The Influence of Instructional Tactic Selection and Moderation Style on Participant Interaction and Exchange in Asynchronous Threaded Online Discussion.

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ABSTRACT

Asynchronous text-based threaded discussion (AD) is a common strategy for encouraging student interaction in post-secondary courses. Although the literature has recommended specific practices for the AD instructor-moderator, little comparative empirical experimental research has been done on this topic. This quasi-experimental, mixed methodology study employed content analysis and focus group techniques to examine the influence of selected instructional tactics (situated and abstract) and moderation styles (social and instrumental) on participant interaction and exchange in four parallel experimental ADs in an undergraduate professional nursing course. The literature suggested that a combination of situated instruction and social moderation would produce more complex AD. The findings of the present research, however, reveal that the experimental AD group treated with abstract instruction and instrumental moderation posted more messages than the other groups, although the AD group treated with the treatment consisting of a combination of situated instruction and social moderation posted messages that contained higher quantities of higher-order interaction types (such as horizontal questions and personal reflections) than those of the other groups. The study also found that moderation style accounted for greater differences in measures of interaction between the groups than did the instructional tactic, and that social moderation was associated with the posting of more personal reflections and abstract instruction with the posting of more scaffolding statements. The findings of this research suggest that a more comprehensive definition of communicative complexity is needed to identify and quantify higher-order AD interaction. The study concludes with recommendations for improving the TAT content analysis instrument and for future research.

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CHAPTER 1
STATEMENT OF THE PROBLEM

Despite the accepted importance of instructor-student interaction in both classroom and online discussion, the current research offers little guidance on effective tactics for initiating and maintaining complex discussion in the context of asynchronous threaded online discussion (AD). As Dysthe (2002) notes, "the teacher's role and what competence is needed to facilitate good Web-based learning discussions are important topics that need further study" (p. 350).

AD consists of text messages authored by the participants that are stored in a common discussion record which is "logged" or "posted" on the Web. Participants can access this record from any Internet-connected personal computer. Thus AD provides a context for discussion that is less dependent on shared time and place than conventional classroom discussion. Participants are often required by the software or Internet interface to present their messages as a part of a "thread," which creates a topically ordered record rather than a time-sequenced record.

AD has become the mode of choice for computer-mediated instructional interaction in post-secondary education. In 2001, more than half of the post-secondary institutions in the United States reported that they offered distance education courses, and 90% reported that AD was a central instructional component in their online courses (Waits, Lewis, & Greene, 2003). The surveyed institutions also projected that they would increase their use of AD over the next few years.

The present research analyzes the influence of instructional tactic selection and instructional moderation style on participation in AD in post-secondary settings. The analysis of the effects of the selected instructional tactics and moderation styles under investigation in this research is confined to measures of *communicative complexity* in AD, as represented by message interaction and exchange between participants. The principle grounding the relevance of these measures is that increases in communicative complexity increase the learning potential offered by online discussion, as has been

claimed by Dysthe (2002), among others (Jonassen, Davidson, Collins, Campbell, & Haag, 1995; Quilter & Chester, 2001; Scardamalia & Bereiter, 1996).

In the present research, the term *instructional strategy* refers to generic instructional approaches, and the term *instructional tactic* refers to discrete teaching techniques used to accomplish a specific instructional strategy (Jonassen, Grabinger, Harris, & Duncan, 1991/1997). For example, writing is an instructional strategy and the assignment of research papers or essay exams are instructional tactics. In the context of this research, discussion is an instructional strategy, and instructional tactics are techniques that teachers use to initiate, maintain, or increase participation in discussion on topics related to the instructional objectives.

Instructional moderation style refers to the emphasis that the instructor places on providing participants with instrumental or social support within the discussions. In the *instrumental moderation style*, the instructor-moderator prompts participants with statements or questions directly relating to the knowledge objectives of the AD. The *social moderation style* is an instructional approach in which the instructor-moderator provides prompts to encourage the participants to interact with each other without direct reference to the knowledge objectives of the AD session.

According to the analysis of AD communications provided in Fahy, Crawford, & Ally (2001), *interaction measures* refer to the rhetorical or structural character of the messages, such as the use of attributions, clarifying questions, or personal position statements. *Exchange measures* refer to the distribution of communications between participants, such as the duration of discussion topic, the density of the discussion, and the ratio between sent messages and responses. The intent of this study is to contribute to the literature by empirically testing the relative influence of selected instructional tactics on participant interaction and exchange in AD and to thus increase our understanding of the effect of instructional tactics and moderation style on the complexity of discussion and by extension, its potential for learning.

This chapter introduces the rationale and context for this research project, which analyzes and compares the interaction and exchange patterns elicited by the selected

instructional tactics and the instructor's moderating style within the context of AD. It presents the theoretical underpinnings and assumptions of the study, a basic description of the instructional tactics and moderation style variables under investigation and their selection, and an overview of research procedures, the significance of this research, and the existing research in the field. A section defining the terms used in this research is also provided.

Theoretical Background and Assumptions

As Salomon (1991) has pointed out, one must recognize the theoretical perspective and assumptions of those who design and conduct educational studies in order to fully understand and apply their findings Therefore, this section identifies the theoretical background and paradigmatic assumptions upon which this research project is based.

The theoretical grounding of the present study is the social constructivist theory of human knowledge, teaching, and learning. According this perspective, an important function of teachers is to facilitate interaction and exchange between students so that learning—that is, an increase in individual knowledge—can be constructed and integrated. As described by Jonassen et al. (1995), "The constructivist sense of active learning is not listening and then mirroring the correct view of reality, but rather participating in and interacting with the surrounding environment in order to construct a personal view of the world" (p. 11). Jung, Choi, Lim, and Leem (2002) specifically identify this type of interactive learning as an essential component of successful distance education. In other words, social constructivists believe that students' interaction and exchange of individual perceptions and ideas is necessary for the formation, mediation, negotiation, comprehension, and distribution of knowledge and for learning to occur. Therefore, social constructivist learning theorists frequently recommend that teachers use discussion as a strategy to facilitate learning. Thus one of the central assumptions on which this study is based is that discussion is an important instructional strategy that promotes learning in the social constructivist sense of the term.

Building on that premise, a number of social constructivist learning theorists have concluded that discussions that persist longer, are more complex, and are more widely distributed among participants increase learning (Hew & Cheung, 2003; Hewitt, 2001; Jeong, 2003). These findings are also supported by Dysthe's analysis of AD (2002), which finds that increases in discussion length, depth, and character positively influence student learning: "Understanding and insight are accumulated as each voice builds on, contrasts and extends the understanding of the other. The [dialogical] exchanges reveal a 'complexification' of the issue, and this is exactly what makes up learning potential" (p. 348). Therefore, a second assumption on which this study is based is that there is a strong association between the learning potential offered by AD and the complexity of participant interaction and exchange. Measurable attributes of this complexity include such features as the rhetorical or structural character of the messages; the use of attributions, clarifying questions, and statements of personal position; the distribution of communications between participants; the duration of discussion topics; the density of the discussion; and the ratio between sent messages and responses. (These attributes are explained further in chapter 3.)

Based on these two assumptions—that discussion is an important social constructivist instructional strategy, and that there is a strong association between learning potential and the complexity of AD—this research project is designed to analyze the impact of two selected instructional tactics and two instructional moderation styles on the complexity of AD. That is, this research project will analyze the ability of the selected treatments to initiate, maintain, and increase participation in AD in post-secondary settings.

Overview of the Study

As stated, the present research project attempts to measure the influence of selected instructional tactics to initiate, maintain, and increase participation in AD in post-secondary settings. This section describes the process used to select the instructional tactics investigated in this study and provides an overview of the experimental procedures

that will be followed. The experimental method will be described in greater detail in chapter 3.

Variable Selection

Three levels of literature analysis established the conceptual basis for selecting the independent variables in this study of the effects of instructional tactics on AD. First, a survey of the literature identified a large number of commonly applied instructional tactics. Second, research studies that provided comparative analysis of such instructional tactics were examined. Third, a conceptual framework for categorizing these instructional tactics was developed from the relevant literature.

The initial review of the research literature revealed more than 80 distinct instructional tactics that could be adopted, modified, or avoided by teachers as part of their instructional design. On further review, it was also noted that instructional tactics could be grouped into two distinct pairs of categories: those that offered real examples to contextualize the instruction as opposed to those that were content-, theory-, or process-oriented, and those that were specific to a given context as opposed to those that were de-contextualized. I refer to these categories, respectively, as *situated* or *abstracted* instruction tactics.

The conceptual framework developed from the literature also reflects the finding that the effectiveness of given instructional tactics is not simply a matter of selection and application but is also highly influenced by the teacher's interaction style. In the present research, I refer to this second dimension of instruction as the *moderation style*, which is the relative emphasis that the instructor places on providing participants with either instrumental or social support within the discussions. I use the term *instrumental moderation style* to refer to instruction in which the emphasis is placed on the content or subject matter being taught, and *social moderation style* to refer to instruction in which the emphasis is placed on facilitating the social processes of learning. In most non-experimental settings, these moderation styles are not mutually exclusive but comprise a continuum—that is, a teacher's adopted AD moderation style may be characterized as

predominantly but not completely social or instrumental and may shift along this continuum through the course of a given instructional episode.

Based on the analysis of the literature, the present research was designed to compare the influence of two instructional tactics and two moderation styles, in all their possible combinations, on the communication complexity of AD. The two instructional tactics selected were the situated instructional tactic of case study-based discussion (CS) and the abstracted instructional tactic of question-and-answer discussion (QA). Each of these instructional tactics was applied using one of the two instructional moderation styles, instrumental and social, to determine their combined influence upon the communications complexity of AD. Table 1 presents the four resulting experimental ADs, each occurring under different instructional tactic and moderation style conditions.

Table 1
Variables Examined in This Study

		Moderation Style	
		Social	Instrumental
Instructional Tactics	Situated Instruction	AD 1 (CS-S) (case study, social)	AD 2 (CS-I) (case study, instrumental)
	Abstract Instruction	AD 3 (QA-S) (question and answer, social)	AD 4 (QA-I) (question and answer, instrumental)

Experimental Procedures

As stated above, four AD sessions are analyzed in the present study. Each AD session included 21 or 22 voluntary participants and was moderated by an instructor using a teaching script. The teaching scripts were based on descriptions provided in the educational literature and included examples, words, phases, ideas, and activities that appropriately corresponded to the application of the instructional tactic and moderation style. The teaching scripts also provided the experiment's instructor-moderator with information relating to the instructional objectives in each AD session.

The teaching scripts provided the instructor-moderator with a specific lesson plan designed to facilitate the application of either a situated or abstract instructional tactic (CS or QA) in either a primarily instrumental or social moderation style (S or I), according to the assigned experimental role. In two of the AD sessions, participants were provided a high level of instrumental support, in which the instructor addressed content issues without prompting social interaction between participants. In the other two AD sessions, the instructor encouraged social interactions between participants without providing instrumental support. The AD sessions also varied by the instructional tactics applied: two AD sessions utilized the situated instructional tactic of a case study approach (CS) to contextualize the discussion, and two AD sessions utilized the abstract instructional tactic of an instructor-led question-and-answer approach (QA).

The text log from each of the four AD sessions was then analyzed using the Transcript Analysis Tool (TAT) content analysis technique created and tested by Fahy et al. (2001) and also employed by Anderson, Rourke, Garrison, and Archer (2001), which is discussed in more detail in chapter 3. The TAT content analysis technique is specifically designed to provide definitions and measurement procedures for analysis of the interaction and exchange in AD, that is, for analysis of the communicative complexity of AD. An analysis team consisting of the primary investigator and one other instructor experienced in moderating AD performed parallel blind analyses of each AD transcript. The analysis team members' individual results were compared and differences were discussed. The TAT interaction and exchange parameters were analyzed for statistical variance associated with the application of the two selected instructional tactics (CS and QA) and the two instructional styles (I and S) and the interaction between the two independent variables (as shown in Table 1) using Cohen's kappa coefficient (*K*) procedure.

Thus, to summarize the experimental procedure, the present research analyzes the communicative complexity in four AD sessions, each addressing the same instructional objectives, as moderated by an instructor applying one of two instructional tactics and one of two moderation styles in all four possible combinations. Instructor interactions

with participants were controlled by teaching scripts that addressed the instructional objectives and controlled the application of the instructional tactic and moderation style of each AD session. Each AD involved 20 voluntary and randomly assigned student participants, for a total of 85 subjects.

Importance of This Research

The present research addresses three gaps in the current understanding of the effects of specific instructional tactics and moderation styles in the context of AD. First, there has been little research on this topic, despite the growing use of AD as a teaching tool in online learning. Second, what research that has been conducted on the effectiveness of teaching tactics is problematic in several ways. Third, current trends in educational evaluation are creating an increasing and urgent need for new research that can demonstrate the effectiveness of specific instructional applications.

First, as noted, asynchronous threaded online discussion has come into widespread use in post-secondary education. According to the U.S. Department of Education, in 2003 over 56% of the country's 2- and 4-year post-secondary institutions offered distance education courses (Waits et al., 2003). Of these, 90% reported that they utilized AD as an important element in online courses, and 88% stated that they planned to increase the use of AD in their distance learning programs in the next 3 years. Despite the rapidly growing use of AD as a teaching strategy, to date relatively little research has been done into how curriculum designers and instructors can use it most effectively. If institutions of higher education are to maximize the value of their investment in distance learning, to utilize AD most effectively to achieve instructional objectives, and to provide credible recommendations about instructional methods, far more comparative empirical research is needed.

Second, although research has been conducted on the effects of instructional tactics used by teachers to facilitate classroom discussion, applying the conclusions of research on the traditional classroom to online courses is problematic in several ways that the present study is designed to address. Most significantly, one cannot assume that

conclusions derived from research on conventional classroom settings are necessarily applicable to the AD context, with its different conditions and variables. In a recent special issue of *Educational Technology Research and Development* titled "Design, Development and Implementation of Electronic Learning Environments for Collaborative Learning," Kirschner (2004) reflects on the dangers of understanding technological instructional innovations as largely parallel to even similar traditional instructional methods:

> These changes cannot simply be responded to by adding technological solutions implemented according to existing educational approaches. Instead, an integrated view on e-learning is necessary, characterized by the combination of pedagogical, technical, social, and organizational factors. (p. 37)

This research project recognizes the necessity of understanding that AD is significantly different than traditional classroom discussion and therefore must be analyzed with attention to the unique character of the medium.

Given that the use of AD is consistent with the prevailing constructivist movement in instruction (Jonassen et al., 1995) and that AD is generally considered an appealing, convenient, and possibly cost-effective approach for facilitating group discussion (Berge, 1999), surprisingly little research has yet been conducted to determine which specific instructional tactics are most effective in initiating, maintaining, and increasing student participation when using AD. And much of that small body of AD research has examined the effects of single instructional strategies or tactics (such as the frequency of instructor comments or the use of minimum interaction requirements) rather than empirically compared the relative effects of several such tactics under comparable conditions. The present study is designed to help meet the dual need for more AD-specific research and for more effective ways to determine the comparative effects of the selected instructional tactics and moderation styles within AD discussions.

Third, this research has implications for the current national trend toward greater accountability in education, often referred to as an outcome orientation. The cornerstone of this outcome orientation is the repetitive, evaluation-based empirical analysis of institutional and programmatic performance to enable necessary and frequent adjustments

to curriculum to improve success. To ensure that curriculum is outcome-based and learning-centered, according to McDaniel, Felder, Gordon, Hrutka, and Quinn (2000), teachers must be given the data and tools needed to "create learning environments that enhance student learning, maximize essential faculty-student interaction, foster student learning opportunities through peer interaction, and integrate new technologies fully into the student learning process" (p. 144).

In post-secondary education, especially in professional teacher preparation programs, the current emphasis on accountability has come to have important implications for educational institutions, such as the awarding of federal financial aid and of institutional and programmatic accreditation. In terms of curriculum design and evaluation, an outcome orientation means that teachers' choices of instructional strategies and tactics must be based on proven effectiveness and continuous assessment of their efficiency and effectiveness. By examining learning potential rather than specific learning outcomes, this study hopes to offer an effective means of measuring the effect of teaching activities.

In summary, the present research on the influence of instructional tactics on the complexity of AD, as demonstrated by an analysis of the interactions and exchange of text messages, is relevant for several reasons. First, despite the increasingly frequent use of AD in higher education, much of what is claimed about the effectiveness of the instructional tactics and moderation styles it commonly employs has not been empirically tested, but rather has been based on case reports and other qualitative methods. Furthermore, much of the current educational research on instructional tactics empirically compares the relative effectiveness of instructional tactics and moderation styles in the context of the conventional face-to-face classroom rather than in AD, with its different conditions and variables.

Overview of Current Literature

This section provides a brief overview of the current literature on instructional tactics in asynchronous threaded online discussion (AD), which will be discussed in more

detail in chapter 2. It particularly describes how the literature has contributed to the reasoning behind this study's examination of factors influencing discussion in the AD setting.

Many authors from various disciplines who have studied conventional and online education advocate the use of specific instructional tactics to trigger and maintain higher-quality student discussions. For instance, among the recommendations researchers have made for stimulating discussion are that teachers should ask more questions (Dillon, 1984), ask higher cognitive level questions (Godfrey, 2001), allow students to ask each other more questions (Elder & Paul, 1997), or present cases or problems and then help the students as they work out possible solutions together (Gibson, 1990).

Researchers have also examined how online discussion differs from face-to-face discussion, as these differences will inevitably affect the instructional choices made by teachers. One difference pointed out by researchers is that because AD generally permits only written (i.e., text) communications, the meaning of messages must be manifest (obvious) rather than latent (inferred) (Rourke, Anderson, Garrison, & Archer, 2001).

Another difference reflected in the literature is that participants value the asynchronicity of AD because it allows students to delay participation to a personally convenient time ("time shifting"), perhaps even completing some preparatory thinking or research before responding (Angeli, Valanides, & Bonk, 2003; Quilter & Chester, 2001; Rourke & Anderson, 2002; Winograd, 2002). Angeli et al. suggest that the capacity for time shifting in AD is an advantage over standard classroom instruction, where limited time and large class sizes often restrict the depth of discussions. They argue that the additional "think time" provided by AD increases the complexity of discussion by giving participants more time and opportunity to employ discussion strategies such as the formulation of clarifying questions, additional evidence, and more complex positions.

