Online Teaching and Learning: Student-Student and Teacher-Student Discourse for Student Learning in Asynchronous Discussions of High School Courses

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ABSTRACT

The purpose of this study was to examine the occurrence of student discourse in asynchronous computer-mediated communication and its relation to student learning. From in-depth investigation of teacher design, facilitation and direction for asynchronous discussion, implications for high school online instruction guidelines and the need for evaluation standards of online courses and teacher instructional practice are made.

Examining student discourse provides information related to the social construction of knowledge. Teacher presence and its relation to higher levels of student discourse provides information for best practices in online teaching. This information can be used to determine specific standards and guidelines for evaluation of online instruction which can contribute to quality online high school courses.

The context of this study was two high school online AP English courses. The multiple case study approach analyzed student discourse within asynchronous discussion forums and the relation to student learning outcomes. Observation of teacher facilitation and course documents were examined in relation to levels of student discourse and student learning outcomes. Triangulation of data sources included discourse analysis, interviews with teachers, and archival documents. Results from comparing and contrasting multiple cases are presented as basis for implications to guide course design, facilitation and evaluation.

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Chapter One

Introduction

Preparation of students for living and working in the 21st century demands a rigorous, meaningful, and relevant education. One of the basic K-12 educational goals involves providing each child with the opportunity to receive a high quality education. A number of obstacles stand in the way of achieving this goal, not the least of which involves the access to and delivery of diverse instructional curriculum (Blomeyer, 2002). One issue relates to how rural school divisions sometimes find it difficult to offer the variety of high quality classes that suburban school divisions provide to their students. Often, it is difficult to offer such courses due to disparities in instructional resources, a lack of sufficient student numbers, or a lack of certified teachers for advanced course offerings. For example, it might be impractical for a small division to offer an AP calculus course in high school if it only has two students who are prepared for and interested in taking that course. Increasingly, school divisions across the nation are considering non-traditional options for addressing this issue.

Online instruction offers a potential means to provide such courses to students who might not otherwise have the opportunity to take them. An online instructor could teach a course to students from several school divisions. The number of students in each individual division might be too small, but the combined number of students could make such a course practical to offer. Online instruction holds the potential to improve the quality of education of many children as it provides opportunities for accelerated courses and fills gaps in required offerings.

As reported in Watson's (2005) executive summary, by July 2005, 21 states had statewide K-12 online learning programs. Cyber charter schools and/or district-level online programs existed in almost all states. Rapid growth was reported in all programs. Picciano and Seaman

(2007) conducted a nationwide survey during the 2005-2006 academic year and found in 63% of the school districts there was student enrollment in either a fully online or a blended course. There was an estimated 700,000 K-12 students enrolled in online courses. Geographically, student enrollments in distance education courses were 46% in rural areas, 28% in suburban areas and 23% in urban areas. For virtual schools or cyberschools, the North America Council of Online Learning (NACOL) reported a growth of 30% each year over the past three years (Powell & Patrick, 2006).

National organizations such as the National Association of State Boards of Education conclude that "e-learning will improve American education in valuable ways and should be universally implemented as soon as possible" (NASBE, p. 4, 2001). They recommend that state education policymakers take a leadership role in developing e-learning policies. Findings and recommendations from NCREL emphasize the need for leadership of state and local policymakers and education leaders. Issues such as state policies; certified, experienced online instructors; research for "resource configuration" and instructional design; research and evaluation of practices for effective e-learning; program evaluation and research are currently being discussed and addressed nationwide (Blomeyer, 2002). In NASBE's report on e-learning policy, educators are urged to "take the lead" on various issues such as quality assurance by establishing policy for evaluation of teacher effectiveness and procedures for assessment of the quality of online courses.

Statement of the Problem

In working with rural, southside Virginia schools, a topic of discussion has been teacher shortages, low student enrollment for advanced courses, and a desire for courses pertinent to today's workplace. Currently, some divisions are using interactive video or online courses

available through various sources. From brief observations of course offerings and conversations with teachers and administration, the quality and effectiveness of instruction for student learning has been a concern. Both positive and negative statements have revolved around the quality of the learning experience. The southside Virginia school divisions desire quality distance learning experiences based on the research of best practices.

Unfortunately, the research base on this topic has been primarily focused on higher education due to the more recent emergence of K-12 e-learning. A nationwide impetus led by the U.S. Department of Education's Office of Educational Technology and entrusted organizations such as the NASBE and NCREL have noted the need for research specific to K-12 distance learning. There is a significant need for teachers and administrators to have access to research literature on effective distance education (Blomeyer, 2002). Policies for evaluation of high school distance education courses and teacher evaluation must be aligned with identified research-based practices. Thus, the examination of instructional practices for effective online learning in secondary schools can guide future evaluation and development of courses.

As online instruction in the public high schools must be tailored to the educational needs of high school students, one must first identify factors based on established theory and research that are important in high school face-to-face classroom instruction. Upon determination of the factors, online environments must be examined for instructional practices which best support the model for student learning.

Theoretical Framework

Traditional classroom designs are common and are characterized as teacher-centered, linear, and competency-based. Yet, a shift has occurred especially in this Digital Age to a more student-centered instructional design (Blomeyer, 2002). Renowned theorists, such as Dewey,

Piaget and Vygotsky, have influenced education and shaped instructional practices based on constructivist theory. The K-12 theory and research has ascertained the beneficial results of a student-centered model where students are actively involved in their learning process (Blomeyer, 2002).

Student engagement with language as the tool for the process of constructing meaning is derived from social constructivist theory (Jones & Brader-Araje, 2002). In Marzano's (2007) review of K-12 classroom research, instructional practices based on evidence emphasize the need for student interaction with the content, the teacher, and other students for construction of learning. Discussions with peers about content facilitate not only knowledge construction but also awareness due to multiple perspectives. As a facilitator of learning, the teacher guides, moderates, scaffolds and supports students as they move from prior knowledge and understanding towards construction of new learning (Boulton, 2002).

The application of the constructivist model is even more important in today's K-12 setting when technology has compelled the need for higher level critical thinking, problem solving, collaboration, and communication skills in the 21st century workplace (Partnership for 21st Century Skills, 2002). The advent of the Internet and evolution of computer technologies has had a profound impact on society and ultimately education (Hartman, Moskal & Dzuiban, 2005). Leaders in business and education have created a model of learning incorporating identified 21st century skills essential to preparation of students for today's world. Emerging technologies provide multiple tools and opportunities for engaged student learning. The Partnership for 21st Century Skills (2002) emphasizes the instructional practices for a 21st century context for learning which includes relevancy, real-world connections, authentic experiences, and interactivity with peers, teachers, and experts. Their vision aligns with constructivist theory. A

quote from Alvin Toffler found in *Learning for the 21st Century*, "the illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn and relearn" (2002, p.4).

As theory and research recognize the strength of interaction, collaboration, and authentic learning, K-12 educational leaders question the adequacy of an online environment for effective student learning. While there is increased interest in online courses, administration, teachers, and students voice their apprehension over the potential for student isolation and lack of social construction of knowledge (Cavanaugh, Gillan, Kromrey, Hess, & Blomeyer, 2004). Designing an online environment that provides for and supports student interaction for social construction of knowledge is essential.

Currently, the lack of distance education research in K-12 has forced educators and policymakers to rely on the profuse research literature from the higher education realm. In Rice's (2006) review of literature for understanding of the K-12 distance education context, studies referenced from higher education indicated there was a relationship between student interaction and learning. The use of discussion forums was viewed as an opportunity for student communication for meaning-making based on constructivist principles; however, purposeful interaction activities and well-designed instruction were considered as integral for implementation. Quality research of knowledge construction through social processes would be beneficial to both distance education and general teaching and learning (Rice, 2006). Until further research is conducted for K-12, this is a question that will have to be answered mainly through examination of higher education research.

Recognized in higher education, the Community of Inquiry model (Garrison, Anderson & Archer, 2000), a concept of an online learning environment integrating social, content, and

teaching presence, presently serves as both a basis for research and a guide for instructional practices in online instruction for higher education. The model was conceptualized from the work of John Dewey and the constructivist theories of learning as a framework for computer-mediated communication. The interactions of all members in the community, students and teachers, can then be examined for levels of knowledge construction and the facilitation of the learning process. Asynchronous computer-mediated communication is seen as a vehicle for student-student and teacher-student interaction and can serve as a medium for knowledge construction (Garrison et al., 2000; Graham, Cagiltay, Craner, Lim & Duffy, 2000, Kanuka & Anderson, 1998; Ferdig & Roehler, 2004). In online course environments, a discussion forum or discussion board is a tool for asynchronous computer-mediated communication between students and instructor.

A second higher education distance learning model, based on research-based practices from undergraduate face-to-face instruction is Chickering and Gamson's (1987) *Seven principles for good practice in undergraduate education*. Multiple research studies for undergraduate and graduate online instruction have been conducted based on the specific principles of good practice determined by Chickering and Gamson. Many of Chickering and Gamson's (1987) concepts align with social constructivist theory. As higher education research-based practices, they noted that frequent student-faculty contact was an important factor relative to student motivation and intellectual and personal involvement. They associated collaboration with "good learning" as it increased involvement, improved thinking, and deepened understanding. Their specific principles can be assimilated into Garrison, Anderson and Archer's model as specific instructional practices for facilitation of a community of inquiry. The need for interactions with the teacher, the content

(structured and designed by the instructor), and other students (learning community) appears to be signified by research (Swan, 2001).

Higher education research centered on the concepts of constructivism has been conducted to examine student-student interaction and teacher-student interaction for knowledge construction. Yet, the higher education research shows inconsistencies, such as whether higher levels of thinking occur in asynchronous discussions (Kanuka & Anderson, 1998; Garrison et al., 2001; Ferdig & Roehler, 2004; Moore & Marra, 2005). It uses diverse models for content analysis measurement (Garrison et al., 2001; Ferdig & Roehler, 2004; Moore & Marra, 2005, Zhu, 2006, Hara, Bonk & Angeli, 2000) The research focuses on various variables related to social construction of knowledge such as frequency of student interaction (Picciano, 2002 and Jung, Choi, Lim, & Leem, 2002), teacher interaction (Zhu, 2006; Mazzolini & Maddison, 2007) and teacher design, facilitation and direction of the environmental affect on student discussion (Hara, Bonk & Angeli, 2000; Lu & Jeng, 2007; Moore & Marra, 2005; Kanuka & Anderson, 1998; Gilbert & Dabbagh, 2005). Also, Cavanuagh et al. (2004) warns those in K-12 to be careful of transferring practices for online learning shown to be effective with adult learners to practice for children.

Purpose of Study

As K-12 schools consider distance education to alleviate local issues, concerns have been raised over the instructional effectiveness of online instruction. Can online courses provide for the instructional needs of high school students, and, if so, what are specific online instructional practices based on research that are effective for student learning? Factors identified from face-to-face K-12 settings include opportunities for social interaction and collaboration, authentic

learning, active and engaged construction of knowledge (Ornstein & Hunkins, 2004; Boulton, 2002). The student is at the center with the teacher facilitating as the "guide on the side".

With the increased interest and enrollment in online high school courses, there is a need to examine if high school students' knowledge construction for student learning evolves in accordance to social constructivist theory through student-student and teacher-student discourse in online environments. As there is a lack of K-12 research for online instruction, the review of higher education literature provides research models which were used in this study for examination of current asynchronous discourse in high school online courses and the teacher practices for online high school courses relative to social interaction and discourse for learning.

Study of instructional practices using the asynchronous computer-mediated communication tool or discussion forum for the facilitation of discourse for student learning provide implications for teacher best practices in high school distance learning. From these implications, research-based direction and support for administrative evaluation of teacher effectiveness and course quality are suggested. The purpose of this study was first to examine the occurrence of student discourse in asynchronous computer-mediated communication and its relation to student learning. Also, this study observed teacher design, facilitation and direction for asynchronous discussion and its relation to student discourse for construction of knowledge.

Research Questions

1. What is the relationship between the level of student discourse in asynchronous discussion forums and student learning outcomes in high school online courses?
2. How is teacher presence related to student discourse in online high school courses?

Propositions

While research questions provided a focus for the study topic, propositions provided a theoretical focus for formulating a plan of data collection (Yin, 1984). Certain evidence was determined as important for examination and analysis. The following propositions reflect this study's research questions and the review of literature. They guided the analysis of high school online courses:

1. Knowledge may be constructed through student discussion.
2. Higher levels of student discourse may lead to higher levels of student performance.
3. Frequency of student interaction may be related to higher levels of student discourse.
4. Frequency of student interaction may be related to student achievement.
5. Higher levels of teacher discourse may lead to higher levels of student discourse.
6. Higher levels of teacher discourse may lead to higher student achievement.
7. Teacher social discourse may be related to higher levels of student discourse.
8. Teacher social discourse may be related to student achievement.
9. Frequency of teacher interaction may be related to the frequency of student interaction.
10. Levels of structuredness may be related to levels of student discourse.

Significance of the Study

Just as classroom teachers are expected by administrators and parents to teach according to best practices based on theory and research, distance education teachers must do the same. The findings from this study can assist teachers in designing and facilitating student computer mediated interaction and discourse for student learning. By understanding how to best structure discussion in online environments; how to motivate, support and facilitate higher levels of student discourse; the teacher will be able to use the technology more effectively for the essential purpose of facilitating student learning.

Comments from a survey of U.S. school district administrators demonstrate skepticism over online course quality and specific concerns about socialization (Picciano & Seaman, 2007). By conducting this K-12 study, exemplary practices for social construction of learning are recommended. Based on the research, policies should be established for these specific components or practices to be included in course and teacher evaluations. Guidance and support should also be provided to online instructors through staff development focused on implementation of the research-based practices.

Watson (2005) found that there is variation across states in policies for course quality assurance. Most states only require teacher licensure without requirements for online training and quality assurance of courses varies from using internal and external evaluators to just student surveys to evaluate course quality. Watson (2005) stated that research is needed for state level online policy decision making. “There are so many differences between the types of online education that additional research is needed to better understand what works in teaching and learning online” (Watson, 2005, p. 116). Thus, this study provides implications for online teaching and learning.

Definitions

Computer mediated communication is asynchronous text-based communication and can include use of bulletin boards, listservs, and discussion forums found in course management platforms (Moore & Marra, 2005). Asynchronous means it can occur at any time rather than simultaneously with another person.

Course management system is the computer platform connected via the Internet for the online course offered. Course content set up and management and use of communication and assessment tools is determined by the instructor or course designer (Watson, 2005).

Discussion board or *forum* is a technology tool usually found in course management systems for asynchronous computer mediated communication between students and instructor.

Distance education is an "educational situation in which the instructor and students are separated by time, location, or both" (ASTD). Distance education can occur synchronously, same time and place, or asynchronously, any time and place. It can be as non technology-based as written correspondence or as technology-based as videoconferencing or computer-based online education. E-learning is included within distance education.

Distance learning is learning that occurs when students and teachers are engaged in activities in different locations (Waterhouse, 2005).

Interaction is actual contact within the environment, such as posting a message through online discussion forums.

Learning outcomes include the levels of student discourse found in asynchronous discussion forums. It also includes the student achievement results seen in tests and student products associated with the discussion forum content.

Levels of discourse is synonymous to levels of critical thinking with the goal being higher levels of critical thinking for construction of knowledge.

Online course is when a class is delivered and interaction takes place through the Internet. Platforms such as Blackboard, Angel, or Moodle are used for course implementation. Online instruction is designed and facilitated for students by the instructor, sometimes with or without assistance from technical and instructional support staff.

Protocol is a formal set of standards, rules, or formats for discussion (ASTD).

Structuredness is the teacher-designed elements guiding online discussions such as discussion evaluation rubrics, guidelines, and protocols. It looks at the degree and type of structure in a course (Gilbert & Dabbagh, 2005).

Student achievement is the student performance outcomes, such as tests, student-generated products, and overall grades.

Student discourse is learner-to-learner collaborative discussion in an online community for construction of knowledge. Higher levels or phases of student discourse are synonymous to higher-order or critical thinking

Teacher discourse is teacher-to-student collaborative discussion in an online community for construction of knowledge. Higher levels of teacher discourse are teacher-to-student interactions involving higher-order or critical thinking to support construction of knowledge.

Teacher social discourse is teacher-to-student interaction through interpersonal feedback which includes compliments, warmth, encouragement, and motivation for building a community for learning.

Teacher presence is the design and facilitation of the online environment for student learning to occur. Design or structure of the course is reflected in instructor documents such as

the syllabus. Facilitation is reflected in the instructor's questioning techniques, frequency of comments, and teacher-student interaction for content or social feedback purposes.

Overview of Methodology

The qualitative case study was conducted with two high school online Advanced Placement English courses from an established virtual school in Idaho that specializes in providing secondary school online courses statewide to school divisions. AP English courses were chosen due to rich literary discussions as well as the course expectations for student writing that normally occur in the classroom. Qualitative methods were mainly utilized to examine student and teacher discourse data in online discussion forums and their relationship to student performance. Content analysis was used to determine the levels of student and teacher discourse found in the archived discussion forums from the two high school online courses. Also, forums were analyzed for indication of teacher social discourse. Quantitative data included number of student and teacher postings, maximum and percentage of coded responses, and student grade performance on a specific course assignment.

Limitations

Due to the qualitative nature of the study, a small sample, and inclusion of only AP English online courses, the generalization of findings is limited. As the subjects are limited to advanced or high academic level students, there is less variability of student levels within the courses. Using archived data eliminates potential behavioral changes in students and teachers due to observation; however, student surveys and interviews could not be performed which could have validated researcher interpretations. Just as in classroom discussion, there are students who observe or lurk. These students may be constructing knowledge from peer dialogue, yet evidence

can not be found in the archived data. Review of the group discussions provided evidence for construction of learning.

Overview of Study

The significance for study of high school online practices aligned to constructivist theory is explained in this chapter. Research questions and propositions that guided the study are outlined. An in-depth review of literature is done in Chapter Two by examining constructivist theory and distance learning models aligned to the theory from the abundant research literature in higher education. Higher education online learning research specific to social construction of knowledge and related to the propositions made in Chapter One is discussed and analyzed. Chapter Three describes the methods, procedures, and data analysis used for this study, and results are reported in Chapter Four. Implications for practice and policy for high school online courses and instruction are given in Chapter Five along with considerations for future research.

Chapter Two

Review of Literature

As Chapter One discussed, there is a lack of research regarding K-12 online instruction. There is research concerning face-to-face high school instruction based upon constructivist theory. A body of research on online higher education instruction also exists. This review focuses on those two realms in order to understand what might work with high school online instruction.

Instructional practices derived from the behaviorist perspective still exist in some of today's high schools, but there has been a shift to the constructivist philosophy due to new research on how humans learn; the need to accommodate diverse learners; and the changes in workplace essential skills (Burns, Heath, & Dinnock, 1998). Different constructivist models, such as cognitive constructivism and social constructivism, exist due to the diverse viewpoints of the theorists. In this chapter, several of the most well-known constructivist models and instructional practices based on the learning theory for face-to-face teaching are reviewed.

Review of the learning theory and research as applied to online instruction is addressed. Due to the limited research in K-12 distance education, research in higher education online environments is examined and described. Bonk and Cunningham (1998) emphasized the viewpoint of social constructivism as the backbone for social interaction and computer-mediated communication. The nature of the theory and the technology are complementary. To research the distance learning instructional practices for social interaction and collaboration, a factor considered as important for student learning, studies of student-student discourse, teacher-student discourse and teacher design and facilitation of student discourse in online education for adults are analyzed.

From face-to-face high school instruction to online instruction to online practices specific to student interaction, theory provides the foundation from which educators must derive effective practices for facilitating student learning. The theory and the research served as a guide for development of this study.

Teaching and Learning Theories

In education, various philosophies and theories guide practice. The variation of practices can be seen from one school to another dependent upon the theoretical concepts held by administration and teachers. Also, there has been a tendency to teach as one was taught. While behaviorism is the oldest theory of learning, instruction based on constructivist theory has become the current thrust. Researchers and teachers note the deficits found in the behaviorist or traditional methods including passive learning and lack of understanding of students at all ages (Gardner, 1991). Due to this shift in practice, the research focused on the constructivist theory of learning.

Constructivism

In the late twentieth century, an educational movement called constructivism influenced by the learning theories of Dewey, Bruner, Piaget and Vygotsky emerged (Lambert, et al., 1995). Their theories focused on the process of learning and construction of understandings. Active involvement, knowledge construction, and social interaction are viewed as central by constructivists; however, the importance of and theoretical explanation behind these central principles varies among the theorists. The most well-known theorists whose influence on instructional practices has been noted in K-12 and higher education are highlighted in this review.

Dewey is not considered a constructivist theorist but his visionary ideas set the stage for constructivism (Lambert, et al., 1995). He observed that daily life as part of a society was an education in itself (Dewey, 1944). Over 60 years ago, he saw the world as ever changing, requiring constant modification of knowledge through the process of inquiry. As a progressivist, Dewey believed that education should provide opportunities for students to practice the necessary skills and tools of learning to prepare them for living in a democratic world. The skills and tools included problem-solving methods, scientific inquiry, and cooperative and independent experiences (Ornstein, & Hunkins, 2004). Also, Dewey viewed communication as educational for both the contributor and the receiver (Dewey, 1944). Language was significant through its use in shared activity rather than only telling or lecturing. Directing and guiding children as they actively worked together through a process of inquiry or thinking was key to learning growth.

