

Communities of Inquiry

Garrison et al. (2000) developed the community of inquiry model, which constitutes three elements essential to an educational transaction—cognitive presence, social presence, and teaching presence. Indicators (key words/phrases) for each of the three elements emerged from this study which was an analysis of computer-conferencing transcripts.

Cognitive presence. The first element of a community of inquiry is cognitive presence. Cognitive presence is defined as the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained negotiation (Garrison et al., 2000). It is composed of four phases of the practical inquiry model.

The first phase of the model is reflective of the initiation phase of critical inquiry and is considered the "triggering event." In an educational context, the instructor often communicates learning tasks that become triggering events. Additionally, in the online

learning environment, any group member can add a triggering event to the learning discourse (Garrison et al., 2000).

The second phase of the model is "exploration." In this phase, students are required to grasp the nature of the problem, and then move on to a fuller exploration of relevant information. This exploration can take place in the community of inquiry and can be characterized by brainstorming, questioning, and exchanging information (Garrison et al., 2000).

The third phase of the model is "integration." In this phase, students are constructing their personal meaning from the ideas generated in the exploratory phase. In terms of teaching presence, this phase is the most important for the instructor to assert his or her presence because students might have ideas that need the teacher's input (Garrison et al., 2000).

The final phase is resolution. This is the phase where students come up with the resolution of the dilemma or problem (Garrison et al., 2000).

Social presence. The second element of a community of inquiry is social presence. Social presence is the ability of learners to project their personal characteristics into the community of inquiry, thereby presenting themselves as *real people* (Garrison et al., 2000). The use of emotion, caring, concern, recognizing others by name, or attending to a message posted by another person all demonstrate social presence. Social presence helps to build community. An example of a post that fosters a sense of community is one in which writer uses the pronouns "us" or "we." Similarly social presence is defined as the ability of learners to project themselves socially and effectively into a community of inquiry.

Teaching presence. The third element of a community of inquiry is teaching presence. Teaching presence is defined as the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educational worthwhile learning outcomes (Garrison et al., 2000). Teaching presence is also the ability of the instructor to develop close proximity to the learners in an online course while overcoming the lack of physical presence associated with the online learning medium (Garrison et al., 2000). In practice, one of the best and easiest ways for a new online instructor to establish teaching presence is to be available and responsive to the learners, whether it is via email or through some form of face-to-face meeting.

Asynchronous discussion forums have lots of exciting potential because it gives online learning communities with new and unprecedented learning opportunities. However, educators are often faced with difficulties on how to evaluate learning effectiveness in such online communities. As Gunawardena, Carabajal, & Lowe (1997) noted, "The development of appropriate methodologies for evaluating the myriad, ever changing forms of online learning presents a critical challenge to distance educators. The open-ended nature of online learning, the multiple threads of conversation, and the fluid of participation pattern calls for new ways of looking at evaluation," which transitions to the next section of discussion in this chapter.

Learning Effectiveness and Student Performance

In the context of online education, learning effectiveness means that learners who complete an online program receive an education that represents the distinctive quality of the institution. The goal is that online learning is at least equivalent to learning through the institution's other delivery modes, in particular, through its traditional face-to-face

(classroom-based) instruction. Regardless of the learning environment, whether face-to-face or online, interaction is key (Sloan Consortium, 2002).

Student performance, at times may be used synonymously with learning effectiveness, is a term that is open to many definitions. Picciano (2002) perhaps has the most comprehensive definition and thus defines student performance as the following "the successful completion of a course, course withdrawals, grades, added knowledge, and skill-building are some of the ways that performance is measured, depending on the content of the course and the nature of the students. Courses may also have multiple performance outcomes, each of which might be measured separately through testing, written assignments, or the completion of individual and group projects. Many studies of student performance in face-to-face and online courses rely on student perceptions of their learning experiences including "how well" or "how much" they have learned. Ultimately, student perceptions of their learning may be as good as other measures because these perceptions may be the catalysts for continuing to pursue coursework and other learning opportunities. Student performance is well understood to be a multivariable phenomenon that could be affected by study habits, prior knowledge, communications skills, time available for study, teacher effectiveness, etc."

Regardless of what term is used, student performance or learning effectiveness, the ultimate goal of education is learning. Thus, learning effectiveness should be the primary measure by which online education is judged. If we cannot learn online as well as we can in traditional classrooms, then online education is met with skepticism. In addition other issues such as access (i.e., internet availability and bandwidth), student and faculty satisfaction, and cost effectiveness, are also important factors in the consideration

of student learning outcomes in online learning environments. In this study, I am interested in the blending of the definitions student performance and learning effectiveness as it pertains to meeting the objectives of learning and promote effective student learning outcomes.

When online learning was first conceived and implemented, a majority of educators believed that it would not compare to face-to-face learning and interestingly many still doubt to this day. The comparison of online learning compared to face-to-face learning coupled with learning effectiveness is one area of research that is prominently cited by Swan (2003). Swan (2003) further explores into this area of research in her literature review. In this research the author, among other literature cited, looked at the research conducted by Russell (1999), Clark (1983), Kozma (1991) and Kulik et al (1985). I will now further consider these research articles.

As an example, Swan (2003) cited Russell's research on "no significance difference." Pertinent to the above age old argument, Russell (1999) designed a Web site titled "no significance difference" that presents the results of 300 plus research studies, dating as far back as 1928, reporting no significant differences between the outcomes of students online versus students learning in the traditional classroom. In other words, the "no significance website" noted that historical research studies accumulated over-time illustrated that student outcomes in distance learning courses were neither better nor worse than those in face to face courses.

Prominent discussion topics to Russell's (1999) comprehensive archive of "no significance difference" research studies, there can be found two distinct arguments made towards the effectiveness of online learning versus traditional learning methods. The first

argument comes from Clark (1983), where he viewed instructional media as "… mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition." Clark's premise for the quote above was the following, he argued that media does not make a difference in learning but rather that instructional design does make a difference. In particular, Clark (1983) brought up issues found in studies of computer-assisted instruction (CAI) (Kulik et al., 1985) that compared CAI with traditional instruction and found that students learned faster from using CAI over traditional classroom. Clark (1983) posits that the CAI studied was designed with a solid instructional design base, while the traditional instruction to which it was compared to was not. Clark (1983) concluded by saying that as long as the quality of instructional design delivered over a distance was as good as the quality of traditional education, there would be no significant differences in learning between the two types of instruction. Other researchers tend to support Clark's research, one of which is Rovai's (2002) work as it provides evidence that it is the method and not the media that matters the most in learning effectiveness.

Clark's position, however, has been challenged by many in the educational technology community, more notably Kozma (1991). Kozma (1991) did agree about the importance of instructional design however he argued that instructional media was still relevant in the argument. CAI is supported positively and strongly by Kozma (1991) because he saw it as effective is its ability to deliver instruction, that is interactive and personalized to every student based on their learning needs, and that it provides students with extensive practice and immediate assessment. Furthermore Kozma (1991) believes that while CAI can provide personal one-on-one time to each student, teachers in the

classroom don't have the time or the resources to do that. Thus Kozma (1991) posits that CAI can replace the individual teachers that are assigned to students. In summary, Kozma (1991) responded to Clark (1983) with his own article. Kozma (1991) argued that Clark's view of media as "delivery trucks" creates an "unnecessary schism between medium and method." Kozma (1991) believed that a continued and careful use of instructional media will enable learners to take advantage of its strengths to construct knowledge. In contrast to Clark (1983), he called for continued instructional media comparison studies because they do present better learning outcomes for students as opposed to traditional face-to-face learning environments. Thus when considering about the effectiveness of online learning outcomes, one comes across the arguments of "no significance difference" and the research of Clark (1983) which supports instructional design while the research of Kozma (1991) calls for continued research in the instructional media.

When it comes to learning effectiveness or student learning outcomes, there is a high amount of research being compiled and conducted regarding the importance of interaction in Web-based distance learning education. The research being conducted indicates that many researchers have supported the concept that student-to-faculty and student-to-student interactions are important elements in the design of a Web-based course. Both students and faculty typically report increased satisfaction with online courses, depending on the quality and quantity of interactions. Other researchers have further explored the relationship between social presence or social interaction and the development of learning communities. Picciano's (2002) review of the literature looks into this area. In this article the author, among other literature cited, highlighted the

research conducted by Shea, Fredericksen, Pickett, Pelz, & Swan (2001), Dziuban & Moskal (2001), Beaudoin (2001) are among the more notable research conducted in the area quality and quantity of student-to-faculty and student-to-student interactions as important elements in the design of online instruction and the achievement of student learning outcomes. I will now further examine these research articles.

As an example Picciano (2002) cited Shea, Fredericksen, Pickett, Pelz, & Swan's (2001) research in a survey of 3,800 students enrolled in 264 courses through the SUNY Learning Network (SLN). The findings of this research note that the relationships between the variables of satisfaction, interaction, and performance (grades) were as follows: (1) There was a strong correlation between course grades and interaction, (2) There was a strong relationship between course grades and student satisfaction of the course, (3) Students who had strong interactions amongst themselves and their instructor performed well in the class (Shea et al., 2001). Finally the authors cited their research as having the following theoretical contribution "The identification through empirical research of these three factors – consistency in course design, contact with course instructors, and real communication through discussion is both supported by social constructivist theory and supports social constructivist notions of the importance of the development of knowledge building communities. It also can guide the development of asynchronous online courses…" (Shea et al., 2001).

Picciano (2002) also cited Dziuban & Moskal's (2001) research where these authors also reported very high correlations and relationships between interaction in online courses and student satisfaction. Their conclusions were based on a questionnaire that was administered over a 3-year period by the Research Initiative for Teaching

Effectiveness at the University of Central Florida to over 50,000 students enrolled in fully web-based, blended (i.e., combination of web-based and face-to-face) and web-enhanced face-to-face courses. The fully web-based and blended web-based courses replace some or all face-to-face classroom time. The findings of their research noted that there were statistically significant correlations between the quantity and quality of the interaction and student satisfaction in all types of courses. Furthermore there was a stronger correlation between the levels of interaction on fully web-based courses versus the levels of interaction to other blended web-based courses web-enhanced face-to-face courses. Dziuban & Moskal (2001) also see potential in blended learning as an pedagogical approach that combines the effectiveness and social elements of the classroom with the enhanced active learning possibilities that the online learning environment affords.

Pertinent to Picciano's (2001) review of the relationship between social presence or social interaction and the development of learning communities is Beaudoin's (2001), research "Learning or Lurking? Tracking the 'Invisible' Online Student." Beaudoin (2001) examines the relationship between student interaction and learning. This research is unique in that it looks at whether or students are actively engaged on the online discourse with their fellow students and instructor, while other research has been written about the social behaviors of the students on the online courses. In this study, an online master's level class was divided into three groups (a high interaction group, a moderate interaction group, and a low interaction group). Beaudoin (2001) reveals that while the high interaction students achieved the highest performance, the low interaction group performed higher than the moderate interaction group. As a suggestion for future research (Beaudoin, 2001) offers the following thought about the student's participation level on

the online discourse at it relates to their performance in the class “Because some choose to be less participatory does not necessarily mean they are less engaged in meaningful learning. Indeed it could be argued that the “overactive” online students (i.e., those who are constantly inputting words) do so at the expense of a more reflective and less visible learning process in which their silent peers are actually more fully engaged

As we have seen, the progression of previous research illustrates that we can indeed learn online through the various learning theories that have been examined. However, knowing that we can learn online in a virtual learning community or asynchronously is just the beginning, which moves us to the qualities determine whether learning is actually occurring.

Henri (1992) presented the first content analysis framework for exploring online discussions and proposes that we look at five dimensions of the discussion: participative, social, interactive, cognitive, and metacognitive. Later on, Garrison and colleagues (2000) modified Henri’s model by dividing it into three components: cognitive presence, social presence, and teaching presence. From Garrison et al (2000) community of inquiry model, we can examine the research to draw correlations between these three components to determine their impacts on learners’ performance or student learning outcomes. The literature above helps to identify the gaps that contributed to the development of the current study. Henri (1992) and Garrison et al (2000) provided the content analysis framework that is particularly useful when attempting to measure the levels of cognitive presence, which transitions to the next section of discussion in this chapter.

Levels of Cognitive Presence

Some of the most current literature on the levels of cognitive presence in online learning environments emerges from a recent review of the literature conducted by Rourke & Kanuka (2009). In this article these authors, among other literature cited, reviewed seven studies relevant to the mean levels of cognitive presence that were published between the years of 2001 and 2007, suggesting that on the four levels of cognitive presence the most learning, ranging from 42% to 75%, occurs at the "Exploration" level. The number of subjects from these seven studies ranged from 52 to 101.

The "Triggering Event" stage yielded a low of 6% as exhibited in the results of the research conducted by McKlin, Harmon, Evans, & Jones (2001) in a sample of 52 subjects and a high of 16% as shown in the research conducted Research by Stein et al (2007) in a sample of 100 subjects. The "Exploration" stage yielded a low of 42% as illustrated in the results exhibited by Schirire (2004) in a sample of 97 subjects and a high 75% in a sample study of 52 subjects from the study conducted by McKlin, Harmon, Evans,& Jones (2001). The "Integration" stage yielded a low of 17% in a sample study of 52 subject from the study conducted McKlin, Harmon, Evans, and Jones (2001). While Schirire (2004) suggested that the highest level of learning occurred in the "Integration" phase, which was 34% and a sample size of 97 subjects. Finally, the study by Kanuka, Rourke, & LaFlamme (2007) resulted in the highest level of learning in the "Resolution" phase, which was at 10% with a sample size of 100 subjects while the study conducted by Vaughan& Garrison (2005) yielded the lowest percentage of the "Resolution" stage at 1% on a sample of 86 subjects. Table 1 summarizes the details of these selected studies.

As an example of one of the studies conducted on the levels of cognitive presence cited in Rourke & Kanuka (2009), I will discuss briefly the composition of the research conducted by Vaughan & Garrison (2005). The research by Vaughan & Garrison (2005) yielded the following mean levels of cognitive presence for each of the stages: (1) Triggering Event = 9 %, (2) Exploration = 71%, (3) Integration = 19% and (4) Resolution = 1%. The study contained N = 86 subjects and it focused on understanding how a blended learning approach can support the inquiry process (cognitive presence) in a faculty development context. The findings from this study

Table 1

Previous Literature on Cognitive Presence in Various Phases

		Levels of Cognitive Presence			
Literature	*N*	Triggering Event	Exploration	Integration	Resolution
Vaughan and Garrison (2005)	86	9%	71%	19%	1%
Stein et al. (2007)	100	16%	52%	28%	4%
Garrison, Anderson, & Archer (2001)	67	12%	63%	19%	6%
Schirire (2004)	97	14%	42%	34%	9%
Kanuka, Rourke, &Laflamme (2007)	100	11%	53%	26%	10%
McKlin, Harmon, Evans, & Jones (2001)	52	6%	75%	17%	2%
Fahy (2002)	101	13%	62%	19%	6%

suggest some notable key differences and similarities in cognitive presence between face-to-face and online discussions. These differences and similarities are pertinent to the four phases of cognitive presence of the practical inquiry model. A comparison of the recent

research on the face-to-face and online discussion forums indicates the following (1) a slightly higher percentage of *triggering events* occurred in face-to-face discussions; (2) *exploration* was the dominant phase in both environments; (3) a noticeably greater percentage of comments were coded for *integration* in the online discussions; and (4) the *resolution/application* phase was almost nonexistent in both forms of discussion (Vaughan & Garrison, 2005). The results from this study (Vaughan and Garrison, 2005) suggest that an increased emphasis should be placed on teaching presence within a blended learning environment to ensure that participants achieve resolution in the inquiry cycle. Along the same lines Vaughan & Garrison (2005) suggested the following as a worthy topic for future investigation "would be to focus on high level learning processes and outcomes using blended learning designs."

One other example of a study conducted on the levels of cognitive presence as cited in Rourke & Kanuka (2009) is the study conducted by Kanuka, Rourke & LaFlamme (2007). In the case study, with N = 100 subjects conducted by Kanuka, Rourke, & LaFlamme (2007), the distance learning 4th year university course was asynchronous based and delivered using the WebCT learning management system. Face-to-face contact between and among the students and the instructor was not allowed. The authors then created five groups of communication activities on the quality of students' contributions to online discussion which were: (1) the nominal group technique, (2) debate, (3) invited expert, (4) WebQuest, and (5) reflective deliberation Kanuka, Rourke, & LaFlamme (2007). Quality of discussion was represented as "cognitive presence," a construct developed to investigate the role of critical discourse in higher or distance education contexts. Using the quantitative content analysis technique, the

postings of the students in an undergraduate university course were assigned to 1 of the 4 categories of cognitive presence. The research conducted by Kanuka, Rourke, & LaFlamme (2007) yielded the following mean levels of cognitive presence for each of the four stages: (1) Triggering Event = 11%, (2) Exploration = 53%, (3) Integration = 26% and (4) Resolution = 10%. Additionally across the instructional methods, the authors found that the mode for the four phrases of cognitive presence was the highest WebQuest and Debate activities There were three advantageous qualities of these two activities, as the authors concluded the following "(1) They were well structured; (2) They provided clearly defined roles and responsibilities for the students; and (3) They provoked the students to explicitly confront others' opinions" Kanuka, Rourke, & LaFlamme (2007).

This literature review in this chapter examined five different areas. The first area focused on the learning theories. The second area looked at existing literature on virtual learning communities/asynchronous discussion forums. The next area examined the research on the communities of inquiry model. Following that, the literature review examined the writings on learning effective/student performance. The final area looked at the research in one of the three elements of the communities of inquiry model, the element of cognitive presence. The next chapter consists of the research methodology I used to conduct the study.

CHAPTER 3

RESEARCH METHODOLOGY

The purpose of this study was to examine performance in an online course in relation to student interaction and the sense of cognitive presence in the course. Data on multiple independent variables (i.e., message lengths, number of posts, presence) and dependent variables (i.e., measures of performance) were collected and analyzed.

Data on actual student participation in online discussions were collected during the duration of the Computer Ethics module of the IT 2010 course. The module assignments consisted of questions that students were asked to respond to in an asynchronous discussion forum. (Questions from the Computer Ethics module can be found in Appendix H.). The data collected were based on asynchronous discussion forum posts from the Summer 2007, Fall 2007, Spring 2008, and Fall 2008 academic terms.

The methodology employed in this study was a descriptive analysis of interaction, cognitive presence, and performance data. The data was collected from students enrolled in an online module on Computer Ethics, which was part of an IT 2010 class taught at a large public university in the Southeastern United States. The IT 2010 course, Computer Skills for the Information Age, is a 3-credit hour elective course for undergraduate students. In this course, students learn how to use the computer as a tool for effective data organization, analysis, and communication. Students also develop competence in word processing, spreadsheets, databases, presentations, simple webpage design, and the efficient use of internet sources. Beginning in the summer of 2007, two of three sections of the course were offered 100% online. By the fall 2008 semester, all sections of the IT 2010 course were offered 100% online. The online sections of the IT 2010 course

included a 1-week or 2-week Computer Ethics module, depending upon the semester in which the course was administered. The entire course, designed to provide a forum for the presentation and discussion of issues in computer use, was structured around readings and weekly discussions. In addition to these readings and discussions, written assignments were required, and these assignments were posted online and graded by the instructor.

Course Details

In addition to the Computer Ethics module that was offered in the IT 2010 online course, there were other modules offered in this course. The other main modules offered were:

a. Internet communication tools (electronic mail, instant messaging, search engines);
b. Word processing (MS-Word);
c. Spreadsheets (MS-Excel);
d. Web Assignments/Development tools (Google Pages).

Figure 1 shows the modules that were covered in one of the online IT 2010 courses offered during the Summer 2007 semester. In this illustration, the module on Computer Ethics was offered in the fifth week of the course and lasted just one week long.