A related advantage of AD discussion that has been frequently reported by researchers is that many participants feel less anxious contributing to an online discussion than they do making verbal contributions in live classroom discussions (Ocker & Yaverbaum, 2001). Researchers have attributed this lowered anxiety to reduced

performance pressure for rapid and correct responses and to the perceived anonymity participants report in computer-mediated communications. According to Beisenbach-Lucas and Weasenforth (2000),

> Students who are shy in the classroom or who are more reflective can take more time processing the postings made by group members. In AD, the pressure to respond immediately in real-time is absent; thus students can reflect more deliberately on reading as well as composing their own contribution to the ongoing group discussion. (p. 9)

This increase in the willingness of many students to engage in discussion (if encouraged to do so) may increase the complexity of discussion.

Several researchers have stated that a primary function of the teacher in AD discussions is to select and apply instructional strategies that motivate engagement and participation in discussion (i.e., initiating, maintaining, and increasing discussion and role-modeling of critical reflection) (Collison, Elbaum, Haavind, & Tinker, 2000; Salmon, 2004; Winograd, 2002). Yet, as previously noted, researchers have also commented on the lack of research guidance for making these instructional tactic decisions (Dysthe, 2002; Gerber, Scott, Clements, & Sarama, 2005). In his study on the use of AD discussion to facilitate instruction in critical thinking, for instance, Bullen (1998) calls for more controlled comparative research on instructional tactics.

One important study that does undertake this type of empirical comparative analysis within the AD context was conducted by Weinberger, Ertl, Fischer, and Mandl (2005). Weinberger et al. distinguish between two modes of instruction through which instructors commonly support AD: those that facilitate learning through an epistemic or content-based approach, and those that facilitate learning through a social or supportive approach. What the authors call an epistemic approach comprises an instructional moderation style that facilitates learning through instrumental support consisting of such activities as direct instruction, structured lessons, or assignments, while the social instructional moderation style comprises an approach to instruction that facilitates learning through support for the interactions between learners. By comparing the relative effect of these two instructional emphases on learning outcomes, the researchers found

that a model of instructional moderating that was oriented toward supporting the social aspects of online discussion resulted in improved measures of learning over those that focused on specific assignments and tasks. For the purposes of this research, I use the terms *instrumental moderation style* to represent Weinberger et al.'s epistemic approach to instruction and *social moderation style* to designate their social approach to instruction.

Weinberger et al. argue that providing social support to students engaged in AD is significantly more effective in furthering knowledge acquisition because it facilitates group interaction consisting of reflections of alternative perspectives: "Social scripts may, therefore, reinforce collaborative learning mechanisms. Collaborative learners are exposed to diverging perspectives about a subject matter and need to elaborate and refine their conceptual models in order to evaluate and eventually integrate the various perspectives" (2005, p. 18). In contrast, they demonstrate, an AD discussion moderating style that focuses on specific activities and assignments actually suppresses the integration of knowledge because the participants are focused primarily on the completion of the assigned tasks. The representation of multiple perspectives among participants is one dimension of increased complexity in AD as defined by Fahy et al. (2001). The Weinberger et al. study is relevant to this study for several reasons. Beyond contributing to the research basis for making instructional tactic decisions, it employs the instructional tactics used in the present study, social and instrumental.

Another familiar instructional duality found in the literature is that instruction is either situated or abstract. This conceptualization holds that instruction either provides a real-world context (situated instruction) or is de-contextualized, theoretical, and didactic (abstracted instruction). Among the theoretical frameworks that address this duality are situated cognition (Hung & Der-Thanq, 2001; Lave, 1985; Scardamalia & Bereiter, 1996), anchored instruction (Bransford, Sherwood, Vye, & Rieser, 1986; Young & Barab, 1999), and authentic instruction (Herrington & Oliver, 2000), which, despite significant differences between them, encourage teachers to contextualize their instruction in real-world contexts.

In summary, with respect to the instructional tactic variables, situated instructional tactics involve the use of context-building means in the AD, such as the use of problem- or case-based discussion or structured debate. Abstracted instructional tactics, such as drill and practice or didactic, theoretical presentations, are defined by the absence of contextualizing examples. Although abstract instructional tactics can also be applied in contextualized ways, examples of those that can be applied in de-contextualized ways include question and answer, posting a reading, or requiring students to restate or discuss content or theory. In this study, the situated/abstract duality provides another dimension for independent variable selection.

This section has provided an overview of the existing literature and described the selection of independent variables. It has discussed the relative lack of research on AD discussion, how AD differs from face-to-face classroom discussion, and the implications these differences have for both participants and researchers. The selection of the investigational variables is described as having evolved from two conceptualizations of instruction in AD: that of instruction which provides a moderation style consisting of either instrumental or social support by the instructor, and that which utilizes either situated or abstract instructional tactics.

Definition of Terms

This section presents definitions of the major terms that will be used throughout this study.

Abstracted and Situated Instructional Tactics: Abstracted instructional tactics are instructional tactics that are de-contextualized—that is, that do not utilize real-world examples to cognitively position teaching and learning. Situated instructional tactics are teaching techniques that are contextualized by the use of real-world cases and examples. In practice, abstract or situated instruction does not often present as a fully dichotomous duality but rather comprises a continuum in which teachers sometimes provide few or many examples or even base their instruction entirely on contextualizing examples, as in case- or problem-based learning. In the present research, teaching scripts are used to

dictate that the experimental instructor-moderators' interactions with participants will be either fully abstract or situated.

Asynchronous Threaded Online Discussion (AD): A form of computer-mediated communications (CMC) that consists of text messages authored by participants and displayed in a threaded record accessible through the World Wide Web (WWW) for the purpose of discussion.

Communicative Complexity: This term, used by this study as an indicator of the learning potential of AD discussion tactics, is derived from the measurement techniques originally designed, described, and validated by Fahy et al. (2000) and employed by Anderson et al. (2001) and Fahy et al. (2001). The study uses these techniques to measure the complexity of participant interaction and exchange in terms of rhetorical and structural features of the messages, such as the use of attributions and clarifying questions, the distribution of communications between participants, and the duration of discussion.

Instructional Strategies and Tactics: For purposes of this research, I have adopted from Jonassen et al. (1991/1997) the terms *instructional strategy* to describe generic approaches to instruction and *instructional tactic* to refer to specific teaching techniques used to accomplish a specific instructional strategy. For example, writing is a generic teaching strategy and the assignment of research papers or essay answers on exams is a teaching tactic. In the context of this research project, discussion is a generic instructional strategy, and instructional tactics are the techniques used by teachers to introduce and maintain discussion on topics related to the instructional objectives.

Instructional Moderation Style: An instructional moderation style is the emphasis that an instructor-moderator places on providing participants with instrumental (epistemic) or social support within an AD discussion. In practice, rather than providing a dichotomy, social and instrumental moderation styles comprise a continuum in which moderation style ranges from fully social to fully instrumental. In the present research, the teaching scripts dictate that the instructor-moderators use fully social or instrumental moderation styles.

Instrumental and Social Moderation Style: The instrumental moderation style is an approach to instruction in which the instructor-moderator prompts participants with statements or questions directly relating to the knowledge objectives of the AD and is equivalent to what Weinberger et al. (2005) term the epistemic moderating style in AD. The social moderation style, in contrast, facilitates AD discussion through encouragement and support of the social interactions between learners.

Interaction and Exchange Parameters: The Transcript Analysis Tool (TAT) of Fahy et al. (2000) measures these two aspects of AD discussion to determine its complexity. *Interaction parameters* refer to the rhetorical or structural character of the messages, such as the use of citations, the use of clarifying questions, or providing statements of personal position. *Exchange measures* refer to factors in the distribution of communications between participants, such as the duration of discussion topic, the density of the discussion, and the ratio between sent messages and responses.

Latent and Manifest Messages: *Latent* messages are non-verbal expressions or signs that are understood by convention, such as facial expressions, gestures, and tone of voice. *Manifest* messages are those in which the meaning of the participant message is obvious, easily observed in the record, and pose little interpretative challenge.

Learning: Learning is defined in the present research as the formation, mediation, negotiation, comprehension, and distribution of understanding and knowledge.

Learning Potential: Learning potential is an instructional condition or context consisting of interaction patterns and content development that favors the formation, mediation, negotiation, comprehension, and distribution of understanding and knowledge. In this study, the learning potential provided by AD is measured in terms of communication complexity, as reflected in interaction and exchange data.

Outcome Orientation: A result of the current national trend toward greater accountability in education, outcome orientation is reflected in the repetitive, evaluation-based empirical analysis of institutional and programmatic performance, involving frequent adjustments to curriculum to improve success.

Summary

This chapter first identified the theoretical grounding of the study as the social-constructivist theory of learning, which is also the source of the study's two main paradigmatic assumptions: that discussion is a highly effective learning strategy and that its effectiveness is heightened as its complexity increases. Next, the chapter discussed the importance of this research study, which lies in the growing use of AD discussion as an instructional mode in post-secondary online education and in gaps and weaknesses in the current literature. Next, an overview of the current literature on the topic was provided, followed by a description of the conceptual framework that guided the selection of the experimental variables. A synopsis of the research design was next provided. Finally, the chapter provided a list of terminology and definitions that are used in the study.

Chapter 2 will provide a more detailed review of the current research on the post-secondary application and extent of use of AD discussion and on instructional tactics that are used to moderate discussion in conventional classrooms and ADs. It will also review the literature on research methodologies in AD discussion and present the research questions and hypotheses of this study.

CHAPTER 2
LITERATURE REVIEW

In "Transcending the Qualitative-Quantitative Debate: The Analytic and Approaches to Educational Research," Salomon (1991) recommends that educational researchers explicitly acknowledge the paradigmatic assumptions of their research, the nature of the phenomenon under investigation, and the research questions and methodology being used in the investigation. Thus this chapter discusses the current literature relevant to the theoretical assumptions and the existing knowledge and controversies involved in the formation of the research questions, the experimental method, and the analysis of the findings of this study on the influence of instructional tactics and moderation styles on the complexity of threaded asynchronous online discussion as used in higher education. The following main sections address (a) the theoretical foundation and assumptions of the present research, (b) the application of AD in instruction, and (c) the research methods used to collect and analyze the data in this study.

Theoretical Foundation

Clark and Estes (1999) suggest that educational researchers should develop a wide knowledge base from other of the liberal arts and sciences related to their topic of inquiry. Thus this section reviews a wide range of literature from many disciplines that have influenced the present research. The major topics discussed include (a) cognition, (b), epistemology, (c) linguistics, (d) hermeneutics, (e) cognitive and social constructivism, and (f) taxonomies of cognitive complexity.

Cognition

The relationship between human knowledge construction, acquisition, and memory is complex and subject to philosophical, linguistic, psychological, and anthropological debates relevant to the present research, which examines the influence of

teachers, instructional techniques, and online discussion on the construction and remembering of knowledge. Memories of knowledge objects and mental processes are commonly conceived of as the domain of cognitive psychology and the general objective of instruction. As early as 350 BCE, Aristotle compared his conception of knowledge to memory: "When a person possesses scientific knowledge and perception without actually exercising them, [he or she is] actively engaged in remembering. . . . Memory is not a perception or conception, but a state of affection connected with one of these, when time has elapsed" (Ackrill, 1988, p. 206).

Psycho-archeologist Julian Jaynes (1990) offers a useful framework for understanding cognition. According to Jaynes, modern human consciousness is a process in which our thoughts and perceptions, including new ideas, can be arranged and rearranged on a trial-and-error basis for "best fit" with an analogical version of the world that we have constructed from our memories. Sense perceptions, experiences, and other people around us present us with novel ideas that we then internally ask questions about in order to evaluate them for congruency with pre-existing memories.

> Consciousness is an operation rather than a thing, a repository or a function. It operates by way of analogy, by way of constructing an analog space with an analogy of "I" that can observe that space, and move metaphorically in it. It operates on any reactivity, excerpts relevant aspects, narratizes and conciliates them together in a metaphorical space where such meanings can be manipulated. . . . Conscious mind is a spatial analog of the world, and mental acts are analogs of bodily acts. (Jaynes, 1990, p. 65)

Many educational thinkers, such as Elder and Paul, agree with Jaynes that all of our knowledge about the world is based on a foundation of questions: "Thinking is driven by questions, not by answers" (Elder & Paul, 1998).

Jaynes attributes the presence of these mental abilities in the modern human consciousness to the parallel evolution of human language—especially the development of a more sophisticated metaphorical capacity. Yet Jaynes' cognitive scheme does not address the relationship of the mind-language apparatus to the use of spoken or written language as a social communicative apparatus—the subject of linguistics. Nor does he

help us understand the distinction between the mind analog of the world and the real world—the subject of epistemology, linguistics, and hermeneutics, discussed below.

Epistemology

Jonassen et al. (1991/1997) argue that teachers and educational researchers need a more sophisticated epistemic framework to improve teaching practice and educational research, especially research on instructional technology such as this study. As defined by Aristotle, epistemology is that branch of philosophical study concerned with the relationship between reality and knowledge (Craig, 2000). At minimum, this means that epistemology is related to questions about the "truth-value" of our understanding of the phenomena we encounter.

While teachers are unlikely to struggle with the development of precise descriptions, definitions, or classifying structures for knowledge as do epistemic philosophers, for instructional design purposes it is useful to acknowledge a "working epistemology," which allows us to classify the epistemic class of knowledge contained in educational objectives. Working epistemologies are implied whenever, for example, educational objectives concern the discrimination of concrete from abstract knowledge, quantitative from qualitative data, or discussable from scientific facts. Working epistemologies are employed when educational objectives involve understanding the scientific, mathematical, subjective, or revelatory basis of human knowledge. With respect to the present research, since teaching is coupled to a knowledge base and that knowledge base contains knowledge objects of various validities, a taxonomic structure of "truth value" is needed to systematize the acceptable range of flexibility and help teachers select appropriate instructional techniques. With respect for Heidegger's warning that "No particular way of treating objects of inquiry dominates the others" (Heidegger, 1929, p. 1), the following categories of knowledge comprise the epistemological assumptions that underlie the present research.

First is scientific knowledge that arises as a direct result of universal and consistent conformity with observation and experience. According to Freud, science aims

"to arrive at a correspondence with reality, that is to say with what exists outside of us and independent of us" (Freud, 1932). This knowledge has been collected as a result of millennia of human experience and, though sometimes referred to as theory, is usually considered beyond argument. Most empirical sciences (for example, mathematical science) produce knowledge in this class. Though this sort of knowledge is at times subject to Karl Popper's caveat that "all knowledge is provisional, conjectural, hypothetical" (Watkins, 1997), this study assumes that a consistent correspondence with human experience results in attainment of status as scientific knowledge.

Second is knowledge based on agreement and probability, or constructed knowledge. In the words of Tocqueville, "There is no philosopher in the world so great but that he believes a million things on the faith of other people and accepts a great many more truths than he demonstrates" (Tocqueville, 1839, 2: Sec. 3). As Tocqueville observes, theories are tested not only in the experimental sense but also in the social context through discussion, debate, and finally in majority agreement. This category of knowledge, then, is co-constructed through a process of observation and mediation. As these observations are replicated and disagreement disappears, constructed knowledge moves closer to first-order scientific knowledge.

Third are beliefs, or knowledge acquired through revelation or intuition. The study of knowledge that cannot be known is termed metaphysics, and is referred to by many philosophers as the first philosophy, that of Aristotle being its earliest and most notable example. Some philosophers have argued that this sort of knowledge has gotten a poor reputation because of a western scientific bias referred to as logical positivism.

Linguistics

Of relevance to this study, which examines the complexity of discussion, is the debate between interpretive and generative linguists over the observation that in everyday use, the structural characteristics that typify meaning in written language cannot display all the meaning carried by sentences as they are used in context. Chomsky has argued that contextual and non-verbal cues can transmit hidden intentions in the "deep structure" of

language (Huck & Goldsmith, 1995), or a subconscious supporting context from which the meaning of language, words, sentences, and ideas are derived. Chomsky refers to this context, or the internal language of the mind, as I-Language, an innate, highly abstract language by which we communicate ideas in our mind, which he contrasts to E-Language, the language we use in any other circumstance beyond the context of the mind-brain, such as spoken or verbal communications (Maher & Groves, 1997).

The linguistic theory of deep structure resonates with post-modern deconstructionist ideology and is similar to schema theory and cognitive constructivism (in education and psychology), metaphorical language theory (in cognitive science and linguistics), I-language (in linguistics), and sub-textual meaning (in philosophy). This study examines the construction of verbal meaning-making in the form of written propositions within the context of an instructional discussion.

Hermeneutics

Hermeneutics is the study of interpretation, especially textual interpretation. Although originally concerned exclusively with biblical interpretation, contemporary hermeneutics is concerned with questions of meaning in written and spoken language (Adler, 1992). Hermeneutics involves the interpretation or understanding of a verbal or written communication beyond that of the expressed concept or idea itself. For instance, hermeneutics concerns the linguistic context or "gloss" of a text, such as whether the writer's language is to be seen as having a literal meaning or whether the meaning is more symbolic, mythological, or metaphorical.

In AD content analysis, the analysis methodology selected for the present research, various researchers have realized that the meaning of text is not always apparent, that there are both *latent* and *manifest* meanings to the messages posted in AD (De Wever et al., 2006). That is, the meaning of messages posted by discussants have cognitive, epistemic, hermeneutic, and linguistic dimensions in the sense that there are learning objectives that involve a human cognitive capacity to explore the various

domains of knowledge, using internal and external modes of expression which often have more complex meanings that are influenced by language and textual interpretations.

According to De Wever et al. (2006), manifest content "is content that resides on the surface of communication and is therefore easily observable" (p. 9). The authors observe that because manifest content is so concrete and its definition can be formalized, it imposes little interpretive burden upon coders. Such is not the case, however, for latent content, which consists of the interactional processes demonstrated by the messages. For example, the process of learning or development of critical argumentation skills could be considered latent content. According to Strijbos, Martens, Prins, and Jochems (2006), the process of identification and classification of latent content is more difficult and specific to a researcher's research questions and therefore requires more interpretive effort on the researcher's part.

The realization that there are latent and manifest meanings to messages present in AD discussion has evolved into a larger conceptualization and debate in AD research, evidenced by quantitative and qualitative research approaches distinguished by the researcher's acceptance of interpretive responsibility. In other words, quantitative AD researchers who wish to limit their interpretive responsibility would likely select AD content analysis methodologies that provide measures of manifest content. In contrast, qualitative AD researchers who have different research goals and are more comfortable with the interpretive necessities of latent content will attempt to identify evidence in the AD transcript indicating more complex activities such as evidence of the engagement of participants or the use of critical inquiry or decision-making processes. In the context of the present research on AD and content analysis, hermeneutics is involved in the distinctions that have evolved between quantitative and qualitative AD research and between manifest and latent meaning.

Cognitive and Social Constructivism.