Both Dewey and Piaget believed in the active role of individuals in the learning process. Also, an individual's prior experiences played an important role in construction of new learning. As a theorist who is considered at the roots of constructivism, Piaget viewed learning as a continuous process involving self-construction of knowledge and active interactions with the world (Driscoll, 1994). Piaget's constructivist philosophy focused on the cognitive development of the individual. Cognitive development was seen as a process of assimilation, accommodation and equilibration that proceeded through developmental stages. An individual moved from more concrete to more abstract thinking. The progression of cognitive development through the sensori-motor intelligence, preoperational thought, concrete operations, and formal operations stages was sequential and cumulative (Wadsworth, 1971). Adolescents' cognition was considered to be at the formal operational stage, the ability of making deductions, inferences, and conclusions (Gardner, 1991). Critics including Bruner challenged the idea of stages of cognitive

development relative to age as even some adults do not exhibit capabilities of abstract thinking (Driscoll, 1994).

Inhelder and Piaget (1958) saw a link between formal thinking and maturation, but they also felt the socio-cultural and educational environments of an individual may accelerate or retard the growth. At the formal operations stage, adolescents were able to build theories, analyze their thinking, reflect, and think in abstracts. Inhelder and Piaget also noted egocentrism of adolescents as they tried to adapt individual egos to the social environment and at the same time tried to adjust the environment to their egos. Through social group interactions, "intellectual decentering" occurred in discussions with peers. As ideas or theories were expressed with peers, they discovered their own theories were not absolute. "Objectivity of thought with respect to conflicting issues is attained (and egocentrism lost) when the adolescent assumes adult roles in the real world and can differentiate the many possible points of view" (Wadsworth, p. 112, 1971).

Similar to Dewey and Piaget, Bruner's theory focused on knowledge construction by the learner and the influence of prior experience. Meaning was made from experiencing, interpreting, reasoning, and reflecting on experiences (Jonnassen, Peck & Wilson, 1999). Bruner's theory of cognitive development was intertwined with instruction as learning was believed to be facilitated through effective instruction (Driscoll, 1994). The context of social and cultural experiences for construction of knowledge was conceptualized by Bruner and Vygotsky. They also saw language as a factor for higher order thinking processes and meaning-making (Lambert, et al., 1995).

Vygotsky's view of the active and engaged construction of knowledge through social interaction laid the groundwork for social constructivism. Unlike Piaget's perspective of cognitive development as an individual learning process, Vygotsky's philosophy argued that

learning was sense making within socio-cultural contexts (Oldfather & West, 1999). Vygotsky saw development as being from social to individual instead of individual to social (Vygotsky, 1986). He was also critical of Piaget's view of social factors as external forces. To Vygotsky, concept formation moved from interpersonal to intrapersonal, and higher level functions were due to interactions between individuals.

Speech was a tool for thinking (Vygotsky, 1986). Awareness evolved through social speech. Vygotsky viewed language as intertwined with thought. Oldfather and West (1999) defined three principles from Vygotsky's work: (a) language is acquired and used socially, (b) thought is based on language, and (c) the roots of learning are socio-cultural. Through dialogue, language and thought are related as language is used to manipulate, relate and organize our thinking (Oldfather & West, 1999).

While both Piaget and Vygotsky saw speech as having a role in cognitive development, their conception of the functions of speech differed. For Piaget, social speech came after egocentric speech, "speech-for-oneself". Egocentric speech had no real use. Vygotsky saw egocentric speech as a stage in between social and inner speech that served as an instrument of thought.

Vygotsky saw the child as actively involved in the learning process and able to move to higher levels with effective adult and peer interaction. Intellectual growth of the individual was brought to a higher level through the zone of proximal development, defined "as the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, p. 86, 1979). Building for new levels of

understanding was done through scaffolding or facilitating by peers or the adult. Thus, how we come to know is through social interaction for construction of new learning.

While variations exist in the positions of these well-known theorists, each has implications for instructional practices based on constructivism. Constructivism entails active involvement of learners (Dewey, Piaget and Vygotsky) in a process of knowledge construction (Piaget) that is mediated through social interactions with adults and peers (Vygotsky). Central principles of constructivism have been derived from the viewpoints of these and other theorists.

Theoretical Implications for Instruction

From the constructivist perspective, the teacher's role is not as the purveyor of knowledge but the facilitator or coach for building a community of inquiry (Perkins, 1999). Jonnassen, Peck and Wilson (1999) provide the following consolidation of constructivist learning principles which can be supported by teacher instructional practices and technologies. Knowledge construction (a) is not transmitted; (b) is active, involves interaction with experiences for meaning making; (c) is contextual, ideas experienced in meaningful settings; (d) is personalized, internally constructed from experiences; (e) includes diverse perspectives; (f) is impelled by dissonance to make sense which leads to ownership of ideas; (g) necessitates articulation of learning; (h) results through social dialogue; (i) is influenced by others in culture and community; and (j) is not equal due to personalized meaning.

Effective instructional practices include providing active, discovery-oriented environments and opportunities for interaction with peers for cognitive development; noting conflicts and inconsistencies in student thinking; providing relevant situations for problem resolution; scaffolding and guiding towards higher levels of knowledge construction (Driscoll, 1994). Gardner (1991) views the constructivist classroom for adolescents as an environment where

students work together, question others, and reflect on their own learning. Social constructivist instructional practices seen in classrooms currently are reciprocal teaching, peer tutoring, think-pair-share, discussion webs or mind mapping, and literature circles. These methods are considered as effective for reaching a greater level of understanding.

21st Century Learning

If educators perceive that learning evolves in the context of social and cultural experiences, they must consider the present world of the student. The social and contextual factors faced by current students differ greatly from those of prior generations (Hartman, Moskal, & Dzuiban, 2005). Net Geners; born 1981-1994 includes students presently in middle and high schools, and college or early workforce who view technology as venues for communication, socialization, learning, and game playing (Hartman et al., 2005). Socialization and communication for this generation occurs frequently through instant messaging, text messaging, blogs, wikis, MySpace, and digital photo sharing. Technology is their avenue for creation and production through podcasting and video sites such as YouTube.

NCREL sees literacy in current educational environments to be based on student exploration as well as creation of authentic student products (Blomeyer, 2002). It is not just about what students are learning, but also how they are learning. In a study of the use of computers in K-12 settings, Jones, Valdez, Nowakowski, and Rasmussen (1995) presented evidence of strategies utilizing technology tools to improve academic achievement through active learning and collaboration in the course of challenging and real-life tasks. Constructivist strategies combined with technology support the development of higher-order thinking skills (Blomeyer, 2002).

Leaders and educators in business and education created a model of learning incorporating identified 21st century skills essential to preparation of students for today's world. Six key elements for 21st century learning (Partnership for 21st Century Skills) include:

1. Emphasize core subjects and 21st century interdisciplinary themes.

2. Emphasize learning and innovation skills – creativity and innovation, critical thinking and problem solving, communication and collaboration.

3. Use 21st century tools to develop learning and innovation skills.

4. "Teach and learn in a 21st century context" - Instructional practices for a 21st century context for learning would be "making content relevant to students' lives, bringing the world into the classroom, taking students out into the world, creating opportunities for students to interact with each other, with teachers and with other knowledgeable adults in authentic learning experiences" (Partnership for 21st Century Skills, p. 12).

5. Teach and learn 21st century content or themes – global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy

6. "Use 21st century assessments that measure 21st century skills." (Partnership for 21st Century Skills, p. 12).

Note how strongly the thinking of constructivists and the thinking of the business leaders and educators for 21st century skills align.

As K-12 schools consider distance education technologies to alleviate local issues and ultimately prepare students for today's workplace, concerns are raised over the instructional effectiveness of online instruction. Can online courses provide for the instructional needs of our high school students? How can constructivist principles be applied in a distance learning

environment? Review of higher education research in distance education can offer potential answers for these concerns.

Online Instruction in Higher Education

Just as K-12, higher education has seen phenomenal growth in distance education. Similar to the belief of K-12 educational leaders, ensuring that the quality of distance education college courses is equal to college classroom instruction is necessary (Batts, Colaric & McFadden, 2006). Empowering students as self-directed learners is a premise of today's adult learning theory (Muirhead, 2001). Constructivist principles provide the framework for this empowerment. These principles are found in models such as Garrison, Anderson, and Archer's (2000) online Community of Inquiry model and are being used for instructional design of online settings. Specific research-based practices from Chickering and Gamson (1987), *Seven principles for good practice in undergraduate education*, have guided instruction for face-to-face classrooms and have been determined as applicable to distance learning for adults (Graham, Cagiltay, Craner, Lim & Duffy, 2000). While the Community of Inquiry model provides the overall model of the distance learning environment, the Seven Principles are contained within the framework as specific practices. As higher education has a much longer history of online instruction than K-12 and more research has been conducted on online teaching and the learning process at that level, further review of the literature can provide understanding of the application of theory and practice in online instruction.

Community of Inquiry Model

A model that has evolved recently from Canada is the Community of Inquiry model as shown in Figure 1. Permission for inclusion of graphic included in Appendix A. Conceptualized

from the work of John Dewey and the constructivist theories of learning, the model maintains that teacher and students participate as members within a community of inquiry where the interaction of cognitive presence, social presence, and teaching presence evolve into a meaningful educational experience (Garrison et al., 2000). The three core elements, categories, and indicators were developed from a thorough review of literature and were used by the researchers to study online communities. Researchers used the model to focus on the relationships between the three interactions and learning in online environments (Garrison, Anderson, & Archer, 2001; Rourke, Anderson, Garrison, & Archer, 2001; Swan, K. 2001; Shea, Pickett, & Pelz, 2003; Lu & Jeng, 2007). Indicators for cognitive presence, social presence, and teaching presence developed by Garrison et al. (2000) have continued to be used as research tools for analysis of online communities.

Figure 1. Community of Inquiry Model, Elements of an Educational Experience

Garrison et al. (2001) feel cognitive presence occurs in online environments when members within a community of inquiry construct knowledge through continuous dialogue. Attaining and applying higher levels of thinking or critical thinking is reflected in the discussions

of the learners. As shown in Figure 1, knowledge construction (cognitive presence) is an interactive process including content (selecting content) and discussion (supporting discourse). From review of Parker & Gemino (2001) and Picciano's (2002) interaction studies relative to content, Swan (2004) notes that online learning and discussions support divergent thinking, multiple perspectives, and reflection. Convergent and scientific thinking seems to have less support in online discussions than face-to-face discussion.

Social presence is defined "as the ability to project one's self and establish personal and purposeful relationships" (Garrison, p. 2, 2006). Ultimately, purposeful communication to collaboratively accomplish educational goals is desired. Social presence should move beyond the affective and personal forms of social interaction towards a cohesive discovery and creation of new learning. In Picciano's (2002) research relative to social presence, he sees the Community of Inquiry model as supportive of active learning environments for sharing of ideas, information, and opinions. In considering social constructivist theory and the concepts behind the model, cognitive and social presences become intertwined within a learning environment. Further review of cognitive and social presence research is discussed in detail in the Studies of Student Discourse and Student Interaction in Online Courses section of this chapter.

The third and binding element for a community of inquiry is teaching presence. Teaching presence is needed to set the climate and present content which includes facilitation of the student discourse through questions and confirmations when appropriate and designing and organizing objectives and content that encourage social interaction (Garrison et al., 2000). Research supports the significance of this element for student satisfaction and success in online learning (Graham et al., 2000; Jung, Choi, Lim & Leem, 2002; Zhu, 2006; Lu & Jeng, 2007). Included within teaching presence are instructional management (design and organization),

building understanding (facilitating discussion), and direct instruction (content, questions, assessment, feedback). Facilitation of discussion and instructional design of the course are necessary ingredients for a meaningful learning experience. Further review of teacher presence research is discussed in detail in the Teacher Presence in Online Courses section of this chapter.

Returning to Figure 1, the interaction of the three elements is necessary for learning effectiveness. Swan (2001, p. 310) states that "current research on teaching online seems to indicate a heightened need for instructor activity and interaction in online environments, as well as highlighting the overlap with content interactions (the need for attention to structure and design), and interaction among students (the need to establish the learning community)". The interaction of cognitive, social, and teaching presence is necessary for higher level educational outcomes. Yet, the developers of the Community of Inquiry model recognize that further work is needed to understand how to best design and deliver an educational experience in this type of environment (Garrison, Anderson Archer, W., 2000). This framework based on learning theory provides important pedagogical implications and guides further research.

Seven Principles for Good Practice in Undergraduate Education

In higher education, a well-known instructional model which has provided principles for face-to-face teaching is Chickering and Gamson's (1987) *Seven principles for good practice in undergraduate education*. Since 1987, these standards have been revised to incorporate technology and to include online practice (Chickering & Ehrmann, 1996; Graham et al., 2001). Internationally, higher education has recognized the seven principles as a model not only for classroom instruction but also distance education. In 2002, the Ohio Learning Network Task Force on Quality in Distance Learning determined that the seven principles were valid for e-learning. Research studies for undergraduate and graduate online instruction have been

conducted based on the principles of good practice determined by Chickering and Gamson. Validation that these criteria apply to online learning as well as face-to-face instruction provides a framework for instructors and developers of distance education.

Chickering and Gamson's (1987) principles to guide teaching include:

- Principle 1 - encourages student-faculty contact
- Principle 2 - encourages cooperation among students
- Principle 3 - encourages active learning
- Principle 4 - gives prompt feedback
- Principle 5 - emphasizes time on task
- Principle 6 - communicates high expectations
- Principle 7 - respects diverse talents and ways of learning.

Those that clearly align with constructivist concepts include (a) encourage student cooperation, (b) encourage active learning, and (c) respect diverse talents and ways of learning. Also, the distance education literature, centered on student knowledge construction and based on principles from social constructivism, discusses the importance of student-faculty contact, prompt feedback, and high expectations (Jung et al., 2002; Picciano, 2002; Ferdig & Roehler, 2003; Moore & Marra, 2005; Zhu, 2006; Lu & Jeng, 2007). The seven principles are seen in practices and implications from Garrison, Anderson & Archer's research. It seems that the Community of Inquiry model can serve as a framework with incorporation of the principles by Chickering and Gamson as specific instructional practices as shown in Table 1.

Table 1

Seven Principles Link to CI Model

Seven Principles	Community of Inquiry Model
Student-faculty contact	Social and teaching presence – setting climate
Student cooperation	Social and cognitive presence – collaboration for meeting content objectives; social and teaching presence – setting climate
Active learning	Cognitive and teaching presence – selecting content
Prompt feedback	Social and teaching presence – setting climate
Time on task	Teaching presence – focusing and pacing; time parameters
High expectations	Teaching and cognitive presence – clear expectations and appropriate tasks and presence
Diverse learning	Cognitive and teaching presence – selecting content

Chickering and Gamson (1987) noted that frequent student-faculty contact was an important factor relative to student motivation and intellectual and personal involvement. An obvious difference in traditional instruction and online instruction is the face-to-face student-faculty contact. Studies of higher education online courses have found that utilization of e-mail and forums and even phone calls provide for this principle (Graham et al., 2000; Batts et al., 2006; Taylor, 2002), and that there is a strong association between student-faculty contact and student satisfaction (Arbaugh & Hornik, 2006).

Chickering & Gamson (1987) associated collaboration with “good learning” as it increases involvement, improves thinking, and deepens understanding. The researchers observed ice-

breaker discussions to build camaraderie and community, group project assignments requiring collaboration, provision of class contact information, and use of discussion groups and chat rooms as opportunities for cooperation among students (Graham et al., 2000; Arbaugh & Hornik, 2006; Batts et. al, 2006). Yet, evidence of effective implementation of this principle was weaker in some observed courses (Graham et al., 2000; Taylor, 2002). From Arbaugh & Hornik's (2006) survey analysis, findings showed that there was a positive relationship for collaboration and perceived learning. There was no significance found for collaboration and course satisfaction.

The third principle of active learning requires planning and facilitation of the instructor and goes beyond the memorization and regurgitation of content knowledge. Authentic assignments, such as having students relate ideas from readings to real-world issues, were examples seen in four online graduate courses (Graham et. al, 2000). From Taylor's (2002) survey of 204 instructors, implementation of active learning were perceived by teachers of Health and teachers of Education/Teacher Education courses as 3.66 and 3.54 out of 5.0 respectively. Business, Marketing and Management field instructor scores were 2.88 for perceived implementation of active learning. It was suggested the difference was due to instructor familiarity and background with learning approaches. Interviews were not conducted for further explanation.

Prompt feedback, the fourth principle, has been categorized as acknowledgement and information feedback and can be conducted as social or interpersonal feedback. The importance of this practice as associated with perceived student learning and satisfaction is noted in Arbaugh and Hornik (2006) and associated with student learning in research from Jung et al. (2002). Graham et al. (2000) observed variation in strength of feedback through instructor responses using forums and e-mails.

Principle five emphasizes time on task. Supporting students' management of time through course structure, deadlines and communications are considerations to address this principle and can vary from course to course as found in evaluations by Graham et. al (2000). Taylor (2002) and Batts et al. (2006) found improvement was needed for supporting time on task. In a survey of instructors and undergraduate students in five courses from two universities, Batts et al. (2006) found that students perceived it as being found in only three of the five courses and instructors perceived it as being found in only one of the five courses. Further, the mean scores for each of the 7 principles were categorized for instructors and students as low, medium, and high. Time on task was the one principle with mean scores at the low level.

Chickering and Gamson's (1987) sixth principle of high expectations refers to the "self-fulfilling prophecy". Practices such as clear expectations, feedback and praise of exemplar performance are recommended. Three of the four courses examined by Graham et al. (2000) demonstrated implementation through listing expectations in the website, including grading rubrics, and giving both praise and advice.

The final principle respecting diverse talents and ways of learning considers the individual learner. Providing multiple options and methods for diverse learning styles and for the various continuums, from the autonomous learner to the social learner, requires a conscientious effort of the instructor. Initial surveys to assess learning styles, interests, and background can provide useful information for shaping the course further. Graham et al. (2000) found that all instructors addressed this principle, and Taylor (2002) found instructors strongly perceived they had recognized and respected diverse learners in their online courses.

There were limited studies found relative to all seven principles. The research discussed provided researcher interpretations of implementation of principles (Graham et al., 2000),

instructor perceptions of implementation (Taylor, 2002), student satisfaction and perceived learning (Arbaugh & Hornik, 2006) or student and instructor agreement of perceptions of implementation (Batts et al., 2006).

Conclusions and implications from these studies of the Seven Principles for Good Practice in Undergraduate Education suggest that the practices should be considered in developing and assessing undergraduate as well as graduate level online courses. Some studies noted more substantial importance of student-faculty contact and feedback (Arbaugh & Hornik, 2006; Jung et al., 2002) and strong indication of implementation in courses of respecting diverse talents and ways of learning principle (Graham et al., 2000; Taylor, 2002). Weaknesses were found in the implementation of the collaboration principle (Graham et al., 2000; Taylor, 2002) and time on task (Graham et al., 2000; Taylor, 2002; Batts et al., 2006). As collaboration is the focal point in the application of social constructivist theory, this is an issue for concern. Also, how these principles relate to actual student learning is not addressed through these studies. A more in-depth investigation is needed to review the higher education research examining the principles or practices for building a community of inquiry for social construction of knowledge.

Studies of Student Discourse and Student Interaction in Online Courses

Based on social constructivist theory, learning is sense making within socio-cultural contexts. Collaborative, active learning has a major role in adolescent learning. Social interaction is considered important for the virtual and the traditional classroom, yet one K-12 distance education qualitative study noted strengths and weaknesses of online courses which included the need for social interaction among peers (Weiner, 2003). Students taking "unscheduled" courses, online courses with an open timeframe allowing flexibility for students

over a year, felt isolated due to the lack of student interaction. Feelings of frustration and loss were noted.

Walker & Fraser's (2005) study of graduate and undergraduate students as well as their reference to numerous studies support student interaction and collaboration as notable factors in distance education. Garrison, Anderson, and Archer (2000) view socio-emotional interaction as necessary to meaningful learning outcomes. Building community is seen as essential for support of collaborative learning and dialogue resulting in higher levels of learning (Garrison, D., 2006). Further discussion of the research on student discourse and interaction and its relation to learning follows.

As noted in the Virtual Greenbush (Mills, 2002) online high school study and by Muirhead's (2001) study of university distance education courses, the quality of interactivity varies from class to class. Some studies on the effect of student discourse and interaction on performance have also noted additional components which support and foster the social aspect, such as design and facilitation (Kanuka & Anderson, 1998; Garrison et al., 2000; Hara, Bonk & Angeli, 2000; Curtis & Lawson, 2001; Jung, et. al, 2002; Picciano, 2002; Salmon, 2003; Ferdig & Roehler, 2004; Gilbert & Dabbagh, 2005; Moore & Marra, 2005; Zhu, 2006; Lu & Jeng, 2007). They provide further evidence of the interrelationships of social presence, teaching presence, and cognitive presence in the context of the Community of Inquiry model as well as reference to practices for online course design and facilitation. Further discussion of design and facilitation effects follows also.

Knowledge Construction

Online forums are viewed as a venue for interactivity, active learning, and teacher-student relations (Ferdig & Roehler, 2004). The implementation of discussion forums aligns with

Vygotsky's social constructivist learning theory that knowledge is constructed through social dialogue. Examination of discussions in online forums has shown that knowledge can be constructed through student discussion but inconsistencies exist as to the level of critical thinking found in student postings (Gunawardena, Lowe & Anderson, 1997; Kanuka & Anderson, 1998; Hara et al., 2000; Garrison, Anderson & Archer, 2001; Ferdig & Roehler, 2004; Moore & Marra, 2005).