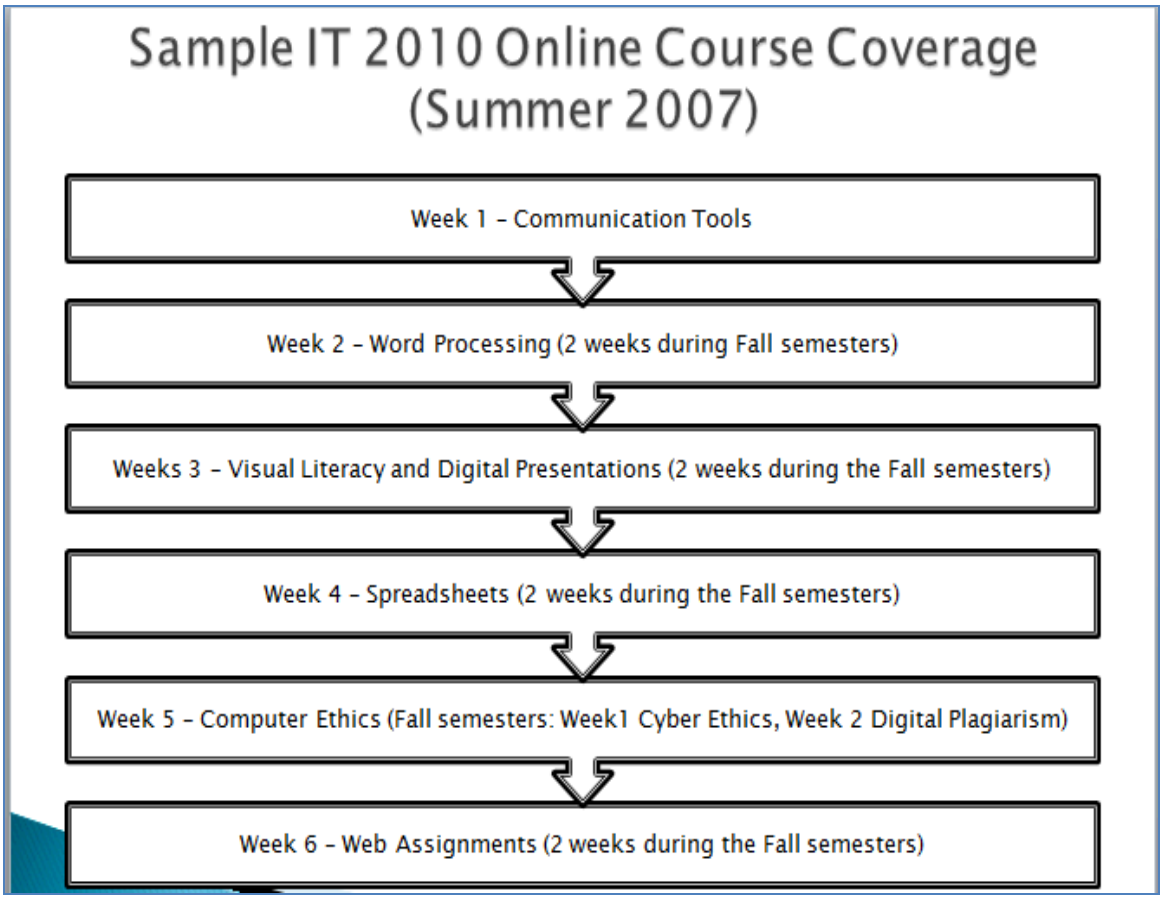


*Figure 1.*Sample IT 2000 Course Timeline for Summer 2007 semester.

Depending upon the semester in which the data were collected, the Computer Ethics module was either 1-week or 2-weeks in length. As a whole, this study consisted of student data from 10 sections, N = 165, of the Computer Ethics Module. For the modules that were 1-week in length, the student data came from 4 sections, n = 59 students. For the modules that were 2-week in length, the student data came from 6 sections, n = 106 students. Additionally during on the 1-week in length modules the topic covered was on Cyber Ethics. During the 2-weeks in length modules, the topics covered were Cyber Ethics and Digital Plagiarism for the 1st and 2nd weeks respectively. Figure 2 titled "Computer Ethics Modules offered during 1-week or 2-weeks"

represented the number of sections and the number of students that comprised of the 1-week and 2-weeks modules of Computer Ethics.

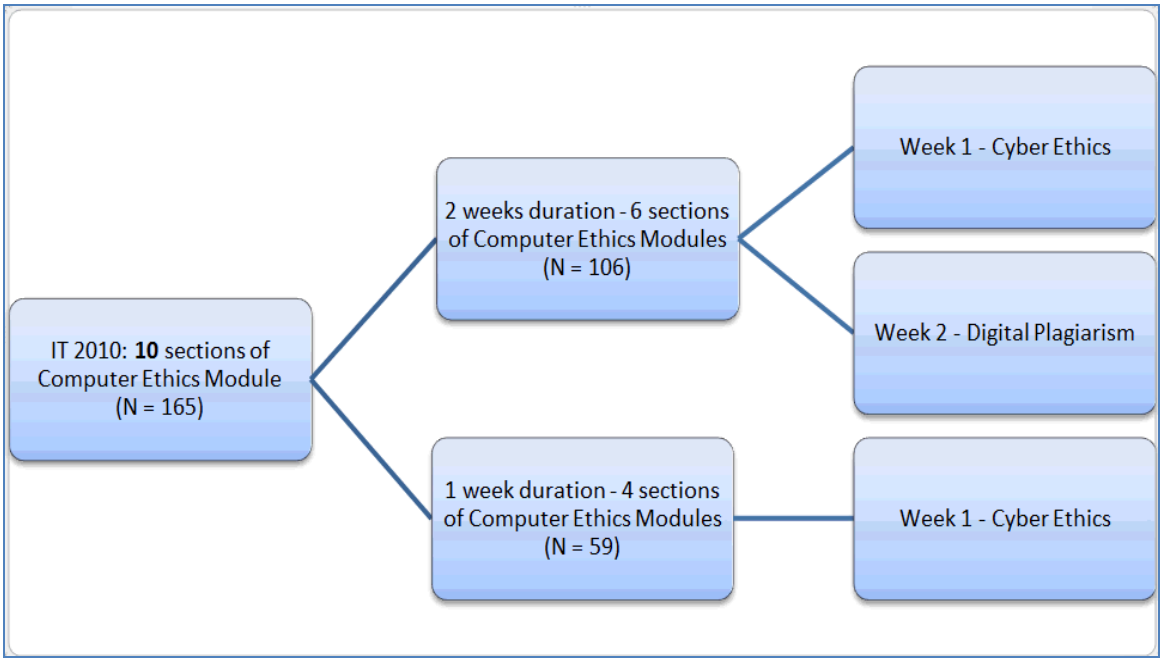


*Figure 2.*Computer Ethics Modules offered during 1-week or 2-week.

The Computer Ethics modules that were 1-week in length consisted of a total of four IT 2010 courses taught during the Summer 2007 and Fall 2007 semesters. There were a total of 59 students in these sections. Again during the 1-week duration sections, the coverage was on Cyber Ethics. The Computer Ethics modules that were 2-weeks in length consisted of six IT 2010 courses taught during the Spring 2008 and Fall 2008 semesters. During the 2-week duration sections, the coverage was on Cyber Ethics and Digital Plagiarism for the 1st and 2nd week respectively. Figure 3 below titled "Computer Ethics Modules with the number of students" consisted of the number of students in each of the sections of the IT 2010 Computer Ethics online course modules.

Of note, one difference with respect to the independent variables (number of messages and message lengths), was that the number of messages and message lengths

for individual students in the 1-week modules were less than the number of messages and message lengths for individual students in the 2-week modules. Due to this difference, I

B	C	D	E	F
Module	Description	Number of Students	Duration	Coverage
5076_020	Summer 2007, section 020	10	1 week	Cyber Ethics
5076_035	Summer 2007, section 035	15	1 week	Cyber Ethics
5079_030	Fall 2007, section 030	17	1 week	Cyber Ethics
5079_035	Fall 2007, section 035	17	1 week	Cyber Ethics
5081_005	Spring 2008, section 005	19	2 weeks	Cyber Ethics and Digital Plagiarism
5089_005	Fall 2008, section 005	17	2 weeks	Cyber Ethics and Digital Plagiarism
5089_015	Fall 2008, section 015	19	2 weeks	Cyber Ethics and Digital Plagiarism
5089_020	Fall 2008, section 020	17	2 weeks	Cyber Ethics and Digital Plagiarism
5089_025	Fall 2008, section 025	17	2 weeks	Cyber Ethics and Digital Plagiarism
5089_030	Fall 2008, section 030	17	2 weeks	Cyber Ethics and Digital Plagiarism
Notes:				
a. Study consists of 10 modules, N = 165				
b. There were 4 1-week modules, N = 59				
c. There were 6 2-weeks modules, N = 106				
d. During 2-weels modules, Cyber Ethics and Digital Plagiarism were covered during the first and second weeks repectively				

*Figure 3.*Computer Ethics Modules with student distribution.

looked at standardizing the number of messages and message lengths during the 1-week and 2-week course modules. More details about the process to standardizing the values for these two variables will be discussed later in this chapter. Additionally, I will compare the correlation calculation results using both the standardized versus original values for these two variables in this study.

Characteristics of the Participants

Students from all colleges at the university located in the Southeast United States, including the College of Education, were eligible to sign up for the course. Through a

random sample of students taking this course in previous semesters, it was evident that the students registered in the course recognized the importance of technology—a majority of the enrollees had access to computers and Internet technology in their homes or at other places, such as their work or at the public libraries. In addition, many of the past students were also professionally curious about an alternative pedagogical experience such as web-based learning, using the Internet and other current technological tools.

Some of the former students who participated in the course balanced full-time jobs, families, parenthood, and higher education in a carefully planned day that includes rushing for subways and buses to meet the next commitment. They were a mature group of people who organized their daily lives around taking care of their families, making sure their children were safely transported to a babysitter or daycare facility, maintaining a home, and, as time permitted, completing homework assignments. Online courses that can be taken at any-time or in anyplace, such as the IT 2010 course, have a great deal of appeal to such students. These types of courses enabled students to fit under-graduate studies into their busy lives, eliminating the need to travel several times a week to the college campus. These non-traditional students in the course typified the mature, self-directed, and busy students who can take advantage of and benefit from online instruction.

The characteristics (see Appendix A) discussed above are based on a survey (see Appendix F) that students completed at the end of the Computer Ethics module.

The survey had a total of 9 questions and it was administered in Survey Monkey, the online survey software and questionnaire tool. The survey had questions related to

student demographic information, also questions about the computer skills of the students and finally questions about the students' knowledge about Computer Ethics.

Three out of the nine questions were related to student demographics. Students were asked about their ethnicity, gender, and age. In the group of 165 students, all ten class sections combined, 71 students (43%) of the students responded to the question on their ethnicity. The highest racial group represented was the Caucasians at 53%. The next to lowest racial group represented was the Hispanics at 3%. Regarding the question gender, 65% of the 71 responders indicated that they were Female. Finally for the question on age, the age range between 18-22 years old had the highest distribution of 66% among the 71 responders.

The remaining questions on the survey were focused on the students' experience with the use or exposure to computers or the Internet and there were also questions that focused on the students' knowledge about Computer Ethics. On the question of "How much time do you spend per week on the computer?" in the group of 165 students (all ten class sections combined), 71 students (43%) responded. The majority of the students, 60 (85%), responded that they spend "More than 5 hours on the computer." Related to the question of "Have you used the Computer for the following purposed?", at least 40 students (56%) responded that they used the computer for multiple purposes ranging from Facebook to Google's search engine feature.

Students were then asked questions about topics related to Computer Ethics. The first question sought to know "How much time did you discuss the topic outside of class?" Given the fact that this Computer Ethics module was taught 100% on-line, I thought it was interesting to solicit feedback from the students if they discussed the topic

anywhere but within the online learning environment. Students responded that they had discussed the topic outside of the learning environment. The discussions outside of the learning environment ranged from the maximum of 39 students (55%) who discussed the topic on "less than 6% of the class module" to a minimum of 5 students (7%) who discussed the topic "between 51%-75% of the class module." Students were then asked a "Yes" or "No" question on whether or not they had previous knowledge about the topic of Computer Ethics. About 80 % of the 71 students who responded noted that they had heard of this topic. The last question on the survey asked the students if any of the following has happened to them. Listed below were the choices and the students' responses.

a. "Your PC has been hacked" – 5 students (7%) indicated that this happened;
b. You have received spam mail – 68 students (96%) indicated that this happened;
c. Your PC has been infected with a virus – 56 students (79%) indicated that this happened;
d. You have been a victim of cyber-stalking – 8 students (11%) indicated that this happened;
e. You have been a victim of cyber-bullying – 5 students (7%) indicated that this happened;
f. You have been a victim of identity theft – 5 student (7%) indicated that this happened;

The students' responses to the end of module questionnaire gave some insights into the characteristics of the students represented in the class, ranging from the student demographic information, their level of computer skills and finally their knowledge about

Computer Ethics prior to starting the course module. The information helped to understand the students as well as to describe them in this study. However no analysis was being conducted against the variables, for example student demographics or student pre-class module knowledge on Computer Ethics, collected in the survey.

Instructional Components

A completely asynchronous model was used to deliver this course via a Website utilizing the Blackboard course management system (CMS). To connect to the course'sWebsite, most of the students used a commercial Internet and electronic mail (e-mail) provider, such as or BellSouth DSL or Comcast internet, in their homes or accessed wireless connectivity via public settings such as Starbucks or a library. Other students used Internet facilities available at the university.

The focus of this study was a Computer Ethics module that was part of an online IT 2010 course. The module was either 1 week or 2 weeks in length, depending on the semester in which the course was administered. The instructional contents for the Computer Ethics learning module were personally developed and the audio of the instructional materials for the module were recorded using Adobe Captivate version 3.0. The Website for the course included a syllabus, reading assignments, weekly discussion topics and questions, supplementary reading materials, and related links. These materials were always available and served as the organizational anchors for the course. The Computer Ethics module was organized for an asynchronous discussion on an electronic discussion board during a time period of 1 week or 2 weeks and was based on assigned readings and case studies. The instructor of the course served as the facilitator of the module. Once the discussion of a topic commenced for the week, students were required

to contribute to the discussions and/or ask a question of another student or the instructor. At the end of the week's discussion, the instructors summarized the topic, added additional notes and comments, posted these notes to the Website for access by the entire class, and evaluated the students' assignments by giving the students a grade on for their participation or contributions to the discussions.

Techniques to encourage social presence and a sense of community were used throughout the course. Rourke and others (1999) provide an excellent review of some of the techniques that can be used to foster a sense of presence and community-building, including complimenting students, self-disclosure, warmth, and activities that build and sustain a sense of group commitment. In this course, many of these techniques were used, for example, first names were used in all online discussions. Discussion questions were designed to encourage students to relate the material to their experiences in their own schools and environments.

Data Preparation

The data analysis was based on two studies: (1) study data from the Summer 2007 and Fall 2007 academic terms, and (2) study data obtained during the Spring 2008 and Fall 2008 academic terms. The duration of the Computer Ethics module was 1week in length for the Summer 2007 and Fall 2007. During the Spring 2008 and Fall 2008 term, however, the duration of the module was 2 weeks in length. During the Summer 2007, Fall 2007 and Spring 2008 terms, the assignments were graded by the researcher. However, during the Fall 2008 semester, the assignments were graded by the instructor for the course. The rationale for involving the instructor in the grading of the assignments during the Fall 2008 semester as opposed to the researcher who had assessed the

assignments in the first three semesters was to see if there would be a difference in the grades assigned when the researcher graded the assignments versus when the instructors graded the assignments. Since there were no differences in the grades assigned by either the researcher or the instructors, the studies were to be grouped together into the overall study sample of N = 165 students for the 10 course modules that covered four different semesters, i.e., Summer 2007, Fall 2007, Spring 2008 and Fall 2008.

Data obtained from each the four semesters of the Computer Ethics module were coded simultaneously to ensure that there were no changes to the standards in coding. There were two primary coders and a third coder, whoserved as the "tie-breaker" if necessary. The method to train the primary coders and the involvement of the third coder, the "tie-breaker" coder will be discussed later in this chapter.

The set of constructed guidelines for the study builds on a series of content analyses described by Garrison et al. (2000, 2001), who analyzed online discussions based on a community of inquiry model that splits community-based learning into three overlapping areas: social presence, cognitive presence, and teacher presence. According to Rife, Lacy, and Fico (1998), content analysis is "the systematic assignment of communication content to categories according to rules and the analysis of relationships involving these categories using statistical methods" (p. 2). Rife, Lacy, and Fico (1998) also outline the steps for performing a quantitative content analysis as: (1) defining the units of analysis, (2) operationally defining the construct to be measured, (3) training coders, and (4) taking reliability measures to determine how consistently the coders have measured the construct.

Rife and colleagues (1998) define unit of analysis, or unit of contents, as "a discretely defined element of content. Thus it can be a word, sentence or paragraph, image, article, television program, or any other description of content based on a definable physical or temporal boundary or symbolic meaning" (p. 58). Rourke et al (1999) described the unit of analysis as a discrete element of text that is observed, recorded, and thereafter considered data. There are several types of units of analysis. One type is the "thematic unit," which is defined by Budd, Thorp, and Donohue (1967) as a single thought or unit or idea unit that conveys a single item of information extracted from a segment of content. Another type is "syntactical unit," which is defined by Garrison et al (2001) as identifying the theme by looking at a sentence, phrase, or paragraph. Garrison et al (2001) chose a syntactic unit of analysis as opposed to a thematic unit of analysis that they used to measure the entire message as opposed to individual paragraphs, sentences, or themes within a message. Further, they used human coders to clarify messages, and their study yielded a reliability figure of $k = 0.74$). Various sources (Rife and colleagues, 1998, Rourke et al, 1999, Budd, Thorp, and Donohue, 1967, Garrison et al, 2001) for the type of unit of analysis were considered for this study. For purposes of this study, I considered Garrison et al's (2001) suggestion and treated the individual student's post or message rather than at the individual sentences as the unit of analysis.

The set of constructed guidelines for this study focuses on cognitive presence, which is defined as "the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry" (Garrison et al., 2001, p. 11). Coding decisions were made using a coding rubric provided

by Garrison et al. (2001), in which the authors identified each of the 4 cognitive presence categories as follows:

1. Triggering event: a message that evokes response(s).
2. Exploration: a message that presents facts, feelings, ideas, suggestions, unsupported conclusions, or unsupported contradiction/disagreement.
3. Integration: a message that includes tentative substantiation, combination of ideas, or synthesis.
4. Resolution: a message that indicates commitment to a resolution and includes real-world applications, testing of solutions, or defense of solutions.

Any value of "0" is considered non-cognitive.

The coding process into the levels described above involves developing a systematic procedure for assigning data into categories, for example, each of the four cognitive presence processes above would be placed into categories. An example of a triggering event is identified as a "sense of puzzlement." An example of exploration would be "leaps to conclusion." An example of integration would be "creating ideas or synthesis." And an example of resolution would be "testing solutions." (see Appendixes B and C).

Content analysis can be performed either manually or through the use of computerized applications. In this study, manual content analysis for each course was performed by the coders, one of which also has taught, administered, or taken the online course. The coders were first trained to code online discussion messages using a rubric based on the model developed by Garrison et al. (2000) (see Appendix B).

Steps for Coding

The steps for coding and re-coding the transcripts are explained in more detail below.

There were two primary coders, this author and his partner, and a third coder who served as a "tie-breaker." The two primary coders coded each set of transcripts during a joint session and sitting at separate tables to lessen the potential for looking at one another's codes.

Before coding the first transcript, 5076_020, the two primary coders met to review the "Transcript Code Sheet" document, which can be found in Appendix B. According to that document, each of the four levels for Triggering Event, Exploration, Integration and Resolution were coded with sub-levels.

The Triggering Event, first level, stage has three sub-levels:

a. Recognizing the problem;

b. Sense of puzzlement – asking questions;

c. Sense of puzzlement – massages that take the discussion in a new direction.

Each of the three sub-levels within the Triggering Event level was coded with a code of 1A, 1B or 1C in the code sheet.

The Exploration, second level, stage has six sub-levels:

a. Divergence – within the online community;

b. Divergence – within a single community;

c. Information exchange;

d. Suggestions for consideration;

e. Brainstorming;

f. Leaps to conclusion.

Each of the six sub-levels within the Exploration level was coded with a code of 2A, 2B, 2C, 2D, 2E or 2F in the code sheet.

The Integration, 3rd level, stage has four sub-levels:

a. Convergence – among group members;

b. Convergence – within a single message;

c. Connecting ideas, synthesis;

d. Creating solution.

Each of the four sub-levels within the Integration stage was coded with a code of 3A, 3B, 3C or 3D in the code sheet.

The Resolution, 4th level, stage has three sub-levels:

a. Vicarious applications to the real world;

b. Testing solutions;

c. Defining solutions.

Each of the three sub-levels within the Resolution stage was coded with a code of 4A, 4B or 4C in the code sheet.

The practice coding round was conducted using the 5076_020 transcript. Also, before coding the first transcript, 5076_020, the two primary coders also reviewed the "Coding Explanations" document which can be found in the third appendix (see Appendix C).

This document provided examples of codes, shown in codes below for each of the sub-levels, within any of the four sub-levels within the main levels of Triggering Event, Exploration, Integration and Resolution.

Within the Triggering Event (1st) level, the examples of the codes for the three sub-levels were as follows.

a. Recognizing the problem example – "When a student was vague and identified the issue, but failed to discuss or develop their feelings toward the issue";
b. Sense of puzzlement, asking questions example – "When a student asked a question that could warrant an answer, as in when there truly seemed to be a question asked and answered that could the student's feelings on the subject";
c. Sense of puzzlement, messages that take discussion in a new direction example- "When a student's response seemed to be not on the issue of plagiarism/how to deal with plagiarism, but the student focused more on the presentation itself (i.e. style, appropriateness, what they learned from it".

Within the Exploration (2^{nd}) level, the examples of the codes for the six sub-levels were as follows.

a. Divergence, within the online community example – "When a student's response is in disagreement with a response that precedes it. When a student says something that differs from what the majority of the students have posted";
b. Divergence, within a single message example – "When a student presents more than one somewhat developed response to an issue in a unified message. The messages in this category were usually well developed, and there may be some (although very little) overlap with brainstorming";
c. Information exchange example – "When a student provides a response that may be about him or herself, but does not apply this response directly to the question that we thought was asked";

d. Suggestions for consideration example – "When a student seemed unsure about their contribution to the discussion by asking a question(s) indicating mild confusion";

e. Brainstorming example – "When a student is almost "rambling" presenting different ideas that are all underdeveloped; kind of "just tossing ideas around." When the student just says something with little support, although this is weaker than the "divergence within a single message" mentioned above";

f. Leaps to conclusions example – "When a student makes a somewhat strong claim, a claim where there is failure to develop with a thorough explanation. With this type of claim, there may be some overlap with brainstorming".