Piaget's theory of cognitive constructivism argues that learning is an internal personal process of accommodating, assimilating, and processing information (Plucker,

2003). In contrast, social constructivist theory argues that knowledge acquisition is not the transfer of information from the outside world to an internal world of cognition, but rather that knowledge is internalized through experience, or mediation with the external world, and that interaction with others is the setting for learning. According to social constructivists such as Vygotsky, then, learning occurs in the process of social interaction with others, such as experts, teachers, and peers. Therefore, learning requires opportunities to interact with such others using any number of venues or media. Scheffel, Omdal, and Usrey (2000) identify social constructivist learning as an interactive, dynamic, evolutionary process rather than the mastery of static elements of knowledge.

Teachers play an important role in the development of human consciousness and intelligence. Vygotsky's research provides an early elaboration of social constructivism from the psychological perspective of the development of the consciousness and intelligence. According to Vygotsky, "thought does not express itself in words but that rather it realizes itself in them" (Vygotsky, 1962, p. 251), and therefore the meaning of a thought is internal while the meaning of language must be negotiated socially. Vygotsky's theory holds that the psychological state of immature, disorganized, spontaneous internal thought requires the systematic assistance of teachers to reach logical mature solutions and ultimately internalization. Thus, he argues, "the only good kind of instruction is that which marches ahead of development and leads it; it must be aimed not so much at the ripe, as at the ripening functions . . . . Instruction must be oriented not only toward certain minimal ripeness of function but also toward the future, not the past" (p. 189). Or, as put by Zhu (1996), intellectual development takes place between people before internalization occurs. Scheffel, Omdal, and Usrey (2000) agree, asserting that language is a necessary ingredient in the process of cognitive growth.

According to Lazonder, Wilhelm, and Ootes (2003), there appears to be a consensus among educational thinkers that collaboration fosters learning, although there is some disagreement between the cognitive constructivist and social constructivist explanations of why or how collaboration works. According to Lazonder et al., cognitive constructivists attribute the benefits of collaboration to the elaboration of knowledge that

is presented to the student: “Giving explanations encourages a student to clarify and reorganize the material to make it understandable to others” (p. 291). In contrast, they continue, social constructivists perceive collaborative learning as a joint process (rather than a personal one) of co-construction of knowledge: “Students construct a shared understanding of a given topic through argumentation, discussing the significance of personal beliefs until mutual agreement is reached” (p. 292).

Recently, Jonassen has suggested that researchers avoid forming strong allegiances to any specific theory as the true theory of instruction or learning:

> The reality is that very little of the knowledge that learners construct can be predicted by any model of instruction or theory of learning. Polemicizing any discussion of theoretical assumptions or instructional methods dooms us to dualistic reasoning. I hope that, as a field, we are more epistemologically mature than that. (Jonassen, 2006, p. 44)

While respecting Jonassen’s warning against becoming polemical, it remains important to the interpretation of educational research that its operational learning theory be identified. The present research is largely predicated on social constructivist learning theory.

Taxonomies of Cognitive Complexity

In the context of the present research, there is a need to analyze and understand the communication complexity of AD. The analysis of communication complexity in AD is ultimately related to the cognitive complexity of the messages posted in the online discussion, and thus an examination of the educational literature relating to taxonomies of cognitive complexity is relevant to the present research.

Educational researchers have studied cognitive complexity for nearly 100 years. As early as 1912, Stevens (1912) used a classification system that categorized cognitive complexity as “memory” or “reflective.” In a 1991 survey of knowledge classification schema proposed in the educational literature, Wilen found at least 21 classification taxonomies (Wilen, 1991). The cognitive complexity of discussion is related to the mental operations required to acquire, assimilate, understand, and comprehend knowledge. For instance, Jonassen et al. (1991/1997) suggest the application of an

instructional taxonomy that recognizes the differing cognitive complexity of verbal and intellectual operations. This section gives an overview of the history and current status of classification schemes for the cognitive complexity axis of knowledge.

In 1956, Benjamin Bloom and a task force of expert educators first published *The Taxonomy of Educational Objectives* (Engelhart, Hill, Furst, & Krathwohl, 1956), which has since been translated into more than 20 languages. Bloom's taxonomy addressed only the cognitive and psychomotor domains, as the research team's primary interest was in producing a framework to facilitate cross-comparative analysis of standardized examinations. The thrust of their work was to standardize the level of cognitive difficulty in utilizing knowledge rather than to create a framework for categorizing the content axis of knowledge. Since they were only addressing the general psychological character of acquired knowledge rather than the content itself, they were able to avoid possible epistemological entanglements.

Later, Krathwohl and some other members of Bloom's original team addressed the affective domain as well. Their revised text, *A Taxonomy for Learning, Teaching and Assessing* (Anderson et al., 2001), identifies four knowledge dimensions: factual, conceptual, procedural, and metacognitive. Each dimension may be cognitively processed at six levels of increasing complexity: remember, understand, apply, analyze, evaluate, create. The authors also explicitly state that the activities of learning, teaching, and assessment are related through epistemology and cognitive psychology.

In 1962, Aschner et al. claimed that a taxonomic system was needed to assess the quality of thinking elicited or expressed in teacher-student interactions. They described five categories of cognitive complexity: cognitive memory, convergent thinking, evaluative thinking, divergent thinking, and routine maneuvers. Aschner's team defined cognitive memory operations as recapitulations, clarifications, or factual representations. Convergent thinking was demonstrated by translations, explanations, simple associations, or conclusions. Evaluative thinking required structured or qualified analysis. Divergent thinking was recognized by interactions involving elaboration, divergent associations,

deductions, and synthetic operations. Routine maneuvers were interactions that structured or maintained classroom operations (Aschner et al., 1962).

In 1991, Wilen suggested that a classification system for teachers' questions first devised by Enokson in 1933 could be adapted to facilitate the classification of knowledge levels. Wilen recommends a taxonomy based on four levels of cognitive complexity. *Cognitive-memory* operations require recalling facts and formulas through such processes as recognition, rote memory, and selective recall. *Convergent thinking* requires that students demonstrate integration of remembered data. When students independently generate their own information in data-poor circumstances, they are *divergently thinking*. *Evaluative thinking* involves judgments, values, or choices (Wilen, 1991).

Godfrey suggested a modification of the Wilen/Enokson taxonomy, noting that these divergent-convergent interactions can best be characterized as low or high and as divergent or convergent cognitive processes (LD, HD, LC, HC). Low convergent (LC) responses demonstrate recall or recognition of information. High convergent (HC) responses exhibit an understanding of information through the use of description, summary, comparison, or interpretation. Low divergent (LD) responses represent cognitive operations at the first level of critical thinking and entail justification of knowledge by acknowledgement of motive, rationale, or cause. High divergent (HD) thinking is indicated through expressions of opinion, judgment of ideas, predictions, and hypothesis (Godfrey, 2001).

In 1998, Bereiter and Scardamailia (1998) suggested a unique approach to cognitive complexity that they claim is more able to accommodate social-constructivist theory. Their taxonomy integrates developmental theory with cognitive complexity. They identified eight hierarchical levels of approach to knowledge ranging from "knowledge is the ways things are" (level 0) to "knowledge is viewable from different perspectives" (level 4) to "knowledge is a social construct" (level 7).

Instructional Technology and AD

Problem selection and definition in the present research on the influence of instructional tactics and moderation styles on the complexity of AD has been influenced by Clark's argument that we need to advance our understanding of fundamental instructional methods, or what he refers to as "generic instructional strategies." In a restatement of his paradigm-shifting 1983 article, Clark elaborates upon his controversial stance, stating that "too many studies [on instructional learning environments] present simplistic conceptualization and design and suspiciously elaborate statistical analysis" (Clark, 1989, p. 57). Clark warns that learning in any environment, whether classroom or technological, is too complex to draw valid causal conclusions and that comparative media research has failed to provide more than "mere advocacy." Because experimental confounding is likely, Clark says that researchers should identify, isolate, and study the "active ingredients" in teaching and learning rather than research the effectiveness of systems that combine several strategies in complex environments. The present research argues that the instructor's interaction in AD is an active ingredient influential in the complexity of online discussion and therefore deserves investigation.

Clark suggests that focusing research resources on the "generic, authentic, and active ingredients of educational technologies" will be more fruitful than descriptions and simple advocacy of complex instructional technologies. For Clark, these authentic technologies are "the missing connection between the science of learning and the practice of education" (Clark & Estes, 1999, p. 5). Take, for example, a hypothetical media effect study that compares a traditionally taught classroom lesson to one delivered via the Internet. According to Clark, the first difficulty is there is no control group. And while this difficulty could be overcome by using a quasi-experimental design, a second difficulty is that there is likely to be cross-contamination between one treatment and the other; that is, in planning the Internet lesson, teaching methods used in the traditionally taught lesson may be altered. Clark states that we may legitimately learn whether one vehicle is faster or cheaper at delivering the lesson, but we cannot know if one is more effective than the other through this sort of research.

Cobb has recently argued that media and learning can be connected in limited ways without compromising on any of Clark's main points. He states that the idea of efficiency has been too restricted by Clark; while he agrees that media choices may need to be determined by consideration of cost and time efficiency, the selection process should also allow consideration of the "cognitive efficiency" of instructional media (Cobb, 1997). Cobb gives the example of learning bird songs via a recording or from printed notes in a textbook. He suggests that it would require far more effort and prior knowledge of musical notes to decode the birdsong transcription, and thus while the cost and access to text media might be more efficient in the Clarksian sense, it is less efficient in the cognitive sense to try to learn bird songs in this way.

Perhaps the strongest general warning that Clark raises is that we need to resist the appeal of our natural hopefulness and pay attention to negative results. In the specific case of media effects research, he says that we should not ignore the fact that "over 70 years and thousands of media research studies have failed to show compelling causal evidence." Clark has said many times that he does not wish for researchers to give up on educational research, but rather to trust themselves and do more meaningful research, or what he calls "substantive evaluation of structural processes in learning and instruction" (Clark, 1994).

In contrast, Kozma (1991) has stated that media and method cannot be separated, as the learner actively collaborates with the media to construct knowledge in a situated context. The distributed cognition view (attributed to Solomon, 1990) held by Kozma states that if an instructional technology, in combination with the representations already present in the learner, are able to provide certain relevant representations that learners could not perform or provide for themselves, then these media would generate problem-solving capacities and representations useful in future situations and thus contribute to learning. Thus he concludes that while comparative research does indeed not currently provide us with a satisfactory understanding of "media-related causal elements," research protocols that that utilize mixed quantitative and qualitative methods can reach valid

conclusions even in complex instructional interactions, as long as they are studied in an authentic context.

Jonassen (1994) takes a different tack in refuting Clark's argument, accusing it of rational positivism and over-simplistic, dualistic analysis. He points out that certainty and prediction are especially thorny in research on human behavior; since the social sciences are problematic, it is unrealistic to think that educational research can generate "truths."

According to "Considerations of Learning and Learning Research: Revisiting the 'Media Effects' Debate" by Nathan and Robinson (2001), the media effect debate will continue to raise methodological, epistemological, and pedagogical issues that, in the final analysis, will lead to better educational research. Nathan and Robinson conclude that any consensus on the ultimate causes of learning will continue to be elusive because the understanding of what constitutes learning is so influential in the debate. According to Nathan and Robinson, traditional theorists (such as Clark) start from a learning framework that can allow for division of media from method; social constructivist theorists believe that media and method are inextricably intertwined and that learning involves learner embedded in a collaborative environment; and situative learning theorists locate learning within the distributed activity of the learner (Nathan & Robinson, 2001).

One difficulty that is at least a component of the "acrimonious debate" that resulted from Clark's conclusion is that the research is confounded by the complexity of measuring learning. Social constructivist educational researchers would agree with Clark that researchers who claim to be measuring learning are not taking into account how expansive and continuing the process of learning is. According to Gunawardena (1999), evaluating learning is challenging because learning requires not only the co-construction and validation of knowledge through social interaction that may be measurable through immediate measures of knowledge acquisition, but also internalization and cognitive growth that may not be easily observable through experimental measurement instruments. In this light, Clark's critique of educational research suggests that valid educational research must demonstrate which instructional technologies can most

efficiently provide an environment that facilitates learning—that is, an environment that provides potential social mediation of knowledge, or learning potential, rather than attempting to measure learning itself.

Like Clark, Dysthe (2002) suggests that cause/effect relationships cannot be truly established between instructional strategies or systems and growth in understanding and the development of conceptual change. Dysthe argues that the pretest/posttest measurement method commonly applied to assess learning cannot isolate what has been learned from the particular activity from other influences. Dysthe suggests, however, that it is possible to analyze aspects of both the interactional patterns and the development of the content, and on the basis of this, to make assertions about the learning potential in the particular instructional activities. Learning potential, according to Dysthe, relates well to the social constructivist view of learning because it focuses on the interactive process rather than the outcome.

Dysthe suggests that especially in the context of research on AD, discourse analysis of text-based communications (*per* Bakhtin's 1981 theory of dialogue) can reveal the interactive processes that relate to the learning potential provided by the instructional strategy. She therefore suggests that the assessment of learning potential is a more realistically accessible target for assessment then learning outcomes.

Taking a somewhat different aim at the same target, Jonassen (2006) argues that social constructivism is not a theory of learning nor a method of instructional design, but rather an epistemology and ontology. In fact, he claims, "One can argue that it is impossible to directly and empirically demonstrate the effectiveness of constructivism" (p. 43). Here Jonassen amplifies the above claims that the causal link between instruction and learning is of questionable validity.

In a status report on research in distance education, Saba (2000) also recommends against experimental approaches that attempt to measure learning outcomes. Saba expands the Clark media effect debate by stating that the fatal flaw in such research is that it fails to account for individual differences and the existence of prior knowledge in their measurements of knowledge acquisition. He suggests that methods (such as content

analysis) which focus on interaction are grounded in theory and attempt to analyze learning potential rather than learning outcomes can make valid and valuable contributions to research on instructional technologies.

As has been suggested by Salomon and others, producing high-quality educational research requires an eclectic understanding of literature from disciplines outside the normal breadth of the educational domain. This section has provided a review of the influential literature that shapes the theoretical orientation of the present research. It has also discussed significant questions about experimental educational research raised by Clark regarding effectiveness of analyzing the influence of instructional interventions through the measurement of learning outcomes. Finally, the section provided the rationale for measurements of learning potential as a more reasonable alternative to the measurement of learning outcomes in AD, the strategy adopted by this study.

Instruction with AD

This section presents a review of literature on learning versus learning potential as it pertains to discussion as an instructional strategy. It also reviews literature relating to the increasingly common use of AD for instructional purposes and the features of AD that provide the learning environment studied in the present research. The literature on the instructor's role in AD is also reviewed.

Learning and Discussion

As a recent U.S. Department of Education-funded summary of the research on learning through discussion states, "Discussion is very often used as a tool in classrooms. When designed properly and used thoughtfully, discussion tasks can be effective learning tools that promote creativity, as well as generate meaningful interaction and understanding for the learner" (Ngeow & Kong, 2003, p. 1). Many important educational researchers agree that discussion is a critical component of the learning process. For example, Berge (1999) observes that the promotion and organization of intrapersonal reflection is a large part of teaching. Vrasidas and McIsaac (1999) state that knowledge

building relies on collaboration, discussion, argumentation, and negotiation, interactions that are critical to learning. As Soller (2001) puts it, "In the classroom, effective collaboration with peers has proven itself a successful and uniquely powerful learning method" (p. 1). In "Constructivism and Computer-Mediated Communication in Distance Education," Jonassen et al. (1995) state that "knowledge construction [learning] occurs when students explore issues, take positions, discuss those positions in an argumentative format, and reflect on and re-evaluate their positions" (p. 16).

While it seems a settled consensus among educational researchers and practitioners that discussion is a key component in the learning process, Dysthe (2002), in agreement with Laurillard (2001), describes this as one of the greatest untested assumptions of current educational science. According to Dysthe, "It may not be possible to test what each student actually learns from a particular interaction, but it is possible to analyze aspects of both the interactional patterns and the development of the content, and on the basis of this make assertions about the learning *potential* in the particular activity" (p.171). Stansberry, Haulmark, and Sheeran (2003) agree that the difficulties inherent in measuring learning in AD make it necessary to consider the role of both the instructors and the students.

According to Soller (2001), simply putting students into a group and assigning them a task does not guarantee that the students will engage in effective collaboration. Rather, he claims, effective participation requires leadership, even in peer-directed AD. "Encouraging active participation also increases the likelihood that all group members will learn the subject matter, and decreases the likelihood that only a few students will understand the material, leaving the others behind" (Soller, 2001, p. 4).

Jonassen et al. (1995) state that interaction is the most valuable component of classrooms and should be facilitated by technology. In "Questions in the Online Learning Environment," Blanchette (2001) states that one of the greatest challenges of distance education is to provide more opportunities for learners to engage actively in learning.

AD as a Technological Context for Learning through Discussion

An instructional technology that can reproduce some of the characteristics of verbal discussion is computer mediated communications (CMC). CMC uses computer networks and the Internet to facilitate the communication of messages (text, audio, or video) between two or more computers. Currently three configurations of CMC are in common use: email, synchronous CMC (SD), and asynchronous CMC (AD).

In email, the messages are sequential and sent electronically via the Internet to another individual or group of individuals. Though the email process facilitates easy reply to messages and can copy the previously received related messages into the reply message (usually displayed in chronological order), the system does not easily lend itself to viewing or archiving multiple messages.

Listserv is a modification of the email system in which emails from one user are distributed to a group of subscribers. Additionally, listserv messages can be archived in a website where subscribers may view topically or chronologically ordered previous messages. Listservs are sometimes referred to as electronic bulletin boards, a metaphor that refers to the capability of Listservs to compile previously posted messages.

AD is an evolved form of email and listserv. AD is a form of conferencing telecommunications in which participants, working on Internet-networked computers, can publish, view, and respond to messages. AD is an improved form of CMC that is intended to provide a platform for facilitating group collaboration (Maas, 2001). AD is the most common configuration of discussion technology used in education (Branon & Essex, 2001; Shneiderman, Yu-Borkowski, Alavi, & Norman, 1998).

The software configurations for AD are numerous and offer diverse additional features, but examples of systems can be observed in Internet newsgroups and HTML-based discussion groups. Participants may view this record on a commonly accessible electronic document via Web browser software. AD has adopted the listserv archiving scheme of providing a common website for an indexical archive of email messages. AD discussion can be unmoderated, such as in Internet newsgroups, or moderated, in which unrelated messages are screened and deleted by the moderator. In educational settings a

teacher will often act as a moderator. In contrast to face-to-face discussion, AD participants may be in any time zone or geographical location that offers computer access.