Gunawardena, Lowe & Anderson (1997) were interested in studying the quality of learning that occurred in computer mediated communication. They knew in order to assess construction of knowledge content analysis was essential. To analyze an international graduate student online debate on a controversial issue, the researchers first reviewed other interaction analysis models to note strengths and weaknesses. From this, a new definition of interaction was formed. "Interaction is the essential process of putting together the pieces in the co-creation of knowledge" (Gunawardena et al., p. 412, 1997). Henri's (1992) model was initially used to analyze the debate transcripts, but a new model based on grounded theory emerged. The Interaction Analysis Model for Examining Social Construction of Knowledge in Computer Conferencing (IAM) is based on the theory that knowledge is constructed through phases which include:

> "Phase I. Sharing/comparing of information; Phase II. Discovery and exploration of dissonance or inconsistency among the ideas, concepts, or statements advanced by different participants; Phase III. Negotiation of meaning and/or co-construction of knowledge; Phase IV. Testing and modification of proposed synthesis or co-construction; and Phase V. Phrasing of agreement, statement(s), and applications of the newly constructed meaning" (Gunawardena et al., p. 414, 1997).

This model was used to examine the social construction of knowledge within an online debate and then applied to another context, a forum of workplace training managers. It was found that

the debate format made it difficult to reach synthesis (Phase IV); however, there were postings at the Phase IV and V levels. In the second context, interaction was predominantly at Phase I. The moderator was not in a "teacher" role, and the forum was a sharing of experiences. Thus, the researchers believed the IAM is appropriate for understanding the diversity in quality of learning in different types of online interactions.

Kanuka and Anderson (1998) evaluated online discussions to understand and assess learning. In Kanuka and Anderson's (1998) multimethod study of adults engaged in a professional development discussion, the majority of messages were at the sharing/comparing phase which is the lowest level of knowledge construction as defined by Gunawardena et al.'s (1997) constructivist model of content analysis.

Further investigation using grounded theory generated the two categories of social interchange and social discord and knowledge construction (Kanuka & Anderson, 1998). From their discourse analysis, multiple exchanges of information (Phase I) occurred through discussions which did not demonstrate any change in participant perspectives or construction of new knowledge. There was occasional evidence of contradictions or dissonance (Phase II) showing evidence of change or new participant perspectives. Questionnaires and phone surveys of participants identified the value seen in the forum for sharing ideas and networking (Phase I) which aligns with the level of discourse primarily found through Kanuka & Anderson's content analysis. Similar to the training manager context of Gunawardena et al. (1997) there was the lack of a facilitator or instructor to draw out or require participation which has been identified as a factor for facilitating student discourse (Ferdig & Roehler, 2004; Lu & Jeng, 2007; Zhu, 2006; Hara et al., 2000). Also, the nature of this professional development online discussion is similar to what is observed in face-to-face professional development (Kanuka & Anderson, 1998).

Garrison et al. (2001) also found that discussion in online forums was mainly at the level of sharing insights and contributing relevant information. Higher levels of integration and resolution were found but at a much lower percentage (Garrison et al., 2001). Using transcripts from two weekly graduate courses, a content analysis tool was developed for assessment of critical discourse and reflection that included an explanation of categories, indicators, and examples, and a third weekly transcript was used to obtain results (Garrison et al., 2001). A detailed description of the process for development of the tool was provided, the use of two graduate students as raters, and an evaluation for inter-rater reliability was addressed. An issue of concern is that the transcript used to assess discourse only involved four students and the instructor for a total of 24 messages. No data was given for differentiating instructor and student levels of discourse or frequency of interaction.

While interactions were found to be at the lower phases of the knowledge construction process (sharing/comparing of information) for some research (Kanuka & Anderson, 1998; Hara et al., 2000; Garrison et al., 2001), there was evidence for higher phases (negotiation of meaning/knowledge co-construction) for others (Ferdig & Roehler, 2004; Moore & Marra, 2005). To evaluate construction of knowledge in online discussions of two sections of a graduate course, Moore and Marra (2005) also used Gunawardena et al.'s (1997) constructivist model of content analysis. Additionally, they compared discussion protocols of less formal guidelines versus a formalized argumentation format to determine affect on knowledge construction (Moore & Marra, 2005). Inter-rater reliability was conducted and evidence of Phases I-III were found in both courses with few postings in either course at Phase IV or V; significance was found at $p < .05$ for the less formal protocol for both frequency and higher phase levels (Moore & Marra, 2005). Summative student feedback was also obtained and provided further insight of

implementation of the protocols. Ferdig & Roehler (2004) also noted that construction of knowledge can be observed at higher levels and can be used as a predictor of student achievement. This study will be discussed in more depth as follows.

Student Discourse and Achievement

Little research has been conducted to correlate levels of student discourse in online forums to levels of student performance. Ferdig & Roehler (2004) conducted a study of 32 preservice teachers in a blended course, combination of face-to-face and online teaching. They examined total number of postings in the discussion forums to determine the relation of frequency to quality of postings. They also looked at the quality of postings as a predictor of scores on a written assignment. Four categories of "no uptake with no intertextuality, no uptake with intertextuality, uptake with no intertextuality, and uptake with intertextuality" (p. 123) were used to analyze surface and deep understandings. Intertextuality was explained as including either personal experience, ideas from course content, responses to other's work, or examples from field; and uptake was characterized as demonstrations of explanation or justification of relationships between examples from field and concepts. Qualitative (constant comparison analysis) and quantitative (correlation analysis) results from the discussion of eight groups of four preservice teachers showed that number of postings had little relation to the type or quality of posting as a group with fewer messages had higher percentages of combined uptake and intertextuality (UI) and higher final paper scores than a group with higher number of responses (Ferdig & Roehler, 2004). The Pearson Correlation of .911 showed significance (.002, $p < .01$) for the type of response of combined uptake and intertextuality to overall final paper scores. From the data, the quality of individual performance was found to be related to the quality of group discussions.

A replication of the study with 331 preservice teachers from five universities showed a positive relation between UI and "growth of knowledge, skills and dispositions" (Ferdig & Roehler, p. 126, 2004); however no specific data was provided to substantiate the claim. They stated that some students had significant gains, so they conducted qualitative research to gain further understanding. The addition of qualitative observations, assignments, surveys, and interviews was used to examine student successes and determine potential solutions for less successful students. It was found that teachers who used discourse for knowledge construction (constructivist teachers) were more successful with forums as they viewed online forums as a tool for constructivist teaching. Discussions that over- or under- challenged were not as successful. Ferdig & Roehler (2004) believed the goal was for discussion content to be at the high end of Vygotsky's "Zone of Proximal Development" in which learning is guided through collaboration with more capable peers or guidance by instructors. Teacher modeling through comments and challenging questions was found to promote understanding of the discussion task. Ferdig and Roehler (2004) did note that outliers, ineffective users of discussions, existed in even the most supportive environments. It was suggested that in the context of constructivist theory, multiple modes of learning should be provided for diverse learners because synchronous communication may be preferred by some students.

Student Interaction

As with knowledge construction, there are inconsistencies for the frequency of student interaction in relation to higher levels of student discourse. While Moore & Marra (2005) provided evidence of significance for higher number of postings and higher phase levels, Ferdig & Roehler (2004) believed there was little relationship between the number and type of responses.

Some consistency is found in the relation between frequency of student interaction and student achievement (Picciano, A., 2002 and Jung et al., 2002). Picciano's (2002) multimethod study of performance in relation to student interaction and sense of presence found a positive but not significant relation for the number of postings and performance scores. When grouping the graduate students according to interaction levels (low, moderate, high), no difference was found for the examination scores (objective, multiple choice), but significance for the high interaction group and the written assignment scores was found. Note that the written assignment scores were determined by an independent scorer for assessment of performance in accordance to instructor objectives. Picciano (2002) states that there is a difficulty of using overall grades as performance measures when evaluating the relationship of interaction and performance outcomes. In many cases, discussion participation grades are included as a component of the overall grade.

A question for investigation by Jung et al. (2002) asked whether different types of interaction in online environments affected student performance. Three interaction group types were set up: 1) academic interaction (control group) - content interaction and instructor interaction for tasks only with no motivational or interpersonal encouragement; 2) collaborative interaction (treatment group) – collaboration on a specific topic or problem and information sharing with content only interaction from instructor; 3) social interaction (treatment group) – peer interaction with interpersonal and social feedback as well as academic from instructor. The collaborative interaction and social interaction groups had the highest frequency of interaction and the social interaction group had the highest performance level (Jung et al., 2002). For achievement, ANOVA and Post-hoc Scheffe analyses showed significant differences between the three groups. Performance was measured through calculation of scores for five assignments

based on the course objectives, but no details were provided as type of measurement such as test, student-generated product, or written assignment. These two studies show the importance of student interaction in online education; however, the latter study also demonstrates the combination of instructor social discourse and student interaction as factors in student performance.

Summary of Research of Student Discourse and Student Interaction in Online Courses

In the review of research on the relationship of student discourse and student learning, most of the studies analyzed specific to student discourse and student interaction referenced Vygotsky and the social construction of knowledge. Kanuka & Anderson (1998) stated that social constructivism is most accepted as the theory of knowledge linked with online learning. In face-to-face classrooms, verbal dialogue provides the opportunity for social construction of knowledge, and in most online environments, text-based conversation is the venue for knowledge construction to occur. Gunawardena (1995) recognized the viability of online environments to

> "promote collaborative learning which involves the active construction of knowledge through social negotiation, only if participants can relate to one another, share a sense of community and a common goal. The development of social presence and a sense of an online community becomes key to promoting collaborative learning and knowledge building" (p. 165).

In Chapter One, propositions were derived from the selection of higher education studies reviewed: (a) knowledge may be constructed through student discussion, (b) higher levels of student discourse may lead to higher levels of student performance, (c) frequency of student interaction may be related to higher levels of student discourse, (d) frequency of student interaction may be related to student achievement. From the review of higher education online learning research, there was evidence of primarily low levels of student discourse (Gunawardena et al., 1997; Kanuka & Anderson, 1998; Garrison et al., 2001) as well as evidence of higher

levels of student discourse (Ferdig & Roehler, 2004; Moore & Marra, 2005). The lack of an instructor for facilitation of discussion was discussed by Gunawardena et al. (1997) and Kanuka & Anderson (1998) as a possible explanation for the lower levels of knowledge construction. Implications from Ferdig & Roehler (2004) suggested the importance of constructivist teachers for support of forums. Instructor design of discussion tasks to match discussion objectives as well as moderate structure was suggested from Moore & Marra (2005). Further research in this area and evaluation of content analysis tools and coding was suggested.

Research on the relation between higher levels of student discourse and higher levels of student performance was lacking. Of the few studies located, Ferdig & Roehler (2004) found there was a significant relationship between the deeper levels, uptake and intertextuality, of student discourse and performance on written final paper scores. Just as there was inconsistency on levels of student discourse found, the relationship between frequency of interaction and levels of discourse also varied (Ferdig & Roehler, 2004; Moore & Marra, 2005). The relationship between frequency of interaction and achievement did show some consistency as found by Picciano (2002) and Jung et al. (2002). As shown, more research is needed to more firmly establish the validity of these relationships.

Teacher Presence in Online Courses

From the social constructivist perspective, the student is actively involved in the learning process and is able to move to higher levels, as explained by Vygotsky's zone of proximal development, with effective teaching and peer interaction. Teachers are key to the development and maintenance of classroom culture for collaborative learning (Oldfather & West, 1999). In the research discussed, both student discourse and student interaction in online courses are considered as factors for student learning; however, the relationships show inconsistencies which

could be attributed to ineffective social, teacher, or cognitive presence needed for an online community of inquiry as suggested in Garrison et al.'s model (2001). Also, as specific practices for supporting a learning community, Chickering and Gamson's principles are considered. An effective instructor would be one that integrates theory and practices for student discourse.

The importance of the teacher to facilitate and design for student interaction and discourse is noted across studies. "It is the instructors' responsibility to thoughtfully design the course, to provide a high degree of interaction between students, to act as a facilitator and to motivate the students by using a variety of teaching strategies" (Weiner, p.49, 2003). Jung et al. (2002) grant that higher levels of interaction don't just happen, but must be deliberately designed.

Discussion forums serve as an integral part of the online environment for asynchronous interaction and collaboration for learning. From the research, teacher presence is necessary for student learning in distance education (Kanuka & Anderson, 1998; Hara et al., 2000; Picciano, 2002; Jung et al., 2002; Ferdig & Roehler, 2004; Gilbert & Dabbagh, 2005; Moore & Marra, 2005; Zhu, 2006; Lu & Jeng, 2007; Mazzolini & Maddison, 2007) and implications for instructional practice have been suggested from this research.

Teacher Discourse

Teacher facilitation in an online environment can be content oriented or socially oriented through interpersonal feedback which includes compliments, warmth, encouragement, and motivation for building of community learning. How does quality of teacher discourse relate to the quality of student discourse or student achievement? Currently, there is a lack of distance education research on teacher levels of discourse and its relation to student achievement in higher education.

In research related to teacher level of discourse and student level of discourse, Zhu (2006) analyzed interaction and level of cognitive engagement of 71 students from three colleges. Class A had no online discussion instructor involvement (met face-to-face), Class B had limited instructor involvement (hybrid or combined online and face-to-face), Class C had full, teacher-centered involvement (full online course), and Class D had moderate instructor involvement (full online course). For content analysis, Zhu (2006) used the Analytical Framework for Cognitive Engagement in Discussion and interaction and centrality of postings (points) was illustrated through star webs (no or little interpersonal relations) and interconnected webs (multiple interactions and connections with other members). The content analysis tool combined a coding system by Zhu, Henri's (1992) content analysis model, and Bloom's (1956) cognitive domains. No evidence was provided by the researcher on the reliability of this tool for analyzing content. Results showed that low cognitive levels of discussion were found in Class A having mainly Statement Type I – Responding messages and a small percentage of Statement Type III – Explanatory messages. Class B also had low cognitive levels at mainly Statement Type I but a higher percentage of Statement Type III messages than Class A. Class C reached Statement Type VI – Evaluative messages and Zhu noted that instructor evaluative comments were made to each student but the instructor did not model how to construct understanding. Class D demonstrated high cognitive levels of engagement similar to Class C, and Mentoring and Scaffolding characteristics were also found as the instructor provided personal opinions, facts, support, guidance, and suggestions. Higher levels of cognitive engagement were found in the classes with full and moderate instructor involvement which may demonstrate a relationship between teacher discourse and higher levels of student discourse (Zhu, 2006).

Research by Lu & Jeng (2007) also suggests a relationship between teacher discourse levels, but teacher social discourse is addressed as well making it difficult to separate the variables and the relation to student discourse. This study will be discussed in more detail in the following section.

Social Discourse

Teacher social discourse defined as facilitation through encouragement and motivation may be related to levels of student discourse. (Hara et al., 2000; Ferdig & Roehler, 2004; Lu & Jeng, 2007). Lu and Jeng's (2007) study with two sections of an online course for inservice teachers examined the extent of knowledge construction and how instructors' participation and facilitation affected knowledge construction. Mixed method research included content analysis of student and teacher discourse levels using Gunawardena, et al.'s (1997) interaction analysis model; content analysis of teacher facilitation approaches using Garrison et al.'s (2000) "Practical Inquiry Model" as related to cognitive presence; and course evaluation student surveys (Lu & Jeng, 2007). Explanation was provided on why specific content analysis models were chosen and inter-rater reliability was conducted. One small weakness noted was a mix-up found in the discussion and the data tables. In the discussion, the Section A course was listed as instructor as facilitator only; whereas, the table listed the instructor as both facilitator and co-participant for Section A course. This also meant Section B course was mixed-up in the discussion and the data table. This caused confusion in interpreting the results and implications.

The same syllabus, activities, and content were used in both courses with one instructor role as facilitator only and the other instructor role as facilitator and co-participant. In both courses, students took roles as starters by providing a summary of the required reading and questions to begin the discussion and as wrappers by providing a summary of the discussion

issues at the end. Most postings were at Phase I, sharing/comparing which is similar to the findings of Kanuka and Anderson (1998) and Garrison et al. (2001). The course with instructor as facilitator and co-participant (Section A) did have more messages for Phase II, dissonance, and Phase III, negotiation and co-construction than the course with instructor as facilitator only (Section B). Also, there were a couple postings at the testing and application phases for Section A and none at this cognitive level for Section B. From the analysis of instructor facilitation, "with the encouragement, acknowledgement, and reinforcement of student contributions, more students seemed to progress beyond the 'social discord' feeling encouraged and invited to express different opinions" (Lu & Jeng, 2007, p. 194). They also observed the instructor facilitated and participated by confirming, explaining, and diagnosing misconceptions. Thus levels of teacher discourse and social discourse may together be a factor in facilitating higher levels of student discourse.

Hara et al. (2000) noted the instructor's surface level and feedback comments for encouragement kept discussion student-centered in the fairly high cognitive level postings; however, their study focused on specific relations for teacher design or structuredness to levels of student discourse which will be discussed later. From examination of online discussions and interviews with teachers of multiple classes conducting online discussions, Ferdig and Roehler (2004) found that successful integration of discussion occurred in "discourse-friendly environments."

Teacher social discourse may be related to student achievement (Picciano, 2002; Jung et al., 2002). In Picciano and Jung et al.'s studies, not only did student interaction show a positive and significant relationship to performance, but also social presence had a positive and

significant relationship to student performance. Details for both studies were discussed in the section on student interaction.

Picciano's (2002) study examined student interaction and performance as well as social presence and performance. Data for student perceptions of social presence was taken from responses to survey questions. Teacher techniques to build social presence and community included using first names, complimenting, and encouraging students to share personal experiences related to content. There was a positive significant relationship (.05) between social presence and performance on the written assignment, but there was a negative but not significant correlation for the exam.

Research by Jung et al. (2002) which looked at academic, collaborative, and social interaction groups found that the social interaction group outperformed the collaborative and academic groups. The social interaction group received encouragement and social feedback from the instructor which the other groups did not receive. Teacher social discourse appears to be an important variable for advancement of student performance, especially for student-generated products such as written assignments.

Teacher Interaction

Frequency of teacher interaction may relate to the frequency of student interaction (Zhu, 2006; Mazzolini & Maddison, 2007). Zhu (2006) believes that instructor's contributions can have a positive and a negative relationship, such as too much instructor involvement may stifle discussion. Mazzolini and Maddison's (2007) study of 40,000 postings to 400 discussion forums over six semesters investigated frequency of instructor participation, instructor timing of posting, and nature of postings by instructor. University evaluation surveys and student/instructor project surveys were used to analyze ratings of the discussion experience and instructor opinions. This

study replicated a 2003 study which had samples and took place over a shorter time span. Mazzonlini and Maddison (2007) found a significant negative correlation for percentage of discussion threads started by instructors with length of student postings and with rate of student postings ($p < 0.001$ for both). There was also a significant negative correlation between percentage of instructor postings within the discussion with length of student postings and rate of student postings ($p < 0.001$ for both). Thus, the higher frequency of teacher interaction appears to relate to lower frequency of student interaction. Surveys of student and instructor perceptions did not match to the statistical implications as they seemed to be satisfied overall with the frequency of instructor interaction.

Structuredness

Levels of structuredness; instructional design through means of discussion evaluation rubrics, guidelines and protocols, may be related to levels of student discourse. (Moore & Marra, 2005; Kanuka & Anderson, 1998; Gilbert & Dabbagh, 2005; Hara et al., 2000, Haavind, 2007) From the constructivist perspective, student-centered instead of teacher-centered environments should be developed and maintained.

Quantitative and qualitative research to document how structured online asynchronous discussions encourage higher-order cognitive and metacognitive processing was conducted by Hara et al. (2000) with 20 graduate students in a traditional classroom setting. Protocols for discussion required a minimum of one message per weekly discussion as well as each student to volunteer at least once to take the role of starter by asking questions related to course readings and once as wrapper by summarizing and noting ideas, issues, debates, and future directions. The starter-wrapper protocol was also found in Lu and Jeng's (2007) study, but their focus was the comparison of instructor facilitation with the protocol as a constant.

For content analysis, Hara et al. (2000) recognized flaws in Henri's (1992) model. Additional categories and examples for content analysis were made. Howell-Richardson and Mellar's activity graphs were used to provide a visual representation of the associations between online messages. This was used to understand the interactive process by mapping direct responses, indirect responses, and isolated responses. Students dominated the discussion, starter and wrappers took responsibility for discussions. Content analysis results for student discourse over the four weeks showed 33 percent at the surface level, 55 percent at the in-depth level and 12 percent containing both surface and deep. The researchers seemed to believe that the starter's questions shaped and directed the level of student discourse found in the discussions (Hara et al., 2000). In their discussion of results, disadvantages of the structured protocol were no negotiating of meaning, taking sides, or compromising observed and most students posted the required minimum of one message per week (Hara et al., 2000). The researchers also noted limitations of the study such as lack of interviews and student evaluation of own transcripts for triangulation.

Gilbert and Dabbagh's (2005) study of 87 graduate students investigated various elements related to structure, student facilitator guidelines, discussion protocols (required number of postings, posting length, and pacing for posts) and evaluation rubrics. The same course was analyzed across four semesters with an addition of a structural element each semester: required weekly participation; online instructor/facilitator guidelines article and evaluation criteria for student facilitators; tips for successful discourse and guidelines for frequency and pacing; discussion evaluation rubric. For content analysis, Gilbert and Dabbagh (2005) created a coding scheme which was mapped to Bloom's taxonomy. Making inferences (MI) was identified as the highest level of cognitive processing in the student discussions. The level of student discourse was discussed relative to the structural elements added to the course. With the introduction of

facilitator guidelines, there was an increase in the level of student discourse. The addition of guidelines for frequency and pacing seemed to have a negative impact on the cognitive level of student postings with a decrease in the percentage of making inferences (MI) from the previous semester (Gilbert & Dabbagh, 2005). While the researchers attempt to show that the addition of discussion rubrics has significant positive impact, no statistical evidence is provided and it seems the data is being reanalyzed in a different way, emergent analysis, to find a positive relation. From this study, the use of facilitator guidelines and discussion rubrics may have a positive impact on the level of student discourse; whereas, the addition of detailed guidelines for length, pacing, and required number of postings may have a negative impact.