Within the Integration (3rd) level, the examples of the codes for the four sub-levels were as follows.

a. Convergence, among group members example – "When a student agrees with a preceding response; words such as "I totally agree" and "I agree with." will be coded as such, even when the agreement was somewhat hidden in the message and not the first thing written";

b. Convergence, within a single message example – "When a student offers his or her opinion in a manner that is logical, easily understood, and unified; these responses varied in length but were all pretty straightforward, readable and code-able";

c. Creating ideas, synthesis example – "When a student integrates information from outside sources to enhance their response and/or put their opinion in perspective";

d. Creating solutions example – "When a student clearly identified how the situation should be handled; student spoke with doctrine, not saying "I think," or "They probably should," but when they said "The student needs to be…"; student gave explicit instructions on the steps that he or she feels would adequately handle the situation".

Within the Resolution (4^{th}) level, the examples of the codes for the three sub-levels were as follows.

a. Vicarious application to the real-world example – "When a student draws a real-life parallel and puts their response into perspective with things actually occurring in their world or our society";
b. Testing solutions example – N/A to this study;
c. Defining solutions example – N/A to this study.

To enable comparison between the set of constructed guidelines used in this study and those of Garrison et al. (2000), Cohen's κ values were calculated among pairs of raters. These values may be interpreted in a number of ways, and this work employed both the lenient benchmarks of Landis and Koch (1997), as well as more conservative benchmarks of Rife, Lacy, and Fico (1998). Table 2 described reliability figures according to Landis and Koch (1997). If Cohen's κ value for any of the transcripts is less than 0.70, the primary coder (this author) will recode. The individualized coding efforts of the primary coder will be called the "re-code" round. After the "re-coding" round, if Cohen's κ value is still less than 0.70 a third coder, the "tie-breaker" will be introduced. The "tie-breaker" coder will also be trained on the technique of coding as enumerated in appendices B and C.

Table 2

Landis and Koch Reliability Figures

Kappa Statistic	Strength of Agreement
< 0.00	Poor
0.00 – 0.20	Slight
0.21 – 0.40	Fair
0.41 – 0.60	Moderate
0.61 – 0.80	Substantial
0.81 – 1.00	Almost perfect

Data Analyses

For a given body of messages, such as those from a single course or those from a number of courses by topic, a maximum cognitive presence weight can be derived. This weight shows the overall cognitive presence, or intellectual effort, exerted by the course participants. The maximum cognitive presence weight is an average of messages whose cognitive presence value falls along a continuum between 1 and 4 as follows:

1. Triggering event
2. Exploration
3. Integration
4. Resolution

The above descriptive analyses immediately surface as a result of associating cognitive presence values with each message. Specifically, the researcher performed correlation analyses amongst the following independent and dependent variables.

1. Maximum levels of cognitive presence (independent variable 1)

2. Message lengths (independent variable 2)
3. Number of messages (independent variable 3)
4. Student performance (dependent variable)

After the messages were coded and cognitive presence weights were assigned to each message, the instructor assigned a grade to the assignments (see Appendix E). The researcher attempted to determine, based on the cognitive presence weights and assignment grades, if there was a correlation between the two. Additionally, the researcher examined the relationships between message lengths and higher order learning effectiveness. Finally, the researcher considered the relationships between the cognitive presence and message lengths. Pearson Correlations (Sirkin, 2006) were used to determine this relationship. With regards to Pearson Correlations, due to the differences in the number of messages and message lengths during the 1-week versus the 2-week modules (i.e. shorter number of messages and message lengths in the 1-week module), I showed the paired-wise Pearson Correlation results using both the standardized versus original values for these two independent variables.

As noted earlier in this chapter, one difference with respect to the independent variables (number of messages and message lengths), was that the number of messages and message lengths for individual students in the 1-week modules were less than the number of messages and message lengths for individual students in the 2-week modules. Due to this difference, I standardized these two variables in this study and sought to determine the paired-wise Pearson Correlation results using standardized values. I did so because I wanted to be able to group the modules from the 1-week and 2-weeks together.

Steps for Standardizing the Data

The first equation below illustrated how I standardized the number of messages. The process to standardize the number of messages is accomplished through converting the individual student's number of messages into a z-score (Sirkin, 2006). Standardized sample student with number of messages is given by the formula

$$z_i = \frac{x_i - \bar{x}}{\sigma_x} \qquad 1$$

where z is the standardized z score of x,

Variable	1-Week Transcript Results from Normalization (n = 59)	2-Weeks Transcript Results from Normalization (n = 106)
Xi(number of messages, IV2)	3	9
$\bar{x}$ (number of messages, IV2)	3.0508	7.6132
σ (number of messages, IV2)	0.7526	2.0216
Zi (number of messages, IV2)	1.2612	0.6860
Xi (message lengths, IV3)	316	624
$\bar{x}$ (message lengths, IV3)	317.1186	537.5755
σ (message lengths, IV3)	113.8032	249.0520
Zi (message lengths, IV3)	-0.0098	0.3470

Figure 4: Standardizing the Number of Messages and Message Lengths.

$\bar{x}$is the sample mean of x, and

σis the sample standard deviation of x.

The process to standardize the message lengths is accomplished through converting the individual student's message lengths into a z-score. This can also be done by considering the equation 1 formula. Evaluating the formula in equation 1 yielded the standardized values for the number of messages and message lengths for the second and third groups (i.e., 1-week transcript and 2-week transcript) in Figure 4. The values for the number of messages and message lengths for the first group, 10-course transcript, is

represented by appending the standardized values for the number of messages and message lengths for the second and third groups.

So in summary, I standardized the number of messages and message lengths so that I can append the transcripts from the 1-week (4- modules) and 2-weeks (6-modules) together into the 10-course transcript (10 modules). The original, i.e., non-standardized, message lengths and number of messages will also be considered in the study to illustrate the differences in the Pearson Correlations results.

Summary

It is important to note the following key difference in this study versus previous studies examining the levels of cognitive presence. This study is different from other previous studies on the levels cognitive presence because I am also examining the relationship between these levels to the individual student performance. With respect to the individual student performance, it is important to further note that this study is also unique compared to previous studies because it focused on the individual student as the unit of analysis rather than the class as a whole, unit analysis. This specificity of focus led to the consideration of the maximum levels of cognitive presence rather than the mean levels of cognitive presence (Vaughan & Garrison, 2005; Stein et al., 2007; Garrison et al., 2001; Schirire, 2004; Kanuka, Rourke, & Laflamme, 2007; McKlin, Harmon, Evans, & Jones, 2001; Fahy, 2002), as performed in previous studies leading up to this one, because it is observed by the author that over-time the students achieved mastery of the subject as they learned the content over-time. Thus, it is important to convey the importance of individual students who mastered the content by illustrating that they

reached the maximum level of cognitive presence of "Resolution." In chapter four, I will present the results that emerged from conducting the study.

CHAPTER 4

RESULTS

In this study, the sample population consisted of 165 subjects, with standardized data, i.e. number of messages and message lengths, and the variables were as follows:

a. Student grade as the dependent variable

b. Maximum level of cognitive presence as the independent variable 1

c. Number of messages as independent variable 2

d. Message lengths as independent variable 3

The study was further divided into three groups, which were:

1. 10-course transcript group, where $N = 165$ subjects; this was the combination of the 1-week and 2-week modules, and there was a total of 10 sections.
2. 1-week transcript group, where $n = 59$ subjects; this was the 1-week duration module, and there was a total of 4 sections.
3. 2-week transcript group, where $n = 106$ subjects; this was the 2-week duration module, and there was a total of 6 sections.

Quantitative Discourse (using Standardized Data)

The first sets of results that I will show are the minimum and maximum values, by the three groups, for the variables of student grades, the maximum level of cognitive presence, the number of messages (the number of messages posted by each student), and message lengths (the number of words posted by each student). Results are summarized in Table 3. In referring to this table and looking at the complete 10-course transcript, it is observed that the students' grades ranged from 0.94 to 10 on a scale of 0 to 10 points.

Table 3

Minimums and Maximums of the Population (Normalized Number of Messages and Message Lengths)

		Student Grade		Maximum Level of Cognitive Presence		Number of Messages		Message Lengths		
Transcript	*N*	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Duration
10-course	165	0.94	10	3	4	3	14	151	1464	1 & 2 wks
1-week	59	0.94	10	3	4	4	14	151	1464	1 wk
2-week	106	2.50	10	3	4	3	14	198	1464	2 wks

Table 4

Means and Standard Deviations of the Population (Normalized Number of Messages and Message Lengths)

Transcript	*N*	Student Grade *M* (*SD*)	Maximum Level of Cognitive Presence *M* (*SD*)	Number of Messages *M* (*SD*)	Message Lengths *M* (*SD*)	Duration
10-course	165	8.72 (1.46)	3.16 (0.37)	9.95 (2.86)	810.38 (320.41)	1 & 2 weeks
1-week	59	8.82 (1.37)	3.15 (0.36)	10.45 (3.19)	852.20 (278.60)	1 week
2-week	106	8.66 (1.51)	3.17 (0.38)	9.68 (2.64)	787.10 (340.50)	2 weeks

The maximum level of cognitive presence ranged between 3 and 4. This variable is measured on a scale with possible values of 1, 2, 3, or 4, for any of the groups of course transcripts. The number of messages ranged from 3 to 14 for the 10-course transcript. Finally, the message lengths ranged from 151 words to 1,464 words for the 10-course transcript.

For the same study with 165 subjects, I also looked at the Means and Standard Deviations for the dependent and independent variables by the 3 groups (i.e., 10-course transcript, 1-week transcript, 2-week transcript). These results are summarized in Table 4. In referring to this table and considering the complete 10-course transcript, we see that the$M$= 8.72 and SD= 1.46 (for student grade respectively). For the maximum level of cognitive presence variable, M = 3.16 and SD = 0.37. In terms of the number of messages, M = 9.95 and SD = 2.86. Finally, when examining message lengths in the 10-course transcript,M = 810.38 and SD = 320.41.

In further examining the results of the study, it is important to remind the readers the four primary questions that guided the research. The research questions were:

1. What are the levels of cognitive presence exhibited by the online learners during the online discussion?
2. What is the relationship between cognitive presence and student performance as assessed by the instructor?
3. What is the relationship between message lengths and student performance as assessed by the instructor?
4. What is the relationship between cognitive presence and message lengths?

Research Question 1

Regarding the first research question pertaining to the levels of cognitive presence exhibited by the online learners during the online discussion, we shall consider a sample of the results shown in Table 4, which is illustrated in Table 5.From the sample of Table 5 shown here, that the means and standard deviations (*M*[*SD*]) for the 10-course transcript, the 1-week transcript, and the 2-week transcripts are observed. So, from these results, we can discern that the maximum level of cognitive presence for any of the three course samples ($N = 165$, $n = 59$, or $n = 106$) ranges from 3.15 to 3.17. If we round this number to the nearest whole number, the maximum level of cognitive presence for this study is a value of "3" which signifies "Integration." The diagram below illustrates the distribution levels of cognitive presence with a value of "Integration" or "Resolution" for the students in my study.

Table 5

Means and Standard Deviations of the Population (Standardized data)

Transcript	*N*	Maximum Level *M*(*SD*)
10-course transcript	165	3.16(0.37)
1-week transcript	59	3.15(0.36)
2-week transcript	106	3.17(0.38)

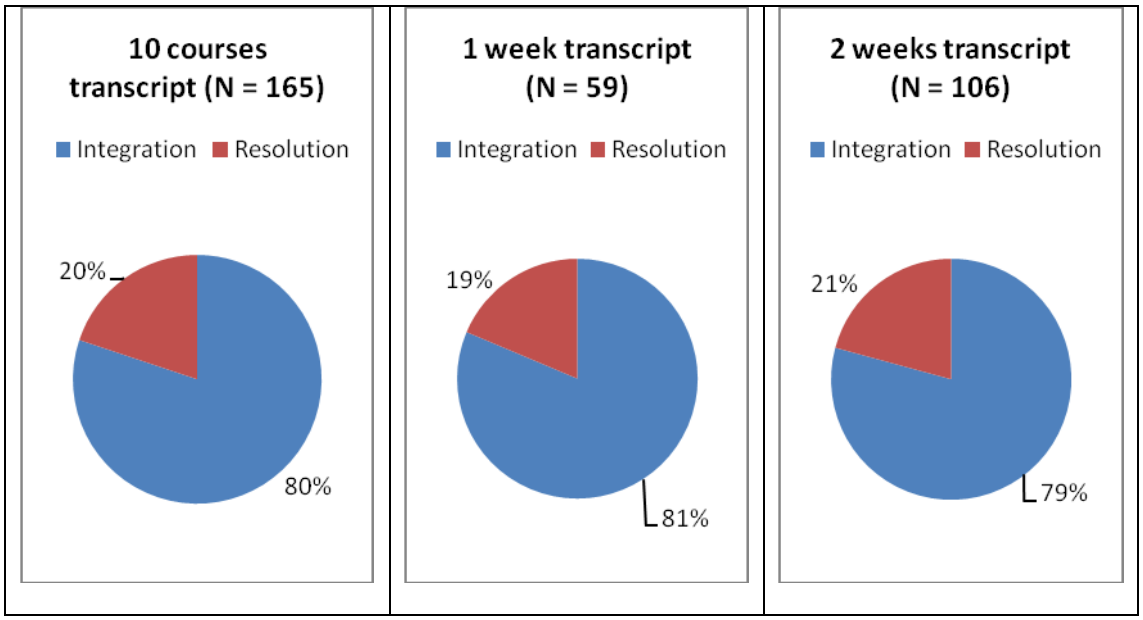


*Figure 5.*Levels of Cognitive Presence at the Resolution or Integration level

As noted in Figure 5, belonging to the first group of N = 165 students, 80% of the students exhibited a Maximum level of cognitive presence of "Integration" while 20% of the students exhibited a maximum level of cognitive presence of "Resolution."

In examining this research question about the maximum levels of cognitive presence in more depth, I want to next look at the 20% of the students who reached the "Resolution" level. Figure 6 below noted that N = 33 students (20% of the N = 165 population) reached a maximum level of cognitive presence of "Resolution." Furthermore, 12% of the 33 students had two occurrences in their number of posts which reached this highest level.

A final in depth examination of the research question about the maximum levels of cognitive presence required the consideration of the 33 students who reached the maximum level of cognitive presence of "Resolution" in each of the class section (Figure 7).

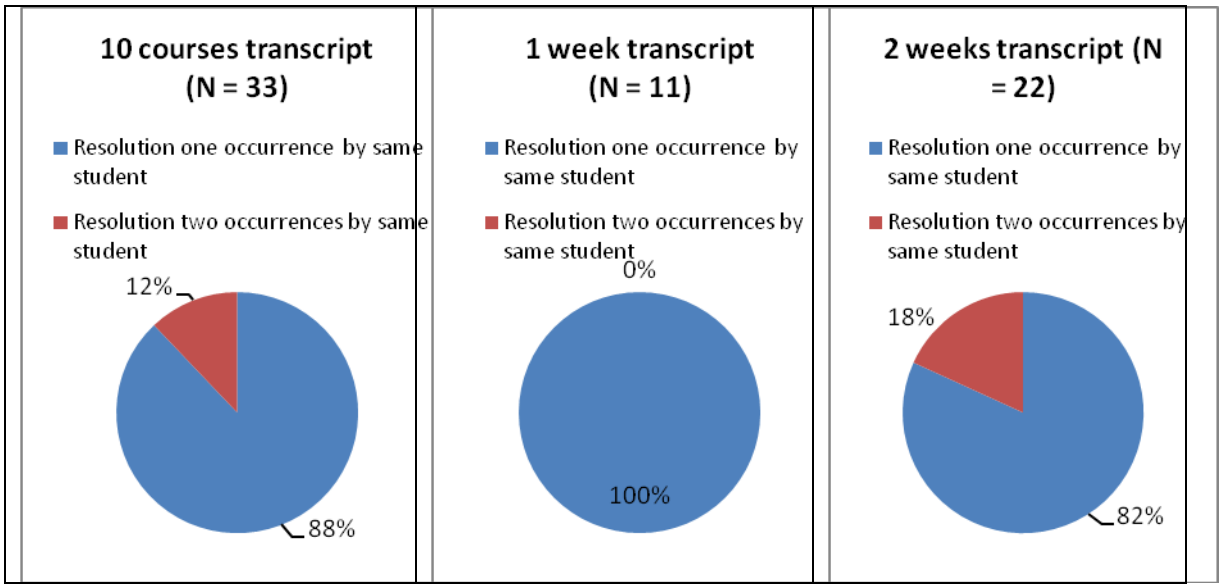


*Figure 6.*Occurrence at the Resolution level by the same student.

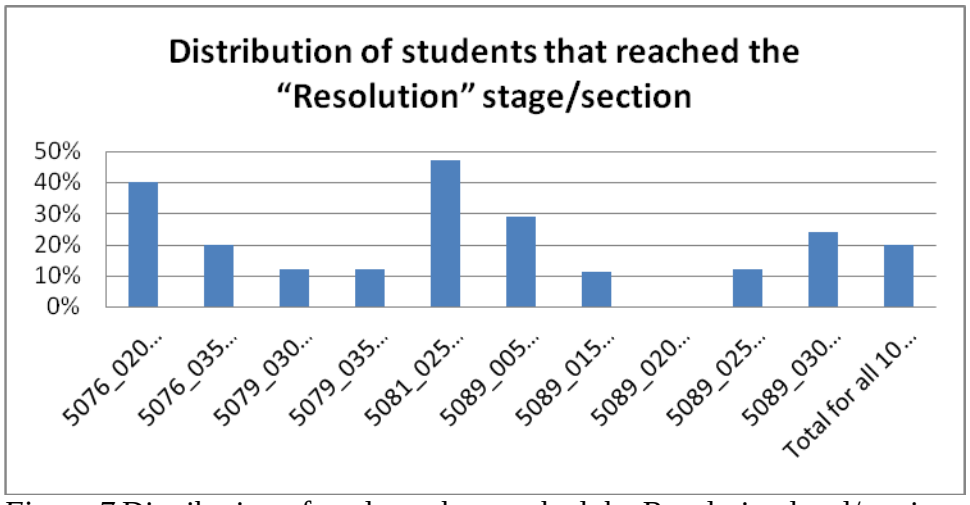


*Figure 7.*Distribution of students that reached the Resolution level/section.

From this figure it was noted that in the "5081_025" transcript (course) had the highest percentage of students who displayed the "Resolution" stage. In this transcript, 47% or 9 out of the 19 students reached this final stage. The "5079_030", "5079_035", "5089_015" and "5089_025" transcripts had the next to lowest percentage, about 12% of

the students in each transcript reached the "Resolution" stage. The "5089_020" transcript had the lowest percentage, where 0.0%, of the students who reached the "Resolution" stage. Table 6 provides a summary by section of the students that reached the "Resolution" stage.

I also examined Pearson'scorrelation calculations between the dependent and independent variables by the three groups (i.e., 10-course transcript, 1-week transcript, 2-week transcript). Results for Pearson correlationcalculations, using standardized numbers of messages and message lengths, are summarized in Table 8. The following results are of note: For the 10-course transcript, 1-week transcript, and 2-week transcript, the correlations between student's grade (DV) and message lengths (IV3) were0.37, 0.47, and 0.45, respectively. This would be described as a "medium" level of correlation according to Table 7 (Sirkin, 2006) which is presented below. Alternatively for comparative purposes, I also illustrated the results for Pearson correlation calculations using original number of messages and message lengths in Table 9. Discussions about the differences in the Pearson correlation calculations using both standardized and original number of messages and message lengths are presented later in this chapter.

There were also "medium" levels of correlation found between the numbers of messages (IV2) and message lengths (IV3) when considering the 10-course transcript, 1-week transcript, and 2-week transcript. In this instance, the correlations are 0.71, 0.62, and 0.65, respectively. When considering the relationship between student's grade (DV) and numbers of messages (IV2), there were also "medium" levels of correlation found among the three groups of courses (i.e., 10-course transcript, 1-week transcript, 2-week

Table 6

Summary of students that reached the "Resolution" stage

Transcript	Students reaching "Resolution"	n Students	% Students reaching "Resolution" /section (for N = 165)
5076_020 transcript	4	10	40%
5076_035 transcript	3	15	20%
5079_030 transcript	2	17	12%
5079_035 transcript	2	17	12%
5081_025 transcript	9	19	47%
5089_005 transcript	5	17	29%
5089_015 transcript	2	19	11%
5089_020 transcript	0	17	0%
5089_025 transcript	2	17	12%
5089_030 transcript	4	17	24%
Total	33	165	20%

Table 7

Ranges of Pearson Correlations

Strength of Association	Positive r	Negative r
Small	.1 to .3	-0.1 to -0.3
Medium	.3 to .5	-0.3 to -0.5
Large	.5 to 1.0	-0.5 to 1.0

transcript). The levels of correlation are 0.26, 0.60, and 0.51, respectively. Finally, there was "low" correlation when examining the relationship between student's grade and maximum level of cognitive presence; maximum level of cognitive presence and numbers of messages; and maximum level of cognitive presence and message lengths. The

Table 8

Pearson Correlations and p values of the Population (Standardized data)

Variables	10-Course Transcript Correlations and *p* values (N = 165)	1-Week Transcript Correlations and *p* values between (n = 59)	2-Week Transcript Correlations and *p* values between (n = 106)
Student grade and maximum level of cognitive presence	0.10	0.04	0.13
Student grade and number of messages	0.53*	0.60*	0.51*
Student grade and message lengths	0.46*	0.47*	0.45*
Student grade and duration of course (1 week or 2 weeks)	-0.05	NA	NA
Maximum level of cognitive presence and number of messages	0.22*	0.20	0.24*
Maximum level of cognitive presence and message lengths	0.28*	0.22	0.32*
Maximum level of cognitive presence and duration of course	0.03	NA	NA
Number of messages and message lengths	0.63*	0.62*	0.65*
Number of messages and duration of course	-0.00	NA	NA
Message lengths and duration of course	-0.00	NA	NA

Note. * $p \leq 0.05$.