Some AD researchers have suggested that a primary advantage of AD is that the environmental and social distractions of face-to-face verbal communications are lessened by the computer-networked environment (Vrasidas and McIsaac, 1999). At the same time, while the communications conditions in AD may take place in a quiet library or computer lab, they may also originate in a busy, noisy coffee shop or a family room with others watching television. The factors that make AD appear to be a communications environment less prone to distractions are that it allows more processing time (think time) and time shifting (delaying responses to a more convenient time). Like face-to-face discussion, participants are free to respond to others immediately, relying on available, on-hand resources, or they can exercise the option of taking a more measured approach, thinking more deeply about the issues raised in the other postings and researching a response before posting it.

In AD the archive of AD messages is typically arranged in topical rather than chronological order. There can be any number of topical threads contained in an AD. Participants may view the posted messages at any time, can see all the other participant's comments, and respond to any of the posted comments. The feature of topical threading in AD discussion is one of the characteristics that distinguish it from verbal discussion. The most commonly used form of AD limits communications exclusively to text, aside from the occasional use of emoticons, symbols that have evolved in email and AD to express emotions—e.g., ;-). In other words, AD allows no non-verbal communications between participants. In the text-only application of AD, the use of non-verbal communications common to face-to-face discussion contexts, such as posture, movements, facial expressions, or dramatic intonations, are not available. More recently, forms of AD have begun to integrate more complex media into participant messages so that, for example, it is possible to thread video and audio messages into the discussions. While the most common applications of AD limit the participants to communications in a

text form, the AD communication model is similar enough to verbal face-to-face discussion that participants use many of the linguistic strategies of verbal discussions in their communications—especially the use of statements, questions, and attributions of expert opinion.

Despite its advantages, the topical (rather than chronological) order of communications in AD can also create some initial disorientation for participants. Survey research on AD has indicated that participants initially experience some anxiety associated with the use of the technology, but that this effect decreases as the participants gain experience with AD (Murphy, Drabier, & Epps, 1998; Vrasidas & McIsaac, 1999). More recent research suggests that improvements in the AD software user interface and the generalized increase in computer and network competence have also lessened technology-related anxieties (Novitzki, 2000).

Another contrast between AD and face-to-face discussion is that participants must actively demonstrate their presence and engagement in a discussion through posting relevant messages. In face-to-face verbal discussions, participants can be physically present without being actively engaged in discussion or perhaps even in listening and thinking. In contrast, the AD participants' engagement in a discussion is demonstrated only by the presence of their messages in the Web archive. While this can be a limiting feature because one cannot use visual cues to project the quiet listening engagement of participants, it may also have the virtue of motivating more participation from usually quiet individuals (Monson, Wolcott, & Seiter, 1999).

In this and other ways, according to Xia (2002), AD encourages more equal distribution of participation in discussion than in face-to-face environments. Other AD researchers have concurred that individuals who are less likely to participate in face-to-face classroom discussions are more comfortable interacting in AD (Usrey, 1999; Winograd, 2002). AD participants have frequently reported that the self-consciousness associated with public speaking in face-to-face classroom interactions is lessened by AD (Powers & Mitchell, 1997). Several researchers have attributed this reduction in self-consciousness to the more relaxed and relatively anonymous communications

environment perceived in the online environment, while others believe that it is due to less performance anxiety (Bender, 2003).

The topical textual message archiving of communications in AD also relieves the discussants of many considerations in the face-to-face verbal process, such as courtesy determinations (e.g., topical continuity and turn-taking), verbal rhetorical skills (e.g., voice control and construction of verbal argumentation), and the use of appropriate non-verbal communications. Additionally, because of the threaded indexical organization of AD, users may also select whether they wish to comment on a specific topic within the discussion. Winiecki and Chyung (1998) have noted that tacit verbal practices such as taking turns are not present in AD. According to Biesenbach-Lewis and Weasenforth (2000), the absence of turn-taking courtesies and the relatively longer think-time in AD also relieve pressure on students to respond immediately as they would have to in face-to-face classroom discussion and help more introverted or thoughtful learners to contribute to the discussion.

Another unique feature of AD is that it allows participants to establish their own pace. The Web archiving of messages in AD also allows discussion elaborations and sub-discussions to develop in the discussion at any time of the day or night anywhere in the world. Thus AD can facilitate discussion between participants living in different time zones or cater to participant preferences as to the time of day in which to engage in the discourse.

Because AD promotes both peer-to-peer and instructor-student interaction, the AD method has been described as discursive rather than didactic and is therefore associated with both cognitive and social constructivist learning theory (Winiecki & Chyung, 1998). Social constructivists such as Jonassen view AD as an instructional communications strategy that can be used to accomplish the social interaction required for generating and acquiring knowledge (Jonassen et al., 1995). Research on the instructional application of AD has suggested that it can improve the quantity and quality of interaction among students and teachers (Quilter & Chester, 2001), reduce public

speaking anxiety associated with face-to-face discussion (Dietz-Uhler & Bishop-Clark, 2001), and distribute participation more equitably (Xia, 2002).

As in the traditional classroom, the AD instructor-moderator can shape the discourse. The process of moderating an instructional AD involves posting questions or statements intended to evoke student responses (Winograd, 2002). While teachers are trained and practiced in initiating and managing classroom discussions, many initially express anxiety about the idea of leading an online discussion (Berge, 1995). Although experienced online educators have suggested that some of the teaching methods that work well in the traditional classroom can be adapted for effective use in AD (Winograd, 2002), there are also some significant differences. For instance, when a discussion fails to catch on in a traditional classroom, teachers can shift to lecturing, which is not so easily accomplished in AD. While it is possible to transmit Web links or complex messages to the group, these sorts of materials may detract from the collaborative nature of the discussion and reduce the advantages of group process (Novitzki, 2000; Wakley, 2002).

The threaded indexical organization of AD discussion also has been cited as an anxiety-producing reorientation for inexperienced participants (Collison et al., 2000). Winiecki and Chyung (1998) have noted that AD participants must assemble the sequence of messages into threads themselves, and because participation is to a great extent learner controlled, postings can become disorganized, leaving participants confused. Another frequent and related problem is that participants inadvertently post responses in a new thread or in the wrong thread, which if not corrected can lead to considerable confusion in the AD indexical display. Winiecki and Chyung suggest that instructor-moderators should engage in strategic editing and indexical repair to resolve this potential confusion, which they liken to occasions during live discussion when teachers intervene to clarify questions or contextualize student comments.

Strategic editing by teachers relies on the fact that the AD moderator has editing privileges over the entirety of the threaded discussion. Teachers may use this privilege to rearrange, edit, or re-index participant comments so that they will more logically fit the format of the AD record. Sometimes revising the topic heading or adding a sub-

discussion or a "response-to-response" comment can also improve the flow of the index. Winiecki and Chyung also suggest that simple graphical representations of the discussion may be created to help participants maintain their orientation.

Student surveys have also indicated that AD participation is complicated by anxiety over the composition of an "appropriate" response structure (Usrey, 1999). According to Ursey, a major contributor to this anxiety is uncertainty about how their participation will be evaluated. Biesenbach-Lewis and Weasenforth have suggested that more qualitative evaluation (rather than quantitative, in which the more postings the better) can motivate higher-order participation. They state that explicit expectations should be specified for participants. Indicators of such engagement should include higher-order, authentic engagement and may include linkages between several threads, reflecting on or analyzing topics, self-initiating new threads, providing evidence, or offering mutual support. Providing model responses for participants may strengthen this strategy. Another suggestion they make is that teachers should provide formative weekly evaluation of each participant's contributions.

Prevalence of AD Use in Higher Education

The use of AD in higher education is proliferating, according to studies of the use of distance education in college and universities (Waits et al., 2003). AD is the most common configuration of discussion technology used in education (Branon & Essex, 2001; Shneiderman et al., 1998). Post-secondary applications of networked computers have become widespread and include email, listservs, asynchronous discussion groups (AD) and synchronous conferencing ("chat") as well as websites and JAVA-based subprograms. It is not unusual for teachers and students to "meet" for formal discussion online in AD as a part of traditional as well as entirely online courses. More and more college faculty are considering the learning potential of AD for their classes (Dysthe, 2002), and new as well as experienced faculty are being challenged to adopt course designs that make considerable use of computer and online resources.

The 2000–2001 report by the National Center for Educational Statistics (NCES) found that 2,320 (56%) of the post-secondary institutions in the United States offered distance education courses. More than 3 million students participated in these Internet-enhanced courses, which more than doubled 1987–1988 enrollments, and 43% of these courses utilized AD. NCES also indicates that the growing use of computer-mediated conferencing in post-secondary education is expected to continue; 40% of the surveyed colleges and universities stated that they planned new or increased use of such technology during the following 3 years (Waits, 2003).

AD Instructional Tactics and Moderation Styles

According to Dysthe (2002), research has produced a variety of suggestions about the preferable extent and kind of teacher involvement in AD, although many researchers have concluded that active teacher involvement is necessary for productive interaction (Collison et al., 2000; Jung et al., 2002; Muirhead, 2001; Robertson, 2000; Tu & Corry, 2003; Winiecki & Chyung, 1998; Zhu, 1996). While observing teacher involvement in AD is highly context-dependent, Dysthe calls for further research (such as this study) that could provide more insight into which forms of active teacher involvement and support are most effective. This section presents a discussion of the literature relating to teacher involvement in AD with respect to instructional tactics (ITs) and moderation styles (MSs) in AD, which are the independent variables in the present research.

Soller (2001) states that student learning in AD requires on-line guidance and support similar to the support offered students in face-to-face classroom situations. “The most effective instructors teach students both the cognitive skills necessary to learn the subject matter, and the social skills they need to communicate well in a team” (Soller, 2001, p. 2). According to Hara, Bonk, and Angeli (2000), because the moderator or discussion starter is a key player in AD and determines the depth of dialogue and overall knowledge-generation processes, the quality of moderation is undoubtedly the crucial problem in AD. In “Stalling the Learning Process: Group Dynamics in Cyberspace” (2001), Davis and Ralph note that online discussions are difficult to manage, but that

students exhibit enthusiasm for it. Fahy et al. (2000) contend that more research is needed on the types of moderator behaviors that are associated with increased (or decreased) participation and satisfaction. Jung (2002) suggests that researchers should use CA to determine what specific messages from instructors or peers stimulate the learner to increase his or her involvement in AD. But what instructional moderation skills are needed to facilitate learning subject matter and social skills in AD? The next section describes two dimensions of AD instructional behavior—instructional tactics and moderation styles—that constitute the experimental variables in this study.

Definitions of Instructional Tactics and Moderation Styles

Instructional tactics (ITs) and moderation styles (MSs) are instructional techniques and communications behaviors that are adopted and deployed by moderators in an instructional AD. The application of ITs and MSs by instructors is intended to initiate, maintain, and increase participant interaction in AD. As has been suggested, the basis for choosing an IT and/or MS has not been well established through empirical study.

Instructional tactics are formulaic teaching methods that have become prescriptive on the basis of experience and instructional science. In the present research, ITs are classified as fitting into a continuum that ranges from situated to abstract, from the use of examples or cases (situated) at one end and of a content or theoretical orientation (abstract) at the other. Moderation style is the instructional voice or instructional philosophy of the teacher as demonstrated in the approach they take to communicating with the participants. According to Oren, Mioduser, and Nachmias (2002), AD instructors exert significant control over the social climate of an AD, which they state is vital to the learning potential of the AD process. In the present research, MS refers to the level of effort that an AD instructor-moderator exerts to promote social interaction and/or participation in instructional processes.

MS is best understood in terms of the signature archetypal instructional style of the traditional didactic instructor as a “sage-on-the-stage” (instrumental orientation) and

of the constructivist instructor as a "guide-on-the side" (social orientation) For example, instructors may apply the instructional tactic of asking many questions in the AD that are primarily aimed at encouraging participants to interact (social moderation style) or specifically about the subject matter of the discussion (instrumental moderation style). In the present research, MS provides a continuum of instructor communications behaviors that comprise the role the instructor assumes in AD, ranging from social to instrumental.

In actual application, MSs and ITs are intertwined and applied in various quantities and with various emphases in even a single lesson. In the present research, the application of ITs and MSs are defined and controlled to their most dichotomous forms, at the ends of the continuums, by the use of teaching scripts. See Figure 1 for a graphical representation of the relationship between ITs and MSs.

Instructional tactics. Many researchers have focused on specific ITs and on systems by which to conceptually organize ITs. For example, Jonassen et al. (1997) provide a conceptual structure distinguishing between instruction strategies (including generic instruction methods such as discussion, experiential, or didactic) and instruction tactics (including more conceptual strategies such as address, content sequencing, learning by elaboration, or argumentation). They define instructional tactics (ITs) as specific techniques used to initiate, maintain, or amplify a generic instructional strategy. For example, the use of AD is an instructional strategy, while the use of case study (CS) or question and answer (QA) methods in the AD would constitute an instructional tactic.

Numerous ITs are recommended in the educational literature. A literature review by Jonassen et al. (1991/1997) found over 100 instructional tactics identified in the early 1990s. More recently, I identified 75 ITs in an informal survey of the literature on online instructional "techniques," "suggestions," "tactics," or "strategies" compiled using an Education Resources Information Center (ERIC) search for references between 1995-2005. (See Appendix A.) Two challenges encountered in generating this compilation of ITs included avoiding counting separately largely identical instructional tactics referred to by different names and distinguishing between general instructional suggestions and recommendations of specific instructional tactics. This exercise demonstrated not only

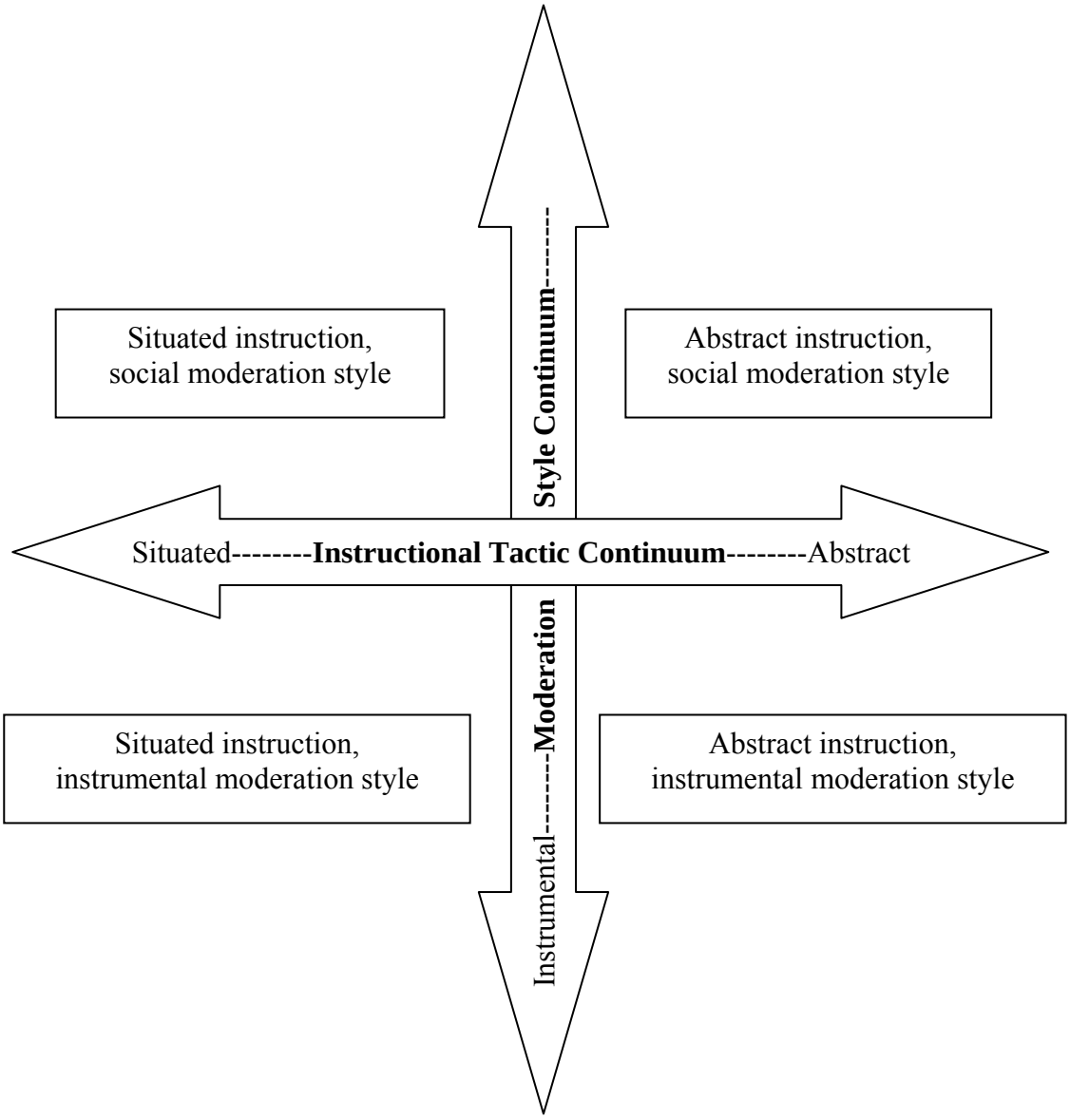

Figure 1. Relationships between instructional tactics (situated and abstract) and moderation styles (social and instrumental).

the sheer volume of this literature, but that recommendations were frequently supported by anecdotal reports rather than empirical evidence, an informal finding that corroborates Clark (1983).

Jonassen et al.'s table of instructional strategies and tactics (1991/1997) lists four general categories of instructional tactics: contextualized, content-oriented, process-oriented, and assessment-based. Several years later, Jonassen, Davidson, Collins, Campbell, and Haag (1995) renamed *contextualized* instruction as *situated* instruction, which they defined as instruction that provides context to support (scaffold) the learners' symbolic generalization of acquired knowledge to other similar situations. In the present research, the term *situated* instruction has been adopted.

The present research examines ITs at both ends of this continuum, ITs that are contextualized (situated) and ITs that are de-contextualized (abstract). According to Jonassen (1995), situated learning theory emphasizes the role of context and symbolic reasoning theory emphasizes the role of abstraction. Situated instruction can be recognized by its use of examples and analogies. Case study, error analysis, and problem-based learning are representative ITs that are situated by design. ITs not situated by design, such as QA or group writing assignments, can be made situated by adding examples and analogies.

Since "situated-ness," as explained above, comprises a continuum from less situated to fully situated, the conceptualization of abstract ITs naturally arises from the definition of situated ITs and represents an opposition and contrast to situated ITs. Under this conceptualization, abstract ITs are defined by the absence of a contextualizing scaffold for instruction. In the most extreme form, abstract instruction would be completely theoretical or didactic, with an absence of examples or real-world cases.