In one of the few and very recent online high school studies found, Haavind (2007) scanned discussion forums from 112 Virtual High School courses to detect those courses having thread depths of four or higher. The researcher considered this standard to be indicative of extended collaborative student dialogue. Twenty-two courses contained forums meeting this standard. In only three of the courses the extended dialogue occurred regularly over the semester. Teacher dialogue was regular but minimal throughout. The cross-case comparison study focused on teaching presence from Garrison et. al's (2001) Community of Inquiry model. Design and facilitation strategies were examined. Harasim's (2002) model was used to categorize student postings as idea generating, idea linking, or intellectual convergence relative to stated learning goals. Two social categories were added by the researcher. Higher-order thinking was not examined.

Instructor postings were analyzed using Collison, Elbaum, Haavind & Tinker's (2000) framework for instructor voices and teaching presence indicators derived from patterns observed. Private feedback, evaluation rubrics, and discussion guidelines were examined. Cross-case

analysis found that evaluation feedback through rubrics or private communications as well as explicit teaching for student discourse supported collaborative dialogue. Additionally, design of specific activities to establish social community and collaboration were evident more so in the three courses than in courses examined earlier. The variation in the teacher instructional design of the online high school courses was noted, but commonalities were revealed.

Moore and Marra's (2005) study referenced in the knowledge construction section found that the less structured, formalized discussion protocol was associated with higher levels of student discourse. The more task-oriented discussion protocol influenced the amount of interaction and there was less evidence of higher levels of discourse. While Gilbert and Dabbagh (2005) show some facilitation and structure has a positive relation for discourse, there can be negative relationships for some types of structure in discussions. In Haavind (2007), structure was seen as a factor for student interaction in online high school courses.

Summary of Research of Teacher Presence in Online Courses

The instructor is responsible for creating a sense of online community. The question was posed as to the relation between teacher practices for design and facilitation of student discourse and higher levels of student discourse in discussion forums. The propositions associated with this question were also derived from the selection of studies: (a) higher levels of teacher discourse may lead to higher levels of student discourse, (b) higher levels of teacher discourse may lead to higher student achievement, (c) teacher social discourse may be related to higher levels of student discourse, (d) teacher social discourse may be related to student achievement, (e) frequency of teacher interaction may relate to the frequency of student interaction, (f) levels of structuredness may be related to levels of student discourse.

From the review of higher education online learning research, there was some evidence (Zhu, 2006) of teacher levels of discourse supporting higher levels of student discourse, but there was a combination of teacher discourse variables which may influence student discourse observed as well (Lu & Jeng, 2007). Further research in this area and evaluation of content analysis tools and coding is suggested. Research on the relation between teacher discourse and levels of student performance is lacking which was also found to be a gap for student discourse and performance. Multiple studies (Hara et al., 2000; Ferdig & Roehler, 2004; Lu & Jeng, 2007) examined or made reference to the positive relation of teacher social discourse and student levels of discourse which has implications for instructional practice. The relationship between high levels of teacher interaction and its negative impact on student discourse (Zhu, 2006; Mazzolini & Maddison, 2007) is similar to what can occur in classrooms when teachers take over the discussion. Even student-centered classrooms provide some structure for students, and Moore & Marra (2005), Gilbert & Dabbagh (2005), Hara et al. (2000) found that moderate levels of structure, not too much or too little, provided an environment for student construction of knowledge to occur.

Review of Literature Summary

With the fast-paced growth of online instruction for K-12, educators must be able to make informed decisions for evaluation of teachers and courses. “Online learning or e-learning isn’t about digital technologies any more than classroom teaching is about blackboards. E-learning should be about creating and deploying technology systems that enable constructive human interaction and support the improvement of all teaching and learning” (Blomeyer, p. 19, 2002). Thus, identification of classroom best practices for students directs instructional practices in online environments. Factors from face-to-face settings include opportunities for social

interaction and collaboration, authentic learning, active and engaged construction of knowledge. Student is center with the teacher as the "guide on the side".

Cavanuagh et al. (2004) warns that educators and leaders of K-12 distance education will need to be careful in generalizing the adult research to young adults; however, the implications from higher education research suggest that constructivist principles relative to social constructivist theory can be applied in online communities with positive results. The Community of Inquiry model, a concept of a learning environment integrating social, content, and teaching presence; and the *Seven principles for good practice in undergraduate education*, an outline of specific best practices for teaching college students, presently serve as both a basis for research and a guide for instructional practices in online learning for higher education. While the Community of Inquiry model provides a conceptual framework for an online environment, the Seven Principles fit within the model as concrete practices for directing instruction. Even in K-12, many of these principles are also seen as effective instructional practices for K12, such as high expectations, active learning, student-teacher contact, and cooperation among students (Marzano, 2007). Until more K-12 distance education research is conducted for effective practices relative to social interaction and collaboration, we can consider the lessons learned through higher education.

Similar to social constructivist theory principles, the online research shows strong evidence for the relation of teacher social discourse and moderate levels of structure to advance student levels of knowledge construction. Instructor facilitation and design of the environment can enhance the potential for student responsibility and ownership of learning. The importance of the teacher as a guide not only in classrooms but also in online environments is seen. Strong evidence is found between the frequency of student interaction and higher levels of performance,

especially seen in student-generated written assignments. This may be due to the nature of asynchronous computer mediated communication, where dialogue is transformed into text. As perceived by Vygotsky, through dialogue, language and thought are related as language is used to manipulate, relate and organize our thinking (Oldfather & West, 1999). How we come to know is through social interaction for construction of new learning.

The United States Department of Education along with national organizations and institutions has stated the need for research in K-12 distance education. "The lack of detail in the research to date hinders thorough investigation of the factors influencing practice, and limits what can be learned for the improvement of practice" (Cavanaugh, Gillan, Kromrey, Hess, & Blomeyer, p. 21, 2004). Gaps in research are seen even in higher education regarding student discourse and performance and teacher presence and performance. Rice (2006) notes the limited K-12 research and existing descriptive type of research provides little context for examination of K-12 interaction related to student performance, satisfaction, and retention. As we consider the key constructivist principles in classroom practice and the ability to transfer and transform these into an online environment, study and review of teacher presence through teacher structure and facilitation of discussion in secondary online courses for student interaction and discourse and the relation to student learning outcomes found in levels of discourse, tests, and student products may offer vital insight for K-12 research-based online instructional practices. That is the intention of this study. Research-based practices to facilitate and improve student discourse and performance need to be identified. From this, administrators will know what to look for as they evaluate teacher and online course quality. Policies for online course and teacher evaluations can be established to determine their effectiveness for student learning.

Chapter Three

Methodology

Statement of Purpose

As stated by Cavanaugh et.al. (2004), there is a need for detailed research in K-12 distance education to examine the factors that influence practice in order to improve practice. Factors identified from K-12 classroom settings include opportunities for social interaction and collaboration, authentic learning, active and engaged construction of knowledge (Ornstein & Hunkins, 2004; Boulton, 2002, Marzano, 2007). Therefore, the purpose of this study was to focus on the factors of social interaction and construction of knowledge by first examining the occurrence of student discourse in asynchronous computer-mediated communication and its relation to student learning. Once this information was collected and analyzed, the second significant issue of interest was the online instructional practices for design, facilitation and direction of asynchronous discussion and its relation to student discourse for construction of knowledge.

From the review of literature, the research questions significant to the topic and propositions reflecting theories based on research were developed. These provided focus and organized the study. The research questions guided the examination: What is the relationship between the level of student discourse in asynchronous discussion forums and student learning outcomes in high school online courses? How is teacher presence related to student discourse in online high school courses?

As recommended by Yin (1984), the theory- based propositions focused attention on examining evidence and providing feasible limits for the study. The evidence collected relative

to the specific propositions is discussed in detail under the data collection section of this research study.

Research Design

The qualitative research design was chosen in order to gain an in-depth understanding of the research questions. In qualitative research, "the researcher builds a complex, holistic picture, analyzes words, reports detailed views of informants, and conducts the study in a natural setting" (Creswell, p. 15, 1998). The various relationships and dynamics that occur in an online course are best studied through a holistic perspective. Gunawardena and McIsaac (2004) recommend qualitative research methodologies for identification of personal, social and educational elements in successful distance education environments. The multi-faceted nature of distance education, and the complexities within an online community of learners requires comprehensive study, analysis, and interpretation in order to expand knowledge. In the review of literature, prior studies were mainly case study designs which provided data from the setting and participants through descriptive narratives and quantification of qualitative data collected from the online course environment.

Case Study

The case study approach involves a specific real-life context of phenomena where multiple sources of evidence are used to explain, describe, evaluate, or explore the situation (Yin, 1984). Waggoner (1992) views the case study method as a systematic and compelling argument by providing the facts, credible evidence and the circumstances in which they occur. Complexities of interacting variables are analyzed for constructing understandings. Through thick description, the circumstances, characteristics of people, and nature of community can be evaluated (Guba & Lincoln, 1981). Kleinman (2004) views the case study method as a useful

approach for examination of social phenomena in online settings, and Henri (1992) considers it as an appropriate method for observing and understanding the social and cognitive processes that take place within the online classroom.

Overall, the case study definition is synonymous among various qualitative experts; however, the classification of the types of case studies differs. Yin (1989) categorizes case studies as exploratory, descriptive, or explanatory. The research questions posed are considered to be the rationale for the strategy. "What" questions are relevant to exploratory study; whereas, "how" and "why" questions are relevant to explanatory or causal inquiry study. While one of my research questions asks "what", the second question asks "how". For both questions, the case study strategy is appropriate. While the goal of exploratory case studies is to generate hypotheses for further study; the goal of explanatory case studies is to explain causal links reflecting theoretical propositions. For my research purpose, an explanation was made from examination and analysis of data related to my propositions.

Case study design can be single-case or multiple-case studies (Yin, 1989). A multi-site study providing detailed descriptions and themes within the individual cases was followed by a cross-case analysis (Creswell, 1998). I examined two high school online AP English courses from Idaho Digital Learning Academy (IDLA) as individual cases. For advanced placement courses, students were able to receive college credit if they took and passed the AP exam.

Each course was an individual explanatory case study, but as a whole it was a multiple-case design. From the original study, the extent, presence, or absence of characteristics was compared and contrasted with the second study (Bogan & Biklen, 1998). Thus, the evidence is considered as "more compelling" (Yin, p. 48, 1984). When similar results are found from the same predictions for each case, then the study can be considered as replicated. Whether

characteristics are found to be similar or not within each case, the disparate and the parallel are equally important (Stakes, 2000). Multiple sources of information were collected and interpreted to generate better understanding and theorizing. Knowledge and enlightenment from the intensive examination of specific cases may guide similar situations (Rossman & Rallis, 2003). In this case, the situation would be limited to advanced level high school populations.

Procedures

Course management system technology affords researchers opportunities for study of a naturalistic distance learning setting whether it is open or no longer available to students. Archived courses provide a complete record of the participant interactions as well as the content and context of all aspects of the online course (Mann & Stewart, 2000). Further advantages for research provided by this technology include extended access across time and space and unobtrusive observation. Ethical access and usage of archived records was addressed through the Virginia Tech Internal Review Board process due to privacy and intellectual property rights of students and teachers (Kleinman, 2004). Approval was received by the VT IRB in January 2008 and is included as Appendix B.

Selection of Participants

In face-to-face secondary AP English classes, individual written assignments and interactive discussions are prevalent partially due to curriculum requirements. In my position as a library media specialist for fourteen years, I collaborated with middle school English teachers. I had the opportunity to observe dialogue leading to social construction of new learning through insightful small group and whole class literary discussions. From trainings with middle school teachers learning to supplement face-to-face classes with online course management technology, English teachers were enthusiastic and amazed with the quality of student discussion especially

from students who did not interact within the face-to-face setting. The text-based online environment requires profuse writing which supports expectations within the traditional AP English class setting. I conducted this study with two high school online AP English courses based on the nature of the curriculum and the activities that would normally occur in the traditional classroom environment. Students taking AP English courses are usually planning to go to college and are more likely to have advanced skills in reading and writing.

I obtained permission from the IDLA to study two of their online high school AP English courses. As a state-sponsored, accredited virtual school, they offer high school online courses statewide. Created by the Idaho State Legislature, 7th- 12th grade students are able to take core and elective classes as well as Advanced Placement and Dual Credit courses. AP English is offered in two parts, Part A and Part B, over two semesters. A written and signed Memorandum of Agreement, included as Appendix C, was received from the IDLA administration and after approval from Virginia Tech's IRB, access to the designated online courses and teacher contact information was obtained.

Data Collection

To develop an in-depth, holistic picture of high school distance education AP English courses, a wide range of data collection methods was necessary. Just as in scientific inquiry, there are tests or criteria for rigor in qualitative research. Yin (1989) describes four concerns to be addressed: a) internal validity b) external validity c) reliability and d) construct validity. The four tests and methods for addressing these concerns are outlined in Table 2 (Yin, p. 41, 1989). The tests and how they were addressed in this study are discussed as follows.

Table 2

Case Study Tests and Tactics

Tests	Tactic
Internal validity	Do pattern matching
	Do explanation building
	Do time-series analysis
External validity	Use replication logic in multiple-case studies
Reliability	Use case study protocol
	Develop case study data base
Construct validity	Use multiple sources of evidence
	Establish chain of evidence
	Have key informants review draft case study report

Internal validity can be addressed through "pattern-matching" or explanation building (Yin, 1984). Inferences and suppositions made may not be airtight or correct. By using initial propositions for comparing findings of individual cases to propositions; comparing across cases; and revising propositions as one continues to compare the findings, analysis is done to build an explanation. "The gradual building of an explanation is similar to the process of refining a set of ideas, in which an important aspect is again to entertain other plausible or rival explanations" (Yin, p. 115, 1989).

External validity is the problem of generalizing results to other cases. In each of the individual case studies, the results showed whether the propositions were supported or contradicted and conclusions were drawn for relationships. Through multiple case design or collective case study, the fittingness of propositions from the original case study was also examined in the second online setting. Cross-case analysis enabled better understanding of the theoretical relationships found across two cases resulting in implications.

Another test to be considered in judging the quality of research is reliability. The objective is to be able to conduct the same study again. Reliability can be addressed by conducting the study so that others could follow the same procedures and potentially come to similar findings (Yin, 1984). Yin considers that having a case study protocol increases reliability. The protocol consists of an overview of the project's issues and readings relative to those issues; explicit field procedures; research questions for inquiry and determination of sources of evidence; and an outlined case study report. The chapters of this study followed a case study protocol.

The subjective nature of qualitative research requires an establishment of specific measures relative to the concepts of the study. Construct validity can be attended to through the use of multiple sources of data providing a chain of evidence (Yin, 1984). Triangulating multiple data sources and cross-checking inferences with participants can corroborate interpretations. As shown in Table 3, data collection relative to the study's propositions consisted of archived data and multiple sources providing the ability to cross-check with a chain of evidence linked to the research questions: discourse analysis and interaction frequencies of archived asynchronous computer-mediated discussions; document analysis of materials posted for student access; analysis of student assignment scores; and teacher interview transcripts.

Table 3

Data Collection Guided by Study Propositions

Research questions	Propositions	Data collection
What is the relationship between the level of student discourse in asynchronous discussion forums and student learning outcomes in high school online courses?	Knowledge may be constructed through student discussion.	Content analysis – Interaction Analysis Model Teacher interviews
	Higher levels of student discourse may lead to higher levels of student performance.	Scores from student timed writing assessments Teacher interviews
	Frequency of student interaction may be related to higher levels of student discourse.	Frequency counts Content analysis – Interaction Analysis Model
	Frequency of student interaction may be related to student achievement.	
How is teacher presence related to student	Higher levels of teacher discourse may lead to higher levels of	Content analysis – Interaction analysis

discourse in online high school courses?	student discourse.	model
	Higher levels of teacher discourse may lead to higher student achievement.	Scores from student timed writing assessments Content analysis Teacher interviews
	Teacher social discourse may be related to higher levels of student discourse.	
	Teacher social discourse may be related to student achievement.	
	Frequency of teacher interaction may be related to the frequency of student interaction.	Frequency counts
	Levels of structuredness may be related to levels of student discourse.	Document analysis of syllabus, schedule, and discussion prompts Content analysis Teacher interviews

Archived discussion forums were obtained and reviewed for coding of student discourse levels and reviewed for emerging characteristics of teacher facilitation of student discourse. Frequency counts of student and teacher interactions were conducted. Documents, such as course syllabi and course schedules for student access were examined. Timed writings scores were reviewed

for student performance outcomes. As discussion prompts contained guidelines or structuredness for posting responses, they were examined. Teacher interviews for additional understanding and confirmation of perceptions about knowledge construction, student performance outcomes, and teacher presence within the environment were conducted.

Data Analysis

Archived documentation, content analysis categories, detailed descriptions, and notes from multiple sources and cases were kept in digitized format for future review and further confirmation of findings and conclusions by others. Whether propositions were demonstrated or not in each case, theory and implications have been reported in accordance to the chain of evidence.

Document Analysis

Document analysis is considered as the most objective means to understanding human behaviors (Guba & Lincoln, 1981). It is a non-reactive and unobtrusive form of research. Content analysis falls in this category but is discussed separately as a method to use for discourse analysis. Documents are written for a specific purpose and reflect the objectives of those involved, including the author and those who will review it (Yin, 1984). Documents can shed light on the context of the situation being investigated (Guba & Lincoln, 1981).

Artifacts reviewed included teacher products, such as syllabi, course schedules, and any documents and discussion prompts outlining objectives and expectations. These data in conjunction with teacher interview statements provided some understanding of the teacher's pedagogical beliefs for student learning. Also, the structural elements included in the course were reviewed. The relationship of teacher guidelines, protocol and structure to the collaborative student discourse was analyzed.

Content Analysis

Mason (1992) criticized earlier conclusions drawn over the innovative potential of computer mediated communication, because little reference had been made to the content and value of the interactions. Measurements were mainly quantitative due to pressure for evaluation of success, subjectivity concerns, and the difficulty of analyzing the quality of interactions. Computer-generated statistics such as number of entries may be reliable and accurate but this does not demonstrate learning resulting from the discussion activity.

"Content analysis helps us to understand the learning process and offers data useful to improving the efficacy of interaction with students" (Henri, p. 135, 1992). Gunawardena, Lowe, and Anderson (1997) view assessment of the quality of interactions and learning as essential to evaluation of computer mediated communication. Additionally, content can be analyzed for emerging roles, types of messages, and nature of interactivity (Mason, 1992).

As a rule-guided, systematic process, one must determine whether instruments developed by other researchers having preconceived coding schemes are appropriate to the case's research purpose, or whether tools from others should serve as a starting point, or whether some or all coding should emerge from the data itself (Guba & Lincoln, 1981; Stakes, 2000). Also, a decision on the unit of analysis for coding into categories must be made.

To examine student levels of discourse for construction of knowledge, I used Gunawardena, et al.'s (1997) Interaction Analysis Model for Examining Social Construction of Knowledge in Computer Conferencing (IAM). Derived through grounded theory principles, the model consists of phases or stages of knowledge co-creation as outlined in detail in Appendix D. The model was developed after review and application of other interaction analysis models. Deficiencies were found in other instruments, so a new model based on theory and a definition of

interaction was derived. It was also applied by the researchers in a second condition and has been used in multiple studies including ones referenced in the literature review of Chapter Two. In considering the question of validity, it was believed that the instrument accurately reflected the levels of knowledge construction in the two different situations studied.

Gunawardena et al. believe the model is appropriate for evaluation of secondary school discussions where the teacher views student learning as collaborative construction of knowledge. Upon obtaining permission for use of the IAM for my study which is included as Appendix E, Gunawardena also expressed interest in the data that I would be collecting from this study of high school online student discussions.

Archived data from three discussion forums within each case were analyzed. Purposive and random selection was used to determine the specific forums for analysis. The total number of discussions was divided into thirds and categorized as beginning, middle, and end of course period. From each category, a forum was randomly selected for analysis. Labeling and coding of archived forum messages using categories derived from prior research by Gunawardena et al. (1997) was used to determine the level of student discourse found within the discussions. Each message was read and coded using the IAM phases. If a message's content was coded in more than one phase, each level found was recorded for that individual's message. A compilation of the results shown as coding frequencies provided quantification of the qualitative analysis (Moore & Marra, 2005). Teacher discourse was also coded in accordance to the IAM for inclusion as part of the learning process.

Inter-rater reliability was conducted by having an experienced online instructor and English professor from a small, rural 4-year college review the messages and score the data separately. Similar to the inter-rater reliability process used by Marra, Moore, and Klimczak

(2004) in their study of content analysis protocols, when discrepancies were found between coders, re-examination, discussion of rationale, and negotiation to reach agreement occurred. When agreement was not reached, the messages were documented as unresolved. Prior to the analysis of actual data for the study, a pilot for training purposes was conducted with this second coder on coding the IAM categorical indicators. Using Cohen's kappa formula of 70% for satisfactory inter-rater reliability, inter-rater reliability for the pilot was 86% which was considered as satisfactory for the training goal. Cohen's kappa formula was used to determine inter-rater reliability for the two courses. Inter-rater reliability for the coding of the six forums was 94%.

It was noted in the comparison process that agreement occurred frequently at the main category or Phase level and became more difficult to define and come to agreement at the IAM subcategory level. Researchers developing their own coding systems in accordance to emerging themes are able to have a more complete understanding for applying the codes.