Table 9

Pearson Correlations and p values of the population (Original data)

Variables	10-Course Transcript Correlations and *p* values (N = 165)	1-Week Transcript Correlations and *p* values between (n = 59)	2-Week Transcript Correlations and*p* values between (n = 106)
Student grade and maximum level of cognitive presence	0.10	0.04	0.13
Student grade and number of messages	0.26*	0.60*	0.51*
Student grade and message lengths	0.37*	0.47*	0.45*
Student grade and duration of course (1 week or 2 weeks)	0.05	NA	NA
Maximum level of cognitive presence and number of messages	0.16	0.20	0.24*
Maximum level of cognitive presence and message lengths	0.27*	0.22	0.32*
Maximum level of cognitive presence and duration of course	0.03	NA	NA
Number of messages and message lengths	0.71*	0.62*	0.65*
Number of messages and duration of course	0.80*	NA	NA
Message lengths and duration of course	0.45*	NA	NA

Note. Mean student grade for 10-Course transcript = 8.72. Mean student grade for 2-week transcript = 8.66. Mean student grade for 1-week transcript = 8.82.
* $p \leq .05$.

computation for Pearson's correlation (Sirkin, 2006) can either be performed in SPSS or by hand. To compute Pearson's sample correlation by hand, Equations 2 and 3 needed to be considered.

$$r_{x,y} = \frac{\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{(n-1)s_x s_y} \qquad 2$$

$$r_{x,y} = \frac{\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i-\bar{x})^2 \sum_{i=1}^{n}(y_i-\bar{y})^2}} \qquad 3$$

where $\bar{x}$ and $\bar{y}$ are the sample means of *X* and *Y*, and

s_x and s_y are the sample standard deviations of *X* and *Y*.

I also examined the p-value calculations, using standardized numbers of messages and message lengths, between the dependent and independent variables by the three groups (i.e., 10-course transcript, 1-week transcript, 2-week transcript). Results for *p* values calculations are summarized in Table 8. The following results are of note: For the 10-course transcript, 1-week transcript, and 2-week transcript, the *p* values between student's grade (DV) and message lengths (IV3) were$p < .05$ respectively. The *p* values between the numbers of messages (IV2) and message lengths (IV3) were found to be $p < .05$ for the three groups. When considering the relationship between student's grade (DV) and numbers of messages (IV2), the *p* values among the three groups of courses (i.e., 10-course transcript, 1-week transcript, 2-week transcript) were $p < .05$, respectively. Finally, when examining the relationship between student's grade and maximum level of cognitive presence; maximum level of cognitive presence and numbers of messages; and maximum level of cognitive presence and message lengths, it was observed that the *p*

value > 0.05 for the three groups. One rejects the null hypothesis of the *p*value < 0.05 and consequently the result has statistical significance (Sirkin, 2006). A more in-depth examination of the standardized correlation calculation results illustrated in Table 8 requires looking into the second, third and fourth research questions in this study.

Research Question 2

Regarding the second question examining the relationship between cognitive presence and student performance as assessed by the instructor, let's consider another sample, the correlation and *p* values calculations, of the results from Table 8 illustrated in Table 10. As illustrated in this table, there is only a slight non-significant correlation (r = 0.10, 0.04 and 0.13 for the 10-course transcript, the 1-week transcript and the 2-week transcript respectively) between cognitive presence and student performance. I will present some interpretations of the results based on this research question in the next chapter.

Research Question 3

Regarding the third research question examining the relationship between the message lengths and student performance as assessed by the instructor, let's consider the sample of the results Table 8 illustrated in Table 11. As illustrated in this table, there is a moderate, significant correlation (r = 0.46 *, 0.47 * and 0.45 * for the 10-course transcript, the 1-week transcript and the 2-week transcript respectively) between message lengths and student grade. I will present some interpretations of the results based on this research question in the next chapter.

Table 10

Correlation between Maximum Level of Cognitive Presence and Student Performance (Standardized data)

Transcript	Correlation between cognitive presence and student performance
10-course transcript	0.10
1-week transcript	0.04
2-week transcript	0.13

Table 11

Correlations between Message Lengthsand Student Performance (Standardized data)

Transcript	Correlation betweenmessage lengths and student performance
10-course transcript	0.46*
1-week transcript	0.47*
2-week transcript	0.45*

* $p \leq .05$.

Research Question 4

Regarding the fourth question pertaining to the relationship between cognitive presence and message lengths, let's consider the sample of the results from Table 8 illustrated is Table 12. As illustrated in this table, there is a moderate, significant correlation (r = 0.28 *, 0.22 and 0.32 * for the 10-course transcript, the 1-week transcript and the 2-week transcript respectively) between cognitive presence and message lengths. I will present some interpretations of the results based on this research question in the next chapter.

Table 12

Correlations between Maximum Levels of Cognitive Presence and Message Lengths (Standardized data)

Transcript	Correlation between cognitive presence and message lengths
10-course transcript	0.28*
1-week transcript	0.22
2-week transcript	0.32*

* $p < .05$.

Table 13

Correlations between Number of Messages and Message Lengths (Standardized data)

Transcript	Correlation between number of messages and message lengths
10-course transcript	0.63*
1-week transcript	0.62*
2-week transcript	0.65*

* $p \leq .05$.

Although not in this study, some new results of note did emerge when examining the number of messages independent variable. In looking at this variable and its relationship with the message lengths (Table 13), I arrived at the following correlations for the three sections. As illustrated in this table, there is a high, significant correlation (r = 0.63 *, 0.62 * and 0.65 * for the 10-course transcript, the 1-week transcript and the 2-week transcript respectively) between number of messages and message lengths. I will present some interpretations of the results based on this research question in the next chapter.

In examining the relationship between student performance and number of messages (Table 14), Iidentified the following correlations any of the three groups. As

Table 14

Correlations between Student Performance and Number of Messages (Standardizeddata)

Transcript	Correlation between student performance and no. of messages
10-course transcript	0.53*
1-week transcript	0.60*
2-week transcript	0.51*

* $p \leq .05$.

Table 15

Correlations between Maximum Levels of Cognitive Presence and Number of Messages (Standardizeddata)

Transcript	Correlation between cognitive presence and number of messages
10-course transcript	0.22*
1-week transcript	0.20
2-week transcript	0.24*

* $p \leq .05$.

illustrated in this table, there is a moderate, significant correlation (r = 0.53 *, 0.60 * and 0.51 * for the 10-course transcript, the 1-week transcript and the 2-week transcript respectively) between student performance and number of messages. I will present some interpretations of the results based on this research question in the next chapter.

In examining the relationship between the cognitive presence and number of messages (Table 15), I identified the following correlations any of the three groups. As illustrated in this table, there is a slight correlation (r = 0.22 *, 0.20 and 0.24 * for the 10-course transcript, the 1-week transcript and the 2-week transcript respectively) between

cognitive presence and number of messages. I will present some interpretations of the results based on this research question in the next chapter.

Summarizing the Quantitative Discourse

So far in this chapter, I have presented the correlation results using the standardized data. It is interesting to note the differences in the correlations calculation results when comparing the standardized data versus the original data.

In this study, we saw that the number of messages and message lengths differ in the 1-week transcript versus the 2-week transcript. In the 2-week module of Computer Ethics the students responded with more number of messages and wrote more words than the students in the 1-week module. As a result of this I standardized the values for the number of messages and message lengths so that I can combine the data in the 1-week and 2-week transcripts into the 10-course transcript. The results illustrated in figure 8 show all the correlation values between the dependent variable and independent variables in my study using the standardized and original values; and in particular the correlation results that involved the two standardized independent variables, number of messages and message lengths.

With respect to the standardized and original values for the number of messages and message lengths, in consideration of the research question "what is the relationship between cognitive presence and message lengths?" we observed the following with respect to the correlation values shown in figure 8. There is only a slight correlation between cognitive presence and message lengths regardless of whether you considered the standardized or original values (r = 0.28 *, 0.22 and 0.32 * or r = 0.27 *, 0.22 and 0.32 * respectively; *$p \leq .05$). Furthermore, in both instances it is noted that higher

Variables	Pearson Correlations using Standardized Data (10 courses, 1 week, 2 weeks)	Pearson Correlations using Original Data (10 courses, 1 week, 2 weeks)
Number of students	165, 59, 106	165, 59, 106
Grades versus Maximum Level of Cognitive Presence	0.10, 0.04, 0.13	0.10, 0.04, 0.13
Grades versus Number of Messages	0.53 *, 0.60 *, 0.51 *	0.26 *, 0.60 *, 0.51 *
Grades versus Message Lengths	0.46 *, 0.47*, 0.45*	0.37*, 0.47*, 0.45*
Grades versus duration of the course (1 week or 2 weeks)	(-) 0.05, NA, NA	0.05, NA, NA
Maximum Level of Cognitive Presence versus Number of Messages	0.22 *, 0.20, 0.24 *	0.16, 0.20, 0.24 *
Maximum Level of Cognitive Presence versus Message Lengths	0.28 *, 0.22, 0.32 *	0.27 *, 0.22, 0.32 *
Maximum Level of Cognitive Presence versus duration of the course	0.03, NA, NA	0.03, NA, NA
Number of Messages and Message Lengths	0.63 *, 0.62 *, 0.65 *	0.71 *, 0.62 *, 0.65 *
Number of messages and duration of the course	(-) 0.00, NA, NA	0.80 *, NA, NA
Message Lengths and duration of the course	(-) 0.00, NA, NA	0.45 *, NA, NA
Notes:		
a. Asterisk indicates *p values* < 0.05		
b. 10 course modules, N = 165		
c. 4 1-week modules, N = 59		
d. 6 2-weeks modules, N = 106		
e. Mean student grade of 10-course transcript (non-normalized) = 8.72		
f. Mean student grade of 2-week transcript (non-normalized) = 8.66		
g. Mean student grade of 1-week transcript (non-normalized) = 8.82		

*Figure 8.*Correlations for *Standardized and Original Populations.*

cognitive presence may induce more writing. Finally, it was shown that the resultsare about the same whether I standardized the message lengths in the 1-week transcript and in the 2-week transcript or used the original data to compute this pair-wise correlation.

With respect to the standardized and original values for student performance and message lengths, in consideration of the research question “what is the relationship between student performance and message lengths as assessed by the instructor?” we observed the following with respect to the correlation values shown in previously in figure 8. There is a moderate correlation between student performance and message

length regardless whether you considered the standardized or original values (r = 0.46 *, 0.47* and 0.45* or r = 0.37*, 0.47* and 0.45*, respectively; *$p \leq .05$).Finally, it was shown that the correlation between the variables is greater when I considered the standardized the message lengths in the 1-week transcript and in the 2-week transcript over the original data used to compute this pair-wise correlation.

Other correlations of note when using standardized data versus original data are the following:

A. Number of messages and duration of the course (using standardized data) = -0.00 (*$p \leq .05$) for the 10-course transcript;

B. Number of messages and duration of the course (using original data) = 0.80* *(*$p \leq .05$) for the 10-course transcript;

C. Message lengths and duration of the course (using standardized data) = -0.00 (*$p \leq .05$) for the 10-course transcript;

D. Message lengths and duration of the course (using original data) = 0.45* (*$p \leq .05$) for the 10-course transcript;

When using standardized data, we noted that the correlation for number of messages and duration of the course was -0.00, and while using the original data the correlation between these two variables was also 0.80. We saw that the resultisless when I standardized the number of messages in the 1-week transcript and in the 2-week transcriptversus when I used the originaldata to compute this pair-wise correlation.

When using standardized data, we also noted that the correlation for message lengths and duration of the course was -0.00, and while using the original data the correlation between these two variables was also 0.45. We saw that the resultis less when

I standardized the number of messages in the 1-week transcript and in the 2-week transcript versus when I used the original data to compute this pair-wise correlation. Again figure 8 shows the summary of the correlation calculation results between the variables when considering standardized versus original number of messages and message lengths.

Qualitative Discourse

Because the results in this study showed that all of the students displayed a maximum level of cognitive presence in either the "Integration" or "Resolution" stage, in this section of the chapter I wanted to provide examples of the students' posts that were coded within some sub-levels of the "Integration" and "Resolution" stage. For the group in the 10 courses transcript, in qualitative terms, students who exhibited a maximum level of cognitive presence of "Integration" had posts primarily with "Convergence – among group members" or "Convergence – within a single message" (Garrison, Anderson and Archer, 2001).

For students whose posts illustrated "Convergence – among group members," I noted that this occurred when a student blatantly agreed with a preceding response; words such as "I totally agree" and "I agree with…" Appendix 4 – "Examples of Codes" illustrates examples of students' posts that were coded at this level. From the "5089_030" transcript, in responding to a classmate's post to one of the questions on Computer Ethics posted the following response "thats exactly how i felt about the cyber ethics information from the audio presentation. i dont like using my credit card online because its difficult for me to trust the information is not really being seen by third parties. iwouldnt want to hack someones computer because i would hate for that to happen to my own personal computer…" In responding to a classmate's post to one of the questions on Computer

Ethics posted the following response "…I agree with everything that you have wrote. I just wish more people would see it as hurting themselves instead of seeing it as just a easy way out or getting a grade…"

For students whose posts illustrated "Convergence – within a single message," I observed that this occurred when a student offered his or her opinion in a manner that is logical, easily understood, and unified. These responses varied in length but were all pretty straightforward, readable and code-able. Appendix 4 – "Examples of Codes" illustrates examples of students' posts that were coded at this level. In commenting to a classmate's response to one of the questions on Computer Ethics posted the following response **"…**I think written or not, you should always try to keep things as professional as possible. Most companies have it in writing what you can view on the web. I think those rules should be followed. If it's not written, then it is a violation to monitor, but I still think integrity should come into play by the employee. Good comments…" In responding to a classmate's response to one of the questions on Computer Ethics posted the following response **"…**If I've learned one thing about people, it's this: if they think they can get away with something, they will try. In other words, I totally agree with you. In this situation, I can't believe this, but the kid actually thinks he is going to get away with cheating just because his grandfather throws money at the college?? The audacity to raise such double standards and hypocrisy!"

In regards to the other levels sub-levels within the "Integration" level, students also responded to a series of questions on these topics and also commented on their classmates' responses to the questions with posts in the sub-levels of "Connecting ideas,

synthesis" or "Creating solutions." Examples of these posts can also be found in Appendix 4 – "Examples of Codes."

For the group in the 10 courses transcript, in qualitative terms, students who exhibited a maximum level of cognitive presence of "Resolution" had all posts in the sub-level of "Vicarious application to the real-world." (Garrison, Anderson and Archer, 2001). Students who had posts in the "Resolution" (Vicarious applications to the real-world) level typically were the first students to respond to one of the questions on Computer Ethics. In other words, they rarely exhibited this level when they commented on another student's initial post. I speculate that in the nature of this on-learning environment, where the course module was very limited in duration (1 or 2 weeks) and students were asked specifically to respond to authentic tasks and also were assessed authentically, when the first students reached the "Resolution" level, it typically prohibited other students who commented on that post to also reach "Resolution."

Furthermore, students who posted at the "Resolution" level typically had posts that drew a real life parallel and placed their responses into perspective with things that are actually occurring in their real world or in our society. As a sample, there are a couple of examples of students' posts that exhibited this level. From the "5076_020" transcript in answering one of the questions on Computer Ethics a student posted the following "…I believe that it is unethical for another person to exploit this situation and take the information that is not theirs to begin with. In my life, I don't tolerate much wrong-doings at all because "what goes around comes back around." There is no good enough defensive response that would justify the act of exploiting and/or taking the information. Of course, it is the fault of the person that left their information open on the

window; but a person with good morals and respect should not take advantage of his or her accidental mistake and steal the information. I personally believe in Karma, and if you don't want that happening to you, then you shouldn't do it to that person…" From the "5076_020" transcript in answering one of the questions on Computer Ethics a student posted the following "…I believe the professor should still fail the student, because his grandfather is not the only person donating money to the school although he has donated a large sum of money to the school its not going to hurt the school with funding because there are plenty of other alumni who are donating great sums of money to the school. You gave the student 2 chances which is more than fair enough. Since his parents feel that they can buy their son a grade he should still fail because if he can pay for a grade so should the other 2 students. I feel that this cyber ethics is something that alot of people should know about because not many people know the rules and conduct of the internet. It has helped me to know my rights as to not allow people from my job to snop around my computer to find out if i am doing my job or not…" Again for the group in the 10 courses transcript, in qualitative terms, students who exhibited a maximum level of cognitive presence of "Resolution" had all posts in the sub-level of "Vicarious application to the real-world." (Garrison, Anderson and Archer, 2001).

Cohen's κ Results

This study consisted of 10 sections from the IT 2010 course, four from 1-week course modules and 6 sections from 2-week course modules. Transcripts, some student sample posts were illustrated above in the "Quantitative Discourse" section, were coded for each section, and inter-rater reliability was computed to determine the reliability

Table 16

Inter-Rater Reliability (Cohen's κ)

Transcript number	Kappa Round 1	Kappa Recode Round	Pr(a) Round 1	Pr(a) Recode Round
5076_020	0.53	0.72	.901	.938
5076_035	0.86		.955	
5079_030	0.79		.962	
5079_035	0.78		.957	
5081_025	0.70		.920	
5089_005	0.73		.915	
5089_015	0.82		.945	
5089_020	0.77		.960	
5089_025	0.78		.925	
5089_030	0.81		.935	

between the two primary coders. The results of Cohen's κ and the values of inter-rater reliability, can be found in Table 16.

The levels ranged from a minimum of κ = 0.70, excluding round 1's κ for the 5076_020 transcript, for one of the sections (5081_025) to a maximum of 0.86 for one of the sections (5076_035). According to Table 17 (Landis and Koch (1997), "substantial" levels of inter-rater reliability ranged from 0.61 to 0.80.

Nine of the ten sections initially met this requirement on the first try, with the exception of one (5076_020), which, before the re-code round, had a Cohen's κ of 0.55. In the re-code round, κ =0.72. There will be no third coder ("tie-breaker") introduced

Table 17

Landis and Koch Reliability Figures

Kappa Statistic	Strength of Agreement
< 0.00	Poor
0.00 – 0.20	Slight
0.21 – 0.40	Fair
0.41 – 0.60	Moderate
0.61 – 0.80	Substantial
0.81 – 1.00	Almost perfect

Because Cohen's κ value during the "re-code" round is .714 for the "5076_020" transcript. It was described in the previous chapter that a tie-breaker coder would be introduced if Cohen's κ value turned out to be less than 0.70 during the "re-code" round. Finally, the probability of observed agreement, Pr(a), between two coders was found to have a minimum 0.915, excluding round 1's Pr(a) for the 5076_020 transcript, for the 5089_005 transcript to a maximum of 0.962 for the 5079_030 transcript. As a reminder, the steps of coding and re-coding the transcripts were explained in more detail in Chapter 3.

The computation of Cohen's κ (Sirkin, 2006) can either be performed in SPSS or by hand. To compute Cohen's κ by hand Equation 4 needed to be considered.

$$K = \frac{Pr(a) - Pr(e)}{1 - Pr(e)} \qquad 4$$

where Pr(a)is relative observed agreement among raters, and

Pr(e)is the hypothetical probability of chanceagreement.

In this chapter, I showed the following results the minimum and maximum values (by the three groups), the Means and Standard Deviations (by the three groups), the Correlations and *p* values (by the three groups) and the Cohen's κ values (by the 10 transcripts, courses). In the final chapter, I will discuss what the results mean, present the limitations in my study as well as propose future research possibilities.

CHAPTER 5

DISCUSSION

Chapter 4 presented the results of this study, including the characteristics of the population, the means and standard deviations, Pearson's Correlation values (from standardized and original data),the *p* values, samples of student posts and inter-rater reliability rate calculationsusing Cohen's κ. In this chapter,a discussion of the results, the limitations of the study, and the suggestions for future research will be presented.

In considering what the results of this study actually signify, I will again start by summarizing the four primary research questions that guided the research. The research questions were:

1. What are the levels of cognitive presence exhibited by the online learners during the online discussion?
2. What is the relationship between cognitive presence and student performance as assessed by the instructor?
3. What is the relationship between message lengths and student performance as assessed by the instructor?
4. What is the relationship between cognitive presence and message lengths?

Research Question 1

Regarding the first research question pertaining to the levels of cognitive presence exhibited by the online learners during the online discussion, we saw previously from figure 5 that 20% of the students displayed the "Resolution" stage while the other 80% displayed the "Integration" stage. This result is notable in that it indicates students in this study reached higher levels of cognitive presence than is typically reported in the

literature (see Table 18).The design of the Computer Ethics course module was such that the students viewed videos on the topics of Cyber Ethics and Digital Plagiarism during the 1st and/or 2nd week of the course's module being taught. They were asked to respond to a series of questions on these topics and also comment on their classmates' responses to the questions.