Other researchers have also suggested the existence of a continuum between situated and abstract ITs by default—that is, by proposing the effectiveness of increased use of context in instruction. For example, Bransford et al. (1986) suggest a continuum when they suggest that too much instruction is focused on skills development in contrast to developing domain-specific knowledge.

In summary, the IT variables in the present research are conceptualized as comprising a continuum between situated and abstract ITs. The term *situated* is used to designate ITs that use examples or cases to provide context for the AD, and the term *abstract* is used to designate ITs that involve de-contextualized approaches to AD instruction. One final note, lest we imagine that traditional didactic approaches are simply impossible in AD or just not employed in the social constructivist territory of online education, Oren et al. (2002) recently found that the lecture style was the most common instructional strategy used in AD.

Moderation styles. Turning next to the moderation style (MS) variables in the present research, Berge (1999) suggests a MS continuum when he observes that AD instruction can be either "highly teacher centered" or employ "constructivist and inter-actionist models which are highly student centered" (p. 5). In the present research on AD, a MS continuum is proposed that comprises a range from instrumental to social MSs. According to Weinberger et al. (2005), epistemic (instrumental) scripts are guidelines that describe and encourage subject-based learning activities, while social scripts describe and encourage social interactions between learners. For instance, an instrumental script encourages learners to avoid coming to quick consensus, to define the problem, to gather information, and to critically question each other, while a social script might encourage learners to collaborate more in developing a good problem-solving and decision-making process. The existence of a social MS of interaction and exchange is also supported by Fischer (2000), who notes that it has become increasingly apparent that AD must support social interactions among individuals to deal with increasingly complex tasks associated with the modern condition. Similarly, Zhu (1996) argues that the instructor's function in AD is to provide an environment in which students can interact in the co-construction of knowledge rather than to provide a platform for content and skills development, which would constitute what this study refers to as an instrumental MS. While noting the common use of Internet-mediated communications to transmit subject matter and theory, Oren et al. (2002) suggest that they represent an expansion of social opportunity in

instructional communications, especially with respect to the novel and varied applications of discussion groups and collaborative learning. Oren et al. conclude that there is more to learn about social communications in AD and that a concerted effort should be made to produce research that advances our understanding of the different modes of social interaction present in on-line discussion and the instructional processes that encourage it. In an article reflecting on the extensive experiences with on-line instruction at Arizona State University, Vrasidas and McIsaac (2000) suggest that the social presence of participants in AD can be effectively promoted by instructional tactics. The authors also suggest that providing organized activities can lead to increased AD participation.

Selected Situated and Abstract Instructional Tactics

In the present research, two ITs—the case study (CS) and question and answer (QA) approaches—were selected to represent the situated and abstract ITs to be examined for their influence on the complexity of AD. CS is an IT that provides context to AD and is a cooperative learning strategy that has been advocated by social-constructivist educators. QA has been identified as an IT that is frequently applied in AD. While QA can be applied in a situated way by providing examples within instructional questions, it can also be formulated in a more abstract way, using content and theory as the knowledge basis for the instructional questions. This section reviews literature relating to these two ITs.

Case study. The use of case study (CS) in instruction most likely has its origins in storytelling. The CS instructional method involves the presentation of real or fictionalized situations to contextualize subsequent instruction or discussion. Case study is a good background IT for cooperative learning as well as a basis for problem-based learning and a structured instructional controversy technique (Johnson, Johnson, & Smith, 1998). Johnson (1992) reports that over 600 research studies on the effects of cooperative ITs in instruction have been published over the past 90 years, leading him to state that more is

known about cooperative instruction than almost any other aspect of education, including lecturing, discipline-specific instruction, or instructional use of technology.

According to Herreid (1994), the case study method has been recommended for instruction in many disciplines. Business, law, and medicine base much of their discipline-specific instruction on the technique, but CS is also currently recommended for instruction in psychology, math, chemistry, and physics as well as for online instruction (Bender, 2003; Brush, 1998; McDade, 1995; Wood & Anderson, 2001). According to Wood and Anderson (2001), research on CS provides a large and diverse body of support for case study instruction. The authors suggest that case study instruction effectively involves higher-level cognitive processing skills and metacognition and prepares learners for dynamic interaction with future problems. For the case study method to be most effective, they suggest, the case should offer opportunities for both low- and high-level cognitive processing, and moderators should ask open-ended and probing questions. Herreid (1994) agrees and notes that instructional CSs present several discussable topics.

Question and answer. Western civilization's oldest written descriptions of systematized educational activity demonstrate teachers' confidence in QA as a method to increase learning. The Socratic method reported by Plato in 350 BCE, for instance, is an instructional strategy that uses increasingly challenging teaching questions to evoke progressively higher-order thinking among acolytes (students). In the Meno dialogue of *The Death of Socrates*, Socrates uses his strategy to lead an uneducated slave to reveal the congenital presence of knowledge of the First Cause, or God (Jowett, 1999). The Socratic method has endured in modified forms as a major component of instructional strategy in many fields of study for 2,400 years. Adapted forms of Socratic method are detectable in problem-based (Albanese, 1993; Duch, 1995), inquiry-based (King, 1995), and social-constructivist teaching (Martens, 1999) and in activity theory (Rice & Smith, 1993). This method is a preferred instructional strategy in the fields of law (Elder & Paul, 1998), philosophy (Fisher, 1995), medicine (Rogge, 2001), mathematics (Hannaford, 1999), and science (Julian, 1995). According to Wilen (1982), well-formulated teaching

questions initiate, redirect, and guide classroom discussion toward instructional objectives. According to Samson, Strykowski, and Weinstein (1987), instructional questioning conveys food for thought—a scaffold for learning.

In online learning, Blanchette (2001) states that QA is of critical importance to computer-assisted instruction (CAI), computer simulation (CS), and CMC. In CAI and CS, the usual format is for the computerized instructional program to present knowledge in textual, visual, and aural formats, and student engagement is evoked through the use of multiple-choice or open-ended questions. Their responses are then analyzed by the program or by human instructors for formative or summative assessment. In AD, Blanchette notes, instructors often initiate threads through the use of questions, which are also often used throughout AD (by teachers and participants) to propel or shape the discussion or to focus the discussion on the instructional objectives.

Many QA advocates attribute sweeping positive effects to using QA in instruction. For example, in mathematics education, it is suggested that students can be taught to perform or improve mathematical thinking through the use of well-designed questions (Schielack, Chancellor, & Childs, 2000); in children's literacy, questioning is held up as a strategy that increases comprehension (MacPhee, 2000); in science education, it is claimed that good instructional questions can lead to acquisition of the lifelong learning skills required for scientific literacy (Harris, 2000); in instructional design technology, it is argued that instructional questioning is a catalyst for reading instructional objectives (Berge & Muilenburg, 2000); in medical education, it is suggested that instructional questions "help the students focus on the important aspects of the case and to bridge the gap between clinical skills and conceptual science knowledge" (Hmelo & Day, 1999, p. 151). According to its advocates, QA can stimulate students to dive more deeply into matters and to adopt alternative viewpoints (Rodriguez & Kies, 1998).

Unfortunately, however, QA has received little meaningful investigation. Dillon (1982) provides this dismal assessment on the corpus of research on QA:

> Overall both in volume and emphasis, the educational literature on questioning may be characterized as bearing on practice rather than theory or research. It

> contains no body of theory and little conceptual analysis of questions, despite numerous theory-like statements—opinions, assertions, presumptions and hypotheses—in manuals and articles on technique, commentary and exhortation. (p. 147)

In a historical overview of research on instructional QA, Wilen (1991) likewise found that the research methodologies used were nearly always focused on descriptions of questioning behavior rather than on the analysis of the effects of QA on discussion. Wilen concluded that the assumption of and reliance on commonsense justifications for the educational use of questioning, along with the absence of research about its effects, weakens any claim that it is superior to any other technique.

Blanchette (2001), in agreement with Wilen (1991), Mills (1981), and Dillon (1984), also comments on the continued absence of research on the effects of QA in instruction: "Most research on questions and questioning in the context of education, whether K-12, post-secondary or online, has addressed how often or how many questions the teacher asks" (p. 38). According to Strother (1989), QA is supported by a lot of commonsense rationales, descriptive research, and advocacy, but is largely unsupported by credible research. Lenoir agrees that many teachers and researchers simply assume the instructional value of QA without much empirical evidence (LeNoir, 1993).

The paucity of basic research supporting the effectiveness of QA in either face-to-face or on-line instruction has been frustrating to instructional practitioners who wish to base practice on valid research (Farrar, 1986). In fact, several educational researchers argue that the extant research actually provides evidence that instructional QA is overused in teaching (Blank & White, 1986; Dillon, 1981; Eckerson, Linz, & Lugton, 2000; Rogers, 1988).

Social and Instrumental Moderation Styles

A moderation style is the communications approach that the instructor adopts in leading an AD. In the present research, two moderation styles (MS) are applied as independent variables in the experimental ADs, the social and instrumental styles. The

research question regarding MSs in the present research is which MS— social or instrumental—is most effective at increasing the complexity of AD.

In identifying the same two general models of interaction and exchange in AD, Weinberger et al. (2005) refer to what this research terms the instrumental model as an epistemic model, which they describe as involving the use of AD instructor prompts that encourage instrumental learner interactions and engagement with the instructional materials. They contrast this with the social model, described as the use of instructor prompts intended to encourage social interaction and engagement between participants.

Social moderation style. The following definition of the social moderation style is adapted from Weinberger et al.'s description of the social communications model and script (2005). In the social moderation style, the instructor provides only social support to the participants, acting as a discussion activator, facilitator, or "guide-on-the-side." The intent of the social moderation style is to facilitate collaborative learning by structuring the interaction of AD participants. According to Weinberger et al., the social moderation style specifies and sequences interaction in order to develop successful interaction patterns that involve equal distribution of participation during the AD, such as by eliciting information from each other, asking and answering questions, and facilitating critical negotiation. In this case, they claim, the instructor should make no statements of fact about the case or subject matter of the AD and should avoid the posting of messages that infer any factual or prescriptive suggestions. Instructor postings appropriate to the social moderation style would include questions such as the following: "Can you say more about _____?" "What does the rest of the group think about _____'s comment?" "Are other any other thoughts about . . . ?" "Is there a position that the group as a whole could agree on?"

Instrumental moderation style. The following description of the instrumental moderation style is also adapted from Weinberger et al.'s description of the epistemic communications model and script (2005). In the instrumental moderation style, the

moderator provides only content-based support to the AD participants, acting as a content expert or "sage-on-the-stage" and as an generator, leader, and organizer of learning tasks aimed at facilitating knowledge-construction activities. According to Weinberger et al., instrumental moderators guide the attention of the AD participants toward specific aspects of the task that lead to collaborative discussions. For example, the instrumental style moderator can encourage the use of knowledge-construction processes associated with any of the various alternative systems for knowledge construction, problem solving, or critical thinking, such as the system suggested by Herrenkohl and Guerra (1998): predicting, theorizing, summarizing results, and relating predictions and theories to results. It is appropriate for the instrumental style moderator to post messages that direct the participants to refer to a decision-making pattern that has been presented in other course materials, to provide or ask participants to generate an appropriate order of specific tasks involved in the current discussion, or to have participants review analysis activities and suggest an improved pattern to use in future processes. Instrumental moderators can provide subject-based information to the participants.

This section has reviewed the literature with respect to instructor involvement in AD. This was followed by a discussion of literature relating to a conceptualization of two continuums of AD instruction involving instructional tactics and moderation styles. The IT and MS continuums led to the selection of the independent experimental variables for this study: the case study and question-and-answer instructional tactics and the social and instrumental moderation styles.

Methodology

As discussed earlier, Clark believes that instructional technology designers and practitioners sorely lack a valid foundation for research and the development of instructional tools. He argues that too much research is done at the systems level and that much more research is needed on the more essential elements of teaching practice, such as interaction or instructional tactics. In a response to Clark, Kozma (1994) suggests that mixed-method research designs such as those recommended by Salomon should be used

to analyze complex learning environments because complex social interactions are an inescapable reality. This section provides a review of the literature relating to research design in instructional technology, the lack of research on instruction in AD, the use of teaching scripts as related to control of the experimental treatments, content analysis in AD and in the TAT method specifically, inter-rater reliability issues for both coding and segmentation, and, finally, the validity of focus group methods.

Research Design

To ensure the validity of educational research, Salomon (1991) claims, it must involve both quantitative and qualitative methods. Salomon argues that analytical (i.e., quantitative) and systemic (i.e., qualitative) approaches are mutually supportive and epistemologically necessary. Creswell has also suggested that the validity of research conclusions is increased by simultaneous multiple perspective inquiry, or triangulation. The mix of methods used in the design of this research is what Creswell (1994) calls QUAN-qual, or quantitative/qualitative, using capitalization to identify the more dominant modality of analysis.

In the present quasi-experimental research on the influence of instruction tactics and moderation styles on the complexity of AD, the influence of the instructor's application of two instructional tactics and two moderation styles on the complexity of AD is analyzed using content analysis and focus group methods. The method used is quasi-experimental in the sense that it does not provide control group experimental design but rather compares the independent variables' effects in four ADs. According to Saba (2000), the use of true experimental design, which arose from the physical science domain, is inappropriate for educational research because the experimental variables must be reduced to their simplest forms, a task he believes to be impossible in learning research. In addition, Saba notes that it is unrealistic to believe that equivalent experimental conditions can be maintained in educational research, as they might be in physical science. Although the presence of control groups and controlled experimental conditions in educational research might be desirable and could be regarded as providing

the highest validity, it is just not possible in anything but laboratory behavior research on animals. Therefore, Abrami and Bernard (2006) suggest that quasi-experimental design is necessary in educational research and has high value.

In a recent article on issues of the generalizablity of pre-experiments, true experiments, and quasi-experimental methodology in distance education research, Abrami and Bernard (2006) conclude that more empirical research on instructional technologies must be supported by a firm foundation of internal and external validity for it to be believable and useful to policy makers and practitioners. According to Abrami and Bernard, "Using evidence to separate fact from fiction and conducting research to avoid faddism will help the field mature and will improve the quality and cost efficiency of learning at a distance" (p. 23). Abrami and Bernard's comments also reflect a general trend toward evidence-based instruction, a trend that provides new vigor to the relationship between research and practice. Unfortunately, the production of more empirical, validated research on instructional technologies is problematical because the definitive process of research validation in educational research requires peer review and experimental replication (Salomon, 1991). This model requires that other researchers share research interests through publication to produce replicated study and that there is adequate time for the analysis and replication process to evolve. Additionally, it is difficult to know when a validity question has become settled, to know when the validation process has reached a conclusion. These challenges for research validity are amplified in the context of limited research resources and of a relatively new research field such as instructional technologies. As a result, many researchers utilize previously tested methods for their research designs, making the argument that the previous use of the tools provides a reasonable certainty of validity.

In a small study in a graduate education course, Quilter and Chester (2001) found significant gains in course outcomes associated with the use of AD but note that more empirical research is needed to determine with certainty if and how AD can do this in other settings. According to Abrami and Bernard (2006), "We have now amassed a great deal of evidence, but much of it is methodologically flawed" (p. 23). According to Fahy

et al. (2001), substantial gaps remain in our understanding of the factors that influence a successful AD. According to Vrasidas and McIsaac, (2000) there is a need for more empirical studies to advance our understanding of the structure and evaluation of AD.

Teaching Scripts

In the present research, teaching scripts are written guidelines that specify the desired communications behaviors used by the instructor in the application of the IT and MS in each experimental AD. In "Epistemic and Social Scripts in Computer-Supported Collaborative Learning," Weinberger et al. (2005) point out that both moderating and participating in an instructional AD are complex skills, involving various communications models that can be highly variable between participants as well as between instructors. They therefore suggest that teaching scripts be used to facilitate more-optimal utilization of the AD instructional strategy. These scripts can be applied to guide instruction or to set participation expectations, and may even be programmed into the AD software to provide prompts or cues to the participants that model problem-solving, critical thinking, or argumentation.

Weinberger et al. (2005) envision scripts as models that specify different factors in collaborative learning and that can be used to encourage certain types of engagement by participants in AD. According to the authors, scripts have also been applied to guide AD participants in construction of better arguments and in software applications that provide message starters in drop-down menus suggesting desirable forms of AD participation, such as the elements of critical thinking.

Content Analysis

According to Lombard, Snyder-Duch, and Bracken (2002), content analysis (CA) is a fundamental form of communications research. According to Strijbos et al. (2006), quantitative content analysis attempts to answer research questions about AD by examining the manifest content of the transcript, such as the presence and extent of use of

questions, statements, or opinions. Saba (2000) claims that CA has the potential to improve our understanding of teaching and learning in AD:

> Starting with the core issue of instructional interaction and grounded on the theory of transactional distance, a new strand of research using methods related to systems dynamics, as well as hierarchy and complexity theories, promises to provide a more comprehensive understanding of the field. (p. 7)

According to Strijbos et al. (2006), the use of CA requires careful consideration of the type of content (latent or manifest) under examination as well as the differences in validity presented by CA in the specific research context. When the object of CA is latent content, such as demonstrations of critical thinking, improved problem solving, knowledge construction, or higher-order thinking, the CA procedure is inherently interpretive and is therefore considered qualitative CA, which is more susceptible to subjectivity and more difficult to replicate.

According to several experts on CA, there remains a lack of consensus on valid and reliable methods and instruments with which to evaluate the complexity of AD (De Wever et al., 2006; Hara et al., 2000; Marra, 2006; Rourke et al., 2001; Strijbos et al., 2006). For example, Strijbos et al. (2004) assert that

> There is still no unifying and established theoretical framework, no agreed-upon objects of study, no methodological consensus, or agreement on the units of analysis (this of course is the challenge for many other disciplines as well) or no established way to classify the variety of tools that might be considered CSCL tools. (p. 44)

De Wever et al. (2006) agree, stating that interpretation and subjectivity are unavoidable and affect the validity and reliability of CA. Both sets of researchers point to the need to improve the theoretical and comparative research on the existing instruments in order to promote the overall quality of AD research.

Regardless of the above-stated challenges, several researchers have attempted to develop AD transcript analysis tools that are efficient, reliable, valid, and practical (Fahy et al., 2000; Gunawardena, Lowe, & Anderson, 1997; Hara et al., 2000; Jeong, 2003; Oriogun, Ravenscroft, & Cook, 2005). As Rourke et al. (2001) state, “the task of developing instruments and techniques for transcript analysis that meet these criteria is a

necessary prerequisite to the empirical investigation of asynchronous, text-based computer conferencing" (p. 16). According to Rourke et al., at the minimum CA metrics should consider the number of postings per participant, number of times a posting is read, the thread depth, and postings per student at each thread depth. Recently, Marra (2006) has provided a comparative overview of CA methods, focusing on the measurement of latent content and agreeing with Rourke on the minimum measures for manifest content.