As the messages were coded for levels of discourse, categories emerged for types of messages that were not for content purposes but were for social purposes. In the review of literature, evidence for social teacher discourse showed a positive relation for student learning. Therefore, the categorization and coding of encouraging, modeling, or off-topic types of messages enabled observation of relationships to messages at higher phases as identified through the IAM. The NVIVO qualitative research software was used for this categorization process.

Interviews

Savenye and Robinson (1996) define interviews as conversation for the purpose of gathering data relative to research questions and propositions. For this study, a semi-structured approach was used. In a semi-structured interview, initial pre-designed questions are used but

there is the freedom to ask other questions that may arise from the conversation with the instructor. A set of questions derived from the protocol of the case study allowed for corroboration and insight to findings from data collected through other methods. Answers were categorized in relation to the propositions for confirmation or disconfirmation of interpretations from the prior review of documents and discourse.

An explanation of the research project was given, and e-mail addresses and phone numbers were exchanged in case future contact was needed (Kleinman, 2004). Questions addressed the initial themes as derived from the review of literature and are listed in Appendix F. A pilot interview was conducted with an English professor who has taught multiple online undergraduate English courses to determine whether changes or additional questions were needed in order to improve data collection and interpretation.

Due to distance, teacher interviewees were amenable for interviews to take place online through Skype, a free messaging service with online audio and video conferencing capabilities. Audio recording of the interview sessions was done using Audacity software and an iPod with a microphone attachment as a back-up. These were used to accurately transcribe interview data. Transcriptions were e-mailed to each teacher for review and further comment as desired.

Care was taken not to ask leading questions that could cause bias. Yin (1984) and Kleinman (2004) also note that poor recall is an issue to be considered. Due to the time span between when the class was taught and when the teacher was interviewed, pertinent archived discussions and instructor documents were referenced for the interviewee. Teachers were able to access their courses during the interview to refer back to discussion prompts posted and teacher documents. Corroboration of the data from multiple resources is essential in qualitative research. The experiences and observations of each of the teachers in the case studies along with

similarities and differences noted between the teacher interviews contributed to the interpretation and analysis as a whole. Student background information, such as possible reasons for student absence in discussions or prior student online experience, was valuable to the understanding of the case.

Frequency Counts

Quantitative methods focusing on volume of interactions does not explain student interaction for learning by itself (Henri, 1992). It can be useful when considered along with the analysis of the interactive learning process. Can the discussion be characterized as more teacher or learner-centered, and what seems to be the importance of the amount of student or teacher participation for the process of learning? Frequency counts in conjunction with evidence from content analysis may be more encompassing and provide further insight into the construction of student learning. Studying counting within the context of the theory is the intention of its use (Bogan & Biklen, 1998).

As discussed in the literature review, there were inconsistencies as to whether higher frequency of student interaction is related to quality of discourse. Additionally, inconsistencies were found for the relation of higher frequency of teacher interaction to student frequency of interaction and quality of student discourse. Frequencies, number of posts by individual students and teachers and total for all students in the class were examined in relation to analysis of discourse levels.

Data Management and Conclusions

NVIVO qualitative research software and Microsoft Excel were used for management and analysis of coded data. Microsoft Word was used to make notes and reflections about specific evidence and its relation to case study issues. For comparisons between cases, data from

each case was delineated in tables. The case study database consists of a chain of evidence citing relevant evidence from data collection linked to the original propositions (Yin, R., 1984).

The details found within the data provided the theoretical and practical insight into the context of learning (Gunawardena, C., Lowe, C. & Anderson, T., 1997). Inferences were drawn from the relationships found within and across cases. Mason (1992) views the qualitative analysis of content as construction instead of discovery of knowledge. As this study was centered on the theoretical framework of the social construction of knowledge, the case study methodology seemed especially appropriate.

Chapter Four

Results

The results of the data analysis for this study are presented in three sections. The first two sections describe the findings for the case studies of two online high school AP English courses. The third section compares findings across the two cases. Within each section, data is organized relative to two of the primary research questions; what is the relationship between the level of student discourse in asynchronous discussion forums and student learning outcomes in high school online courses and how is teacher presence related to student discourse in online high school courses? Descriptive data is presented using frequency counts, maximums, and percentages for tabulation of student discourse, student learning outcomes, and teacher discourse. Direct quotes from posted course documents, discussion prompts and responses, and teacher interviews have been extracted for triangulation of data with multiple sources. The data collected addresses the research propositions relative to the research questions.

Course 1

Through IDLA, students take the AP English course in two parts, Part A and Part B over two semesters. The first case study designated as Course 1 was AP Language and Composition American Nonfiction, Semester One. At the beginning of the term, there were eleven students in the class. One student dropped out. The Course 1 teacher had taught in the traditional high school and had taught online English and science courses prior to teaching the course examined in this study. Course 1 was divided into weekly units which included required readings, discussion prompts for student response to topics addressed in the readings, timed writings, and a variety of writing and objective assessments. Using the purposive and random selection techniques described in Chapter 3, data from Units 6, 9, and 14 were collected and analyzed.

Relationship of Student Discourse and Student Learning Outcomes

While this first research question provided a focus, the plan for data collection was formulated by the propositions that knowledge may be constructed through student discussion; higher levels of student discourse may lead to higher levels of student performance; and frequency of student interaction may be related to higher levels of student discourse and to student achievement. Data sources used in relation to these propositions were the student responses from Units 6, 9, and 14, timed writing scores, and teacher interviews.

Knowledge construction. For each unit, students were to read the listed titles prior to participating in the unit discussions. The discussion prompts were centered on ideas from the readings and served as practice for different types of writing. After coding of all student responses for each unit, the co-rater and I reached consensus on the level of knowledge construction in Course 1 discussions as shown in Tables 4, 5, and 6. For analysis of relationships, the IAM phases and their subcategories were coded according to the phase level and its sublevels. For example, Phase I has five subcategories, A. through E., and each was coded sequentially as 1.01, 1.02, 1.03, 1.04 and 1.05. While passages from each student response may have been coded at more than one level, the highest phase level from each student response is recorded in the tables.

The Unit 6 focus was argument which included exercises with argument terms and argument analysis. The discussion prompt for Unit 6 asked students to find the fallacies in arguments from newspaper editorials. As shown in Table 4, all students who responded reached Phase II during Unit 6 discussion, “the discovery and exploration of dissonance or inconsistency among ideas, concepts, or statements” (Gunawardena, et. al., 1997). Student H1 reached Phase III as he proposed a statement of compromise from the student discussion on the argument of gay

marriages, " Don't hate them. Appriate [*sic*] what they can do in this world. You can allow them to have love and not hidding [*sic*] in the darkness". Overall, 39.29% of the student responses were at Phase I, 57.14% at Phase II, and 3.57% at Phase III. Note that Student K1 made no responses for Unit 6 discussion.

Table 4

IAM Phases for Unit 6 Discussion Responses

Student	R1	R2	R3	R4	Max
A1	2.03	2.01	2.03	1.03	2.03
B1	2.01	1.02			2.01
C1	2.01	2.02	2.03		2.03
D1	2.03	2.03	1.02		2.03
E1	1.05	2.03			2.03
F1	2.01	2.03	1.01		2.03
G1	1.02	1.01	2.03		2.03
H1	1.03	2.01	3.04		3.04
I1	1.05	1.02	2.03		2.03
J1	2.01	1.03			2.01
K1					

The argument focus was continued in Unit 9. In Table 5, coding for Unit 9 discussion responses to the discussion prompt on an author's history of America titled *A Different Mirror* are reported. Seven of the ten responding students reached Phase II and three reached Phase III, "negotiation of meaning/co-construction of knowledge" (Gunawardena, et. al., 1997). Student

K1's Phase III response clarified the meaning behind the book's mirror analogy, "Everyone sees something different when they look into a mirror. When rooms full of people are looking at the same mirror, they all see different angels [sic] of other people and no two people see the same picture." Overall, 40.98% of the student responses were at Phase I, 52.46% at Phase II and 6.56% at Phase III.

Table 5

IAM Phases for Unit 9 Discussion Responses

Student	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Max
A1	2.01	3.02	2.03	1.03	3.02	2.03	1.05	1.04			3.02
B1	1.02	2.01	2.01	1.01							2.01
C1	2.03	2.03	2.03	1.02	1.05	2.01					2.03
D1	2.03	2.03	1.03	2.02	2.01						2.03
E1											
F1	2.01	2.01	2.01	1.02	1.02	2.01	1.05	2.02			2.02
G1	1.01	2.03	2.03	1.03	2.01	2.01					2.03
H1	2.01	1.05	2.02	2.03	1.03						2.03
I1	1.01	1.02	1.03	1.02	2.03	1.01					2.03
J1	2.03	2.03	3.01	2.03	1.02	1.02	1.05	1.05	1.04	2.02	3.01
K1	2.01	2.02	3.01								3.01

The reading and writing focus for Unit 14 involved reflection. The Unit 14 discussion prompt requested students to consider a quote from the required reading on photos and their captions. As shown in Table 6, three students responded at Phase I level of knowledge

construction, three at Phase II, and three at Phase III with neither Students E1 or K1 responding to the discussion. Student I1's Phase III response reached 3.05, "proposal of integrating or accommodating metaphors or analogies" (Gunawardena, et. al., 1997). Student I1 commented,

> When she says that photos wait to be explained by their captions that cannot actually happen because pictures do not have captions, so she is speaking metaphorically and is creating an image for her readers. She is creating an image saying that every time a person looks [*sic*] a picture, they might create in their mind a caption underneath it to describe what they think of that picture.

Overall, 65.31% of Unit 14 discussion was at Phase I, 26.53% at Phase II, and 8.16% at Phase III.

Using the IAM, I was able to find out the level of student discourse for the discussions for verification of social construction of knowledge. During the interview with Teacher 1, the teacher stated,

> I think what I've noticed the most, umm, is the change in students' writing over the course of the semester. Umm, and I think because in this environment, almost all of the communication is taking place in writing that sometimes and not with every single student, but frequently there's a really noticeable change in the students' writing from the beginning of the semester to the end where they're having to really express themselves, to take down their thoughts, to maybe have an argument and develop it in writing, umm I think it's just a lot more practice then they would have perhaps in the face-to-face classroom where some of these discussions would be happening orally.

Table 6

IAM Phases for Unit 14 Discussion Responses

Student	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Max
A1	1.05	1.03	1.01	2.01	1.03	1.03	2.01	3.01	2.02	2.03	3.01
B1	1.03	1.03	1.05	1.05							1.05
C1	1.03	1.05	1.03	1.05							1.05
D1	1.02	2.02	1.05	1.05	1.03						2.02
E1											
F1	1.05	1.02	1.05	2.03	3.04	1.02	1.02	1.02			3.04
G1	1.04	2.02	2.01	1.05	2.03						2.03
H1	1.02	1.03	1.02	1.03							1.03
I1	2.03	3.01	2.03	2.01	3.05						3.05
J1	1.05	1.02	2.01	1.02							2.01
K1											

Level of student discourse relative to student performance. Timed writings were given at the end of each unit to assess student writing on an assigned topic and to provide practice for the Advanced Placement examination. An explanation of the timed writings was provided to the students in a teacher-generated document posted in Blackboard,

> The AP exam consists of a section of multiple-choice questions, followed by some essay questions which ask you to respond to a passage selected from a nonfiction text. The "Timed Writing" at the end of every unit in this class is

modeled on (often directly copied from) questions taken from past years' AP exams.

As each unit had different kinds of student assessments and the timed writings were a consistent evaluation of student performance, I requested timed writing scores from Units 6, 9, and 14 for analysis of the relationship between student discourse and student learning outcomes. Also, the teacher believed there were similarities in the expectations for the timed writing assessments and discussion responses compared to other course assessments of student performance. Of note, time is a factor for timed writings but not for the discussion forum. The maximum score for timed writings was 20.

Table 7 shows each student's level of discourse in the three discussion forums and their timed writing scores as assigned for each unit. Frequency is included in Table 7 but will be discussed in the following section of this chapter.

In Unit 6, the maximum student discourse level was mainly at Phase II for all students, but the timed writing scores ranged from 15 – 20. Student H1 reached the highest level of Phase III but did not have the highest score. Student B1 scored the lowest and responded at a lower Phase II level. Yet, Student J1 had the identical maximum discourse level as Student B1 and scored 19 on the timed writing. Also, Student K1 did not participate in the discussion and achieved a score of 19.

While Student A1 responded at the highest level, Phase III, for Unit 9 and achieved a 20 on the timed writing, Students B1 and H1 also obtained the same score but responded at the Phase II level. Student K1 who did not participate in Unit 6 responded at a higher level for this forum but received the lowest score on the Unit 9 timed writing.

Table 7

Course 1 Overview

Student	Forum 6 Max	Freq	TW score	Forum 9 Max	Freq	TW score	Forum 14 Max	Freq	TW Score
A1	2.03	4	20	3.02	8	20	3.01	10	20
B1	2.01	2	15	2.01	4	20	1.05	4	16
C1	2.03	3	18	2.03	6	14	1.05	4	17
D1	2.03	3	19	2.03	5	14	2.02	5	20
E1	2.03	2	19		0	14		0	12
F1	2.03	3	18	2.02	8	18	3.04	8	20
G1	2.03	3	20	2.03	6	12	2.03	5	19
H1	3.04	3	19	2.03	5	20	1.03	4	20
I1	2.03	3	18	2.03	6	15	3.05	5	17
J1	2.01	2	19	3.01	10	16	2.01	4	20
K1		0	19	3.01	3	10		0	

Half of the students received the maximum score of 20 for Unit 14 timed writings. This forum had the highest percentage of Phase III responses. Student E1 did not respond for this forum and received the lowest timed writing score of 12. Yet, Student I1 reached the highest level within Phase III in Unit 14 but scored 17 on the timed writing. Student H1 responded at the lowest level of all responding students but scored 20.

I did not have access for viewing of student timed writings. Teacher feedback was provided to students on their timed writings. This was stated at the beginning of the course through the teacher's timed writings expectations,

> And I want to tell you up front—because I know that all of you are probably accustomed to earning high scores, and sometimes with*out* a great deal of effort – that I'm a tough grader when it comes to these essays—I'm here to push you to improve. Even a *good writer* can grow. So--especially at the times when I'm giving you an opportunity to add points with revisions—I won't be "giving away" points, I'll be pushing you [*sic*] *earn* them.

When asked if the teacher saw any relationship between the discussions and the quality of the timed writings, the teacher believed,

> The kids who've had a lot more to say in the discussions and tended to go more in-depth in their conversations, they're also the ones who are more likely to write the lengthy and involved timed writings. Now having said that, it is a timed writing so they were limited in their time but perhaps they've had more practice in getting more words out in that time.

Frequency related to level of discourse and achievement. For Unit 6, the frequency of student responses ranged from 0 – 4. While Student A1 had the highest frequency of responses, he did not have the maximum discourse level. Student A1 responded most frequently, Student K1 did not respond at all, and the students scored 20 and 19, consecutively.

Unit 9 had the highest total of student responses for the three forums with more students responding at the Phase III level compared to Unit 6. The frequency ranged from 0 – 10 student interactions. Timed writing scores were lower overall.

In Unit 14, the frequency range was the same as for Unit 9, but two students did not participate in the discussion. Two students with the highest frequency of interactions and responding at Phase III levels scored 20 on the timed writing. Yet, Students H1 and J1 also scored 20, responded less frequently, and at the lower phase levels.

After setting up the previous tables for data analysis, I asked the teacher about the lack of participation by Students E1 and Student K1 and whether they completed the course. Teacher 1 responded that both students had fallen behind in the schedule but did complete the course with C's.

Teacher Presence and Student Discourse

For the second research question on the relationship of teacher presence to student discourse, the plan for data collection was formulated by the propositions that higher levels of teacher discourse may lead to higher levels of student discourse and higher student achievement; teacher social discourse may relate to the levels of student discourse and achievement; frequency of teacher interaction may relate to frequency of student interaction; and levels of structuredness may relate to levels of student discourse. Data sources used in relation to these propositions were the teacher responses from Units 6, 9 and 14, teacher-produced documents, and teacher interview.

Level of teacher discourse related to level of student discourse and achievement. The IAM was used to code teacher responses also. Within each unit discussion, the maximum level of teacher discourse as well as the percentage of overall teacher responses at each phase is shown in Table 8. For each unit, the percentage of student responses at each phase level and the average of total student timed writing scores were calculated.

Unit 6 had the highest level of teacher discourse as shown by the maximum and percentage of responses at the Phase III and IV levels and had the highest timed writing average. Level of student discourse was mainly at Phase II though. Unit 9 had the lowest timed writing average with teacher discourse mainly at Phase II. Unlike Units 6 and 9, there were no teacher responses beyond the Phase II level for Unit 14 with student discourse mainly at Phase I. Yet, there was a small increase in student discourse at Phase III.

When asked about the teacher's role in facilitating student discussion, Teacher 1 responded,

> My main role there is to keep them talking and to get them talking and to bring it to a deeper level, because very often they'll start out with a sort of a post of umm simply answering the prompt or the question that was posed and sometimes they do that very well, but the idea of the discussion is to keep them going, to keep them thinking, to try to bring it to another level. Umm, so very often asking questions, trying to prompt them to take it somewhere else.

Table 8

Level of Teacher Discourse in Relation to Level of Student Discourse and Achievement

Unit	Max	TE Phase I	TE Phase II	TE Phase III	TE Phase IV	TE Phase V	ST Phase I	ST Phase II	ST Phase III	ST Phase IV	ST Phase V	TW
6	4.02	50.00%	0.00%	25.00%	25.00%	0.00%	39.29%	57.14%	3.57%	0.00%	0.00%	18.55
9	3.04	27.27%	50.00%	22.73%	0.00%	0.00%	40.98%	52.46%	6.56%	0.00%	0.00%	15.73
14	2.02	50.00%	50.00%	0.00%	0.00%	0.00%	65.31%	26.53%	8.16%	0.00%	0.00%	18.1

T*eacher social discourse and student discourse and achievement.* As teacher postings were read and coded, it was noted that some teacher responses were not focused on content. Encouraging, modeling, or off-topic categories emerged and were coded as social discourse. In Table 9, the frequency of teacher social discourse for each unit discussion is listed. The overall percentage of student responses at each Phase level and the average timed writing scores is shown. The amount of teacher social discourse was similar for each unit.

Table 9

Teacher Social Discourse

Units	Freq Social Discourse	Student Phase I Responses	Student Phase II Responses	Student Phase III Responses	Student Phase IV Responses	Student Phase V Responses	TW Average
6	3	36.29%	57.14%	3.57%	0.00%	0.00%	18.55
9	4	40.98%	52.46%	6.56%	0.00%	0.00%	15.73
14	3	65.31%	26.53%	8.16%	0.00%	0.00%	18.1

Frequency of teacher and student interaction. Table 10 shows the frequency of teacher discourse including non-social and social teacher responses. Unit 9 has the highest frequency of teacher discourse and student discourse. Note that Unit 14 has the fewest teacher interactions but student interactions are higher than for Unit 6.

Table 10

Frequency Teacher Discourse

Units	Frequency Non-social Teacher Discourse	Frequency Social Teacher Discourse	Teacher Frequency Total	Frequency Student Discourse
6	4	3	7	28
9	22	4	26	61
14	2	3	5	49

Level of structuredenss. In the syllabus, Teacher 1 described the expectations and responsibilities for taking an online course.

> You will have guidance on what type of information you should be finding out, and where to find it, and how to find it, but the actual information-gathering and skill-development will be primarily *your* job. Your instructor is available as a guide and helper, but the responsibility (and the success!) in this course is yours.

An assignment schedule was posted in the course and Teacher 1 stated that students could work ahead. Deadlines were provided to help students stay on track and late assignments received 20% penalties.

From the teacher interview, Teacher 1 shared some of her expectations for the online discussions.

> So, what I'll tell my kids is that they can be conversational, but it needs to be correct. So, you know it doesn't need to be formal like you're writing your research paper, but on the discussion board I don't want the IM umm

> abbreviations and those sorts of things. Now they text me on my cell phone, they're welcome to do it there because that's the appropriate venue for it. Umm, and some teachers are much more sticklers about umm everything needs to be perfectly spelled on the discussion board, some of them prefer to sort of let the kids have a little more free rein, because they don't want to be inhibiting that conversation. So, there's some range there of teacher's expectations in terms of the level of writing, but certainly we have an acceptable use policy that outlines umm threats aren't allowed and language, that sort of thing.

Teacher 1 was also asked about what she saw as disadvantages in having specific guidelines and expectations. Her response was,

> I think the biggest disadvantage is when you don't provide those guidelines, because it's very umm, know what the kids really want to do is say "nice job friend" and get on with it and be done with it. So, very often at the beginning of a class, I tried to explain to them sort of what constitutes a worthwhile post. And I use a grade as a carrot, because when they first will post something in the discussion board, I will give them a few points of the total and I will just keep adding to it as they add meaningful points to the conversation, and so if they post one to be "yeah, good job" types of things I don't give them any points for that. And, so they realize after the first couple of discussions that if they're not happy with their grade yet, what they need to do is get back in there and keep talking. So, you know that's the, the external carrot that also gets dangled.

Each unit discussion prompt provided some guidelines to expectations for the discussion. Teacher 1 referenced her guideline for student interactions, "I've generally asked them that they

need to make at least 3 meaningful posts to the discussion or I might put a different number on it but just to make sure they're in there participating beyond their own initial posts."