The reason this study differs from previous studies on the levels of cognitive presence is because I looked at students' performance by examining the relationship among these levels and individual student grades. With respect to the individual student performance, it is important to note that this study is also unique, compared to previous studies, because it focused on the individual student as the unit of analysis rather than the class as a whole. This specificity of focus led to the consideration of the maximum levels of cognitive presence rather than the mean levels of cognitive presence, as performed in previous studies, because the author observed overtime that students achieved mastery of the subject as they learned the content.

Existing literature (e.g. Garrison & Cleveland-Innes, 2005) on online learning communities and cognitive presence leading up to this study mainly focused on the concept of "deep and meaningful learning" and less on students' performance. Learning that is deep and meaningful implies that it is a type of learning that makes sense of facts and feelings and integrates them with knowledge that was previously acquired. But previous studies focus on student interaction regarding the content and ignore more objective assessments of student knowledge. While it makes sense that a higher level of cognitive presence would be indicative of a greater understanding of the content, this

Table 18

Levels of Cognitive Presence in Online Environments Cited in Previous Studies

Literature	*N*	Triggering Event	Exploration	Integration	Resolution
Vaughan & Garrison (2005)	86	9%	71%	19%	1%
Stein et al. (2007)	100	16%	52%	28%	4%
Garrison, Anderson, & Archer (2001)	67	12%	63%	19%	6%
Schirire (2004)	97	14%	42%	34%	9%
Kanuka, Rourke, &Laflamme (2007)	100	11%	53%	26%	10%
McKlin, Harmon, Evans, & Jones (2001)	52	6%	75%	17%	2%
Fahy (2002)	101	13%	62%	19%	6%

relationship has not yet been documented using objective assessments of student performance. I sought to take the current study one step further by integrating "deep and meaningful learning" with assessing students' performance in an online-learning class module. In other words the limitation presented in previous studies made it difficult to quantify the meaning of "deep and meaningful learning." In this study, by associating the concept of "deep and meaningful learning" with the students' performance, I sought a means to quantify the students' learning.

Existing research on online learning communities and cognitive presence prior to this study focused on determining the mean levels of cognitive presence (Garrison et al., 2000); this study focused on the maximum levels of cognitive presence. I was more

concerned with the final state of student learning with respect to the content (mastery), rather than the process by which the students reached that final state. In some instances, students exhibited the maximum level of cognitive presence at the "Resolution" stage as the online discourse progressed. Referring back to Figure 5, we recall that 20% of the students in the study, exhibited a maximum level of cognitive presence of "Resolution." However, in studies published prior to this one, we note that the majority of the students exhibited a mean level of cognitive presence at the "Exploration" stage (Table 18).

The table above illustrates seven studies conducted on cognitive presence in an online learning environment, where the highest concentration of cognitive presence was found to be a mean at the level of "Exploration." In this study, 80% of the students exhibited a maximum level of cognitive presence at the level of "Integration," while 20% of the students exhibited a maximum level of cognitive presence of "Resolution." Again, the primary reason for this is that this study considered the students' ultimate mastery of the subject matter. Another reason for the higher levels of Cognitive Presence in this study is that in order to look beyond the idea of "deep and meaningful learning" and in trying to quantify the students' learning, I considered the student as the unit of analysis, while the previous seven studies presented in Table 18 focused on the course as the unit of analysis. Also in this study, in order to quantify the student's learning, I examined the student's posts and determined how they contributed to his or hergrade in the course module on Computer Ethics. The course module in this study was either 1 week or 2 weeks in length; therefore, students had to very specifically focus their posts on the questions posed at the conclusion of the Computer Ethics videos. This format allowed

me to look at the relationship between students' performance and the maximum level of cognitive presence.

The summaries of the seven studies identified in a review of the literature (Vaughan & Garrison, 2005; Stein et al., 2007; Garrison et al., 2001; Schirire, 2004; Kanuka, Rourke, & Laflamme, 2007; McKlin, Harmon, Evans, & Jones, 2001; Fahy, 2002), and illustrated in table 18 above, outlinethe progression of research illustratinghow we can best learn online through the various learning theories that were examined. However, simply knowing that we can indeed learn online in a virtual learning community or asynchronously is just the beginning. We must then identify the qualities that determine how and to what extent learning is actually occurring. Henri (1992) presented the first content analysis framework for exploring online discussions and proposes that we look at five dimensions of the discussion: participative, social, interactive, cognitive, and metacognitive. Later on, Garrison et al. (2000) modified Henri's model by breaking it into three components: cognitive presence, social presence, and teaching presence). Now, I have examined research to draw correlations looking specifically at the cognitive presence component to determine its impacts on learners' performance. So,although a good deal of research has been conducted on interaction, presence, and student performance in Web-based learning and while researchers can draw from the past for insight, new situations created through new technologies require new study and evaluation. As educators attempt to develop and implement these technologies in instruction, ongoing evaluation involving multiple measures will be necessary.

Research Question 2

Regarding the second research question, we saw earlier in figure 8 that there was no significant correlation between cognitive presence and student performance regardless of whether you considered the standardizedor original values (r = 0.10, 0.04 and 0.13 or r = 0.10, 0.04 and 0.13 respectively). There are no differences in correlation results between the three groups when using either standardized or original values. These results have several possible implications which I will discuss below.

The first implication is that there is not enough variability in the levels of cognitive presence in the results from my sample. In this study, as discussed in the first research question, all students exhibited a maximum level of cognitive presence at either the "Integration" or "Resolution" stages. In other words, there were no students who exhibited a maximum level of cognitive at the "Triggering Event" or "Exploration" stages. Because this study focused on the individual student as the unit of analysis rather than the class as a whole, I observed that over-time, as students learned the content, they achieved mastery of the subject, which therefore placed them in the "Integration" or "Resolution" level for the maximum level of cognitive presence.

The second possible implication is that there is indeed a "small" correlation between cognitive presence and student performance but that it is not demonstrable from this study. The overall mean performance score was 8.72 out of 10 possible points. Due to this small variance and the small variability in the levels of cognitive presence as discussed earlier, there was only a slight, non-significant correlation between cognitive presence and student performance regardless whether you considered the standardizedor original values (r = 0.10, 0.04 and 0.13 or r = 0.10, 0.04 and 0.13 respectively). The

restricted range of the results could have contributed to this lack of significant correlation. Figure 9 illustrates the "Restriction of Range" on the maximum levels of cognitive presence. The graph shows that all of students displayed either a level of

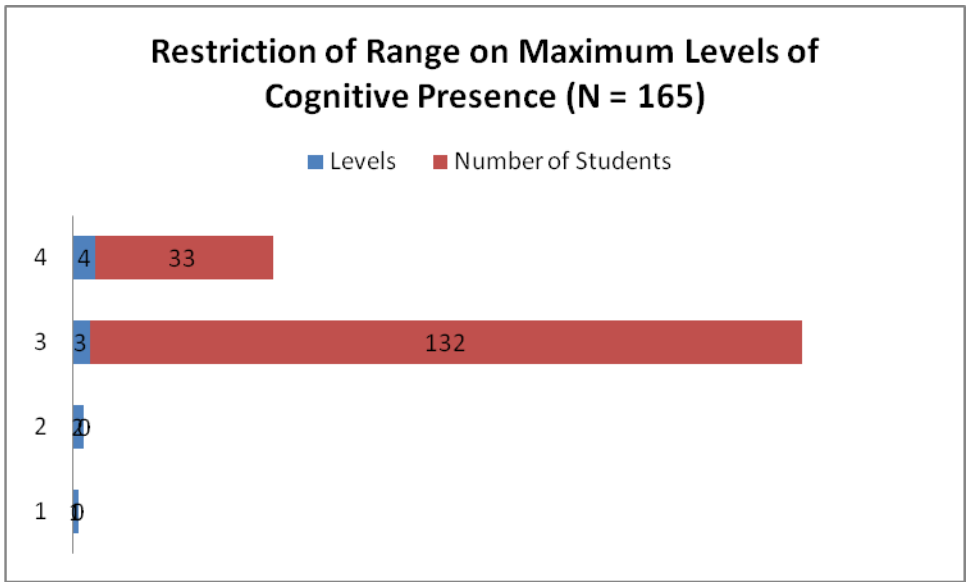


*Figure 9.*Restriction of Range on maximum levels of cognitive presence

"Integration" or "Resolution" and no presence of levels 1 and 2 for "Triggering Event" or "Exploration."

Perhaps with a larger sample or a more finely gradated scale a significant correlation would be revealed. Regardless of these possibilities though, this study did not find a relationship between cognitive presence and student performance. Students in this study achieved mastery of the subject matter over time, but there appeared to be a ceiling effect, a threshold level where the dependent variable (student performance) has no effect on the independent variable (cognitive presence).

Research Question 3

Regarding the third research question, we saw earlier in figure 8 that there was a moderate, significant correlation between student performance and message

lengthsregardless of whether you considered the standardizedor original values (r = 0.46 *, 0.47 * and 0.45 * or r = 0.37 *, 0.47 * and 0.45 * respectively; *$p \leq .05$). There are no differences in correlation results between the second and third groups (i.e., 1-week transcripts and 2-week transcripts) when using either standardizedor original values. These results could signify the following which I will discuss in further detail below.

One implication is that there is a "medium" correlation between message lengths and student performance. Previous studies have found a positive relationship between the amount of time students spend reading messages and engaged in virtual dialogue with their classmates and their achievement of course objectives (Wee, 2011). Therefore, students' effort in the online discussion forums could be reflected by the amount of words (i.e., message lengths) they postedon the asynchronous discussion forum. Higher performing students tend to write more than lower performing students. Perhaps because they have a better grasp of the content they are able to express this knowledge more fully. Or perhaps their greater word output is a reflection of a greater amount of time or effort that they are expending on the course. While this study did not examine demographic variables, it may be that more verbose students are better students overall and would therefore naturally achieve a higher score in this format. These are all explanations for this result that could merit further research.

However, there could also be a scoring bias when examining the relationship between message lengths and student performance. The grader could be conditioned over time to give higher grades to students whose posts contain higher amount of words or are longer in message lengths. This study did not control for grader bias. Thus the evident correlation could be an artifact of the study design rather than an indication of student

learning. Regardless, the results to this third research question showed that in looking at the relationship between message lengths and student performance, students in this study who wrote more, generally performed better than the ones who wrote less.

Research Question 4

Regarding the fourth research question, we saw earlier in figure 8 that there was a small, significant correlation between cognitive presence and message lengths regardless whether you considered the standardizedor originalvalues (r = 0.28 *, 0.22 and 0.32 * or r = 0.27 *, 0.22 and 0.32 * respectively; *$p \leq .05$). There are no differences in correlation results between the three groups when using either standardizedor originalvalues. These results could signify the following which I will discuss in further detail below.

The first possible explanation is that there is not enough variance in the levels of cognitive presence, as discussed above, and this lack of variance may be limiting the results to lower levels. Because this study focused on the individual student as the unit of analysis rather than the class as a whole, I observed that over time as students learned the content, they achieved mastery of the subject and therefore placed in the "Integration" or "Resolution" level for the maximum level of cognitive presence. Furthermore it was noted that there is a "Restriction of Range" on the maximum level of cognitive presence where no student in the study displayed the "Triggering Event" or "Exploration" level, as well as a possible ceiling effect in terms of student performance scores. These combined may be masking a stronger relationship that was evident here.

The second possibility is that the "small" correlation between cognitive presence and message lengths is accurately revealed here.This finding would indicate that while cognitive presence does have some relationship to message lengths, the relationship is not

strong. As students achieved higher cognitive presence they tended to write longer messages, or perhaps, as students wrote longer messages they achieved higher cognitive presence. While these results indicate that there is some small relationship, I am not able to infer causality. In summary, the results to this fourth research question showed that in looking at the relationship between cognitive presence and message lengths, students in the study who exhibited a higher level of cognitive presence may have written more but the small correlation to message lengths makes it difficult to infer much beyond that.

Additional Findings

Although not part of the four research questions, some new results or correlations of note did emerge when examining the standardized "number of messages" independent variable. In looking at this variable and its relationship with message lengths I saw earlier in figure 8 that there was a high, significant correlation regardless whether you considered the standardizedor originalvalues (r = 0.63 *, 0.62 and 0.65 * or r = 0.71 *, 0.62 and 0.65 * respectively; *$p \leq .05$). There are little or no differences in correlation results between the three groups when using either standardizedor original values. These results could signify the following.

The "high" correlation between the number of messages and message lengths means that students who wrote more messages (i.e. number of messages) also tend to write longer messages (i.e. message lengths). As noted above, this could be an artifact of student verbosity, but it could also reflect grasp of content knowledge. If so, this was not necessarily reflected in performance. Although this study showed that there was a strong correlation between number of messages and message lengths, it is interesting to note that in examining the relationship between student interaction and performanceas a whole,

there is not a strong correlation. Beaudoin (2001) examines the relationship between student interaction and learning. In one study, he divides an online class into three groups (high interaction, moderate interaction, and low interaction). He found that while the high interaction students achieved the highest performance, the low interaction group performed higher than did the moderate interaction group. Most faculty have probably observed similar situations in many classes. While much of the research relates student satisfaction and performance to the active participation in online course activities, faculty teaching these courses face a small dilemma in establishing requirements for interacting online because some students may not need to participate actively in the course to do well on a test or some other performance measure (Beaudoin, 2001). In summary, the results showed that in looking at the relationship between number of messages and message lengths, students in this study who had more posts tend to write longer messages.

Although not part of the four research questions, a second, new result emerged when examining the relationship between student performance and number of messages. In looking at this, we saw earlier in figure 8 that there was a moderate, significant correlation regardless whether you considered the standardizedor originalvalues (r = 0.53 *, 0.60 and 0.51 * or r = 0.26 *, 0.60 * and 0.51 * respectively; *$p \leq .05$). There are no differences in correlation results between the second and third groups (i.e., 1-week transcripts and 2-week transcripts) when using either standardizedor originalvalues. These results could signify the following which I will discuss in further detail below.

The “medium” correlation between student grade and number of messages mean that students who have a higher number of messages tended to perform better, or at least were graded that way. This makes sense since we saw above that there was an equivalent

correlation between message lengths and performance as well as between message lengths and number of messages. This finding supports the conclusion that there is indeed some relationship between messages and student performance. However, as noted above this could be indicative of greater learning or could be an artifact of grader bias. Whichever, the results showed that in looking at the relationship between student performance and number of messages, the students in our study who had more posts tended to perform better.

Although not part of the four research questions, another new result emerged when examining the relationship between the cognitive presence and number of messages. In looking at this, we saw earlier in figure 8 that there was a small, significant correlation regardless whether you considered the standardizedor originalvalues (r = 0.22 *, 0.20 and 0.24 * or r = 0.16, 0.20 and 0.24 * respectively; *$p \leq .05$). There are no differences in correlation results between the second and third groups (i.e., 1-week transcripts and 2-week transcripts) groups when using either standardizedor originalvalues. These results could signify the following which I will discuss in further detail below.

It is possible that cognitive presence is an empty construct that doesn't mean anything. If this is so then purported measurements of cognitive presence are actually measuring something other than student engagement or mental state, or are perhaps just measuring some frequency of word count that has nothing to do with learning. This seems unlikely based on the literature and the results of this study. It is also possible that the "small" but real correlation between cognitive presence and the number of messages indicates students who understand the content better write more about it, as noted above.

This result is consistent with the findings of research questions three and four and the additional finding that message lengths correlated positively with number of messages. While it is possible there is not enough variance in the levels of cognitive presence to fully justify this conclusion, it at least merits further investigation.

Summarizing the Findings

In summarizing the discussions of the results, we see that in the examination of the pair-wise correlation calculations between cognitive presence versus the other variables in the study, student performance, number of messages and message lengths, the following findings emerged. The first finding is that cognitive presence was not shown to correlate with student performance and showed only a small correlation with message lengths and number of messages. This could be because cognitive presence is an empty construct that measures word frequencies that might occur in any given language rather than some aspect of student learning. This does not seem likely given previous research on this topic and the results of this study. More likely is that the restricted range of cognitive presence ratings coupled with the small variance in student performance scores, together with a possible ceiling effect, limited the strength of the findings. The second finding is that the relationship between number of messages and message lengths had a high correlation value. This may be because some students were simply more verbose than others. Thirdly when examining the relationship between student performance versus number of messages and message lengths, it was observed that there was a moderate correlation.This could reflect a deeper understanding of the subject, student verbosity, or grader bias.

In this study I standardized the variables of number of messages and message lengths and looked at the pair-wise correlation results between the standardized variables and the original variables.This leads me to the fourth finding in my study. Table 8 summarized the correlation results using standardized values for number of messages and message lengths while table 9 provided a summary of the correlation results using original values for number of messages and message lengths. When comparing the correlation results between method # 1 from table 8 (using standardized values for number of messages and message lengths) and method # 2 from table 9 (using original values for number of messages and message lengths), I saw that the pair-wise correlation results were the same for the 2 of the 3 groups (i.e., 1-week transcripts and 2-week transcripts). This was an indication that the pair-wise correlation values for the standardized or original data number of messages and message lengths through the standardization of the z scores were mostly identical based on the fact that the z score was calculated in Equation 1 was derived from the ratio of the difference of the i^{th} score of x and the sample mean of x over the sample standard deviation of x where the ratio of the sample mean of x over the sample standard deviation of x resulted as a fixed variable or a constant value.

In the previous paragraph, I explained why the pair-wise correlation values for the standardized or original data in the number of messages and message lengths for the second and third groups were identical. I explained that this was based on the fact that the z score was calculated in Equation 1 was derived from the ratio of the difference of the i^{th} score of x and the sample mean of x over the sample standard deviation of x

where the ratio of the sample mean of x over the sample standard deviation of x resulted as a fixed variable or a constant value.

I will now examine in further depth the pair-wise correlation results for the second and third groups. For the 1-week transcript (i.e., the second group), we saw that the median correlation was about 0.30. For the 2-week transcripts (i.e., the third group), we saw that the median correlation was about 0.39 (regardless of whether the correlation results came from either table 8 or table 9). This indicates that students tend to perform better in the course given more time, in this case more so in the 2-week long courses. In practical terms, it would be interesting to see when schools converted from a quarter system to a semester system if the student's performance also improved because they too were given more time to learn the content. Looking at simply the median correlations of the 1-week versus 2-week transcripts, we at least saw that student performance improved given more time to read and absorb the materials.

In further interpreting the results in table 8 versus table 9, it is important to look at the correlation results in these two tables against the 10-course transcript group. In this evaluation, there are some pair-wise correlation results that are worth pointing out. In many instances in table 9, there are higher correlation values in the 2-weeks transcript than the 1-week transcript, in particular the correlation values number of messages and message lengths, number of messages and duration of the course, and message lengths and duration of the course. It is also interesting to note that with respect to the correlation values for the number of message and duration of the course, and the message lengths and duration of the course that the results in table 8 yielded pair-wise correlations of $r = - 0.00$. One possible explanation for this is in table 8 I considered standardized

values for number of messages and messages lengths. Upon standardizing the number of messages and message lengths, there are no longer the big differences between the number of messages and message lengths in the 2-week transcripts versus the 1-week transcript. The lack of differences between the number of messages and message lengths after standardizing these two variables result in zero valued correlations. The zero valued correlations can also be explained by the results of the t-tests between the number of messages and duration of the course and the message lengths and duration of the course. The resulting t-tests (i.e., between variables of duration of the course and number of messages or between the variables of duration of the course and message lengths) provided a value of zero, which indicated that the results are not significant thus supporting zero valued pair-wise correlations between variables of duration of the course and number of messages or between the variables of duration of the course and message lengths.

Limitations of the Study

While the literature is replete with articles and books discussing online learning from the perspective of social and teaching presence, there are few studies that examine cognitive presence and higher order learning effectiveness online. The primary purpose of this study was to examine the impact of cognitive presence in an asynchronous discussion forum and determine its relationship to student performance. This study may add to the current literature by looking at the relationship between cognitive presence and higher order learning effectiveness online.

As in all studies, there were some limitations. This study is limited in the following ways. In analyzing the students' posts through the use of content analysis, the coder's interpretations of the messages, whether they constituted a triggering event,

exploration, integration, or resolution, is subject to coder bias. In other words, the coder could be conditioned to give higher levels of cognitive presence to students whose posts contain higher amount of words or longer in message lengths. There could also be grader bias involved when it comes to assessing the student's performance on the assignments. In other words, the grader could be conditioned to give higher grades to students whose posts contain higher amounts of words or longer in message lengths. Therefore students can perform well on written assignments without contributing very much in terms of the number of discussions posted during the duration of the course.

Another limitation of this study is the uncertainty of interaction between students in an online learning environment. It was stated that this study is 100% online; however, we do not know for sure if the students discussed the contents of the course outside of the online environment. The survey issued to participants at the conclusion of the Computer Ethics module attempts to determine if there was any interaction among students outside the classroom; yet, answering such a question was voluntary, and not all of the students completed the survey. However, it is important to note that some of the students who responded to the end-of survey's questionnaire and the question on discussion of the module's contents outside of the on-line learning environment, did indicate that they communicated with each other about the contents and materials.