Transcript Analysis Tool (TAT)

For its analysis, this study employs the Transcript Analysis Tool (TAT) developed by Fahy et al. (2001), a CA instrument designed to promote a holistic approach. Applying the social network theory of Wellman and Berkowitz (1988), which holds that social networks are sustained by both the context and the social interaction opportunities they offer, the developers of TAT focused on the structural and interactional exchange patterns commonly observed in AD transcripts.

The TAT metrics include measurements for exchange features such as the number of participants (number), the ratio of the actual numbers of links to the possible total (density), and the responsiveness and attentiveness of members to each other (intensity). Measures of interaction in the TAT quantify the rhetorical types of content exchanged in the AD. Fahy et al. has reported that the validity and reliability of the TAT is supported by code-recode intra-rater agreement (Cohen's kappa: 0.45–0.65 is in the fair to good range) at the level of 86% agreement (De Wever et al., 2006).

Inter-Rater Reliability Issues

Lombard, Snyder-Duch, and Bracken (2002) define inter-rater reliability as "a measure of the extent to which two judges make the same coding decisions in evaluating the characteristics of the messages" (p. 587). De Wever et al. (2006) have suggested that clear and transparent inter-rater coding procedures are necessary to produce reliable research on AD. According to Rourke et al. (2001), "The primary test of objectivity in content studies is *inter-rater reliability*, defined as the extent to which different coders,

each coding the same content, come to the same coding decisions" (p. 6). In fact, several authorities on CA have concluded that inter-rater reliability of coding of AD messages into the various categories used in the CA tool is the critical concern in the CA process (De Wever et al., 2006; MacKinnon, 2003; Strijbos et al., 2006).

Most authorities on CA also strongly recommend that inter-rater reliability procedures be transparent and explained fully in research publications. Lombard, Snyder-Duch, and Bracken (2002) provide the following comprehensive list of inter-rater reliability procedures, which captures and agrees with most other CA authorities' recommendations. According to Lombard et al., CA researchers should do the following:

- Calculate and report intercoder reliability.
- Select one or more appropriate indices.
- Obtain necessary tools to calculate, such as SPSS.
- Select an appropriate minimum acceptable level of reliability. Coeffecients of .9 are always acceptable, 0.8 is acceptable, 0.7 may be acceptable in some specific circumstances. Higher coefficients should be used for liberal indices, lower ones for more conservative indices (such as Cohen's kappa).
- Assess inter-rater reliability informally during coder training,
- Assess reliability formally in a test pilot CA.
- Select, follow, incorporate, and assess reliability procedures for full CA outcomes.
- Not use percent agreement.
- Not use chi-square to calculate reliability.
- Not use overall calculations of reliability; use reliability calculations on each individual variable instead.
- Provide a detailed report of inter-rater reliability procedures and calculations that includes at minimum and as appropriate the following:
    - State the size of and the method used to create the reliability sample, along with a justification of that method;
    - State the relationship of the reliability sample to the full sample;
    - State the number of reliability coders and whether or not they include the researchers;
    - Describe the amount of coding conducted;
    - Identify the index or indices selected to calculate reliability and a justification of these selections;
    - State the accepted range for inter-coder reliability level for each variable for each index selected;
    - State the approximate amount of training (in hours) required to reach the reliability levels reported;

- Identify where and how the reader can obtain detailed information regarding the coding instrument, procedures and instructions (for example, from the authors).

De Wever et al. (2006) identify a number of statistical processes that assess inter-rater reliability: percent agreement, Holsti's method, Scott's pi, Cohen's kappa, Krippendorff's alpha, Spearman's rho, Pearson's correlation coefficient, Lin's concordance correlation coefficient, and Kupper-Hafner's index. They note that no general consensus has arisen regarding which index should be used. De Wever et al., observing that no standards for an acceptable level of inter-rater agreement currently exist, suggest that a cut-off value of between .75 and .80 should be established as an acceptable range for inter-rater reliability for all indexes, based on a survey of the several available statistical methods.

According to Strijbos et al. (2006), Cohen's kappa is the most reasonable and popular statistical procedure used to assess and display inter-rater reliability in CA. The kappa procedure provides a statistical process that accounts for chance agreement between CA coders. Strijbos et al. suggest that two kappa statistics be evaluated, one for the sub-category level of variables and one for the main categories. The authors state that kappa tends to be stricter than other measures of inter-rater reliability.

Strijbos et al. (2006) point out that inter-rater reliability of both segmentation and coding are necessary to warrant the objectivity, reliability, and replication of the CA process. Unfortunately, they note, "most conference papers and CSCL articles provide information on the reliability of their coding categories but little information is provided on segmentation" (Strijbos et al., 2006, p. 35).

Units of Analysis

According to Rourke et al. (2001), the units of analysis in CA are the segments of the transcript that will be categorized by the rater panel. As stated by De Wever et al. (2006), "The unit of analysis determines the granularity in looking at the transcripts in the

online discussion. To get a complete and meaningful picture of the collaborative process, this granularity needs to be set appropriately."

According to Rourke et al. (2001), researchers who use CA methodologies may choose segments as small as words or as large as the entire AD, though they observe that the most practical research approach is to select segments that are inarguably recognizable, such as each message or each sentence, as the unit for analysis. Since there is no consensus on the best segmentation procedure, Strijbos et al. (2006) suggest that the chosen unit of analysis may be guided by accepted practice and the research context, but whatever choice is made, the unit boundaries must be clearly defined.

Strijbos et al. (2006) also point out that CA researchers must also address the potential for unit boundary overlap in their choice of units for analysis. Unit boundary overlap occurs whenever a single message or sentence contains multiple messages. Take, for example, a message such as "I think we should do CA, and I wonder if you think that's a good idea." As can be seen, such a message actually contains two messages—a statement message and a question message. Some researchers, including Strijbos et al., have suggested that smaller sized units of analysis, such as meaning-level segmentation, could prevent unit boundary overlap. But for such segmentation to maintain inter-rater reliability, a complete and detailed procedure for the segmentation process needs to be provided. In a review of CSCL 2001, 2002 and 2003 proceedings, Strijbos et al. (2006) report that a considerable number of CA reports were vague in their definition of the unit of analysis, and that "problems with reliably determining the unit of analysis turned out to be the primary cause for the failure of the original procedure" (p. 35). Rourke et al. (2001) concur that most sub-sentence level segmentation procedures do not adequately address the definition requirement.

To address these problems, Strijbos et al. (2006) suggest that "proposition level segmentation be used. Proposition level segmentation is a form of meaning-level segmentation for which a standardized detailed definition is proposed." The authors suggest that proposition-level segmentation can unitize a sentence or part of a compound sentence as "meaningful in itself, regardless of the meaning of the coding categories" (p.

37). In a brief overview of the proposition segmentation procedure, they explain that punctuation and the word *and* can be signal markers that break up compound sentences into meaningful units of analysis. The proposition segmenting procedure they propose is "practical, not laborious and can be mastered in a single day" (p. 37). For these reasons, this study has selected proposition-level segmentation.

Focus Groups

In the present research, focus group methodology is used to confirm, elaborate upon, or correct the CA findings. The purpose of the focus group interviews will be to elicit participant comments, concerns, feelings, and preferences about the instructor's participation in the ADs.

According to Villard (2003), focus group interviews are a qualitative research methodology consisting of carefully designed discussions on the experience of the participants. Focus group research has been heavily utilized in marketing, communications, and organizational research (Byers & Wilcox, 1991). According to Byers and Wilcox, focus group methodologies offer researchers the chance to observe transactions among participants and to expose underlying attitudes, opinions, and behavior patterns. The authors suggest that focus group findings can provide a unique and independent source of qualitative data that can add value to other qualitative or quantitative data.

The focus group is moderated by a trained moderator and typically consists of 8-12 participants (Byers & Wilcox, 1991). Participants in focus groups are brought together to discuss common experiences relating to the topic of research interest because other group participants may bring out thoughts on the part of individual members that might not otherwise arise in survey research. Vaughn, Schumm, and Sinagub (1996) suggest that focus group participants should be representative of the group at large. Villard states that a key component of a productive focus group process is pre-planning. According to Villard, focus group moderators should identify and sequence what questions and follow-

up questions are appropriate and informative in the specific research context. According to Byers and Wilcox (1991), there are ten necessary conditions for focus group research:

1. Clearly understood objectives.
2. Group homogeneity with respect to participation in the topic under discussion.
3. Adequate participant recruiting.
4. A relaxed atmosphere for discussion.
5. A listening moderator.
6. A well-prepared moderator.
7. Free-flowing dialogue.
8. A moderator who refrains from unnecessary contributions to the discussion.
9. Skilled analysis and summary of the focus group proceedings.
10. Competent researchers who make sure that as many factors are controlled as is possible.

Villard (2003) suggests that focus group proceedings be recorded to ensure accurately capturing the participants' comments. According to Vaughn et al. (1996), if multiple focus groups are being used to explore the same research questions, the preparations need to be as identical as possible. If multiple moderators are used in the focus group sessions, training and inter-moderator reliability processes should be used.

This section has provided a review of the literature relating to the research methodology employed in the present research. Topics included a discussion of issues of research design in instructional technology, the current lack of research on instruction in AD, the use of teaching scripts to control the instruction in the experimental ADs, the use of content analysis in AD research, and the TAT CA instrument specifically. The literature on inter-rater reliability and segmentation of the AD transcript for CA was discussed. Finally, the literature pertaining to the validity and use of the focus group methodology was discussed.

Summary

This chapter has reviewed the literature related to the present research on the influence of instructional tactics and moderation styles on asynchronous threaded online discussion. Following a discussion of the theoretical orientation of the present research, the literature pertaining to the use of quasi-experimental design and mixed methodology

research was presented. Discussion and learning, especially as related to the limitations of measuring learning outcomes in AD, were examined. The literature supporting the validity of measuring learning potential was reviewed, as was that on the educational use of AD, including the role of the AD instructor. This chapter has also reviewed the literature relating to instructional tactics and moderation styles and the lack of research on their effectiveness in increasing the complexity and resulting learning potential of instructional AD. The literature pertaining to the use of AD content analysis, the selected research instrument (TAT), and inter-rater reliability issues in CA was reviewed. The literature relating to the use of teaching scripts was presented, and a review of the literature that supports the application of focus group methods in the present research was provided. Finally, this chapter presented a review of the literature that will be instrumental in determining the significance of the results during the analysis phase of this research study.

CHAPTER 3
METHODOLOGY

The present research is a quasi-experimental, mixed-methodology examination of the influence of instructional tactics (situated and abstract) and moderation styles (social and instrumental) on the complexity of asynchronous threaded online discussion (AD) in an undergraduate nursing course. Specifically, the two independent variables in the present research are instructional tactics (case study and question-and-answer discussion, representing situated and abstracted tactics, respectively), and moderation style conditions (social and instrumental moderation styles). This chapter first provides an overview of the study and then describes the participant selection process, materials, and experimental procedures. Next it discusses the validity of content analysis and the Transcript Analysis Tool (TAT), followed by an examination of reliability issues in content analysis and a description of the data analysis procedures in this study.

Overview of Study

As described in chapters 1 and 2, the present research examines the influence of instructional tactics on the complexity of AD. The two instructional tactics examined were situated and abstract instruction. *Situated instruction* utilizes instructional tactics that offer real or fictional contextualization for discussion. *Abstract instruction* is instruction that facilitates discussion without providing examples or context. The case study instructional tactic (CS) was selected to represent a situated instructional tactic because CS instruction requires that life-like scenarios be provided to contextualize (situate) the discussion. The question and answer instructional format (QA) was selected to represent an abstract instructional tactic because instruction with QA can be applied in a decontextualized (i.e., situationally independent) way. An abstract instructional question would center on content and theory without reference to real-life examples.

As noted, the present research also examines the influence of two moderation styles on the complexity of discussion: the *instrumental* (a “traditional,” “expert,” “sage-

on-the-stage" instruction model) and the *social* (an activator, facilitator, constructivist, "guide-on-the-side" instruction model). In the instrumental instructional style (I), the instructor's role is that of a content expert; messages contain information and demonstrate the expert analytic skills related to the objectives of the AD lesson. In the instrumental style, instructor messages are specific to the content objectives of the lesson and, for example, elicit information, answer questions, and correct or elaborate upon the content of the AD lesson. In contrast, in the social instructional style (S), instructor messages provide encouragement and social support to the participants. In this style, the instructor's messages are essentially generic, without direct reference to the lesson objectives or any demonstration of the information processing required by the AD lesson objectives. For example, the instructor's messages in the social style of instruction might encourage participation or ask participants to explain further, react to a comment, or examine consequences.

Four teaching scripts that describe, define, and specify appropriate instructor interactions in the four experimental AD sessions were used to control the application of the independent variables by the instructors moderating the AD sessions. The independent variables were combined in all four possible combinations and were deployed by the primary researcher in collaboration with the course instructor as the experimental treatments in four AD sessions (ADs1-4), as described below. The course instructor for NURS 328 provided subject matter expertise and content for the AD sessions, which was then conditioned by the primary researcher as specified by the teaching scripts summarized below:

CS-S (AD1)—Case study, social moderation style: A case study is used to contextualize the AD; the instructor-moderator's postings are designed to encourage collaborative construction of knowledge.

CS-I (AD2)—Case study, instrumental moderation style: A case study is used to contextualize the AD; the instructor-moderator's postings provide instrumental and subject matter-related support to the participants.

QA-S (AD3)—Question and answer, social moderation style: The instructor-moderator asks questions in the AD; the questions are designed to encourage collaborative construction of knowledge.

QA-I (AD4)—Question and answer, instrumental moderation style: The instructor-moderator asks questions in the AD; the questions are designed to provide instrumental and subject matter-related support to the participants.

The influence of the instructional tactic and moderation style combinations on the complexity of participants' communications was analyzed using content analysis on the transcripts from each AD session and focus group interviews with the participants. Figure 2 illustrates the experimental procedures employed in the study.

Student Participant Selection

Eighty-five third-year day school nursing students enrolled in NURS328 (Health Patterns II) were randomly assigned into four AD sessions as a part of a required course assignment during the first half of the winter semester of 2007 at the college in which this research was conducted. The purpose of the assignment was to provide a more widely accessible, less intimidating communications environment for more complex student/teacher discussions of the pathology, treatment, and nursing care of patients with renal, obstetrical, and gynecological disease than had been possible within the live classroom setting. The AD assignment included minimum participation expectation levels (see Appendix B) and represented 2.5% of the course grade. On the recommendation of the NURS 328 instructional team, the English language learners (ELL) among the students were equally distributed across the groups to minimize the effects of a previously observed hesitancy by these students to engage in face-to-face discussion. A random number assignment process was used to distribute the participants.

Materials

This section describes the materials used by the study. Among these were teaching scripts that guided the AD instructor-moderator's interactions with participants in each experimental AD session. A pre-experimental questionnaire was used to collect information about the participants' demographics, AD experience, and prior knowledge

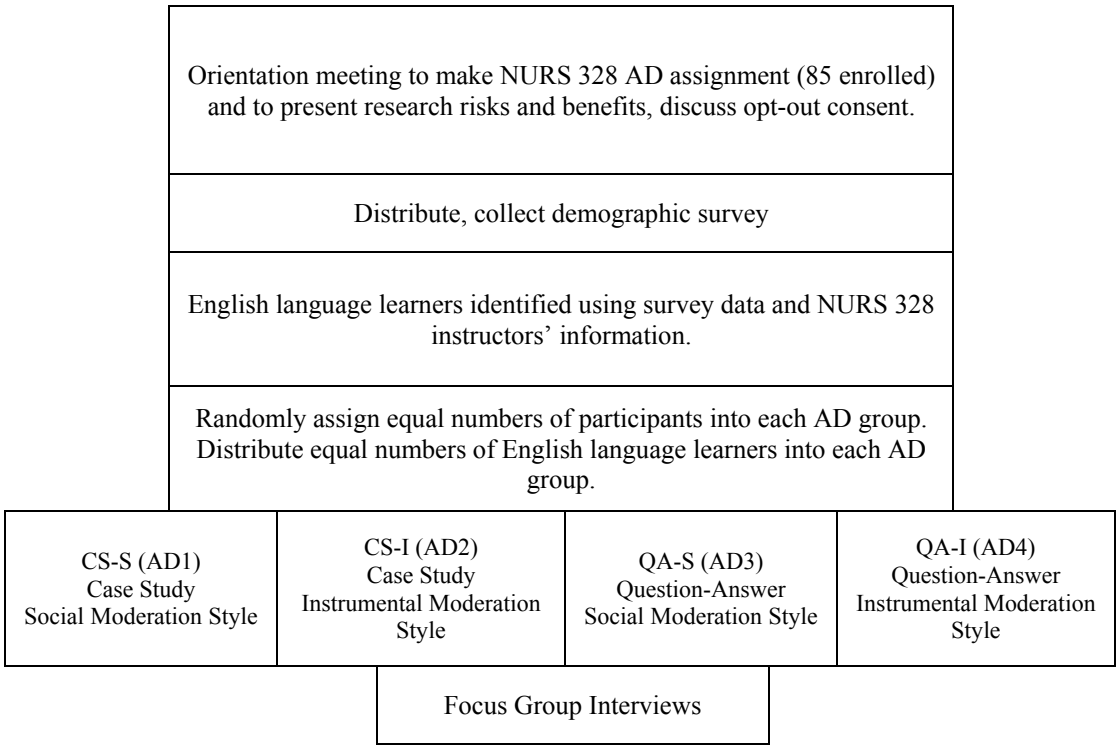

Figure 2. Diagram of experimental procedures.

about the unit content. Detailed instructions were also used to segment the AD log into units for categorization and to facilitate the focus groups.

Teaching Scripts

Teaching scripts were used in the present research to specify and control the application of the instructional treatments in the four experimental AD sessions. The teaching scripts used in this research described, defined, and specified instructor interactions consistent with the four independent variables and the instructional objectives applied in the four experimental AD sessions. Sixteen initial instructional threads (four for each AD group) were pre-designed according to the selected experimental treatments. The teaching scripts also provided response guidelines that were used by the instructor-moderator to construct further postings during the AD sessions.

Subject matter expertise required by thread postings, whether in the pre-design phase or during the actual AD sessions, was provided by the primary course instructors in NURS 328. The researcher collaborated with the subject matter experts to condition all AD postings in accord with the teaching scripts. The full text of each of the teaching scripts is provided in Appendices C–F.