In Unit 6, students were to post their own response to the teacher's questions and respond to their classmate's postings in a specific manner, "Respond to a classmate's posting with your thoughts on the analysis of the argument (do you agree? Did they miss anything?), and then discuss how effective you think the argument may actually be, in practice." For Units 9 and 14, the teacher expected at least a half page initial response to the prompt which was not required in Unit 6. Yet, the length of almost all initial responses was a half to a full page in length. In Unit 9, they were asked to respond to at least four postings by their classmates, but unlike Unit 6 it was not stated how students were to respond to their peers. Of note, this unit had the most student interactions. Unit 14 also required students to post to at least three postings without stating how to respond. It also had a higher number of interactions than Unit 6. Primarily, the student responses were on-topic throughout all units. When a response of agreement or disagreement was made to another student, justification was included by the respondent.

The Teacher 1 interview comments addressing teacher presence are included to provide additional background and teacher perspectives for the case study. They are discussed further as part of the implications in Chapter 5.

Course 2

The second case study designated as Course 2 was AP Language and Composition American Nonfiction, Semester Two, taught in the spring of 2008. Of the seven students in this class, three students took Semester One with Teacher 2, and four students had a different instructor for Semester One. Teacher 2 was an experienced classroom English teacher, but this was her first year of online instruction. The Course 2 format was the same as Course 1. Weekly

units included readings, discussion prompts, timed writings, and a variety of writing and objective assessments.

Relationship of Student Discourse and Student Learning Outcomes

From purposive and random selection, data from Units 4, 6, and 10 were collected and analyzed. As with Course 1, sources examined included student responses in the discussion forums, timed writing scores, and the teacher interview.

Knowledge construction. For each unit discussion, student responses were coded by the co-rater and me. After rater consensus, the highest phase level for each student response was recorded and the results are shown in Tables 11, 12, and 13.

Table 11

IAM Phases for Unit 4 Discussion Responses

Student	R1	R2	R3	R4	R5	R6	R7	R8	R9	Max
A2	1.04	2.01	1.02	2.02	2.02	2.01	3.04			3.04
B2	1.05	1.01	3.01	2.03	2.02					3.01
C2										0
D2										0
E2	1.03	3.01	3.01	1.01	1.02	2.02	3.04	1.01	5.03	5.03
F2										0
G2	1.05									1.05

Unit 4 focused on political writers. The discussion prompt asked students to explain what "political" meant to them and how this applied to the two texts they had read by political writers. As is shown in Table 11, two of the four respondents reached Phase III and one reached the

highest level of the IAM model, "metacognitive statements by the participants illustrating their understanding that their knowledge or ways of thinking (cognitive schema) have changed as a result of the conference interaction" (Gunawardena, et. al., 1997). Student E2 responded to a peer and the teacher,

> In George Will's With a Happy Eye but... he tells of a similar situation that you two are discussing. The article says by increasing speeds more people will come to the safer roads that police patrol instead of going to roads that are not as well taken care of, speed, and then crash. The death rate was decreased by raising the speed limit to pull people back to safer roads. I think [Teacher 2] is applying this same concept... I am so glad I made a connection!

Overall, 40.91% of student responses were at Phase I, 31.82% at Phase II, 22.73% at Phase III, 0.00% at Phase IV, 4.55% at Phase V. Note that three of the seven students made no responses for Unit 4.

Unit 6 focused on sports writing in America. Students were to discuss their beliefs or opinions on the influence and effect of sports on people in our culture. As seen in Table 12, six of the seven students responded to this forum. Note that Student C2 did not respond in either unit. As in Unit 4, Student E2 responded at the highest level of all students. The student was "testing the proposed synthesis against 'received fact' as shared by the participants" (Gunawardena, et. al., 1997) when he responded with,

> My question to you is 'What about advertisement and air time?' I think that advertisement and air time, whether it be on the radio, T.V., or your cell phone, is the difference. If we were to do the same with the Nobel Prize that we do with football it would almost have the same result over time.

Overall, 40.00% of the student responses were at Phase I, 36.00% at Phase II, 20.00% at Phase III, 4.00% at Phase IV and 0.00% at Phase V.

Table 12

IAM Phases for Unit 6 Discussion Responses

Student	R1	R2	R3	R4	R5	R6	R7	Max
A2	1.04	1.02	1.03					1.04
B2	2.03	2.03	3.02	2.01	1.02	3.04		3.04
C2								0
D2	1.05	1.02	1.02					1.05
E2	2.03	2.01	2.03	2.02	4.01	1.01	2.02	4.01
F2	1.05	2.03	3.02	3.04	3.04			3.04
G2	1.05							1.05

For Unit 10, the focus was memoirs. For the discussion, students were asked if autobiographies and memoirs were the same or different. They were then to provide their opinions, i.e. motivations for writing, and examples from memoirs. As shown in Table 13, four of the five participating students responded at Phase III. Student G2 made a "proposal of integrating or accommodating metaphors or analogies" (Gunawardena, et. al., 1997) in describing memoirs, "the 'diary' or 'journal' format... Its like a window into the life of someone else, and often they're just regular people with regular lives." As in Unit 4, Students C2 and D2 did not respond at all. Student C2 did not respond in any of the random and purposive selected unit discussions.

Table 13

IAM Phases for Unit 10 Discussion Responses

Student	R1	R2	R3	R4	R5	R6	Max
A2	1.02	1.05	2.01	2.01	2.01	3.01	3.01
B2	2.03	2.01	2.01				2.03
C2							0
D2							0
E2	1.05	2.03	1.02	3.01			3.01
F2	1.04	1.02	3.01	2.01			3.01
G2	1.05	1.02	3.05				3.05

When asked about the purpose of discussion, Teacher 2 explained

> It allows the students to get an understanding of the material beyond um, beyond their own lens, beyond the way they see it. Um, to be, to hear other people's or read whatever, other people's viewpoints about things, and maybe see events, issues, topics, whatever from a different viewpoint instead of what they bring with their experiences and background.

Level of student discourse relative to student performance. As in Course 1, timed writings were given at the end of each unit to assess student writing on an assigned topic and to provide practice for the AP exam. Multiple choice reading tests and a variety of written assignments were given for the different units, but the timed writings were consistently assigned

throughout the course. The maximum score for timed writings was 30. Of note, when asked about discussion and student performance Teacher 2 responded,

> Discussion topics are interesting but are not I think directly tied to their timed writings and things. I mean the grade on the discussion and their participation in the discussion doesn't have a lot of carryover in the way the class is set up to their assignments and writings.

Table 14 shows each student's level of discourse for the three forums and their timed writing scores for each unit. Frequency is included but will be discussed in the following section. In Unit 4, two students reaching Phase III achieved the maximum of 30; however, student G2 responded at the lowest phase and scored a 28 on the timed writing. Student E2 with the highest level of discussion at 5.03 scored 24, yet Student F2 did not participate and scored 24 also.

For Unit 6, Students B2, F2, and G2 scored the highest score of 26. Students B2 and F2 responded at the 3.04 level; however, Student G2 only responded at the 1.05 level. Student E2 once again responded at the highest level at 4.01 but scored 21, the lowest of all students.

In Unit 10, the maximum responses were primarily at Phase III with timed writing scores ranging from 22 – 30. Student B2 performed the best on the timed writing but had the lowest maximum posting. Student G2 had the highest maximum response but had the low score of 22.

Table 14

Course 2 Overview

Student	Forum 4 Max	Freq	TW score	Forum 6 Max	Freq	TW score	Forum 10 Max	Freq	TW Score
A2	3.04	7	30	1.04	3	22	3.01	6	28
B2	3.01	5	30	3.04	6	26	2.03	3	30
C2	0	0	20	0	0	22	0	0	22
D2	0	0	15	1.05	3	22	0	0	22
E2	5.03	9	24	4.01	7	21	3.01	4	22
F2	0	0	24	3.04	5	26	3.01	4	24
G2	1.05	1	28	1.05	1	26	3.05	3	22

Frequency related to level of discourse and achievement. For Unit 4, the frequency of student responses ranged from 0 – 9. As frequency levels increased, the level of discourse also increased. Student E2 had the highest number of responses and reached the highest Phase V level in the IAM model. Student A2 had the second highest number of responses, reached Phase III, and achieved the maximum score on the timed writing. Students C2 and D2 did not participate at all in the discussion and had the lowest timed writing scores of the seven students, yet Student F2 did not participate either and achieved the same score as student E2 with the highest response frequency.

In Unit 6, the frequency of postings ranged from 0 – 7. Similar to Unit 4, as frequency of responses increased levels of student discourse increased. Once again, student E2 had the

highest number of responses reaching 4.01 but had the lowest timed writing score. Students B2 and F2 had the second and third highest frequency, had maximum responses at 3.04, and had the highest timed writing score of 26; however, Student G2 responded one time and also scored 26.

For Unit 10, the frequency of responses ranged from 0 – 6. Student A2 responded the most and scored second highest for the timed writing; however, Student B2 responded at a lower frequency and had the top timed writing score. While Student G2 responded at the highest phase level for this unit, the frequency was low and the timed writing score was one of the lowest.

When asked about the student non-participation in the discussions, Teacher 2 explained that Students C2 and F2 were not "active in any of the discussion boards because they were really never active in the class but did not drop during our drop window. [Student D2] was another funny case. I know he was taking several courses online, and my guess is that English was his least favorite." The three students completed the course through extensions and received low but passing grades.

Teacher Presence and Student Discourse

As with Course 1, data sources examined to consider the relationship of teacher presence to student discourse for Course 2 were the teacher responses from Units 4, 6 and 10, teacher-produced documents, and the teacher interview.

Level of teacher discourse related to level of student discourse and achievement. Table 15 shows the coded teacher responses using the IAM, the maximum level of teacher discourse, and the percentage of teacher responses at each phase. For each unit, the percentage of student responses at each phase level and the average of total student timed writing scores were calculated.

Unit 4 had the highest maximum phase for teacher discourse and was the only unit in which students reached Phase V. Unit 4 also had the highest timed writing average, yet there is a small difference in the timed writing average across units. In Unit 6, teacher discourse was only at Phase I, but student discourse reached Phase IV. Over half of the student responses were at the Phase II - IV levels. The level of teacher discourse was higher in Unit 10 than Unit 6, but student discussion was mainly at the Phase I and Phase II levels. For Unit 10, the timed writing average was closer to the Unit 4 average than Unit 6.

When asked about the teacher role in facilitating discussion, Teacher 2 responded,

> I think my job and where the discussions turn out best um is when I challenge the kids to look at things from other viewpoints, kind of the traditional devil's advocate role of "well yeah this, but what do you think about so and so, or if you believe that how do you feel about this other related topic", that kind of thing.

Table 15

Level of Teacher Discourse in Relation to Level of Student Discourse and Achievement

Unit	Max	TE Phase I	TE Phase II	TE Phase III	TE Phase IV	TE Phase V	ST Phase I	ST Phase II	ST Phase III	ST Phase IV	ST Phase V	TW
4	5.01	37.50%	12.50%	25.00%	12.50%	12.50%	40.91%	31.82%	22.73%	0.00%	4.55%	24.43
6	1.04	100.00%	0.00%	0.00%	0.00%	0.00%	40.00%	36.00%	20.00%	4.00%	0.00%	23.57
10	3.05	25.00%	12.50%	62.50%	0.00%	0.00%	40.00%	40.00%	20.00%	0.00%	0.00%	24.29

T*eacher social discourse and student discourse and achievement.* In Table 16, the frequency of teacher social discussion is shown along with the student data for response percentages at each phase and the class average for unit timed writings. Teacher 2 social discourse was limited to Unit 4. This was also the unit that discussion reached Phase V and had the highest timed writing average.

Table 16

Teacher Social Discourse

Units	Freq Social Discourse	Student Phase I Responses	Student Phase II Responses	Student Phase III Responses	Student Phase IV Responses	Student Phase V Responses	TW Average
4	3	40.91%	31.82%	22.73%	0.00%	4.55%	24.43
6	0	40.00%	36.00%	20.00%	4.00%	0.00%	23.57
10	0	40.00%	40.00%	20.00%	0.00%	0.00%	24.29

Frequency of teacher and student interaction. Table 17 shows the frequency of teacher discourse including non-social and social teacher responses. Unit 4 had the highest frequency total of teacher discourse. Frequency of student responses was highest for Unit 6, and there was only one posting by the teacher. Of note, the teacher discourse consisted of the posting of the Unit 6 discussion prompt only. The teacher was absent for this unit's student discussion.

Table 17

Frequency Teacher Discourse

Units	Frequency Non-social Teacher Discourse	Frequency Social Teacher Discourse	Teacher Frequency Total	Frequency Student Discourse
4	8	3	11	22
6	1	0	1	25
10	8	0	8	20

Level of structuredness. The same statement for expectations and responsibilities from the Course 1 syllabus was included in the Course 2 syllabus. As in Course 1, deadlines were to help students stay on track. Late assignments were accepted with some penalty, but discussion responses had to be completed by the stated date in order to receive credit.

From the teacher interview, Teacher 2 described some of her guidelines for the online discussions.

> I have eliminated your ability to create new threads in the DBs, mainly because it will save time (because we'll be able to see ALL parts of a discussion by clicking on the single thread instead of having to click on the various "starter" threads to see all the different parts of the conversation). On a personal note, it also makes it a lot easier for me to grade your work.

She also explained the need for discussion expectations in the interview,

> The more information you provide kids, um the better they're going to be able to meet your expectations. They're not mind readers, and we shouldn't expect them

> to be. Um, so I think you have the questions that you want kids to answer in the prompt and then there needs to be a piece in the directions um, always in the directions for all the prompts about your good response will be such and such length and will cover you know all of the questions in the prompt in a thoughtful manner. You're required to make two replies… The more information they've got, the more they know what you want, the better they do, because they know what you want.

In Unit 4, students were to post 2-3 paragraphs in response to the discussion prompt questions and reply to at least two classmates' postings. For Unit 6, students were able to select listed questions of interest to write a 3-4 paragraph opinion piece. As in Unit 4, they were to respond to at least two postings. For Unit 10, students were to write at least two paragraphs relative to the questions on memoirs or develop a topic discussion of their own for the genre. At least two responses to peers were expected.

The Teacher 2 interview comments addressing teacher presence are included to provide additional background and teacher perspectives for the case study. They are discussed further as part of the implications in Chapter 5.

Cross-case Analysis

Course design and class size was comparable for each course. Both were set up as weekly units with similar types of assignments. Class size was very small, eleven students in Course 1 and seven students in Course 2. Teacher experience in online instruction was different. Teacher 1 was experienced and Teacher 2 was in her first year of online instruction.

Relationship of Student Discourse and Student Learning Outcomes

In the two courses, student discourse shows evidence of social construction of knowledge. As shown in Table 18, all forums for student discussion reached at least the Phase III level, "negotiation of meaning/co-construction of knowledge" (Gunawardena, et. al., 1997). Only Course 2 had responses at the Phase IV and Phase V level. Also, there were a higher percentage of student responses at Phase III in Course 2.

Table 18

Student Discourse and Student Learning Outcomes

Course and Unit	Frequency	ST Phase I	ST Phase II	ST Phase III	ST Phase IV	ST Phase V	TW Class average
C1 Unit 6	28	39.29%	57.14%	3.57%	0.00%	0.00%	92.50%
C1 Unit 9	61	40.98%	52.46%	6.56%	0.00%	0.00%	78.65%
C1 Unit 14	49	65.31%	26.53%	8.16%	0.00%	0.00%	90.50%
C2 Unit 4	22	40.91%	31.82%	22.73%	0.00%	4.55%	81.43%
C2 Unit 6	25	40.00%	36.00%	20.00%	4.00%	0.00%	78.57%
C2 Unit 10	20	40.00%	40.00%	20.00%	0.00%	0.00%	80.97%

In examining the level of student discourse relative to student performance, for both courses the randomly selected units from the beginning part of the semester had the highest timed writing average, end of the semester was the next highest, and middle had the lowest average. In Course 2's Unit 4, the discourse reached Phase V and timed writing average was the highest of the three units. The timed writing average was the highest in Course 1's Unit 6, reached Phase III and had the highest percentage of Phase II discourse, cognitive dissonance. As the point

systems and timed writing evaluators were different for Course 1 and 2, the class averages are not compared between the two cases.

In examining frequency of student discourse relative to student achievement, the highest frequency was in the randomly selected middle section of both courses. This was also the unit with the lowest timed writing class average. While Course 1 had a higher frequency of student responses, there were four more students in Course 1. Also, Course 2 had more students not participating in two of the three forums.

Teacher Presence and Student Discourse

In Table 19, the level of teacher and student discourse, frequency of teacher and student discourse, and student performance is illustrated for Course 1 and Course 2. In Unit 6, Teacher 1 reached the highest level of discourse and students had the highest timed writing average. In Unit 4, Teacher 2 reached the highest level of discourse and students had the highest timed writing average. Course 2 teacher and student discourse reached the highest level in the Unit 4 forum. While Course 1 teacher discourse was the highest in Unit 6, student discourse reached the Phase III level in all units. Yet, the combined percentage of Phase II and III student discourse is highest for Unit 6.

In Course 1 Unit 9, both the teacher and student frequency was highest, but the timed writing average was the lowest. For Course 2, the unit having the lowest timed writing average had the lowest teacher frequency and the highest student frequency.

Table 19

Teacher Discourse in Relation to Level of Student Discourse and Achievement

Course Unit	TE Phase I	TE Phase II	TE Phase III	TE Phase IV	TE Phase V	TE Freq	ST Phase I	ST Phase II	ST Phase III	ST Phase IV	ST Phase V	ST Freq	TW Class Ave.
C1 Unit 6	50.00%	0.00%	25.00%	25.00%	0.00%	4	39.29%	57.14%	3.57%	0.00%	0.00%	28	92.50%
C1 Unit 9	27.27%	50.00%	22.73%	0.00%	0.00%	22	40.98%	52.46%	6.56%	0.00%	0.00%	61	78.65%
C1 Unit 14	50.00%	50.00%	0.00%	0.00%	0.00%	2	65.31%	26.53%	8.16%	0.00%	0.00%	49	90.50%
C2 Unit 4	37.50%	12.50%	25.00%	12.50%	12.50%	8	40.91%	31.82%	22.73%	0.00%	4.55%	22	81.43%
C2 Unit 6	100.00%	0.00%	0.00%	0.00%	0.00%	1	40.00%	36.00%	20.00%	4.00%	0.00%	25	78.57%
C2 Unit 10	25.00%	12.50%	62.50%	0.00%	0.00%	8	40.00%	40.00%	20.00%	0.00%	0.00%	20	80.97%

As shown in Table 20, Teacher 1 social discourse frequency was similar for all units, and the highest level of student discourse was the same for all units. Timed writing averages were not similar though. Teacher 2 social discourse occurred only in Unit 4 which had the highest timed writing average and reached the highest level of student discourse.

Table 20

Teacher Social Discourse in Relation to Student Discourse and Achievement

Course Unit	TE Freq Social	TE Freq Non-social	TE Freq	ST Phase I	ST Phase II	ST Phase III	ST Phase IV	ST Phase V	ST Freq	TW
C1 Unit 6	3	4	7	39.29%	57.14%	3.57%	0.00%	0.00%	28	92.50%
C1 Unit 9	4	22	26	40.98%	52.46%	6.56%	0.00%	0.00%	61	78.65%
C1 Unit 14	3	2	5	65.31%	26.53%	8.16%	0.00%	0.00%	49	90.50%
C2 Unit 4	6	8	11	40.91%	31.82%	22.73%	0.00%	4.55%	22	81.43%
C2 Unit 6	0	1	1	40.00%	36.00%	20.00%	4.00%	0.00%	25	78.57%
C2 Unit 10	1	8	8	40.00%	40.00%	20.00%	0.00%	0.00%	20	80.97%

In structuring the courses, both teachers had assignment schedules with deadlines and penalties. Teacher 1 took off points for late discussion responses; whereas, Teacher 2 did not give any credit for late discussion postings. Both included a student responsibility statement. Both teachers had expectations for meaningful responses beyond “I agree.” Both teachers gave specific expectations for length. Initial student responses to Teacher 1 discussion prompts were to be a half to a full page. Initial responses to Teacher 2 discussion prompts were to be approximately 2-3 paragraphs. They also had expectations for students to respond to other

students' postings. Teacher 2 expected at least two responses in each forum. Teacher 1 did not have a response expectation for Unit 6 from the beginning of the course but 4 responses were expected for Unit 9 and 3 responses for Unit 14. Note that in Course 1 the frequency of student postings was higher in the units having a response expectation.

This chapter presents the findings for the two case studies and examines similarities and differences seen. From observing data pertinent to the first research question, both courses showed evidence of knowledge construction through student discourse. Frequency of student interactions in relation to student achievement appeared to have a negative relation. For the second research question, teacher presence related to student discourse, the level of teacher discourse in both courses appeared to be related to student achievement. Frequency of teacher social discourse seemed to have a relation to level of student discourse.

Several relationships were evident in the two courses and afford consideration in determining principles of effective teacher design and facilitation. These principles based on the stronger relationships seen within the two courses can then be integrated into the evaluation of online instruction. In Chapter 5, the need for consistent standards to evaluate the quality of instruction in online high school courses is addressed. Further research is also discussed for propositions that appeared to have a stronger relation in one course but were not as evident or consistently observed in the other.

Chapter Five

Discussion and Implications

The purpose of this study was to examine the occurrence of student discourse in asynchronous computer-mediated communication and its relation to student learning, and to observe teacher design, facilitation, and direction for asynchronous discussion and its relation to student discourse for construction of knowledge. In this chapter, the results from the study and the implications and needs for future practice, policy, and research are discussed. The first section addresses the research questions posed and the theory-based propositions relative to these questions. Results as related to prior research are referenced. The final section suggests implications for high school online instruction guidelines, the need for evaluation standards, and proposes future research. Only those propositions where implications from the study's evidence can be made are discussed.