The timing of the administration of the modules during the semester could have an impact on the results gathered. It takes time for students to become accustomed to interacting in an online environment. In other words, the module would not be administered during the first week of the semester because some of the students might not have had prior experience or exposure to taking an online course prior to the online IT

2010 class. As the semester progressed may have become more comfortable with both the environment and each other. This increasing comfort may have led to greater, and possibly deeper interaction as the semester went on.

Furthermore, quality interaction and discourse for deep and meaningful learning must consider the confluence of social, cognitive, and teaching presence – that is, interaction among ideas, students, and the teacher. Teaching presence provides the structure (design) and leadership (facilitation/direction) to establish social and cognitive presence (i.e., community of inquiry). The community of inquiry model has proven to be a useful framework to analyze and understand interaction in an online educational environment. Thus it would be of importance to deliver the module on Computer Ethics later in the semester to give time for the establishment of social presence between the students and the growth of teaching presence from the leadership of the instructor because in turn this allows for the expansion of cognitive presence.The result of this study may be different if it were conducted at different stages of the semester.

Recommendations for Future Research

There are some possibilities when addressing the limitations of this study, for instance, in an online learning environment, the instructor is viewed as a subject matter expert, so his or her comments on key discussion postings carry a significant amount of weight. High levels of learning are dependent less on the quantity of interaction than on the quality, or substance, of interaction. That is, social presence may be a necessary but insufficient precondition for creating a community of inquiry and encouraging deep approaches to learning. Teaching presence must be available, either from the facilitator or the other students, to transition from social to cognitive presence.

Another strategy is for the instructor to provide the learners with a rubric for their discussion postings.For instance, the instructor can present the four different levels of discussion (i.e., excellent, good, fair, poor) to provide learners with a way to gauge the level of their postings. Also included in the rubric for the learners' discussion postings are the guidelines for postings, such as the length of the post (which could either be determined by number of words or the frequency of the posts), content of the post, citations, and the expectations for the learner to reply to postings. A common practice in replying to postings is to be very succinct by simply stating "I agree." The learner needs to know that this is not an adequate response to a posting. Some other recommendations for future research, which also addresses some of the current limitations in this study, are as follows.

Another recommendation for future research is to design the course so that students make their posts without seeing other students' posts. Note that this would be a very different exercise, with student interaction limited to being only with the instructor. Another way to accomplish this is by requiring the students to respond to a question or topic with all of the responses from his or her classmates hidden from view. After the student responds to the question or topic, his or her classmates' responses appear. So in essence the students who have not responded to the question will not be able to view his or her classmates' responses to the question until he or she has responded to the question.As noted earlier, in this study, 80% of the students exhibited a maximum level of cognitive presence of "Integration. To achieve this level students typically posted or replied with the words of "I agree" to the initial students' post that had a maximum level of cognitive presence of "Resolution."Thus it was a challenge for these students

whoposted after the initial student to elicit responses that corresponded to a maximum level of cognitive presence of "Resolution."A third option to foster discussion and potentially reduce the "I agree" responses from some students is for the instructor to tell the students that an answer of "I agree" will not receive any credit unless it is followed by constructive reason or criticism on why he or she agrees with his or her classmate's comments.

One other possibility for future research is to give assignments that are based on authentic tasks and assessments. This study was very focused. Students enrolled in the IT 2010 class were either presented with the "Computer Ethics" course module that was either 1 week or 2 weeks in length. The students were shown instructional videos on "Computer Ethics." They were asked to respond to questions that pertained to what they learned in the "Computer Ethics" videos. The students were assessed on the responses to the questions and also their comments to their classmates' responses. Mueller (2011) defined authentic assessment as a form of assessment in which students are asked to perform real-world tasks that demonstrate meaningful application of essential knowledge and skills. Furthermore students' performance on a task or assignment is typically scored on a rubric to determine how successfully the student has met specific standards. By giving the students ethical dilemmas to resolve and scoring those instead of student's discussion postings, a more accurate indication of student performance may result.

Conclusion

Technology continues to evolve and redefine the student and instructor relationship. Both students and instructors seek and desire an interactive one-on-one relationship, and that is possible to achieve. However, those relationships are now

redefined through new media, the Internet. Students and teachers are seeking the same values with Internet based learning that they find in traditional classes.

These values are ones of continuity, community and belonging. The internet does not necessarily take away from those values, but both instructors and students must reframe the educational experience within the confines of new media if they are also going to demand the wider, more unrestricted structure of the global electronic community.

Students place a high value on learning. Instructors place a high value on their ability to facilitate that learning. These values need not be sacrificed because of the new technologies available. Rather, the new technologies offer new ways to enhance both perspectives within newly defined frameworks. As researchers, we must continue to evaluate how effectively students are learning and teachers are teaching with these new technologies.

Web-based learning progresses as access to the Internet grows. As learners and educators in virtual learning communities, we strive for ways to measure how well teachers teach and learners learn. While the literature is replete with articles and books discussing online learning from the perspective of social and teaching presence, there are few studies that examine the relationship between cognitive presence and learning effectiveness in an online environment. The purpose of this study was to examine the relationship between cognitive presence and learning outcome in an asynchronous discussion forum. Thus, this study examined performance in an online course in relation to student interaction and level of cognitive presence in the course.

The data were collected from students enrolled in 10 sections of an online class taught at a large public university in the Southeastern United States. The study was mixed-method in nature. It consisted both of qualitative content analysis and descriptive statistics with Pearson correlations between the dependent variable (student course module grades) and the independent variables (maximum levels of cognitive presence, number of messages and message lengths).

The study resulted in two key theoretical contributions. The first is that maximum level of cognitive presence is a better indicator of student learning than mean level of cognitive presence. The results of the study indicate that students achieved mastery of the subject matter over time. Typically cognitive presence has been measured as a mean score for a course. This strategy is akin to giving the student a pre-test on a body of content at the beginning of the lesson, and a post test at the end, and then averaging these two to determine the student's grade. Doing so seems to ignore, or at least diminish the fact that learning occurs over time. Student mastery of a content is a better indicator of learning than student progress. Thus, this study suggests that a more appropriate measure of student learning, in terms of cognitive presence, is the maximum level reached by every student, rather than the mean level of all students. The second theoretical contribution is that in on-line learning, a student displaying the cognitive presence "Resolution" stage in a discussion may inhibit others from displaying that stage. When a student has posted a message at the resolution stage during a discussion other students are more likely to respond with messages like "I agree" than they are to restate the resolution stage message. The "I agree" type message would not be coded at the resolution stage, thus the student who posted that message would not be seen to have reached that stage,

when in fact, he or she may well have done so. This leads to a faulty perception of the overall level of cognitive presence. It may be difficult to control for this inhibitory effect but some creative structuring of course content and assignments should make it possible. Future studies addressing cognitive presence in online learning environments should take both of these ideas into consideration.

References

Anglin, G.J. (1995). *Instructional technology: past, present and future*. Colorado:Libraries Unlimited, Inc.

Anderson, T., Rourke, L., Garrison, D. R., & Archer, W. (2001).Assessing teaching presence in a computer conferencing context.*Journal of Asynchronous Learning Networks*, *5*(2), 1–17.

Beaudoin, M. (2001). *Learning or lurking? Tracking the 'invisible' online student*.*Internet and Higher Education,5(1),* 147-155.

Bransford, D., Brown, A., & Cocking, R. (1999). *How people learn: Brain, mind, experience and school*. Washington, DC: National Academy Press. http://www.nap.edu/catalog.php?record_id=6160 (book online).

Brown, R.E. (2001). The process of building community in distance learning classes.*Journal of Asynchronous Learning Networks,5*(2), 18–35.

Budd, R. & Donohue, L. (1967).*Content analysis of communication*. New York:Macmillan.

Clark, R. E. (1983). Reconsidering research on learning from media. *Review of Educational Research, 53*(4), 445–459.

Dewey, J. (1963). *Experience and Education*. New York: MacMillan Press.

Dziuban, C., &Moskal, P. (2001). *Emerging research issues in distributed learning*. Paper delivered at the 7th Sloan-C International Conference on Asynchronous Learning Networks, Orlando, FL.

Fahy, P. (2002). Assessing critical thinking processes in a computer conference. Retrieved April 19, 2008, from http://cde.athabascau.ca/softeval/reports/

mag4.pdf

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, *2*(2–3), 87–105.

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education*, *15*(1) 7–23.

Garrison, D.R. & Cleveland-Innes, M. (2005). Facilitating cognitive presence in online learning: interaction is not enough. *The American Journal of Distance Education, 19*(3).133-148.

Gunawardena, C. N., Lowe, C. A., & Anderson, T. (1997). Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of Educational Computing Research, 17*(4), 397-431.

Henri, F. (1992). Computer conference and content analysis.In A.R. Haye (Ed). *Collaborative learning through computer conferencing: The Najaden papers,* 117-136. Berlin: Springer-Verlag.

Kanuka, H., Rourke, L., &Laflamme, E. (2007). The influence of instructional methods on the quality of online discussion. *British Journal of Educational Technology, 38*(2), 260–271.

Kozma, R. B. (1991). Learning with media.*Review of Educational Research, 61*, 179–211.

Kulik, J. A.; Kulik, C. C.; and Bangert-Drowns, R. L. "Effectiveness of Computer-Based Education in Elementary Schools." Computers in Human Behavior 1/1 (1985): 59-74.

Landis, J. R., & Koch, G. G. (1977). The measurement of observed agreement for categorical data. *Biometrics*, *33*, 159–174.

Lave, J (1988). Cognition in Practice: Mind, mathematics, culture in everyday life. Cambridge, UK: Cambridge University Press.

McKlin, T., Harmon, S. W., Evans, W., & Jones, M. G. (2001). Cognitive presence in web-based learning: A content analysis of students' online discussions. *American Journal of Distance Education, 15*(1) 7–23.

Mueller, J (2011). *Authentic Assessment Toolbox.* Retrieved from http://jonathan.mueller.faculty.noctrl.edu/toolbox/index.htm

Picciano, A.G. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in an online course. *Journal of Asynchronous Learning Network*, 6(1), 21-40.

Rife, D., Lacy, S., & Fico, F. (1998).*Analyzing media messages: Quantitative content analysis.* New Jersey: Erlbaum.

Rourke, L., Anderson, T. Garrison, D. R., & Archer, W. (1999). Assessing social presence in asynchronous text-based computer conferencing. *Journal of Distance Education*, *14*(3), 51–70.

Rourke, L.,&Kanuka, H. (2009). Learning in communities of inquiry: a review of the literature. *Journal of Distance Education, 23(1),* 19-48.

Rovai, A. P. (2002). A preliminary look at the structural differences of higher education

classroom communities in traditional and ALN courses. *Journal of Asynchronous Learning Networks, 6*(1), 41–56.

Russell, T. L.(1999). *The No Significant Difference Phenomenon*. Montgomery, AL: IDEC. Retrieved from http://teleeducation.nb.ca/nosignificantdifference/

Schirire, S. (2004). Interaction and cognition in asynchronous computer conferencing. *Instructional Science, 32*(6), 475–502.

Shea, P. J., Swan, K., Fredericksen, E. E & Pickett, A. M. (2001).Measures of Effectiveness in the SUNY Learning Network. Retrievedfrom http://www.google.com/url?sa=t&source=web&cd=1&ved=0CBUQFjAA&url=http%3A%2F%2Fciteseerx.ist.psu.edu%2Fviewdoc%2Fdownload%3Fdoi%3D10.1.1.135.3647%26rep%3Drep1%26type%3Dpdf&rct=j&q=research%20in%20a%20survey%20of%203%2C800%20students%20enrolled%20in%20264%20courses%20through%20the%20SUNY%20Learning%20Network%20%28SLN%29&ei=xuwrTvW2Os6ctwfb0enXAg&usg=AFQjCNGgIfWxCG1Etv9q2uippqQ0KC9bQg&cad=rja

Sirkin, M.R. (2006). *Statistics for the Social Sciences* (3rd ed.). Wright State University: SAGE Publications, Inc.

Sloan Consortium.*Elements of Quality: The Sloan-C Framework.* Needham, MA: Sloan Center for On-Line Education, 2002.

Stein, D., Wanstreet, C. E., Glazer, H. R., Engle, C. L., Harris, R. A., Johnston, S. M., et al. (2007). Creating shared understanding through chats in a community of inquiry. *Internet and Higher Education, 10*(2), 103–115. DOI: 10.1016/j.iheduc.2007.02.002

Swan, K. (2003). Learning effectiveness: What the research tells us. In J. Bourne & J. C. Moore (Eds.), *Elements of quality online education, practice and direction* (pp. 13–45). Needham, MA: Sloan Center for Online Education.

Swan, K., & Shea, P. (2005). The development of virtual learning communities. In. S. R. Hiltz, & R. Goldman (Eds.), *Asynchronous learning networks: The research frontier* (pp. 239–260). New York: Hampton Press.

Tinto, V. (1993).*Leaving college:Rethinking the causes and cures for college attrition*. Chicago: University of Chicago Press.

Vaughan, N., & Garrison, D. R. (2005). Creating cognitive presence in a blended faculty development community.*Internet and Higher Education*, *8*(1), 1-12.

Vygotsky, L. S. (1962). *Thought and language*. Cambridge, MA: MIT Press.

Wee, M-C., &Abrizah, A. (2011). An analysis of an assessment model for participation in online forums. Retrieved from: http://www.doiserbia.nb.rs/img/doi/1820-0214/2011/1820-02141000036C.pdf

Wegerif, R. (1998). The social dimension of asynchronous learning networks.*Journal of Asynchronous Learning Networks, 2*(1), 34-49.

Wenger, E. (1997). *Communities of Practice: Learning, meaning, and identity*. New York: Cambridge University Press.

APPENDIXES

APPENDIX A

Population Characteristics

Population Characteristics

	5076_020	5076_035	5079_030	5079_035	5801_025	5089_005	5089_015	5089_020	5089_025	5089_030	Total	Percentage
Total Students for module	**10**	**15**	**17**	**17**	**19**	**17**	**19**	**17**	**17**	**17**	165	100.00%
Total Responders "How much time you spend/week using the computer?"	**5**	**4**	**5**	**9**	**11**	**7**	**8**	**10**	**8**	**4**	71	43.0%
Less than 1 hr/week spent on computer	0	0	0	0	0	0	0	0	0	0	0	0.0%
1-2 hrs spent on the computer	0	0	0	0	0	0	0	0	1	1	2	2.8%
3-5 hrs spent on the computer	0	0	1	1	1	1	0	0	3	2	9	12.7%
More than 5 hours	5	4	4	8	10	6	8	10	4	1	60	84.5%
Total Responders "Have you used the computer for the following purpose(s)?"	**5**	**4**	**5**	**9**	**11**	**7**	**8**	**10**	**8**	**4**	71	43.0%
Used computer to check/send emails	5	4	5	9	11	7	8	10	8	4	71	100.0%
Used the computer for Instant Messaging (Yahoo or Hotmail)	2	3	1	8	9	6	6	6	6	3	50	70.4%
Used the computer for Facebook	4	2	3	6	6	7	7	8	7	4	54	76.1%
Used the computer for MySpace	2	3	2	7	9	5	5	6	5	2	46	64.8%
Used the computer for Google	4	4	3	8	10	7	7	8	7	4	62	87.3%
Used the computer for YouTube	3	4	2	5	8	6	7	8	7	4	54	76.1%
Used the computer for other reasons	3	2	5	6	8	3	3	4	5	1	40	56.3%
Total Responders "How much of this class did you discuss outside of the online learning environment?"	**5**	**4**	**5**	**9**	**11**	**7**	**8**	**10**	**8**	**4**	71	43.0%
Less than 6% of class module discussed outside of learning environment	3	3	3	5	9	4	3	5	2	2	39	54.9%
6%-25% of class module discussed outside of learning environment	0	0	1	3	2	3	4	4	4	2	23	32.4%
26%-50% of class module discussed outside of learning environment	1	0	1	0	0	0	1	1	0	0	4	5.6%
51%-75% of class module discussed outside of learning environment	1	1	0	1	0	0	0	0	2	0	5	7.0%
76%-100% of class module discussed outside of learning environment	0	0	0	0	0	0	0	0	0	0	0	0.0%
Total Responders "Do you have previous knowledge of Computer Ethics before starting this course?"	**5**	**4**	**5**	**9**	**11**	**7**	**8**	**10**	**8**	**4**	71	43.0%
Yes	4	3	5	9	10	6	6	5	6	2	56	78.9%
No	1	1	0	0	1	1	2	3	2	2	13	18.3%
Total Responders "Which of the following has happened to you?"	**5**	**4**	**5**	**9**	**11**	**7**	**8**	**10**	**8**	**4**	71	43.0%

Population Characteristics

Your PC has been hacked	0	**0**	1	0	2	0	1	0	0	1	5	7.0%
You have received spam mail	5	4	5	9	11	7	7	10	7	3	68	95.8%
Your PC has been infected by a virus	3	3	3	8	6	4	8	10	7	4	56	78.9%
You have been a victim of cyberstalking	1	0	0	1	2	1	1	1	0	1	8	11.3%
You have been a victim of cyberbullying	0	0	0	0	2	1	1	1	0	0	5	7.0%
You have been a victim of personal identity theft	0	0	0	0	2	0	1	1	0	1	5	7.0%
Other	0	0	0	0	0	0	0	0	0	0	0	0.0%
Total Responders "What is your race?"	**5**	**4**	**5**	**9**	**11**	**7**	**8**	**10**	**8**	**4**	71	43.0%
Caucasian	1	1	2	5	7	4	4	6	5	3	38	53.5%
African American	1	2	3	0	3	2	3	3	0	1	18	25.4%
Asian	3	1	0	2	1	1	1	1	0	0	10	14.1%
Hispanic	0	0	0	2	0	0	0	0	0	0	2	2.8%
American Indian	0	0	0	0	0	0	0	0	0	0	0	0.0%
Other	0	0	0			0	0	0	0	0	0	0.0%
Total Responders "What is your gender?"	**5**	**4**	**5**	**9**	**11**	**7**	**8**	**10**	**8**	**4**	71	43.0%
Female	3	2	3	5	9	5	6	7	5	1	46	64.8%
Male	2	2	2	4	2	2	2	3	3	3	25	35.2%
Total Responders "What age group are you in?"	**5**	**4**	**5**	**9**	**11**	**7**	**8**	**10**	**8**	**4**	71	43.0%
Less than 18	0	0	0	0	0	0	0	0	0	0	0	0.0%
18-22	3	3	2	5	6	6	7	8	5	2	47	66.2%
23-25	1	1	1	3	3	1	0	2	1	2	15	21.1%
Above 25	1	0	2	1	2	0	1	0	2	0	9	12.7%

APPENDIX B

Transcript Code Sheet

Transcript Code Sheet

TRIGGERING EVENT		
Evocative	**Recognizing the problem:** Presenting background information that culminates in a question	Code 1A
	Sense of puzzlement: Asking questions	Code 1B
	Sense of puzzlement: Messages that take discussion in a new direction	Code 1C
EXPLORATION		
Inquisitive	**Divergence—within the online community:** Unsubstantiated contradiction of previous ideas	Code 2A
	Divergence—within a single message: Many different ideas/themes presented in one message	Code 2B
	Information exchange: Personal narratives/descriptions/facts (not used as evidence to support a conclusion)	Code 2C
	Suggestions for consideration: Author explicitly characterizes message as exploration (e.g., "Does that seem about right?" or "Am I off the mark?")	Code 2D
	Brainstorming: Adds to establish points but does not systematically defend/justify/develop addition	Code 2E
	Leaps to conclusions: Offers unsupported opinions	Code 2F
INTEGRATION		
Tentative	**Convergence—among group members:** Reference to previous message followed by substantiated agreement (e.g., "I agree because…"); Building on, adding to others' ideas	Code 3A
	Convergence—within a single message: Justified, developed, defensible, yet tentative hypotheses	Code 3B
	Connecting ideas, synthesis: Integrating information from various sources—textbook, articles, personal experience	Code 3C
	Creating solutions: Explicit characterization of message as a solution by participant	Code 3D
RESOLUTION		
Committed	**Vicarious application to real world:** *None*	Code 4A
	Testing solutions: *Coded*	Code 4B
	Defining solution	Code 4C

From Garrison, Anderson and Archer, 2001

APPENDIX C

Transcript Coding Explanation

TRIGGERING EVENT		
Evocative	**Recognizing the problem:** Presenting background information that culminates in a question	When a student was vague and identified the issue, but failed to discuss or develop their feelings toward the issue.
	Sense of puzzlement: Asking questions	When a student asked a question that could warrant an answer, as in when there truly seemed to be a question asked and answered that could affect the student's feelings on the subject.
	Sense of puzzlement: Messages that take discussion in a new direction	When a student's response seemed to be not on the issue of plagiarism/how to deal with plagiarism, but the student focused more on the presentation itself (e.g., style, appropriateness, what they learned from it).
EXPLORATION		
Inquisitive	**Divergence—within the online community:** Unsubstantiated contradiction of previous ideas	When a student's response is in disagreement with a response that precedes it. When a student says something that differs from what the majority of the students have posted.
	Divergence—within a single message: Many different ideas/themes presented in one message	When a student presents more than one somewhat developed response to an issue in a unified message. The messages in this category were usually well developed, and there may be some (although very little) overlap with brainstorming.
	Information exchange: Personal narratives/descriptions/facts (not used as evidence to support a conclusion)	When a student provides a response that may be about him or herself, but does not apply this response directly to the question that I thought was asked.
	Suggestions for consideration: Author explicitly characterizes message as exploration (e.g., "Does that seem about right?" or "Am I off the mark?")	When a student seemed unsure about their contribution to the discussion by asking a question(s) indicating mild confusion.
	Brainstorming: Adds to establish points but does not systematically defend/justify/develop addition	When a student is almost "rambling," presenting different ideas that are all underdeveloped; kind of "just tossing ideas around." When the student just says something with little support, although this is weaker than the "divergence within a single message" mentioned above.
	Leaps to conclusions: Offers unsupported opinions	When a student makes a somewhat string claim, but fails to develop the claim with a through explanation. There may be some overlap with brainstorming.