As outlined above, the experimental treatments selected for examination in the present research were the case study (CS) and question and answer (QA) instructional tactics and the social (S) and instrumental (I) moderation styles. In AD1 and AD2, an identical case study was provided to the students and the instructor's interactions (thread and response postings) were constructed in either social (CS-S) or instrumental (CS-I) moderation style. In those AD sessions, the instructor avoided the use of questions in the posted interactions and frequently referred participants to the context provided by the CS.

In AD3 and AD4, which employed a question and answer format, no examples or cases were provided to contextualize the discussion, and the instructor-moderator's interactions were all phrased as focusing questions. In AD3, the instructor-moderator posted focusing questions that related to the AD group's collaborative process and asked the participants to find, provide, and discuss the subject matter entirely by themselves; in AD4, the instructor-moderator posted focusing questions that either explicitly provided subject matter support or suggested that such information was primary to the discussion. All questions in both groups were designed to be as horizontal as possible—that is, to involve complex ideas that did not have simple or right-wrong responses. The full texts of the teaching scripts are provided in Appendices C-F.

Validation of the teaching scripts involved a panel of the four expert post-secondary teachers, who blindly identified which instructional tactic (IT) and moderation style (MS) were being applied in the initial instructional threads and segmented response guidelines. Simple percent agreement (SPA) was used to compare the initial researcher's IT and MS categorization to the teacher panel's categorization decisions, with a goal of a 90% SPA. A process was designed for revising and revalidating the instructional threads if needed to achieve the target SPA.

Demographic Survey

A demographic and information survey (Appendix G) completed by the participants during the initial orientation meeting gathered information on their ages, language preference, ethnic identity, prior experience with AD, and prior knowledge regarding the specific lesson objectives, as these have been identified as possible confounding issues by previous AD researchers. The pre-experimental demographic data were used to equally distribute ELL participants among the four AD groups, to analyze the homogeneity of the four AD groups, and to examine the participant pool for any group characteristics that might provide alternative explanations for observed changes in the experimental findings.

Unit Segmentation

Segmentation is the process of dividing the AD log into units for analysis by the rater panel. As discussed in chapter 2, several alternative approaches for segmentation have been used in previous AD content analysis procedures, with varying effects on inter-rater reliability. Following the recommendations of Strijbos et al. (2006), this study uses propositions as the units of analysis. Briefly, propositions are sentences or parts of sentences that communicate complete, singular ideas; the detailed definition of propositions followed by the study is included in Appendix H.

Focus Group Discussion

Following each AD session, all participants were invited to participate in focus group interviews to elicit observations or concerns from the experimental participants. A free lunch was provided and a drawing for a bookstore gift certificate was used to motivate participant attendance. Of specific interest were the participants' impressions about the influence of the instructor's support on their discussions. The researcher employed an outline of discussion questions and focus group procedures to maintain consistency in the focus group (Appendix I).

Experimental Procedures

The study included four experimental AD sessions, each occurring under different instructional tactic and moderation style conditions (representing the independent variables—instructional tactics and moderation styles) as specified by teaching scripts. The transcripts from each experimental AD session were examined using the Transcript Analysis Tool (TAT), a content analysis instrument developed specifically to quantify the complexity of AD discussion by Fahy et al. (2000). The TAT instrument provides descriptions and procedures for the quantification of the message-level activity and rhetorical complexity of an AD.

This content analysis involved three steps. First, the principal researcher quantified the message exchange in each AD transcript by counting certain measures described in the TAT exchange parameters. Next the primary researcher segmented the posted messages in the AD transcripts into units for analysis according to the proposition segmentation procedures described above and provided in Appendix H. Next, two trained raters (the rater panel) independently coded the AD transcript by categorizing the propositions according to the TAT interaction definitions and procedures. The rater panel's independent coding decisions were then statistically compared to determine the level of inter-rater agreement. The final step in the content analysis was recording and compiling the coded data and conducting the statistical analysis. This section describes the procedures used to ensure the protection of the experimental participants, the experimental AD sessions, the dependent variables examined by the study, the training of the rater panel, the categorization process, and the focus group procedures.

Protecting Human Subjects

In accordance with the policies of the Institutional Review Board (IRB) of the University of Minnesota and of the college at which this research was conducted prior to participating in this research, prospective participants were provided with verbal and written information about its general purposes and risks (Appendices J–L). Non-consent

to participate in this research was accomplished through the use of an opt-out written declaration as approved by the review boards. Individuals who opted out of the research did not participate in the survey or focus group procedures, but their logged messages on the transcripts of the experimental AD sessions were included and analyzed. Neither AD participants nor NURS 328 course instructors knew who had or had not consented. During the analysis phase, personal identification information was used to maintain group data and to match AD content analysis data to focus group participants' comments. After all experimental data analysis was completed, personal identification information was converted into anonymous identification numbers. No personal identification data link was maintained by the researchers. The IRB application, amendment, and approval documents are included in Appendices M–R.

Asynchronous Discussions

Participation in the AD assignment was a requirement of NURS 328. The AD assignment represented 2.5% of the course grade. Participants were randomly assigned into four groups as equally as possible, resulting in a participant distribution of 21 in ADs1–3 and 22 in AD4. The number of self- and instructor-identified English language learners was balanced across the groups. Guided by the teaching scripts, the course instructor for NURS 328, in collaboration with the primary researcher, moderated each experimental AD session. Each AD session was available for participation for 3 weeks. A transcript of the messages posted by the participants in each AD session was recorded electronically. Each AD group's transcript was maintained separately.

Dependent Variables

The Transcript Analysis Tool (TAT) developed by Fahy et al. (2000) was used in the present research to analyze the influence of the independent variables (instructional tactics and moderation styles) as represented by the selected experimental treatments (CS-S, CS-I, QA-S, and QA-I) on the dependent variable, communication complexity. The TAT content analysis instrument measures readily observable structural and

rhetorical attributes recorded in the AD transcript. It provides two general categories of data relevant to communications complexity in AD: exchange and interaction parameters. *Exchange parameters* quantify structural features of the AD discussion, four of which were examined by this study, as shown in Table 2 and discussed below. The unit of analysis for exchange parameters is the posted message. *Interaction parameters* quantify the rhetorical features of the participants' communications with each other during the AD, eight types of which were studied (Table 3). The unit of analysis for the interaction parameters is the proposition.

Table 2
TAT Exchange Parameters

Code	Parameter description
D	Density
I	Intensity
$S\text{-}R_I$	Send-Receive Ratio - Instructor
$S\text{-}R_P$	Send-Receive Ratio - Participants
TP	Thread Persistence

Table 3
TAT Interaction Parameters

Rhetorical Type	Code	Parameter description
Questions	1A	Vertical questioning
	1B	Horizontal questioning
Statements	2A	Expository statements
	2B	Referential statements
	3	Personal reflections
Scaffolding	4	Engaging comments, symbols
Attributions	5A	Quotes, paraphrases
	5B	Citations

Exchange Parameters

The TAT exchange parameters provide detailed quantification of the scope and distribution of AD messages beyond simply counting the number of messages or noting the degree to which responses accumulate under AD threads. The TAT provides four group-wide measures of communications complexity: discussion density, intensity, send-receive ratios, and thread persistence. The exchange parameters in the present research were acquired and computed by the primary researcher.

Density. Density is a measure of the degree to which participants interact with each other, expressed as a ratio or a percentage. Density is defined as the number of AD messages posted by participants (a), divided by the potential number of AD messages that could be posted in an AD with *N* participants. The TAT calculates AD density as follows:

Density (D) = 2a / N (N – 1) where a = the actual number of messages posted, and N = the number of participants in the AD. For example, if there are 200 messages posted (N) by 20 participants, the density would be 1.05 [(200 X 2) / 20(20-1) = 1.05]. Although the TAT's creators acknowledge that the density in AD can be distorted by a few participants' sending many messages, this distortion can be detected by observing the intensity data.

Intensity. Intensity reflects the distribution of participation. The value is the average number of messages posted per participant (a). Intensity is calculated as (a/N) and measures the dedication and persistence of participants, not mere one-time contact. For example, if 20 AD participants post 200 messages, the intensity would be 10 messages posted per participant. According to Fahy et al. (2001), increasing levels of intensity indicate increasing level of AD engagement by the participants. If a minimum level of AD participation has been required by the instructor, the intensity must be interpreted in this context. For example, if the AD minimum was established at 10 postings for each participant and participants posted an average of 20 messages, participants were engaging in the AD beyond the minimal expectations.

Send-receive ratio (S-R ratio). AD requires participants to post or send initiating messages, which are then displayed for all participants in a topical arrangement referred to as discussion threads. Other participants are then expected to reply to the sent messages, and reply messages are displayed below the related postings in the discussion thread.

The S-R ratio is a decimal fraction that compares the number of initial thread-level or sent (S) messages to the number of reply (R) messages they evoke. The S-R ratio is an indicator of the reciprocity of interaction in the AD. An S-R ratio is calculated by dividing the number of new threads initiated (S messages) by the number of R messages posted below it. For example, if one S message evokes one R message from another participant, the S-R ratio would be 1.0. Using the TAT, the S-R ratio is measured for the

participants as a group ($S\text{-}R_P$) and for the instructor-moderator individually ($S\text{-}R_I$) to compare peer-to-peer and peer-to-instructor message exchange. The $S\text{-}R_P$ ratio is calculated by dividing the total number of S messages posted in an AD by the participants (excluding postings by the instructor) divided by the number of R messages posted by the participants, including messages posted by the instructor to that specific participant-generated thread ($S\text{-}R_P = S / R$). The $S\text{-}R_I$ ratio is similarly calculated by dividing the total number of S messages posted in an AD by the instructor divided by the corresponding R messages in the thread posted by the participants, including the instructor's reply messages posted in reply to participant reply messages ($S\text{-}R_I = S / R$).

The following sample AD transcript further demonstrates the calculation of S-R ratios. In the example, *S* = send messages, *R* = reply messages, and the participants who posted each message are identified in parenthesis after each message:

S: "When QA is used in leading AD, do participants typically answer the question with another question, or do they answer the question?" (Instructor)
R: "I think most people will try to answer a question with a statement, hopefully providing evidence." (Participant 1)
R: "I think it is better to answer with questions – it demonstrates critical thinking." (Participant 2)
S: "Are student responses generally at the same cognitive level as the instructional question?" (Instructor)
R: "What is meant by cognitive level?" (Participant 3)
R: "Cognitive levels as in Bloom's Taxonomy." (Instructor)
R: "Can you give us an example?" (Participant 4)
R: "Recall, application, analysis. . . ." (Instructor)

In the example, the instructor posted two S messages and there were six R messages, including two R messages from the instructor herself ($S\text{-}R_I = 2/6 = 0.33$). The participants posted no S messages, and thus there were no corresponding R messages ($S\text{-}R_P = 0/0 = 0$).

Thread persistence. In an AD, participants may post messages either as new threads or as replies to a previously posted thread or reply message. Reply messages appear indented and directly beneath the specific message to which they are responding, as in the example provided below. The term *reply level* is used to refer to the hierarchical

progression of the topic. In this study the initial thread or topic is referred to as a thread level message and the replies are referred to as reply1, reply2, reply3 as the responses to the thread persist, as illustrated below:

Thread Level (initial thread topic) message>
Reply1 message> replies to the thread level message
Reply2 message> replies to reply1 messages
Reply3 message> replies to reply2 messages
Etc.>

The topically ordered threads grow, or persist, according to number and depth of the posted reply messages evoked by the previously posted thread or reply messages. Thus, thread persistence (TP) is closely related to intensity and provides a statistical depiction of the participants' engagement in the topic of the AD.

The counts for all messages posted at each reply level for the AD as a whole are divided by the total number of reply messages posted, and the thread persistence is displayed as a percentage of replies at each level, as shown for the following example:

Thread level: "When QA is used in leading AD, do participants typically answer the question with another question, or do they answer the question?" (Instructor)
(Reply1): "I think most people will try to answer a question with a statement, hopefully providing evidence." (Participant 1)
(Reply2): "I think it is better to answer with questions – it demonstrates critical thinking." (Participant 2)
(Reply2): "Are student responses generally at the same cognitive level as the question?" (Instructor)
(Reply3): "What is meant by cognitive level?" (Participant 3)
(Reply4): "Cognitive levels as in Bloom's Taxonomy." (Instructor)
(Reply5): "Can you give us an example?" (Participant 4)
(Reply6): "Recall, application, analysis. . . ." (Instructor)

The instructor's initial posting, which begins the thread, is by definition excluded from the thread persistence because it is not a reply. Thus the above interchange consists of seven postings beyond the instructor's initial posting, including two at reply level 2:

Thread Level: Instructor posting -- excluded
Reply1: 1/7 = 14.3%
Reply2: 2/7 = 28.6%
Reply3: 1/7 = 14.3%
Reply4: 1/7 = 14.3%
Reply5: 1/7 = 14.3%
Reply6: 1/7 = 14.3%

According to Fahy et al. (2001), thread persistence is a better measure of the participants' involvement in the AD than simply counting the number of postings because it can reveal deeper engagement with the content of the topical threads. They define TP as an indication of the participants' investment of time and energy in processing the content posted in an AD, as opposed to simply posting messages to respond to the instructor's messages and meet course requirements without respect to the accumulated meaning of messages throughout the AD.

Interaction Parameters

The TAT identifies eight specific interaction types reported for each individual participant, which can then be combined to quantify an AD group's interaction. The unit of analysis for the interaction parameters is the segmented message, which in the present study was the proposition. Interaction parameter outcomes provide a view of the rhetorical types of communications that are commonly employed in the experimental AD sessions.

Transcripts from each AD session were segmented into propositions (by the primary researcher), which were copied into a form used by the rater panel for categorization into the interaction parameters (an example of this form is included in Appendix S). TAT's interaction parameters fall into four general rhetorical categories derived from communications theory: questions, statements, scaffolding comments, and attributions. The TAT's interaction parameters are further identified by their specific rhetorical functions, as described below.

Type 1A, vertical questioning. Vertical questions are recall- and application-level questions and have a correct answer. For example, "Are surveys used in this research?" "How many of you agree with the answer?" "What are the differences between X and Y?"

Type 1B, horizontal questioning. Horizontal questions are analysis- or evaluative-level questions for which there are no correct answers but are rather matters of opinion and thus inherently solicit alternative perspectives. For example, "Are there cultural dimensions to X?" "Which software application is better suited for X?" "What are the advantages/disadvantages of data mining using WWW-based search applications over journal research using library-based search engines?"

Type 2A, expository statements. Expository statements provide information or facts for either didactic or corrective purposes without reference to personal bias, opinion, or beliefs. For example, "X occurred when Y was done"; "The death rate from homicide is 1:X"; "We found that . . . facilitates discussion of difficult subjects."

Type 2B, referential statements. Referential statements are comments that are direct responses to specific preceding statements. For example, "I agree with your statement"; "An example of what you have noted could also be. . . ."

Type 3, personal reflections. Personal reflections are direct revelations of personal opinions, judgments, or beliefs. Personal reflections implicitly invite questions or responses to the revelation and often contain a personal possessive pronoun. For example, "My view of X is Y"; "I think good parenting requires. . . "; "I can't understand why such small changes are so difficult."

Type 4, scaffolding or engaging statements. Scaffolding or engaging statements encourage other participants to initiate, continue, or elaborate on a subject. They may also

include rhetorical questions (to which no answer is expected) or statements and symbols that have no meaning other than to provide encouragement or recognition of others in the discussion, such as salutations, closings, or emoticons. For example, "Let me know if you need any more help"; "These discussions are so intense sometimes"; "That's interesting! ;-)"

Type 5A, quotations, attributed paraphrases. These refer to messages that make direct reference to other sources. For example, "<quoting someone's previous text message> I don't really understand what you mean by this"; "According to X, 'Y'"; "The city council has stated that they have found the bond issue to be a win-win situation."

Type 5B, citations. Citations include quotations or paraphrases provided with their source. For example, "Clark, 1981 says…"; "According to Aristotle's Metaphysics…"; "Hara, N., Bonk, C. J., & Angeli, C. (2000) suggest 'X' in "Content Analysis of Online Discussion in an Applied Educational Psychology." *Instructional Science, 28*(2), 115-152."

Rater Panel Training Procedures

For this study, a rater panel consisting of the primary researcher and another experienced educator received training on classifying the interaction types of segmented sample AD transcripts. The rater panel practiced categorizing TAT interaction types in two 2-hour training sessions until a consistent unanimous agreement on interaction categorization was reached. Following the training exercises, a sample AD was analyzed by each rater independently using the interaction rater coding form included in Appendix S. The rater agreement was calculated and recorded as the pre-content analysis inter-rater agreement statistic. Both members of the rater panel also recoded their own practice AD transcript after 48 hours to measure the degree to which they had retained the procedure. The percentage of agreement between the two raters and for the code-recode process

were also calculated using Cohen's κ procedures. Once the transcripts were thus coded, the data were entered into a spreadsheet for statistical analysis.

Focus Group Procedures

The experimental AD session was followed by structured focus group discussions to ascertain the participants' impressions of the instructional support provided during the AD sessions, especially regarding instructional tactics, moderation styles, interaction, and exchange in each discussion. The focus group sessions were recorded and analyzed for common or particularly insightful participant observations. All focus group meetings were moderated by the primary investigator and were approximately 30 minutes in length.

Validity and Reliability

This section discusses three ways in which the present study ensures the validity and reliability of its research procedures, in concurrence with the recommendations of De Wever et al. (2006). First, it uses a content analysis method (TAT) firmly grounded in AD communications theory. Second, it provides a detailed definition of the units of analysis to facilitate the meaningful and unambiguous segmentation of the AD log for classification by the rater panel and maintains a high level of intra- and inter-rater agreement. Finally, by also employing focus groups, it includes both qualitative and quantitative methods.

Theoretical Coherence

As discussed in chapter 2, researchers have determined that content analysis is a valid method for studying the communicative complexity of AD. The developers of the TAT report high correlations between the TAT and descriptive outcomes in several uses of the tool and its use with large groups of students and substantial quantities of analyzed units, and its validity is supported by other researchers.

Segmentation and Content Analysis Reliability Issues

Three issues are central to the reliability of AD content analysis: consistency in the process for segmenting the AD log into units of analysis, the consistency of the coding choices of each individual rater (intra-rater consistency), and the consistency of the coding choices across all members of the rater panel (inter-rater consistency).

Segmentation Reliability

As discussed in chapter 2, the developers and other users of the TAT have chosen to use sentence-level segmentation because it is relatively unambiguous. But this choice can also create reliability problems in the categorization process of rater panels analyzing AD interaction and exchange because sentences may contain multiple messages and thus coders may classify the sentence differently. Thus, this study follows the recommendation of Stribos et al. (2006) that sentence-level segmentation be refined and augmented with a set of rules that permits segmentation to propositions, a sub-sentence level unit of meaning.