Relationship of Student Discourse and Student Learning Outcomes

Based on social constructivist theory, the first research question examined the student interactions within an online environment and their relation to knowledge construction, frequency of interaction, and student achievement. The following discusses the findings from the examination of online student discourse and student performance results.

Knowledge construction

The literature (Gunawardena, Lowe & Anderson, 1997; Kanuka & Anderson, 1998; Hara et al., 2000; Garrison, Anderson & Archer, 2001; Ferdig & Roehler, 2004; Moore & Marra, 2005) has shown variation in the level of critical thinking found in computer mediated discussions.

While Kanuka & Anderson (1998) reported interactions at preponderantly Phase I, Moore & Marra's (2005) results were similar to the findings for this study. In their study of four discussions within two courses, over 60% of the total responses of one course were coded in the Phase II-V levels and 44% for Phases II-V in the second course. In my study, five out of the six discussions studied had approximately 60% of the responses at Phase II-V. All of the discussions reached at least Phase III, "negotiation of meaning and/or co-construction of knowledge" (Gunawardena, et al., 1997), but the percentage of responses at Phase II –V was different within the two high school courses. Moore & Marra (2005) and this study showed differences in the student discourse levels between courses. For Moore & Marra's (2005) study, a specific discussion protocol treatment was implemented which was believed to have an effect on the level of discourse. In this study, the differences in student discourse may be attributed to several factors. Students in Course 2 had taken the first semester of AP English online, and some of the students had the first class together with the same teacher. Thus the students had prior experience with computer mediated discussions, and several had familiarity with each other. Teacher 2 said,

> Many of these students, not all but many and certainly the kids that are most active in the discussion boards, were also in the 11A. And so we came into this semester with that not having to start from scratch.

From the study, the proposition that knowledge may be constructed through student discussion seems to be evident. Every student did not respond at the Phase III-V levels for every discussion, but social construction of knowledge is a building or scaffolding for new learning to occur. Levels of student discourse did not appear to increase over the course of the semester as suggested by Teacher 1. Students did share multiple perspectives through their interactions,

based opinions on experiences or readings, referenced excerpts from peers' posts, and proposed new ideas. In the interview statement quoted in the Course 2 section of Chapter 4, Teacher 2 believed this was the purpose of student discussion.

Level of Student Discourse Relative to Student Performance

There is a lack of research correlating levels of student discourse to levels of student performance in higher education and secondary education. While Ferdig & Roehler (2004) did find a positive correlation for their higher education research, for this study there did not appear to be a relation between the level of student discourse and performance. Students posting at the highest levels within a forum did not consistently score the highest on the timed writings. The relationship between overall timed writing averages and percentage of responses at higher levels was inconsistent as well.

From the Teacher 1 and Teacher 2 interview statements for level of student discourse relative to student performance in Chapter 4, there were divergent viewpoints on the relationship of the discussions to the achievement on the timed writings. Even though Teacher 1 felt there might be some connection for students who went into more depth for discussions, the data did not corroborate this assumption. An obvious difference between the discussion assignment and the timed writing assignment is time. In the asynchronous discussions, students are able to reflect on the given prompt, consider the posted perspectives of their peers and instructor, and compose and edit their ideas without consideration of a time limit. Performance results from other course assignments may have yielded different findings; yet timed writings are an important part of the standard Advanced Placement assessment that would determine whether students received this credit or not.

Frequency Related to Level of Discourse and Achievement

There was some consistency in the literature for the relation between frequency of student interaction and student achievement (Picciano, A., 2002 and Jung et al., 2002), but for this study frequency of student interactions appeared to have a negative relation to student achievement. In both courses, the highest frequency was found in the randomly selected forums from the middle section of each course. These forums also had the lowest timed writing averages. The question remains as to whether the timed writings were the most appropriate performance measure to use for this study.

Moore & Marra (2005) found a positive correlation for frequency of student interaction and level of discourse. For this study, the Course 1 forum with 61 responses had a higher percentage of Phase III responses compared to the forum with 28 responses, yet the forum with 49 responses had the highest percentage of Phase III responses. The frequency for all forums in Course 2 were similar with 22, 25, and 20 responses respectively, but the forum with fewest responses was the only one that did not go beyond Phase III. In this study, frequency did not appear to have a strong positive or negative affect on the level of student discourse.

For the first research question examining the relationship of student discourse to student learning, evidence of knowledge construction within the online discussion forums was found in this study. Student discourse in online asynchronous discussions did provide for social construction of knowledge. Student achievement on timed writings did not appear to be impacted by the level of discourse while frequency of interaction seemed to have a negative impact on student performance.

Teacher Presence and Student Discourse

Whether face-to-face or online, teacher presence is necessary for student learning. Theory and research acknowledge the importance of teacher facilitation of collaborative learning. The second research question examined the relationship of teacher presence to student discourse within an online environment. The following discusses the findings from the examination of online teacher discourse, discussion prompts, course documents, and teacher interview transcripts.

Level of Teacher Discourse Related to Level of Student Discourse and Achievement

Zhu (2006) studied the relationship between level of teacher discourse and student discourse and found teacher involvement in discussions was attributed to higher levels of student cognitive engagement. There appears to be evidence of this relationship for this study. In two of the three forums from Course 2, students responded at identical higher phase levels as Teacher 2, Phase V for Unit 4 and Phase III for Unit 10. Also, in Course 1, when Teacher 1 responded at the Phase IV level in Unit 6 and the Phase III level in Unit 9, the percentage of student discourse between Phase II-III was higher. When Teacher 1 responded only at Phase I-II levels, student discourse was primarily at Phase I. In Course 2, there was an inconsistency found in the evidence. Teacher 2 did not facilitate discussion in Unit 6, but students reached Phase IV level of discourse. In a conversation with the co-rater and after questioning Teacher 2, it was noted that one student who had been in Teacher 2's online class the previous semester took the teacher role. This student posted the teacher's prompt, used probing questions, provided feedback, support, and encouragement. It is felt that the student was able to aptly facilitate the discussion as a teacher due to previous Teacher 2 mentoring and modeling.

There was little research found to attribute level of teacher discourse to student achievement, yet in both of the online high school case studies there was evidence that higher levels of teacher discourse may be related to student performance. Unit discussions having the highest teacher discourse levels also had the highest timed writing averages. The question remains though as to the appropriateness of the timed writings for assessing the relation of student performance to the student discourse or even teacher discourse. Potentially, the teacher discourse may have had an influence on the writing of students in discussions and in the assigned timed writings.

Teacher Social Discourse and Student Discourse and Achievement

Lu & Jeng's (2007) research found that levels of teacher discourse and social discourse together may be a factor in facilitating higher levels of student discourse. There seems to be some consistency with this research. In Course 2 Unit 4, Teacher 2 not only responded at the highest level of teacher discourse but also had the highest frequency of social discourse. Of the three forums, Unit 4 had the highest percentage of Phase III student responses, and student posts reached the Phase V level. It was not quite as clear for Course 1 as Teacher 1 social discourse was similar throughout the three forums. Yet, teacher discourse levels were higher for Units 6 and 9, and the percentage of student discourse at the Phase II-III levels was approximately 60% compared to about 35% in Unit 14. The combination of levels of teacher discourse and social discourse may be a factor for the level of student discourse.

Picciano (2002) and Jung et al. (2000) examined teacher social discourse and its relationship to student performance. A positive relationship was found for social presence and performance on written assignments. The evidence is inconsistent for the two online high school courses. Course 1 teacher social discourse was similar, but the overall timed writing scores were

not similar for the three units. In Course 2, teacher social presence occurred in Units 4 and 10 only, and overall timed writing scores were similar. The unit with no teacher discourse, social or content oriented, had the lowest timed writing percentage.

There is some evidence in the research and in this study that the combination of teacher social discourse and teacher discourse levels is related to student discourse levels. From evidence in the research and the Course 2 case study, teacher social discourse may also be related to student performance. While the combination of teacher social discourse and teacher discourse levels related to higher student discourse has been studied in higher education, a question arises as to the relation of this same combination to student performance. Was student performance low in Course 2 Unit 6 due to the combined lack of teacher and social discourse?

Frequency of Teacher and Student Interaction

Mazzonlini and Maddison (2007) found a significant negative correlation for frequency of teacher interaction in discussion forums. Student interactions decreased when there were higher frequencies of teacher interaction. In this study, there was no evidence for the relation of teacher to student frequency. In Course 1 Unit 9, both the teacher and student interactions were at the highest frequency. Course 2 had similar student frequency whether the teacher posted in the discussions or whether she was absent from the discussion.

Level of Structuredness

Structuredness is the instructional design of online activities and interactions through guidelines, discussion evaluation rubrics, and discussion prompts. While there was some evidence in higher education research that less structure or some types of structure influenced the level of discourse (Hara et al., 2000, Gilbert & Dabbagh, 2005, Moore & Marra, 2005), Haavind's (2007) study of Virtual High School classes found discussion rubrics, the design of the

discussion prompt, and explicit teaching of how to post collaboratively positively impacted collaborative student discourse. Similarities in design of the Idaho online English courses included deadlines and penalties, guidelines for length, and expectations for number of responses. The expectations for length and number of responses were different between the two courses with Course 1 requiring longer initial postings and 3-4 responses compared to 2 responses in Course 2. Considering the level of student discourse found within the two courses, the higher quantity expectations for length and response number may have had a negative impact. One design feature that was used in Course 2 was elimination of student ability to create new threads in the forum. Reasons for structuring the forum in this manner included saving time and being able to see all of the discussion by selecting one thread. From conversation with the co-rater, it was noted that it was easier to follow the student discourse including the connections between student responses. This type of structure may have facilitated student discourse in Course 2.

Evaluation rubrics for student discussions were not found in either of the courses. In the Teacher 2 interview, the need for giving direction for what makes a good response was noted, yet an expectation statement was only found in the syllabus for Course 2. Course 1 included the same syllabus statement and did have "be thoughtful, be detailed" in the Unit 9 prompt.

While Haavind's (2007) research and Teacher 2's interview statement supports the design of discussion prompts for quality collaborative student discourse, the prompts for Course 2 were found to be at Phase ID with Course 1 prompts at Phase IE, IIA, and IIB levels respectively. Explicit teaching for how to post was observed in Course 1, Unit 6 and 9 prompts. In Unit 9, the prompt provided direction for students, "Argue your opinion (think about those techniques for argumentation that we've been studying – use an effective argument!) using examples or trends

you see in current events." As this may have been the first online class for students in Course 1, explicit teaching for student discussions may have been more advantageous than for experienced students in Course 2.

Implications

Guidelines for Practice

Quality assurance for online courses and teaching is necessary not just in higher education but in K-12 education as well. Research provides educators the basis for effective practice and instructional design for online learning. Establishment of policy and evaluation of teacher and course effectiveness can be derived from the research.

National guidelines setting criteria for quality K-12 online courses and online teaching were only released within the past year. As an organization founded to provide expertise and leadership for K-12 online learning, NACOL conducted a research review to develop standards. From review of the stronger relationships found in this study and the NACOL evaluation criteria for quality online courses and teaching, practices for enhancing student discourse for construction of knowledge and learning are proposed. Recommendations from the National Education Association (NEA) and Southern Regional Education Board (SREB) are also referenced.

Student discourse for construction of knowledge. Gardner's (1991) perception of the constructivist classroom for adolescents entails students working together, questioning each other, and reflecting on their learning. Asynchronous discussion forums provide a venue for implementing social constructivist instructional practices. Building a community of inquiry for constructing new meaning through interactions is achievable in an online classroom. The cross case analysis illustrated that student discourse in online high school courses can progress to

"negotiation of meaning/co-construction of knowledge" and potentially to "testing and modification" and "agreement/application of newly constructed meaning" (Gunawardena et al., 1997) as shown in the Course 2 case study.

These findings align with specific NACOL expectations from the *National Standards of Quality for Online Courses* (2007) and the *National Standards for Quality Online Teaching* (2008). Practices indicated as necessary include:

- Facilitates the construction of knowledge through an understanding of how students learn in specific subject areas.
- Promotes learning through group interaction.
- Creates a warm and inviting atmosphere that promotes the development of a sense of community among participants. (NACOL, 2008)

Teacher discourse and level of student discourse and achievement. Through adult and peer interactions, students are brought to higher levels of understanding (Vygotsky, 1979). Guiding, moderating, scaffolding, and supporting students is how a teacher facilitates the construction of new learning (Boulton, 2002). The cross case analysis found student discourse levels reached higher levels as teacher discourse attained higher levels. Examination of teacher responses for the six discussions and the increasing literature discussing facilitation techniques seem to indicate teacher presence through facilitation of collaborative discussions is noteworthy. Suggested practices from NACOL (2008) include:

- Facilitates and monitors appropriate interaction among students.
- Builds and maintains a community of learners by creating a relationship of trust, demonstrating effective facilitation skills, establishing consistent and reliable expectations, and supporting and encouraging independence and creativity.

- Uses best practices to promote participation.
- Recognizes that student interaction with the lesson has instructional value and therefore encourages students to participate in leading the instruction and/or demonstrating mastery of the content in other appropriate ways.

From the cross case analysis, there is a potential implication for level of teacher discourse having a positive relationship for student performance. Currently, there is a lack of research evidence in K-12 or higher education for substantiation. In this study, the question regarding the appropriateness of the timed writing for assessing student performance relative to discourse was discussed. It was noted that there were inconsistencies between teacher interview statements on the relationship of student discourse to student performance on timed writings. While Teacher 1 did believe the discussions were related to the timed writings, Teacher 2 did not feel student assignments and writings in her course were tied to the discussions. The following guideline from NACOL (2008) could imply why there was difficulty in determining a relationship between the student discourse and the student performance in this study, the online teacher "demonstrates an understanding of the relationships between and among the assignments, assessments and standards-based learning goals." Thus, the purpose of the student discussions should be clear to the teacher and students and connected to the student performance outcomes for the online course.

Teacher social discourse and student discourse. Research literature and the cross case analysis show that the combination of teacher levels of content-specific discourse and social discourse may be related to levels of student discourse. The Community of Inquiry model substantiates this proposition. Supporting discourse is a combination of social and cognitive presence (Garrison et al., 1997). Practices for social discourse include interpersonal feedback

such as compliments, encouragement, reinforcement, warmth, and humor. Also, offering personal examples and experiences were noted in both cases. The teacher became "real" or more "human" within the virtual environment.

The literature on practices for teacher facilitation of discourse has become more prevalent as its importance has been acknowledged by research. Teachers should review and keep abreast of the current research and practices for teacher content and social discourse. Professional development and training on effective strategies for facilitating student discourse should be provided for online teachers. As suggested by NACOL (2008), teachers should experience online learning from the perspective of a student themselves. Personally, even with the knowledge gained from the research and literature, professional development, and discussions with online faculty, much insight into the online experience was gained from taking an online course as a student.

Recommendations from the Research

As evident from the examination of the two high school online courses, instructional practices based on the social constructivist theory of learning can be implemented in online high school courses. For administrators to evaluate the course quality and teacher effectiveness for online courses offered to students, and for teachers of online courses to design for instruction, research-based practices need to be identified. The following are specific recommendations especially for instruction of advanced students similar to this study's representative sample:

- Building and facilitating of a warm and inviting online environment.
- Consistent inclusion of instructional activities for student-student discourse
- Discussions aligned with student learning objectives.
- Discussions connected to student assignments and assessments.

- Teacher facilitation of discourse through probing questions, feedback, and modeling. Conscientiously leading students to higher levels of thinking.
- Use of encouragement, reinforcement, and personal experiences for teacher social discourse.

Need for Consistent Standards

Just as in Watson's 2005 report, Watson and Ryan's 2007 report found that there continues to be variation across states in policies for course quality assurance. Diverse online program types and lack of common outcome measurements creates challenges for policymakers. While it is suggested that oversight of online programs should occur at a higher level than the local level, it is historically unlikely for national government or organizations to take such a role. It is more likely that assistance at the national level could assist with: (a) "creating standards for data and reporting so that programs can be compared across states, (b) disseminating best practices across states, and (c) helping to craft policies across state lines, such as for online teachers" (Watson & Ryan, p. 46, 2007). Thus, quality assurance of courses and instructors continues to be left to policymakers at the state and/or local levels.

As in many states, online course options for Virginia's students vary from school district to school district. Some larger districts have developed online programs mainly for their own students with a few offering seats to students in other districts. Virginia districts named in Watson and Ryan's recent report on state-level policy and practice for online learning included Fairfax Public Schools Online Campus, Arlington Public Schools Distance Learning, Prince William County Schools Virtual High School, Halifax Virtual Academy, Nelson Academy of Virtual Learning, Pittsylvania County Schools K12 Virtual School Program, and York County Virtual High School. There are also some larger Virginia districts developing specific online

courses for students within the division only. Teachers within the division are utilized to teach the courses.

Virtual Virginia is a supplemental, state-funded program offering Advanced Placement, world language, and elective courses for students. Virtual Virginia or various out-of-state Virtual Schools are especially being utilized by the smaller and rural Virginia school districts.

Watson and Ryan's (2007) report verifies Virginia's current distance education policy, "Distance learning courses are governed by the Virginia Standards of Accrediting Public Schools, which leaves most policies to the local school board. Each local school district is encouraged to establish a district distance learning policy" (p. 89). As ascertained by the Virginia Department of Education, no state initiatives for online education policies and legislation are foreseen. In regard to evaluation of online programs available in Virginia, the Keeping Pace report (Watson & Ryan, 2007) showed that the state-led program used SREB guidelines for formal evaluation but no explanation for administration of the evaluation process was given. Details for only one of the Virginia district-led online programs were provided. Fairfax Public Schools Online Campus had no formal evaluation process reported.

Inherently, it is left to the discretion of local school administrators and policymakers to determine the goals for using and procedures for providing appropriate and effective online courses for their division's students (NEA, 2002). Essentially, they must ask questions such as these to assure the quality of the online course opportunities:

> "Are there procedures for ensuring that online courses and other instructional resources are aligned with state/district academic standards, curriculum frameworks, and assessments" (NEA, 2002, p. 9)? "Who monitors and evaluates the online teacher? Are there procedures in place at the state/district levels to

assess and rate online courses and other resources and ensure their sources are properly accredited? Are there accountability measures in place to identify effective instructional practices and discourage ineffective ones, both among online course providers and on-site educators" (NEA, 2002, p. 10)?

Quality assurance measures for online courses, teaching, and programs should be equal to measures used for traditional programs (Patrick, S., 2008). Standards and guidelines have recently begun to emerge for assisting school districts in the selection or development of effective online learning. NACOL's 2007 *National Standards of Quality for Online Courses* outlines expectations for online content, instructional design, technology, student assessment, and course management. Criteria from the rubrics that are related to the stronger research propositions from this study can be instituted as policy for instructional design of online courses and the evaluation of online courses and teachers:

- The course provides opportunities for appropriate instructor-student and student-student interaction to foster mastery and application of the material and a plan for monitoring that interaction.
- Information literacy and communication skills are incorporated and taught as an integral part of the curriculum.
- Course design reflects a clear understanding of student needs, and incorporates varied ways to learn and multiple levels of mastery of the curriculum.
- The course provides opportunities for students to engage in higher-order thinking, critical-reasoning activities and thinking in increasingly complex ways (p. 3-4).

In conversation with several Virginia school district administrators, on-site facilitators, and most recently with my daughter who took a high school online course, student interaction through the utilization of computer-mediated communication tools such as discussion boards does not seem to consistently occur in online high school courses. In some cases, course instructional design did not include any student-student interaction activities. The lack of student interaction was perceived as a deficiency in these courses.

Current national standards and guidelines from SREB, NACOL, and the NEA are derived from a review of research literature. Criteria for student interaction are included in all of their published guidelines or rubrics. NEA states, "It is critically important that school systems and school administrators contemplate such issues before launching online courses or enrolling significant numbers of their students in such courses" (2006, p. 2)

Recommendations to Administration

- Establish standards and guidelines for procurement of online courses from external sources.
- Establish standards and guidelines for online courses developed and taught internally.
- Develop a process for evaluation and quality assurance.
- Ensure that online courses include student interaction for student-centered learning.
- Keep abreast of research findings and implications for best practices in K-12 online learning.

Guidelines for Research

The need for K-12 distance learning research has been noted nationwide. Examination of outcomes and impact of online instruction on learning are limited. Research-based practice can be derived through further study.

Research by Garrison et al. (2001) defined teacher presence as setting the climate, facilitating student discourse through questions and confirmations, and designing and organizing objectives and content that encourage social interaction. As the evidence suggests from this study, the levels of teacher discourse and teacher social discourse have an impact on the levels of student discourse. Guidelines for K-12 instructional design and practice have been suggested, but strategies for teacher facilitation are not specified.

Further research should include:

- Examination of effective discussion prompts or questions.
- Examination of teacher discourse, both social and content types, to determine effective practices for facilitating student discourse.

The case study approach and use of coding models for discourse levels and types would be appropriate for the purpose. The grounded theory method or alternative models for content analysis of discussion could be considered due to some ambiguity interpreting discourse with the IAM model. If teachers are sending individual communications in conjunction with the discussion forum responses such as found in Haavind's (2007) study, access and coding of the communications should be included.

From this study, the evidence is not clear on the relation of student discourse to student achievement, yet the teacher appears to be key to student learning in online courses. Just as in the face-to-face high school classroom, the role of the teacher as facilitator of student learning is

essential in the online classroom. The case study “window” affords a venue to observe, interpret, and assess online interactions. As more and more “windows” are viewed, the significant elements for facilitating student discourse will be revealed.