INTEGRATION		
Tentative	**Convergence—among group members:** Reference to previous message followed by substantiated agreement (e.g., "I agree because…"); Building on, adding to others' ideas	When a student blatantly agrees with a preceding response; words such as "I totally agree" and "I agree with …" were coded as such, even when the agreement was somewhat hidden in the message and not the first thing written.
	Convergence—within a single message: Justified, developed, defensible, yet tentative hypotheses	When a student offers his or her opinion in a manner that is logical, easily understood, and unified; these responses varied in length but were all pretty straightforward, readable and code-able.
	Connecting ideas, synthesis: Integrating information from various sources—textbook, articles, personal experience	When a student integrates information from outside sources to enhance their response and/or put their opinion into perspective.
	Creating solutions: Explicit characterization of message as a solution by participant	When a student clearly identified how the situation should be handled; student spoke with doctrine, not saying "I think," or "They *probably* should," but when they said "The student *needs to be* expelled…"; student gives explicit instructions on the steps that he or she feels would adequately handle the situation.
RESOLUTION		
Committed	**Vicarious application to real world:** *None*	When a student draws a real-life parallel and puts their response into perspective with things actually occurring in their world or our society.
	Testing solutions: *Coded*	N/A *
	Defining solution	N/A *

Modified from Garrison, Anderson and Archer, 2001 to add coding examples in column 2

N/A * - denotes levels of codes not found in this study

APPENDIX D

Examples of Codes

Level 1 - Triggering Event

Triggering Event – Recognizing the problem: Presenting background information that culminates in a question
From a student in the 5089_005 transcript "… It is never alright for anyone to exploit a situation when someone is forgetful or in a hurry and leaves some of their personal information up. I know that I would never do that to anyone and I hope no one would ever do that to me. I mean what is that point and what do you really get out of it?"
From a student in the 5089_015transcript "…You chose your future profession and if you are not able to do the prerequisites for that degree and you refuse to work harder, so you cheat, change your major or drop out, because every level of school will have its stresses. Just think about it, would you want a surgeon operating on you that has cheated his way through school or was given get out of jail passes, because his grandfather was a financial contributor to his school?"

Triggering Event – Sense of puzzlement: Asking questions
From a student in the 5081_025 transcript "… Hey 'student's name',when I was reading your response for the cyberethics question 3 I ran across a term that I never heard before which is phishing. What does that term mean?"
From a student in the 5081_025 transcript "I agree that it is not right to take anyones information even if it is left up on a screen. I know someone that got in trouble at work because they left there personal email up and someone else found it. Would it still not be right to use this info?"

Triggering Event - Sense of puzzlement: Messages that take discussion in a new direction
From a student in the 5089_005 transcript "…really? whose class is it? im in 'professor's name' class (monday/wednesday 1:30-2:45)...r u in that too?"
From a student in the in the 5089_025 transcript "It's always scary when you lose your personal information. I left a cell phone in a classroom in high school and it was turned into an administrator. When I went to get it the cell phone (which was off when I lost it) was turned on and the administrator had read a text I'd sent earlier in the day to another student at school. She threatened to give us both detention for using our cell phones at school, but is she not in the wrong too for turning my cell phone on and snooping to acquire this info? Sketchy..."

Level 2 - Exploration

Exploration - Divergence—within the online community: Unsubstantiated contradiction of previous ideas
From a student in the in the 5076_035 transcript "… In response to your first answer I don't think that exploiting anyone and then finding something like illegal such as child pornography would make that an ethical action. Although I believe it is a good thing I do not think everyone should take the law into their own hands to exploit fellow citizens even if you are giving it over to higher authorities. That just allows other people to have a ready excuse if they are caught accessing other people's data…"
From a student in the in the 5079_030 transcript "… In all cases if email is not properly secured, I donâ€™t believe it is ok to "exploit" or "take" the information. One should log out of the computer and start fresh. However the action of "reading" and "reporting" email or documents in contrast with exploiting or taking it, is a different story in some instances. As a teacher I have come across a flash drive left in the computer with a minimized tab reading "I hate myself". I this situation, I read it and notified the counselor of suicidal content. I feel this was a responsibility that outweighed cyber ethics..."

Exploration - Divergence—within a single message: Many different ideas/themes presented in one message
From a student in the in the 5079_035 transcript "… To an extent I believe anyone should be allowed to or given the right to say what they feel and what they believe. On contrary to what you believe against what they say, there is always a follower(s), or people who agree with that person. I very much agree with a free mind and expressing it. On the other hand I am split. Websites that promote hatred or killing, especially killing, I do not believe in. Killing is universally wrong and should be flagged and not allowed. Hatred websites is more of an opinion and see a person differently. But because there is a universal knowledge that killing is wrong, nomatter the view, these websites should be pulled..."
From a student in the in the 5081_025 transcript "… I do not believe an employer should be able to monitor your work because you were hired for a reason and if there was any doubt in your abilities then the employre should have thought twice about hiring you. The goverenment addressed a portion of this type of problem in the Privacy Act of 1974 but this Act is still broken. One situation that I think is still wrong, but many cases have shown that it is needed, is the nanny cam. Where mothers can monitor their children's nanny or babysitter while they are at work. Many cases have shown that in fact, the nanny was being abusive to the children and wouldn't ahve gotten caught if it wasnt for the hidden camera…"

Exploration - Information exchange: Personal narratives/descriptions/facts (not used as evidence to support a conclusion)
From a student in the in the 5081_025 transcript "… I will be the first to admit that when I first began college I would search www.ratemyprofessor. com in hopes of finding an "easy" professor. I wanted to take a class that didn't take a lot of effort and was a guaranteed A. As I hit my sophomore year and began taking classes more directed towards my major, I realized the importance of actually grasping every bit of information in my classes. I believe the students that chose to cheat in this class were only hurting themselves. We have to pay for our education in college and it only makes sense to me that we should learn from each and every class. If you spend your whole time cheating you are never grasping the information that is important for you in the future. It is negligence to an extent on the teacher's part for not keeping a closer eye on these cheating students, but in actuality these students are punishing themselves enough by not learning the educational information that they are paying for. I guess what I am trying to say is that cheating is bad for yourself and that it doesn't make a lot of sense to pay for an education that you aren't even learning from…"
From a student in the in the 5089_005 transcript "…I will have to say that people think that their employers are not doing what they are suppose to be doing but my dad being a small business owner has caught people doing unrelated work things during the day so he put an end to it. He now monitors the office as a WHOLE on which websites their going to and what times. He does not get mad if they do one or two things during the work day but it is not acceptable if they start going to alot of websites when their suppose to be doing their job…"

Exploration - Suggestions for consideration: Author explicitly characterizes message as exploration (e.g., "Does that seem about right?" or "Am I off the mark?")
From a student in the in the 5089_015 transcript "…No, it is not ethical for another person following another who has left their email or personal accounts open for access…"
From a student in the in the 5089_015 transcript "…I thought the CyberEthics modules were very informative. With the way the increasing importance of computer now being ethical with the cyber world is more important than not..."

Exploration - Brainstorming: Adds to establish points but does not systematically defend/justify/develop addition
From a student in the in the 5089_020 transcript "…I think that an employer should be able to monitor an employees' work. The computer's are property of the business and they should be able to make sure that employees are being productive and not just "surfing" the internet. Employees should not be shopping online while at work because they are not getting paid for that. It is inappropriate to have a home computer monitored because that is your own private space. I also do not believe that all phone conversations are private. .."
From a student in the in the 5089_020 transcript "…I do not think it is ethical to exploit someone if they happen to leave important data, or any data…"

Exploration - Leaps to conclusions: Offers unsupported opinions
From a student in the in the 5076_020 transcript "…I agree with your comments. I believe that the student should be kicked out of the institution or at least suspended for a significant amount of time. What is he learning if he's able to slide by?"
From a student in the in the 5079_020 transcript "…I personally believe that the professor was already being nice to even give the three students a second chance to make-up for their cheating; but to take advantage of his kindness and consideration, that is enough. It has to stop there, because the professor didn't have to give the students a second chance, but he did. There shouldn't be a third chance for the Student # 3 because it would be unfair for the other two students. A lot of times, rich people normally get what they want in life because they have all the money in the world to bribe the other person, but it is completely wrong and unethical. I feel that the professor should record what was happening in the conference and report it to the dean and leave it all up to him/her. I personally would just fail the student and let the school find another sponsor because there's no need for the parents to put the professor in this kind of dilemma…"

Level 3 - Integration

Integration - Convergence—among group members: Reference to previous message followed by substantiated agreement (e.g., "I agree because…"); Building on, adding to others' ideas
From a student in the in the 5089_030 transcript "…i agree, just because someone did not properly secure thier information does not make it open to the public. it is unethical to take a persons mistake such as this to use to your advantage in this way…"
From a student in the in the 5089_030 transcript "…thats exactly how i felt about the cyber ethics information from the audio presentation. i dont like using my credit card online because its difficult for me to trust the information is not really being seen by third parties. iwouldnt want to hack someones computer because i would hate for that to happen to my own personal computer…"
From a student in the in the 5089_030 transcript "…I agree with everything that you have wrote. I just wish more people would see it as hurting themselves instead of seeing it as just a easy way out or getting a grade…"

Integration - Convergence—within a single message: Justified, developed, defensible, yet tentative hypotheses
From a student in the in the 5089_005 transcript "…I think written or not, you should always try to keep things as professional as possible. Most companies have it in writing what you can view on the web. I think those rules should be followed. If it's not written, then it is a violation to monitor, but I still think integrity should come into play by the employee. Good comments…"
From a student in the in the 5089_005 transcript "…What goes around comes around! I think that is their business if they are cheating, but by no means do I agree with it. If the English class is veryeasythen why cheat? They are taking the extremely easy route out of the class. It is never a good thing to cheat…"
From a student in the in the 5089_005 transcript "…If I've learned one thing about people, it's this: if they think they can get away with something, they will try. In other words, I totally agree with you. In this situation, I can't believe this, but the kid actually thinks he is going to get away with cheating just because his grandfather throws money at the college?? The audacity to raise such double standards and hypocrisy!"

Integration - Connecting ideas, synthesis: Integrating information from various sources—textbook, articles, personal experience
From a student in the in the 5079_030 transcript "…I believe that it is unethical for another person to exploit a situation where one has left their computer in an unsecure place. I mean that is the exact reason why we have passwords, right? For example, I witnessed a situation at another university where a person just left their computer open without logging out. Rather than the person who is currently using the computer restart or log out, they just used everything under the other person's name. As a result that person could have gotten any personal information, in addition to any school work (i.e. essays, projects) that was done on that computer…"

From a student in the in the 5079_030 transcript "…I feel that the professor needs to stick by the university and his class policies in regards to cheating. It is known in every class setting the rules against plagiarism and cheating. Obviously, these students knew them and took the chance anyways. I've been in college for almost five years now and I can guarantee that I've heard the same lecture once if not twice in every single class about cheating and plagiarism. That would be ridiculous to let student #3 get away with what he did considering he did the same thing twice after his professor was nice enough to give him another chance. Who cares if his grandfather was a rich alumni. If this professor let this student off the hook this would add more controversy against him and I'm sure he would be in trouble with the university. Why put his job at state for an irresponsible student? The idea that his grandfather would flaunt money makes me upset being a Sociology major because that right there adds to the issues with inequality because of money. Money can't buy everything, nor should it even come anywhere close…"
From a student in the in the 5079_030 transcript "…In all cases if email is not properly secured, I don't believe it is ok to "exploit" or "take" the information. One should log out of the computer and start fresh. However the action of "reading" and "reporting" email or documents in contrast with exploiting or taking it, is a different story in some instances. As a teacher I have come across a flash drive left in the computer with a minimized tab reading "I hate myself". I this situation, I read it and notified the counselor of suicidal content. I feel this was a responsibility that outweighed cyber ethics…"

Integration - Creating solutions: Explicit characterization of message as a solution by participant
From a student in the in the 5081_025 transcript "…No it is not ethical for someone to take someone else's information in any way shape or form, especially from the internet. It is not right to exploit someone else's mistake. Many people are careless when it comes to the internet not realizing the damage it can lead to. The internet can be dangerous when it comes to people's personal information so if someone were to catch a situation like this they should shut off the computer immediatley and go on with what they were doing. They should respect that person's privacy because they would want someone to do the same for them…"
From a student in the in the 5081_025 transcript "…I believe that the professor has a duty to fail the third student regardless of whether or not his grandfather donates money to the college. If the student cheated once and was reprimanded it is incomprehensible that he would cheat again. If the first student was able to find the time to redo the assignment then the third student could of also redid the assignment. The fact that the third studentsâ€™ parents would defend their plagiarizing son helps me understand where he might have learned his ethics. I could understand the professors dilemma in offending an alumni and donor to the college but to be fair to all the students and uphold the universities name it is necessary for the professor to fail the student and report his actions to the schoolâ€™s dean…"
From a student in the in the 5081_025 transcript "…The professor should stand his ground and fail the third student regardless of who his grandfather is. To do otherwise would be completely unjust to everyone involved, especially the first two students. The professor should tell the third student's parents (and grandfather, if need be) that the student should have technically failed the assignment after being caught cheating the first time, and that the second chance he had been given was a major opportunity to make up for his wrondoing. Since the student decided to cheat again (which, quite frankly, is a slap in the face to the professor) he must suffer the consequences and be given a zero. There can be no other action than this that could be considered right…"

Level 4 - Resolution

Resolution - Vicarious application to real world: *None*
From a student in the in the 5076_020 transcript "…I believe that it is unethical for another person to exploit this situation and take the information that is not theirs to begin with. In my life, I don't tolerate much wrong-doings at all because "what goes around comes back around". There is no good enough defensive response that would justify the act of exploiting and/or taking the information. Of course, it is the fault of the person that left their information open on the window; but a person with good morals and respect should not take advantage of his or her accidental mistake and steal the information. I personally believe in Karma, and if you don't want that happening to you, then you shouldn't do it to that person…"

From a student in the in the 5076_035 transcript "…I believe the professor should still fail the student, because his grandfather is not the only person donating money to the school although he has donated a large sum of money to the school its not going to hurt the school with funding becuse there are plenty of other alumni who are donating great sums of money to the school. You gave the student 2 chances which is more than fair enough. Since his parents feel that they can buy their son a grade he should still fail because if he can pay for a grade so should the other 2 students. I feel that this cyber ethics is something that alot of people should know about because not many people know the rules and conduct of the internet. It has helped me to know my rights as to not allow people from my job to snop around my computer to find out if i am doing my job or not…"
From a student in the in the 5079_035 transcript "…First of all, the students should be lucky they got another chance to do the assignment, and take full advantage. The example was set by student #1. With the example of student #3, I feel the university needs to get involved with threats of the grandfather. There is no excuse for cheating on the same assignment none-the-less. The professor needs to fail the student based on the conduct policy by the university. The student already made a mockery by cheating once. If given another chance it would be an embarrassment to the university and the teacher. It would make them both look weak. It would also make the school look like it cares about some money over the childs ethics of an earned education. An example would need to be made of the student. The incident would get out amongst the student body. They need to know they get severely punished for cheating, not given chance after chance…"
From a student in the in the 5081_005 transcript "…I agree that the professor should not have to deal with such arrogant parents. This kind of behavior can bring down a universities reputation drastically if word about this situation go out. I'm sure there are plenty of former students that have regrets because they simply tried to get by with cheating and without putting in effort. Can you imagine there somehow being a doctor out there that just cheated his/her way through med school?! scarey!"
From a student in the in the 5089_025 transcript "…As a response to your first question about it being equivalent to stealing. I believe the problem with it is, it is hard to prove someone stole their information. Unless, it is traceable such as a credit card account. However, their are people that can cover up their tracks well and when taken into court, without evidence, it would be hard to convict the person…"

Resolution - Testing solutions: *Coded*
N/A *

Resolution – Defining solution
N/A *

N/A * - denotes levels of codes not found in this study

APPENDIX E

Assignment Grading Rubric

Assignment 1 – 4 point total (Pt 1 - 3pts for own post, PT 2 - 1 point for response to classmate's post)
Assignment 2 – 4 point total

	A1-PT1	A1-PT2	A2
Excellent Post	3	1	4
Good Post	2.75	0.75	3.75
Okay Post	2.5	0.5	3.5
No Post	0	0	0

Example – Person could have the following scores

1. Excellent post for A1-PT1 = 3 points,

2. Good post for A1-PT2 = .75 points,

3. Excellent Post for A2 = 4 points,

TOTAL = 3 + .75 + 4 = 7.75 points

Notes –

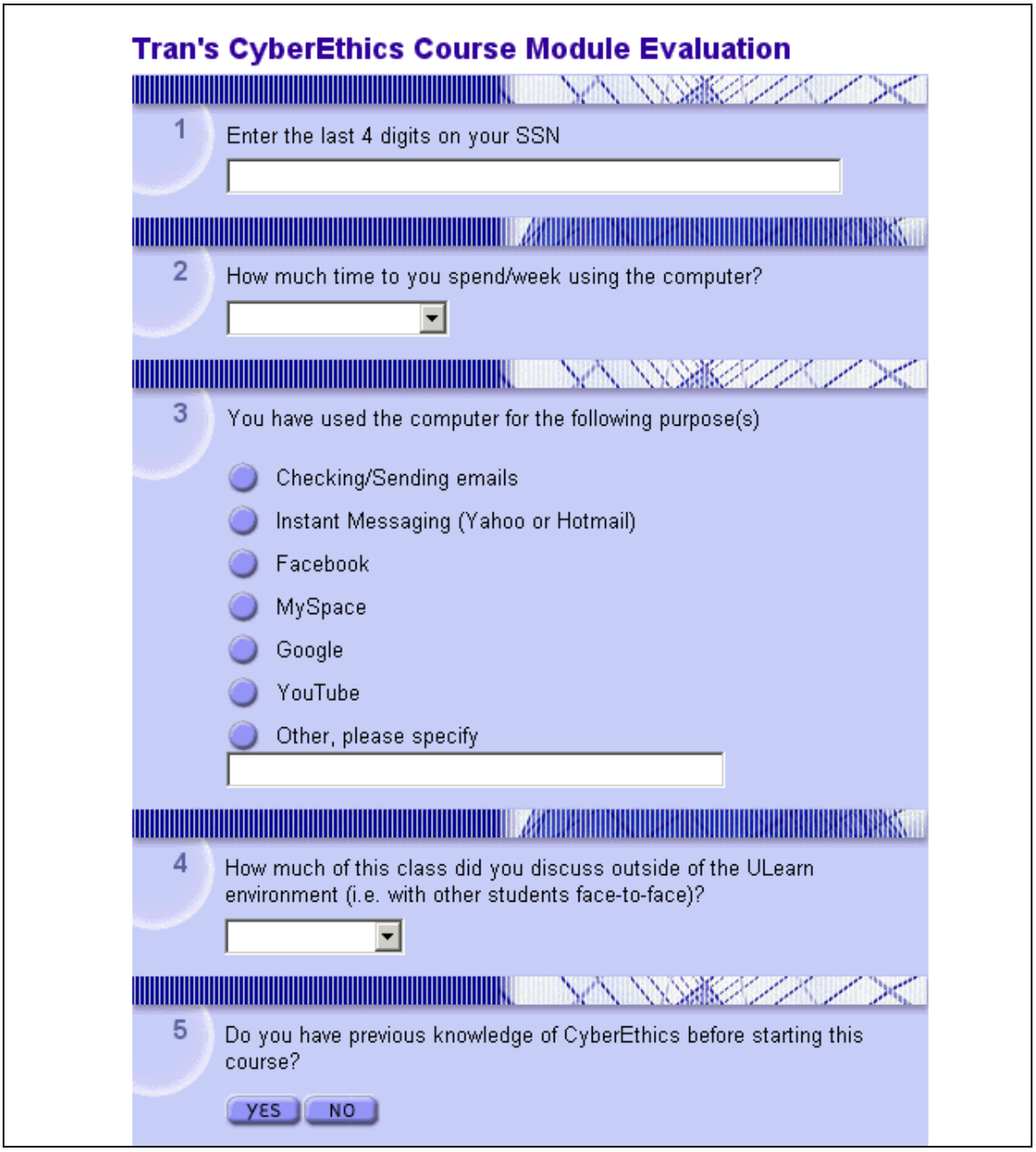
1. Assignment 1, Part 1 = A1-PT1,

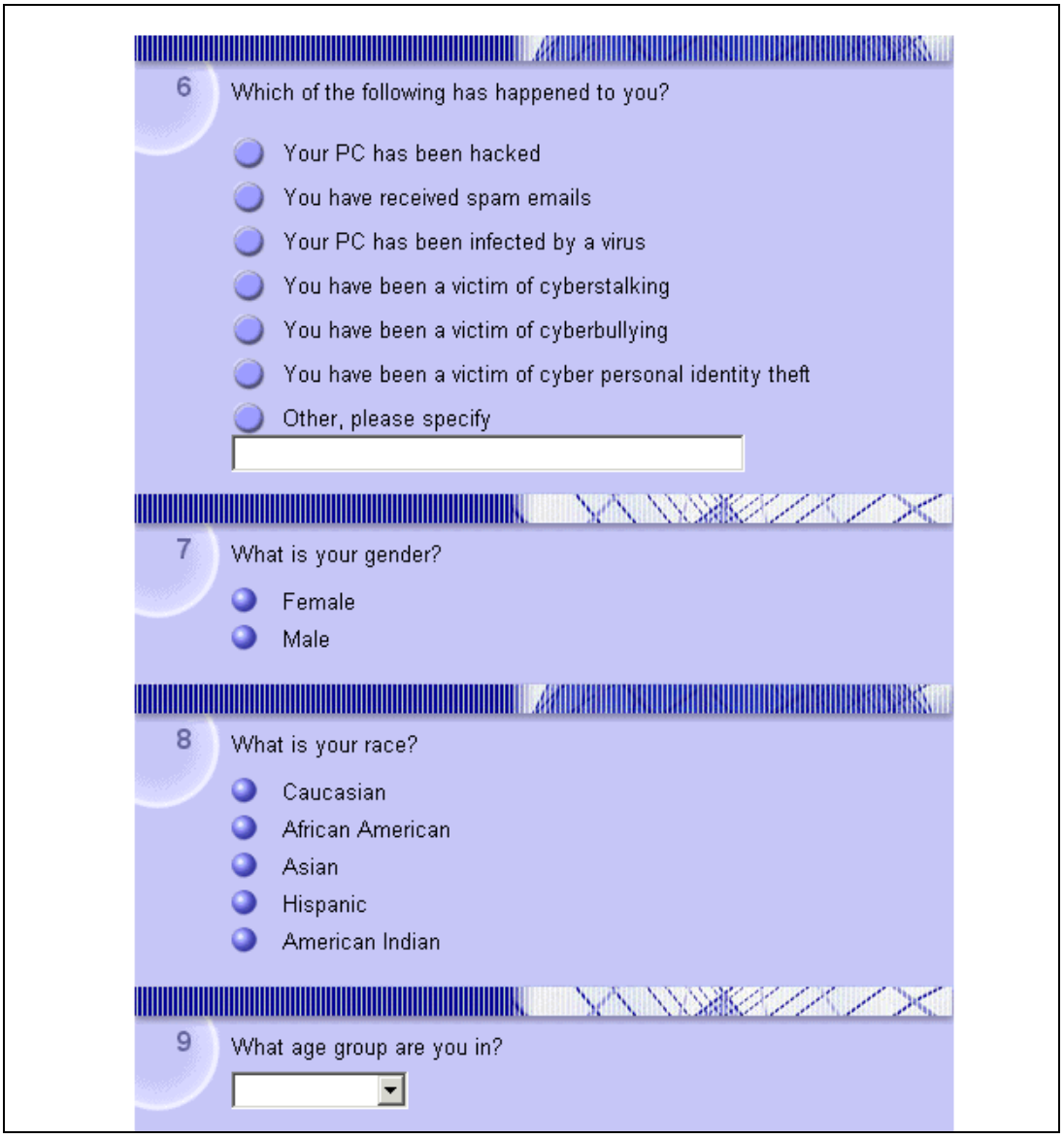
2. Assignment 1, Part 2 = A1-PT2,

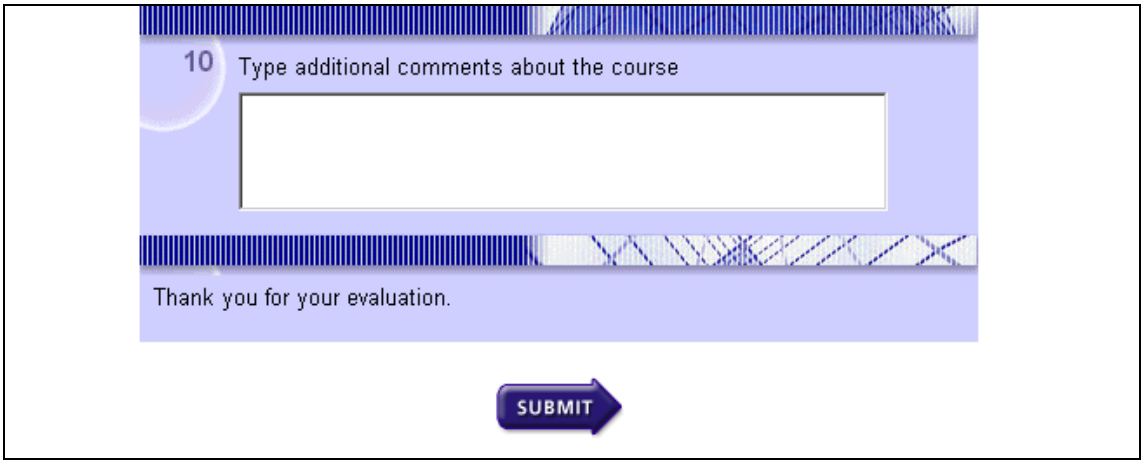
3. Assignment 2 = A2

APPENDIX F

End-of-Module Survey Questions




6
Which of the following has happened to you?
Your PC has been hacked
You have received spam emails
Your PC has been infected by a virus
You have been a victim of cyberstalking
You have been a victim of cyberbullying
You have been a victim of cyber personal identity theft
Other, please specify
7
What is your gender?
Female
Male
8
What is your race?
Caucasian
African American
Asian
Hispanic
American Indian
9
What age group are you in?


10
Type additional comments about the course
Thank you for your evaluation.
SUBMIT

APPENDIX G

Script (to replace PowerPoint Presentation) of Computer Ethics Module

1st week of Computer Ethics Module - CyberEthics Slide Notes:

Slide 1

Hello class, welcome to the Computers for the Information Age - My name is Tan Tran and out topic for today will be on CyberEthics.

Slide 2 Introduction

Currently we are all living in what I believe as the most exciting time in the history of mankind. We have evolved from receiving news and information from paper means to receiving them through electronic. The widespread availability of computers and internet connections provide us with unprecedented opportunities to communicate, to collaborate and to. Although most people use the internet as a powerful and beneficial tool for communications and education, some individuals exploit the power of the internet for harmful or non-positive purposes.

As responsible and ethical users of the internet, we can minimize the harm that such individuals do by learning ourselves and teaching others around us, how to use the internet safely and responsibly.

The information provided to you in this online course module offers guidance and resources so that you can develop good cyberethics (and share this knowledge with others), so that you all can get the most out of the exciting world of the internet.

Slide 3 - Objectives

The presentation is delivered to you with the following objectives.

The definition of CyberEthics

Define the problems that exist in CyberEthics

Review the current issues that are present in CyberEthics

Some recommendations to consider when it comes to maintaining good CyberEthics

Summary of the Do's and the Don't's in CyberEthics

Resources on CyberEthics for future reference

Slide 4 - Defining the terms

In order to understand what the term cyberethics mean, it is important to understand first what the term ethics mean. Simply put, ethics is the set of acceptable behaviors in a given culture. It is not just a list of rules. It is also a long respected code of conduct by which society chooses to survive longterm. Similarly, cyberethics is the code of behavior that governs the internet and other forms of electronic communications in the cyberworld. Thus practicing good cyberethics involves understanding the risks of harmful and illegal behavior online and learning how to protect ourselves, and other internet users, from such behavior. It also involves teaching others around us, how to use the internet safely and responsibly.

Slide 5 - The Problem

We live in a era that is known as the Wild Wild Web. The use of the internet has grown so much that everyone can access it almost everywhere, whether it is at home, at school, at work, or at the library. With it being widely available, there are lots of opportunities for people to misuse its resources. Some of these types of misuse are presented to you all in the next few slides of the presentation.

Slide 6 - Current Issues

I have broken up the types of misuses into 3 main categories. They are 1. The internet as a forum for online harassment, 2. The internet as a forum for the invasion of privacy, 3. The internet as the forum for the violation of individuals' onwnership rights. Some of these types misuse are harmless pranks while others are federal crimes, punishable with high fines, banishment from the internet, and prison time. I will provide more details about each of these types of misuse next. After a brief break we will resume with the discussion on the issues related to online harassment.

BREAK # 1

Slide 7 - Harassment

There are three types of harassment online. Harassment on the internet can either be harmless, somewhat harmful and harmful.

Slide 8 â€“ Harmless

For this particular presentation, I will present the 3 most common types of harmless forms of harassment. The first is sending spam to someone's computer email system. Spam is considered non-solicited or not requested for bulk email. The second is changing a webpage's appearance, either the content on the webpage that is an image or sets of images and the webpage's textual contents. The final is redirecting websites. For example, you thought by entering cnn.com that you would be at the cnn news website, you are taken to another webpage. So in summary, these nuisances are for the most part non-violent activities that do not harm anymore but rather just causes momentarily headaches for parties affected.

Slide 9 - Somewhat harmful

The 2nd type are categorized as somewhat harmful. One example is hacking. Hacking is an action that hacks others off. In all seriousness, hacking is also defined as the use of a computer without a specific, constructive purpose, or without proper authorization. The second example is called viruses. Viruses have 3 main characteristics. Most of the viruses are created and distributed by students. The more successful viruses are the ones that cause the most damage and aggravation to the computer systems involved. Finally, viruses are an equal opportunity offender in that they offend everyone. Everyone is a target of a computer virus. The example third of a somewhat harmful online harassment is called causing dos or denial of services. Denial of services is attempts to make a computer resource unavailable to its intended users. This type of misuse is one that is considered harmful to the computers affected.

Slide 10 - Somewhat harmful video

Please take a few moments to view this video of an individual who was not very happy after learning that his PC was violated by a hacker.

Slide 11 - Harmful

Cyberstalking - the use of the Internet or other electronic means to stalk someone. This term is used interchangeably with **online harassment** and **online abuse**.

Cyberbullying - the term used to refer to bullying and harassment by use of electronic devices though means of e-mail, instant messaging, text messages, blogs, mobile phones, pagers, and websites.

Internet pornography - is pornography that is distributed via the Internet, primarily via websites, peer-to-peer file sharing, or Usenet newsgroups. While pornography had been traded over the Internet since the 1980s, it was the invention of the World Wide Web in 1991 as well as the opening of the Internet to the general public around the same time that led to an explosion in online pornography.

Slide 12 - Summary so Far

To summarize what we have discussed so far. 1. I have given you a working definition of CyberEthics by first defining what Ethics means. 2. Secondly, I have identified the problems surrounding CyberEthics. 3. Thirdly, I have presented you all with one of three issues of CyberEthics, online harassment. We will now take a brief break and resume with the 2nd of three issues surrounding CyberEthics and this is the issue of Privacy on the internet.

BREAK # 2

Slide 13 - Invasion of Privacy

This next type of misuse makes lots of victims very angry. The two most common types of personal identity thefts are stealing private information and making unauthorized purchases. It is also known as using someone else's name or credit. Examples are personal identity theft are 1. Phishing for private information, passwords and credit card code numbers. Related to private information, we have seen examples of companies who have databases of people's personal information and they sell this information to others. 2. Making unauthorized purchases with stolen create cards or ID, 3. Damaging someone's personal credit ratings. These actions are evils and are considered federal crimes that can be punishable with high fines, banishment from the internet, and prison time.

Another form of invasion of privacy is employer's eavesdropping or reading employee's work emails to see if they are using it for personal communication and if so, what types of personal communications.

Slide 14 –Invasion of Privacy video

At work if you feel like your privacy is being electronically invaded by your boss, that is probably what you would do in order to combat that.

Slide 15 - Ownership

This type of misuse is one that happens more frequently in higher education. There are 3 common types of theft of intellectual property. The first is the downloading of copyrighted materials. Copyrighted materials are a set of exclusive rights regulating the use of a particular expression or information. It consists of a wide range of creative, intellectual, or artistic forms or works. These are either poems, plays, book or music. The second type of intellectual property theft is called software piracy. Piracy on the internet consists of people who copy music, film or software and help to spread them out. The final type is called plagiarism/cheating. Plagiarism is the unauthorized use or close imitation of language of another author and representing them as your own work. As you can see ownership is a big issue on the internet. The authors of the works that are being violated lose profit because their work is exploited without permission or payment. We will now take our final break and when we resume, I will wrap up this presentation by giving you some recommendations to follow when it comes to dealing with the Internet Ethics issues that we have discussed.

BREAK # 3

Slide 16 - Recommendations to students

As good abiders of CyberEthics laws and rules, we ask that you remember the following

1. Respect and protect the privacy of others.

- Use only assigned accounts.
- Not view, use, or copy passwords, data, or networks to which they are not authorized.
- Not distribute private information about others or themselves.

2. Respect and protect the integrity, availability, and security of all electronic resources.
   - Observe all network security practices, as posted.
   - Report security risks or violations to a teacher or network administrator.
   - Not destroy or damage data, networks, or other resources that do not belong to them, without clear permission of the owner.
   - Conserve, protect, and share these resources with other students and Internet users.
3. Respect and protect the intellectual property of others.
   - Not infringe copyrights (no making illegal copies of music, games, or movies!).
   - Not plagiarize.
4. Respect and practice the principles of community.
   - Communicate only in ways that are kind and respectful.
   - Report threatening or discomforting materials to a teacher.
   - Not intentionally access, transmit, copy, or create material that violates the school's code of conduct (such as messages that are pornographic, threatening, rude, discriminatory, or meant to harass).
   - Not intentionally access, transmit, copy, or create material that is illegal (such as obscenity, stolen materials, or illegal copies of copyrighted works).
   - Not use the resources to further other acts that are criminal or violate the school's code of conduct.
   - Not send spam, chain letters, or other mass unsolicited mailings.
   - Not buy, sell, advertise, or otherwise conduct business, unless approved as a school project.

Slide 17 - Summary

- **Do's Use the internet to**
  - **Explore**
  - **Research**
  - **Learn**
- **Dont's**
  - **Share your password with anyone**
  - **Give personal information to anyone on the internet**
  - **Hack or break into computers**
  - **Steal copyrighted computer programs**
  - **Make copies of copyrighted materials**
  - **Make materials you steal on the internet and pretend that it is yours**

Slide 18- Summary continued

I hope that you've learned something from this presentation. As a final reminder, your private information is your own to protect so do not share it with others. I think that the illustration on this slide pretty much makes that statement.

Slide 19 - Assignments

To measure your understanding on the materials that has been presented related to the topic of CyberEthics, we ask that you consider this assignment. The assignment is broken up into 2 parts.

Slide 20 - Resources

Finally, here are some internet resources on CyberEthics that you can consider to help with doing the assignment and also as a reference in your future classes here at GSU. The resources are broken up into 3 types, general Symantec software, Governmental endorsed US Copyright Office, Case Studies real life issues related to CyberEthics and its consequences or end-results.Â Thanks again for your time and good luck with the rest of the class.

2nd week of Computer Ethics Module – Digital Plagiarism Slide Notes:

Slide 1

Hello class, this is the 2nd part of the CyberEthics Module. Again my name is Tan Tran and this week we will look at Digital Plagiarism.

Slide 2 â€“ Introduction

As of September 30, 2007, 1.244 billion people use the Internet according to Internet World Stats. Furthermore, it is estimated that there are more than 1.4 billion pages on the Internet with 25 new pages being added every second. With so much available content, the application of the World Wide Web in class education and research has now become common practice in schools and universities. With its increased use, the Internet has opened up new ways for students to digitally copy information from web-based sources, some of which that actually encourage plagiarism. The Internet has created new opportunities for students to become better cheaters and as a result created new challenges for educators. The purpose of this week's class to inform both students and educators about this new challenge. We will provide both groups with recommendations on how to better combat it.

Slide 3 - Definitions

Letâ€™s review some old definitions and go over some new ones.

a. Ethics - The set of acceptable behaviors in a given culture. It is not just a list of rules. It is also a long respected code of conduct by which society chooses to survive longterm.

b. CyberEthics - The code of behavior that governs the internet and other forms of electronic communications in the cyberworld.

c. Plagiarism - The practice of claiming or implying original authorship of (or incorporating material from) someone else's written or creative work as that of your own.

d. Digital Plagiarism - " Using the internet to conduct plagiarism. In other words, it is the practice of claiming or implying original authorship of someone else's written or creative work that is posted in the Internet as that of your own.

Slide 4 - Myths

Plagiarism can be intentional or unintentional with a majority of student's claiming they did not know they needed to site sources in the first place. Plagiarism is not illegal. The reality is that all academic institutions have some sort of disciplinary action against it.

Slide 5 - Recommendations: How to avoid Plagiarism

We are now going to share with you some ideas for both students and educators to follow in order to avoid Digital Plagiarism.

Slide 6 - Recommendations to Students

For the students here are some of the recommendations on how to avoid Digital Plagiarism.

a. Understand what Digital Plagiarism is. Recall that we previously defined this as a practice of claiming or implying original ownership of someone's written or creative work that is posted on the Internet as that of your own. In order to avoid it, you need to cite your work with the appropriate source(s).
b. Understand the rules of the University related to Academic Honesty and Integrity. The information can often be found in the course catalog.
c. Understand the rules of the course related to Academic Honesty and Integrity. This information is usually mentioned in the course's syllabus.
d. Learn how to properly cite references. There are many citation styles APA, MLA, Turabien etc.
e. Learn how to paraphrase. Restate other sources ™ ideas as your own, but still cite those sources.
f. Collect your sources. If you are writing a paper, collect all of your resources, i.e. books, articles etc so that you can cite them properly.

Slide 7 - Recommendations to Educators

For the educators here are some of recommendations on how you can help your students avoid Digital Plagiarism. Educators should design their assignments in a way that it allows the students an opportunity to do research in order to understand the subject and also be able to express their thoughts and ideas. The following are the levels of research.

a. Just the Fact - Avoid giving assignments where facts or information about a subject is required. This type of assignment requires very thinking or thought.

b. Other People's Ideas - Avoid giving assignments where students gather other people's ideas and pass them on as their own.

c. New ideas and synthesis - Give students assignments where they present their opinions or ideas on the facts and information about a subject.

d. Assess progress throughout the entire process - Give students assignments where they have to turn in parts of assignments.

    a. Outline

    b. Research data / Annotated bibliography

c. Rough draft

d. Final paper

Cited from http://questioning.org.

Slide 8 - Resources

The growth of the Internet has opened up new ways for students to digitally copy information from web-based sources, some of which that actually encourage plagiarism. The Internet has created new opportunities for students to become better cheaters and as a result created new challenges for educators. We have dispelled the myth about Digital Plagiarism and provided the students and educators with recommendations on how to avoid Digital Plagiarism. Finally, we will provide you with some resources to consider.

APPENDIX H

Computer Ethics Assignments

1st week of Computer Ethics Module Questions

Question 1

If someone has not properly secured some important data, such as leaving the email system up on a public computer, is it ethical for another person to exploit that situation and take the information?

Question 2

Should an employer be allowed to monitor your work, such as monitoring your keystrokes, randomly reading your emails, and monitoring the hard drives to determine your activity on the internet to see what you are doing at work? In general in what types are situations are monitoring activities appropriate/inappropriate, which could be considered un-ethical, and which could be considered illegal? In considering this question, think of this hypothetical - are private phone conversations actually private?

Question 3

Please provide your personal reflection of Cyber Ethics after this week's module.

2nd week of Digital Plagiarism Module Questions

Question 1

The professor noticed striking similarity amongst the assignments turned in by students for his computer science class. The four students submitted individual computer programs for their assignment. Apparently, three students in one class had copied a computer program from a student in another class, changed a few variable names, and then turned it in as their own work.

The professor spent many hours investigating the situation and was able to conclude that it was plagiarism. The professor told the students that he could not accept the programs, and gave the students an opportunity to redo the assignment and submitted in a 1 week timeframe.

Here was how each student responded to the professor's request.

i. Student # 1 was truthful and admitted that he had violated his professor's trust. He embraced the second chance, redid the assignment by working overtime in the next week to complete the work and turned in the assignment that was reflective of his own work.

ii. Student # 2 did not confess to anything. He worked on the computer program, but could not complete it during the 1 week timeframe. He accepted the failing grade. He was having difficulty in the course anyway, so he ended up having to withdraw from the class.

iii. Student # 3 did not apologize, but eventually found another program written from the previous by another student that was similar to this assignment. The professor was able to prove that this student had cheated again. So he called for a conference with the student and his parents. Neither the parent nor the student apologized, but the parents blamed the professor and the computer science department for creating a stressful learning situation where students have to cheat. They demanded that their son be given another chance especially because the student's grandfather was a rich alumni that contributed to the school.

How should the professor respond to the parental complaints of student # 3? If they fail the student, they anger the grandfather of the student who has donated countless amounts of money to the college. If they bow to the parent's pressure and allow a third try to make up the work, this student will have an unfair advantage over students #1 and #2.

Question 2

The professor for the Freshman English class is very easy. In fact, several of your friends have taken his class and have been able to get away with cheating on the assignments and never have been caught. Now you are taking this class. How do you feel about that they have been getting away with cheating? Is it a good thing or bad thing that they are doing?

Question 3

Please provide your personal reflection of Digital Plagiarism after this course module.