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Appendix A

Date: Wed, 21 Jan 2009 08:24:47 -0700
From: "Dr. D. Randy Garrison" <garrison@ucalgary.ca>
Reply-To: "Dr. D. Randy Garrison" <garrison@ucalgary.ca>
Subject: Re: Community of Inquiry Model
To: lmtownse@vt.edu

Linda,
You certainly have my permission to use the CoI image in your
dissertation and hopefully future publications.
I just finished emailing another person who has used the CoI framework
in a K-12 context. I noted to her that I have always considered this
framework to be generic.
All the best,
RG

lmtownse@vt.edu wrote:
> Dear Dr. Garrison,
>
> Your research and development of the Community of Inquiry model is referenced
in
> my dissertation for the Virginia Tech Educational Leadership and Policy
Studies
> doctoral program. Even though my research is with high school online courses,
> your constructivist model for higher education seems to be theoretically
> applicable to this level as well. In November 2007, I attended your session
at
> the SLOAN conference and introduced myself to you at the end. Obviously, I do
> not expect that you would remember our conversation. It was exciting to meet
> you and others who I had read and was referencing in my writing.
>
> The reason I am contacting you is to obtain permission for inclusion of the
> graphic image of the Community of Inquiry model in my dissertation. In my
> dissertation, I have discussed and cited the research from several of your
> studies and included the image of the model.
>
> Thank you for consideration of this permission. I hope that I will have the
> opportunity to hear and meet you again at future conferences.
>
> Linda Townsend
> IT Design Specialist
> Institute for Teaching through Technology and Innovative Practices@Longwood
> University
> lmtownse@vt.edu / townsendlm@longwood.edu
> 804-690-9238

Appendix B

VirginiaTech

Office of Research Compliance
Institutional Review Board
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, Virginia 24061
540/231-4991 Fax 540/231-0959
e-mail moored@vt.edu
www.irb.vt.edu

DATE: January 14, 2008

MEMORANDUM

TO: William Glenn
Linda Townsend

Approval date: 1/14/2008
Continuing Review Due Date: 12/30/2008
Expiration Date: 1/13/2009

FROM: David M. Moore

SUBJECT: **IRB Expedited Approval:** "Online Teaching and Learning: Student-Student and Teacher-Student Discourse for Student Learning in Asynchronous Discussions of High School Course (Pilot Study)", IRB # 08-011

This memo is regarding the above-mentioned protocol. The proposed research is eligible for expedited review according to the specifications authorized by 45 CFR 46.110 and 21 CFR 56.110. As Chair of the Virginia Tech Institutional Review Board, I have granted approval to the study for a period of 12 months, effective January 14, 2008.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.
2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.
3. Report promptly to the IRB of the study's closing (i.e., data collecting and data analysis complete at Virginia Tech). If the study is to continue past the expiration date (listed above), investigators must submit a request for continuing review prior to the continuing review due date (listed above). It is the researcher's responsibility to obtained re-approval from the IRB before the study's expiration date.
4. If re-approval is not obtained (unless the study has been reported to the IRB as closed) prior to the expiration date, all activities involving human subjects and data analysis must cease immediately, except where necessary to eliminate apparent immediate hazards to the subjects.

Important:
If you are conducting **federally funded non-exempt research**, this approval letter must state that the IRB has compared the OSP grant application and IRB application and found the documents to be consistent. Otherwise, this approval letter is invalid for OSP to release funds. Visit our website at http://www.irb.vt.edu/pages/newstudy.htm#OSP for further information.

cc: File

VirginiaTech

Office of Research Compliance
Institutional Review Board
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, Virginia 24061
540/231-4991 Fax 540/231-0959
e-mail moored@vt.edu
www.irb.vt.edu

FWA00000572(expires 1/20/2010)
IRB # is IRB00000667

DATE: January 15, 2008

MEMORANDUM

TO: William Glenn
Linda Townsend

Approval date: 1/15/2008
Continuing Review Due Date:12/31/2008
Expiration Date: 1/14/2009

FROM: David M. Moore

SUBJECT: **IRB Expedited Approval:** "Online Teaching and Learning: Student-Student and Teacher-Student Discourse for Student Learning in Asynchronous Discussions of High School Courses" , IRB # 07-650

This memo is regarding the above-mentioned protocol. The proposed research is eligible for expedited review according to the specifications authorized by 45 CFR 46.110 and 21 CFR 56.110. As Chair of the Virginia Tech Institutional Review Board, I have granted approval to the study for a period of 12 months, effective January 15, 2008.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.
2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.
3. Report promptly to the IRB of the study's closing (i.e., data collecting and data analysis complete at Virginia Tech). If the study is to continue past the expiration date (listed above), investigators must submit a request for continuing review prior to the continuing review due date (listed above). It is the researcher's responsibility to obtained re-approval from the IRB before the study's expiration date.
4. If re-approval is not obtained (unless the study has been reported to the IRB as closed) prior to the expiration date, all activities involving human subjects and data analysis must cease immediately, except where necessary to eliminate apparent immediate hazards to the subjects.

Important:
If you are conducting **federally funded non-exempt research**, this approval letter must state that the IRB has compared the OSP grant application and IRB application and found the documents to be consistent. Otherwise, this approval letter is invalid for OSP to release funds. Visit our website at http://www.irb.vt.edu/pages/newstudy.htm#OSP for further information.

cc: File

Appendix C

Memorandum of Understanding
Between

THE IDAHO DIGITAL LEARNING ACADEMY (IDLA)
and VIRGINIA TECH (LINDA TOWNSEND).

SUBJECT: Access to IDLA data by VIRGINIA TECH (LINDA TOWNSEND): to individually identifiable public school student assessment and related information acquired by the Idaho Digital Learning Academy (IDLA).

The Idaho Digital Learning Academy has collected individually identifiable information, the confidentiality of which is protected by the Family Educational Rights and Privacy Act of 1974 (FERPA), as amended, (20 U.S.C. §1232g, and the rules promulgated pursuant thereto in 34 CFR, Part 99), Section 444 of the General Education Provisions Act, and the Individuals with Disabilities Education Act (IDEA) (34 CFR 300.560-300.576) and wish to make the data available for statistical research and analysis purposes, but only if the data are used and protected in accordance with the terms and conditions stated in this Memorandum of Understanding.

VIRGINIA TECH (LINDA TOWNSEND) and the Idaho Digital Learning Academy agree as follows:

I. INFORMATION SUBJECT TO THIS UNDERSTANDING

A.
All data containing individually identifiable student information collected by or on the behalf of the IDLA that are provided to VIRGINIA TECH and all information derived from those data, and all data resulting from merges, matches, or other uses of the data provided by the IDLA with other data, are subject to this agreement and are referred to in this Memorandum of Understanding as "subject data."

B.
Subject data under this Memorandum of Understanding may be in the form of computer tapes, diskettes, CD-ROMs, electronic data transfers, hard copy, etc. VIRGINIA TECH (LINDA TOWNSEND) may only use the subject data in a manner consistent with:

1. The statistical purpose for which the data were supplied, being represented as an analysis of instructor design and facilitation of learning, student learning, and student engagement resulting from online, a description of which is attached and made a part of this Memorandum of Understanding (Attachment No. 1),

2. The limitations imposed under the provisions of this Memorandum of Understanding, and

3. FERPA, the Regulations promulgated pursuant thereto, and applicable IDEA Regulations, which are incorporated into and made a part of this Memorandum of Understanding as if set forth fully herein.

II. INDIVIDUALS WHO MAY HAVE ACCESS TO SUBJECT DATA

A.
There are three categories of individuals that VIRGINIA TECH (LINDA TOWNSEND) may authorize to have access to subject data within its organization. The three categories of individuals are as follows:

1. The primary researchers as the most senior members in charge of the operations involving the use of subject data and is responsible for liaison with IDLA.
2. Professional/Technical Personnel (P/TP) who conduct the research for which this Memorandum of Understanding is issued.
3. Support staff who come in contact with the subject data in the course of their duties only to the extent necessary to support the research under this Memorandum of Understanding.

III. LIMITATIONS ON DISCLOSURE

A.
VIRGINIA TECH (LINDA TOWNSEND) shall not use or disclose subject data for administrative non-research purposes nor may the data be applied in any manner to change the status, condition, or public perception of any individual regarding whom subject data is maintained.

B.
VIRGINIA TECH (LINDA TOWNSEND) shall not disclose subject data or other information containing, or derived from, subject data at fine levels of specificity, to anyone other than IDLA employees working in the course of their employment or individuals for whom access is authorized under this Memorandum of Understanding. VIRGINIA TECH (LINDA TOWNSEND) may make disclosures of subject data to individuals other than those specified in this paragraph only if those individuals have executed an Affidavit of Nondisclosure and VIRGINIA TECH (LINDA TOWNSEND) has obtained advance written approval from IDLA.

C.
VIRGINIA TECH (LINDA TOWNSEND) shall not make any publication or other release of subject data listing information regarding individual students.

D.
VIRGINIA TECH (LINDA TOWNSEND) may publish the results, analysis, or other information developed as a result of any research based on subject data made available under this Memorandum of Understanding only in summary or statistical form so that the identity of individuals contained in the subject data is not revealed, and only in a manner consistent with Section IV.D. of this Memorandum of Understanding..

IV. ADMINISTRATIVE REQUIREMENTS

DRAFT

A.
The research conducted under this Memorandum of Understanding and the disclosure of subject data needed for that research must be consistent with the statistical purpose for which the data were supplied, given in paragraph I.B.1. above.

B.
Execution of Affidavits of Nondisclosure.

1. VIRGINIA TECH (LINDA TOWNSEND) shall provide a copy of this Memorandum of Understanding to each employee of any research part or extension of VIRGINIA TECH (LINDA TOWNSEND) who will have access to subject data and shall require each of those employees to execute an Affidavit of Nondisclosure.

2. VIRGINIA TECH (LINDA TOWNSEND) must ensure that each individual who executes an Affidavit of Nondisclosure reads and understands the materials provided to her or him before executing the Affidavit.

3. VIRGINIA TECH (LINDA TOWNSEND) shall ensure that each Affidavit of Nondisclosure is notarized upon execution.

4. VIRGINIA TECH (LINDA TOWNSEND) shall not permit any individual specified in paragraph II.A. to have access to subject data until the procedures in paragraphs IV.B.1. through 3. of this Memorandum of Understanding are fulfilled for that individual.

5. VIRGINIA TECH (LINDA TOWNSEND) shall promptly, after the execution of each affidavit, send the original affidavit to IDLA for inclusion in the record of access.

C.
Notification regarding authorized individuals to IDLA.

1. VIRGINIA TECH (LINDA TOWNSEND) shall promptly notify IDLA when an employee who has been authorized to have access to subject data is no longer authorized access to those data.

D.
Publications made available to IDLA.

1. VIRGINIA TECH (LINDA TOWNSEND) shall provide IDLA a copy of each publication containing information based on subject data or other data product based on subject data that will be made available to individuals who have not executed an Affidavit of Nondisclosure.

2. Copies of the proposed publication or release are provided to IDLA before that disclosure is made so that VIRGINIA TECH (LINDA TOWNSEND) may be advised whether the disclosure is authorized under this Memorandum of Understanding. VIRGINIA TECH (LINDA TOWNSEND) agrees not to publish or otherwise release research results provided to IDLA if it is advised that such disclosure is not authorized.

E.

VIRGINIA TECH (LINDA TOWNSEND) hereby acknowledges that its costs in performing under this Memorandum of Understanding are to be paid by North Central Regional Education Labs, and not with funds from IDLA. VIRGINIA TECH (LINDA TOWNSEND) shall indemnify, defend and save harmless IDLA, their officers, agents and employees from and against any and all liability, claims, damages, losses, expenses, actions, attorneys' fees and suits whatsoever caused by or arising out of VIRGINIA TECH (LINDA TOWNSEND)' performance, acts or omissions under this Memorandum of Understanding.

F
VIRGINIA TECH (LINDA TOWNSEND) shall notify IDLA immediately upon receipt of any legal, investigatory, or other demand for disclosure of subject data.

G
VIRGINIA TECH (LINDA TOWNSEND) shall notify IDLA immediately upon discovering any breach or suspected breach of security or any disclosure of subject data to unauthorized parties or agencies.

H
VIRGINIA TECH (LINDA TOWNSEND) agrees that representatives of IDLA have the right to make unannounced and unscheduled inspections of the facilities of VIRGINIA TECH (LINDA TOWNSEND) including any associated computer center, to evaluate compliance with the terms of this agreement.

V. SECURITY REQUIREMENTS

A.
Maintenance of, and access to, subject data.

1. VIRGINIA TECH (LINDA TOWNSEND) shall retain the original version of the subject data at a single location and may make no copy or extract of the subject

data available to anyone except P/TP as necessary for the purpose of the statistical research for which the subject data were made available.

2. VIRGINIA TECH (LINDA TOWNSEND) shall maintain subject data (whether maintained at a mainframe facility, remote terminals, personal computers, or on printed or other material) in a space which is limited to access by authorized personnel.

3. VIRGINIA TECH (LINDA TOWNSEND) shall ensure that access to subject data maintained in computer memory is controlled by password protection. For subject data maintained on a mainframe computer, password protection is required at the file level. VIRGINIA TECH (LINDA TOWNSEND) shall maintain all printouts, diskettes, personal computers with subject data on hard disks, or other physical products containing individually identifiable information derived from subject data in locked cabinets, file drawers, or other secure locations when not in use.

4. VIRGINIA TECH (LINDA TOWNSEND) shall ensure that all printouts, tabulations, and reports are edited for any possible disclosures of restricted use data.

5. VIRGINIA TECH (LINDA TOWNSEND) shall establish procedures to ensure that subject data cannot be extracted from a computer mainframe, remote terminals or separate personal computer by unauthorized individuals.

6. VIRGINIA TECH (LINDA TOWNSEND) shall not permit removal of any subject data from the limited access space protected under the provisions of this Memorandum of Understanding as required in the attached SECURITY PROCEDURES, without first notifying, and obtaining written approval from IDLA.

B.
Retention of subject data.

VIRGINIA TECH (LINDA TOWNSEND) shall return to IDLA all subject data, or destroy those data by approved IDLA procedures, when the statistical research that is the subject of this Memorandum of Understanding has been completed or this Memorandum of Understanding terminates, whichever occurs first.

C.
Compliance with established security procedures.
VIRGINIA TECH (LINDA TOWNSEND) shall comply with the SECURITY PROCEDURES attached to this Memorandum of Understanding.

VI. PENALTIES

A.

Any violation of the terms and conditions of this Memorandum of Understanding may subject VIRGINIA TECH (LINDA TOWNSEND) to immediate abrogation by IDLA, and the return of all subject data materials.

1. The IDLA official responsible for liaison with VIRGINIA TECH (LINDA TOWNSEND) shall initiate abrogation of this Memorandum of Understanding by written notice to VIRGINIA TECH (LINDA TOWNSEND) indicating the factual basis and grounds for abrogation.

2. Upon receipt of the notice specified in paragraph VI.A.1. of this Memorandum of Understanding, VIRGINIA TECH (LINDA TOWNSEND) has thirty (30) days to submit written argument and evidence jointly to the Idaho Digital Learning Academy's Board of Directors, regarding IDLA data, indicating why the Memorandum of Understanding should not be abrogated.

3. The IDLA'S Board of Directors shall decide whether to abrogate the Memorandum of Understanding based solely on the information contained in the notice to VIRGINIA TECH (LINDA TOWNSEND) and the rebuttal provided by the party or parties alleging the release of personally identifiable restricted data. The IDLA shall provide written notice of the decision to VIRGINIA TECH (LINDA TOWNSEND) within forty-five (45) days after receipt of the joint response of the IDLA Board of Directors. This time period may be extended for good cause.

B.

Any violation of this Memorandum of Understanding may also be a violation of Family Educational Rights and Privacy Act of 1974 (FERPA), and/or the Individuals with Disabilities Education Act (IDEA), as amended.

Alleged violations under FERPA are subject to review and investigation by the Family Policy Compliance Office of the U.S. Department of Education and enforcement by the United States Office of Administrative Law Judges.

VII. PROCESSING OF THIS MEMORANDUM OF UNDERSTANDING

A.

This Memorandum of Understanding shall be for a period of six (6) months from the date of its execution. If before the expiration of this MOU, the IDLA Board of Directors establishes regulatory standards for the issuance and content of Memoranda of Understanding, the recipient agrees to comply with the regulatory standards.

B.

This Memorandum of Understanding may be amended, extended or terminated by mutual written agreement between VIRGINIA TECH (LINDA TOWNSEND) and the IDLA. Any amendment must be signed by VIRGINIA TECH (LINDA TOWNSEND) and by the Executive Director of IDLA and is effective on the date that all required parties have signed the Memorandum of Understanding.

agree that this Memorandum of Understanding shall be construed under the laws of the State of Idaho and the parties hereto consent to the jurisdiction of the courts of Ada County in the State of Idaho in the event of any dispute with respect to this Memorandum of Understanding.

D.

The Primary Researcher of VIRGINIA TECH (LINDA TOWNSEND) shall sign this agreement below, and certifies by his/her signature, that -

1. The organization has the authority to undertake the commitments in this agreement;
2. The Primary Researcher, VIRGINIA TECH (LINDA TOWNSEND), has the authority to bind the organization to the provisions of this Memorandum of Understanding.
3. Signature of VIRGINIA TECH (LINDA TOWNSEND) Primary Researcher: Linda M. Town

   Date 12/8/07 Telephone: (804) 594-3559

DRAFT

E.
The Executive Director of the Idaho Digital Learning Academy (IDLA) concur in this Memorandum of Understanding and authorize the access of VIRGINIA TECH (LINDA TOWNSEND) to the subject data.

This is effective as of the date of the signatures below.

Donna Vakili

Dr. Donna Vakili
Director (IDLA)

12/3/07
Date

Jim Norton

Jim Norton
Chairman, IDLA

12/2/07
Date

DRAFT

Appendix D

Gunawardena, Lowe and Anderson's (p. 414, 1997) interaction analysis model for examining social construction of knowledge in computer conferencing

Phase I: Sharing/comparing of information. Stage one operations include:

A. A statement of observation or opinion [PhI/A]

B. A statement of agreement from one or more other participants [PhI/B]

C. Corroborating examples provided by one or more participants [PhI/C]

D. Asking and answering questions to clarify details of statements [PhI/D]

E. Definition, description, or identification of a problem [PhI/E]

Phase II: The discovery and exploration of dissonance or inconsistency among ideas, concepts, or statements. (This is the operation at the group level of what Festinger [20] calls cognitive dissonance, defined as an inconsistency between a new observation and the learner's existing framework of knowledge and thinking skills.) Operations which occur at this stage include:

A. Identifying and stating areas of disagreement [PhII/A]

B. Asking and answering questions to clarify the source and extent of disagreement [PhII/B]

C. Restating the participant's position, and possibly advancing arguments or considerations in its support by references to the participant's experience, literature, formal data collected, or proposal of relevant metaphor or analogy to illustrate point of view [PhII/C]

Phase III: Negotiation of meaning/co-construction of knowledge

A. Negotiation or clarification of the meaning of terms [PhIII/A]

B. Negotiation of the relative weight to be assigned to types of arguments [PhIII/B]

C. Identification of areas of agreement or overlap among conflicting concepts [PhIII/C]

D. Proposal and negotiation of new statements embodying compromise, co-Construction [PhIII/D]

E. Proposal of integrating or accommodating metaphors or analogies [PhIII/E]

Phase IV: Testing and modification of proposed synthesis or co-construction

A. Testing the proposed synthesis against "received fact" as shared by the participants and/or their culture [PhIV/A]

B. Testing against existing cognitive schema [PhIV/B]

C. Testing against personal experience [PhIV/C]

D. Testing against formal data collected [PhIV/D]

E. Testing against contradictory testimony in the literature [PhIV/E]

Phase V: Agreement statement(s)/applications of newly-constructed meaning

A. Summarization of agreement(s) [PhV/A]

B. Applications of new knowledge [PhV/B]

C. Metacognitive statements by the participants illustrating their understanding that their knowledge or ways of thinking (cognitive schema) have changed as a result of the conference interaction [PhV/C

Appendix E

From: Lani Gunawardena <lani@unm.edu>
To: <lmtownse@vt.edu>
Date: 7/26/2007 12:35 PM
Subject: Re: Use of Interaction Analysis Model for Dissertation Research

Dear Ms. Townsend,

Thank you for letting me know about your research and
your interest in using the model we developed. You
have my permission to use it in your dissertation.

Please share the results of the analysis when you are
done as I would be very interested to know how it
worked for your data set.

Best wishes
Charlotte Gunawardena

--- lmtownse@vt.edu wrote:

> Dear Dr. Gunawardena,
>
> As a doctoral student with Virginia Tech's
> Educational Leadership and Policy
> Studies, I am currently writing my research proposal
> for submission to my
> committee in August. As the focus for my study is
> student levels of discourse
> in high school online courses, I would like to use
> the Gunawardena, Lowe &
> Anderson Interaction Analysis Model to analyze
> archived discussions from online
> high school English courses. I have seen your model
> used in multiple higher
> education studies,
> and so I would like to request permission to use
> your model in my secondary
> distance education research. Please advise if I
> should also ask permission from
> Lowe and Anderson.
>
> Thank you for your consideration of this request,
> Linda Townsend
> lmtownse@vt.edu
> 804-690-9238

Appendix F

Interview Questions

What is your theory for how students learn?

What are instructional practices that you believe work best for student learning to occur?

What do you believe is the purpose of student discussion in online classes?

What do you feel your role should be for facilitating student discussion?

In facilitating discussion, what seemed to you to help the quality of the discussion most?

What seemed to you to hinder the discussions of students?

Were other communication tools used to further support the student discussion forums? If so, how were they used with students?

Have you seen any results on student performance on student assignments or tests that may have been affected by the student discussion?

What advantages and disadvantages have you found in having guidelines and expectations for student discussion?

What kind of structure do you feel is needed for student discussion?