Intra- and Inter-Rater Reliability

To ensure the reliability of the segmentation decisions by each of the raters, this study included a code-recode procedure, in which the raters recoded the training transcripts after several days to see if the two sets of coding decisions were consistent. To ensure that coding decisions were consistent between the two raters, this study measured the simple percentage of agreement (SPA) between their choices and then used Cohen's kappa coefficient (κ) to test that the level of agreement could not be explained by chance agreement.

Focus Group Validity

Focus group interviews have been established as a valid and reliable method to analyze human perception and experience, largely because it requires little interpretation. According to Villard (2003), focus group interviews are most productive when evaluating

the strengths and weaknesses, the success or failure of new procedures on participants, as they were used in this study.

Data Processing and Analysis

This section describes the data processing and statistical analysis to be used in the study. First, it presents the procedures for data scoring and management. Next, it provides a description of the procedure for determining an appropriate sample size. Finally, it describes the statistical analysis of the experimental data. The data processing and analysis process used in this study is illustrated in Table 4.

Data Scoring

The researcher used the data derived from content analysis of the AD transcripts and recorded on the forms (Appendix S) and a spreadsheet to record the interaction and exchange findings obtained from the AD transcripts. The resulting data will be stored as numerical, textual, and tabular data in a numbered, anonymous state. Data will be maintained by the primary researcher in locked filing cabinets for 7 years.

Focus group data consisted of recordings and the textual data acquired from summaries of the proceedings of the focus group interviews. Descriptive and qualitative analysis of the focus group interview transcripts was organized by AD session numbers; all personal identification data were replaced by identification numbers (corresponding to the identification numbers used in AD logs) to protect the privacy of participants. Focus group recordings and textual summary data will be maintained by the primary researcher in a numbered anonymous state in locked filing cabinets for 7 years.

Table 4
Summary of Analysis Procedures

Prior to experimental AD sessions	After experimental AD sessions
Teaching script validation process: • Blind identification of segmented experimental teaching scripts. • Perform SPA analysis (target is 80 % or greater match). • Interview panelists and revise teaching scripts. • Repeat blind identification of segmented experimental teaching scripts. • Perform SPA analysis (target is 80% or greater).	Pre-experimental survey analysis: • Descriptive statistics and Chi square (χ^2) analysis of pre-experimental data by AD group and sample-wide.
Rater panel CA training process: • Rater panel practice case with TAT. • Perform SPA and Cohen's κ analysis. • Negotiate non-matching CA decisions. • Add/refine TAT definitions as needed to assure consistent identification of segments.	Transcript analysis: • Segmentation of AD logs by the primary researcher. • Rater panel categorization of segments (interactions) on the experimental AD transcripts. • Perform SPA and Cohen's κ statistic. • Negotiate rater coding disagreements in TAT interaction parameter categorizations. • Descriptive statistics of exchange findings and two-way ANOVA analysis of interaction findings by AD group and sample wide as appropriate. • Cohen's d (effect size) calculated for any statistically significant finding.
	Focus group analysis: • Record (electronic and as written notes) structured focus group interviews. • Transcribe recordings and written notes. • Prepare focus group summary including; common or insightful comments, comments that reflect directly on instructional support or style.

Sample Size

In the present research, the pre-experimental determination of sample size was based on recommendations about participant group sizes by experienced research advisors and colleagues, the Office of Research Consulting at the University of Minnesota, and the relevant literature, which indicated that an adequate number of participants would be 20 per AD discussion. After the experiment was conducted, the effect size on any statistically significant findings was statistically analyzed. To report effect size, Effect Size (*f*) was calculated. The *f* statistic is calculated by taking the square root of the SS_{Effect} divided by the SS_{Error}. The resultant *f* statistic and the df value are then used to obtain an effect size on an *f* statistical table. According to Cohen, if the effect size (*f*) statistic is 0.10 = small effect, 0.25 = medium effect and 0.40 = large effect. The Effect Size (*f*) table for significant two-way ANOVA values in the present research is provided in Appendix V.

Inter- and Intra-Rater Reliability Procedures

After the experimental AD logs were segmented by the primary researcher, the raters independently categorized and documented the interaction quantities on a spread sheet designed to facilitate data entry and statistical analysis. As in the training exercise and the code-recode process described previously, the code decision agreement between the independent rater AD was analyzed using Simple Percent Agreement (SPA) and Cohen's κ procedures.

In the SPA procedure, the number of matches is compared to the total number of classification decisions and is expressed as a percentage. In Cohen's κ coefficient procedure, the number of chance agreements (Σc) is accounted for by counting the number of times a coding category was used by the coders, which is then converted to a percentage of all coding decisions. Finally, this percentage is squared, and the squared percentages for all categories are summed. In the formula below, N is used to designate

the total number of coding decisions made by the raters and Σa is used to designate the sum of actual agreements:

$$\kappa = \frac{\sum_a - \sum_c}{N - \sum_c}$$

Table 5 below presents the matches and mismatches, SPA, and the κ for all AD groups combined. The matches occur on the central diagonal, designated in bold; mismatches are both summed and specifically identified in all the other cells. SPA and κ was also calculated for each AD group (not shown). The κ value for the combined AD groups was 0.800, with κ values for AD groups 1-4 being 0.849, 0.662, 0.763, and 0.820, respectively, which represents good to excellent agreement in social science research (Olswang, Svensson, Coggins, Beilison, and Donaldson, 2006).

Table 5
Inter-Rater Reliability Contingency Table for Combined CA Data

		Rater 1								
		1A	1B	2A	2B	3	4	5A	5B	Sum
Rater 2	1A	**50**	1	0	0	0	0	0	0	51
	1B	15	**20**	0	0	0	13	0	0	48
	2A	0	2	**1439**	2	83	13	2	0	1541
	2B	2	2	8	**14**	16	11	0	0	53
	3	7	4	11	4	**513**	9	3	0	551
	4	7	5	3	0	9	**26**	0	0	50
	5A	0	0	1	0	0	0	**5**	0	6
	5B	1	0	1	0	0	1	4	**17**	24
	Sum	82	34	1463	20	621	73	14	17	

Total segments = 2324
Σ Pa = Σ of matches (**in bold**) (Rater Matches) = 2084
Inter-rater CA mismatches = 240
Simple % matches = 89.7%
Σ Pc = Σ (Row 1-8 X Col 1-8) / Total segments (Rater chance matches) = 1122.061
Cohen's κ index = Σ Pa - Σ Pc / Total Segments - Σ Pc = 0.800

Instructional Treatment Fidelity

The postings by the instructor in each AD session were retrospectively analyzed by the rater team for fidelity to the teaching script variable descriptions. It found that all instructor thread postings (n=16 postings, 42 segments) were posted as designed in all AD groups and that the instructor segments posted were congruent with the interaction categories appropriate to the instructional tactic and moderation style treatments designated in the experimental design.

Demographic Survey Findings

Before initiating the experimental AD session, a survey of participants was conducted to facilitate equal distribution of English language learner participants within the AD groups and to retrospectively determine if the groups were homogenous in terms of several characteristics that other research suggests can influence participant interaction and exchange in asynchronous online discussion. The survey also documented that the participants had received an oral and written explanation of the risks and consent procedures used in the research. The overall survey return rate was 47.06%.

Survey data were analyzed for the participant pool at large and for each AD group. (Sample-wide and group-by-group participant survey response data are presented in Appendix T.) An χ^2 analysis of the returned surveys, presented in Table 6 below, found that the participant characteristics within the four AD groups were independent from group assignment with the exception of age, where analysis revealed that the participants in the QA-I group (AD4) were notably older than those in the other groups.

While the pre-experimental survey procedure proved useful in verifying and refining the assignment of English language learners across the AD groups, the importance of the other findings is difficult to determine because of the low return rate. Thus, the assumption of homogeneity among the groups is based primarily on the random participant procedures followed.

Table 6
Chi Square Data on Pre-Experimental Survey Questions 2-7

Question #	Topic	χ^2	df	p-value
2	Age	24.9817	3	0.00002*
3	English language fluency	5.56190	3	0.13498
4	AD experience	1.75439	3	0.62491
5	AD context	0.86022	3	0.83502
6	Pre-existing knowledge 1	5.76000	3	0.13498
7	Pre-existing knowledge 2	1.75439	3	0.62491

* p-value less than 0.01

Analysis of Statistical Significance

As described, the TAT interaction and exchange data are of different classes: the TAT interaction data are analyzed on a participant-by-participant, segment unit-level basis, and the TAT exchange data are analyzed on a group-wide, message unit-level basis. Thus different statistical procedures were needed to analyze the significance of the data: two-way analysis of variance (ANOVA) to analyze the significance of differences between the interaction parameter values for the four AD sessions, and descriptive statistics for the TAT exchange values.

In the present research, interaction parameters are analyzed individually for each AD participant, and then the data were combined in the two-way ANOVA procedure to quantify participant means in each experimental AD group (AD1–4), and to identify statistically significant differences between AD groups as associated with moderation style, instructional tactic, and combined treatments. Two-way ANOVA is a statistical procedure that tests means for statistical significance by comparing the variances. This is accomplished by determining (partitioning) the amount of variance in the group mean

that is due to true random error from the variance due to the true differences between the groups being analyzed. Two-way ANOVA provides a single statistical process to analyze the statistical significance of multiple independent variables on the dependent variables (Hill & Lewicki, 2006).

The first step in the ANOVA procedure requires determining the individual AD group means (χ_i), the overall mean for all groups ($\overline{\chi}$), and AD group variances (S^2). The sample size is designated by (n).

$$S^2 = \sum (\chi_i - \overline{\chi})^2 / n - 1$$

Next the sum of the square (SS) of the variances from the means for each group is calculated, which is referred to as SS within groups or SS error. The SS computation is also done for the total membership next without regard to group membership; this is referred to as total SS. SS effect is the difference between SS total and SS error. A large difference between the SS within groups and SS total indicates a large significance attributed to membership in the groups and, by inference, caused by the treatment. The differences in SS error and SS effect are compared using the F-test, which provides a probability value (p-value or p-level) for the statistical reliability of differences in the group means being significant and not due to random fluctuations. P value is the probability of a type 1 error in hypothesis testing—the probability that the observed differences between groups is due to pure chance rather than the instructional tactic or moderation style treatments. A p-value of < 0.05 is generally accepted as the borderline for acceptable reliability that the groups are in fact different, not just randomly variable. In other words, p-value = 0.05 would mean that there is a 5% probability that the observed differences in the group means were *not* related to membership in the group and by inference related to the experimental treatment. Lower p-values, such as p-value = 0.01, would mean that there is only a 1% chance of the observed differences between the groups being variation due to error, rather than the effects of the experimental treatments (Howell, 1997). Generally p values $\leq .05$ are considered sufficient to reject the null hypothesis, and p values $> .05$ bring the statistical significance of findings into doubt

(Hill & Lewicki, 2006). When two-way ANOVA identified statistical significance in the differences between the group means, the specific differences were examined for their relative contribution to the p-value findings for the dependent variables—instructional tactic, moderation style, and the combined effect of the two.

Summary

This chapter described the participant selection, materials, and the experimental and analysis procedures used to determine the influence of instructional tactics and moderation styles on the complexity of asynchronous online discussion. The recruitment, selection, and assignment of participants into the four experimental AD sessions were discussed. The documents and tests, content analysis instrument (the TAT), and outcome variables for the present research were described. The coding and focus group procedures were outlined, followed by a discussion of the validity of content analysis in AD and the specific applicability of the TAT content analysis method to the present research. The chapter then discussed intra- and inter-rater coding reliability as an important concern for the interpretation and replicability of content analysis. Three factors were identified as important components in establishing the reliability of the present research: the process for segmenting of the AD logs into units of analysis, the training of the rater panel, and the categorization of the units by the rater panel. The units of analysis for this study were identified as propositions, for which a description of the segmentation process was provided. Descriptions of the rater panel training, the procedure for analyzing and reporting intra- and inter-rater agreement expressed by Cohen's κ coefficient, and the Institutional Review Board process for participant consent and data were also given. Also provided was a discussion of the focus group interview process and the validity and reliability of the focus group process. A final section on data management and statistical analysis discussed the determination of adequate sample size to maximize statistical power as well as the statistical analysis procedures that provide the quantitative data that is reported in chapter 4.

CHAPTER 4
FINDINGS

This chapter presents the data obtained by conducting this study's four asynchronous online instructional discussion (AD) sessions, as described in chapter 3. The transcripts from each AD were analyzed using the Transcript Analysis Tool (TAT), and focus group interviews were conducted shortly after the AD sessions to ascertain the participants' perceptions about the influence of instruction on their AD sessions and to validate the quantitative findings. The following sections present the findings of the content analysis, including both exchange and interaction data, and of the focus group interviews.

Content Analysis Findings

As described in chapter 3, the TAT provides two different categories of content analysis for AD communications: exchange and interaction parameters. The following subsections present the findings for each of these parameters among the four AD groups.

AD Group Exchange Data

Table 7 presents the data on the number of messages posted at each hierarchical level and the density, intensity, send-receive, and thread persistence measures for each of the four AD groups. In terms of message volume, the data show that the QA-I group (AD4) posted a considerably higher number of messages than the other three groups (by greater than 1 standard deviation) and that the combined number of responses at reply levels 2 and 3 was considerably lower than that at the reply1 level. (Because participants could choose whether or not to post messages at any reply level, participants could reply at reply3 in response to the instructor's reply2 responses without themselves posting any messages at the reply2 level, as occurred with all participants in the QA-S group [AD3].)

Table 7
TAT Exchange Data by AD Group

		AD1 (CS-S)	AD2 (CS-I)	AD3 (QA-S)	AD4 (QA-I)	*Mean*	*SD*
Threads		8	16[a]	8	11	10.75	3.78
Reply1 messages		51	50	43	68[a]	53.00	10.61
Reply2 messages		1	0	0	8[a]	2.25	3.86
Reply3 messages		7	0	6	1	3.50	3.51
Total messages		67	66	57	88[a]	69.50	13.13
Density		0.32	0.31	0.27	0.38[a]	0.32	0.05
Intensity		3.19	3.14	2.71	4.00[a]	3.26	0.54
$S\text{-}R_{Instructor}$		0.13	0.12	0.11	0.12	0.12	0.01
$S\text{-}R_{Participants}$		1.14	1.00	1.00	0.55	0.92	0.26
Thread Persistence	Level 1	76.12%	75.76%	75.44%	77.27%[a]	76.15%	0.80%
	Level 2	1.49%	0.00%	0.00%	9.09%[a]	2.65%	4.35%
	Level 3	10.45%	0.00%	10.53%	1.14%	5.53%	5.75%

[a]AD group value exceeds overall group mean by one or more SD, [b]AD group value is below overall group mean by one or more SD.

Density and Intensity Parameters

Discussion *density* is a measure of the degree to which participants interact with each other, a numerical indicator of the distribution of postings between the participants expressed as a ratio or a percentage (participant messages posted / N [N-1]). The TAT density value reflects the actual participant message postings as compared to the number of messages that would be posted if each participant posted one reply message to every other participant. The higher density value for the QA-I group (AD4) shown in Table 7

indicates that this treatment group distributed their messages more widely to their fellow group members than did the participants in the other groups. *Intensity* is the average number of messages posted per participant (participant messages posted / *N*). Intensity thus is a value that accounts for the number of participants in an AD, facilitating comparisons between AD groups with differing numbers of participants. As can be seen in Table 7, the AD intensity values for the QA-I group (AD4) were again higher than those of the other three groups.

Send-Receive Parameters

The TAT send-receive ratios are decimal fraction quantifications that compare the number of posted or sent (S) messages (threads) to the number of reply (R) messages each evokes. The S-R_I ratio is calculated by dividing the instructor threads by the participant replies, and the S-R_P ratio is calculated by dividing the number of participant-generated threads by the number of instructor and participant replies to those messages. The S-R_I ratio values indicate the degree to which participants replied to the instructor's postings, and the lower the S-R value, the higher the number of replies evoked by a thread. The S-R data in Table 7 show that the threads posted by both the instructor and participants evoked fewer replies in the CS-S group (AD1) than in the others, that the instructor threads received the highest number of replies in the QA-S group (AD3), and that the participant threads received the highest number of replies in the QA-I group (AD4).

Thread Persistence

Thread persistence (TP) quantifies the reply messages posted to each hierarchical level in response to thread messages and is calculated by dividing the number of threads by the number of replies at each level. Higher thread persistence values suggest that the threads are more engaging to the discussion participants. The thread persistence data given in Table 6 indicate that most AD participants responded to each thread at the reply1 level and that participant responses to responses (reply2 and reply3) were sparse,

including no reply2 postings at all by the QA-S group (AD3). On average, the participants posted only 8% of their messages at reply2 or reply3. The total number of messages and the number of messages posted at the reply1 and reply 2 levels by the QA-I group (AD4) were notably higher than those of the other groups (by greater than 1 standard deviation above the mean). When two-way ANOVA was performed on these data, however, the differences in mean message posting (total, reply1 and reply2) between the groups did not reach the level of statistical significance (p-value > 0.05). (Two way ANOVA results on the exchange metrics can be found in Appendix U, Tables U-1 through U-5.) There were two exceptions to these exchange findings; the combination influence of abstract instruction (QA) and instrumental moderation was associated with a marginally significant higher number of reply2 messages, and social moderation had a statically significant influence on the number of reply3 messages. This latter finding was judged to be of little practical significance, however, given the low number of reply3 postings.

AD Group Interaction Data

The first participant interaction analysis was the quantification of segments (rather than messages) posted in each AD, parsed by the total number of segments and segments at each level of exchange (i.e., threads, reply1, reply2, reply3). The longer the individual messages, the larger the number of message segments, and this difference in participants' communication styles would be revealed as differences between message counts (exchange) and segment counts (interaction). A second level of examination of the participant interaction involved two-way ANOVA on the segmentation data parsed by the dependent variables (instructional tactic and moderation style) and the combined influences of both. A third level of analysis of the interaction data involved summing the various rhetorical types (questions, statements, attributions—for example, summing the numbers of both types of questions) to determine if there was an influence on rhetorical use more generally, as associated with the application of instructional tactic or moderation style.

Interaction Segments by Level

As can be seen in Table 8, approximately 20% more segments were posted by the QA-I group (AD4) than by the other three groups, exceeding the overall mean for segment posting by more than 1 standard deviation. The total segment count for this group was composed primarily of responses posted at the reply1 level, which also constituted the highest number of segments among the groups as a whole. (The participant mean interaction data by hierarchical level is provided in Appendix U-6.)

Table 8
TAT Interaction Segments by Hierarchical Level

	Threads	Reply1	Reply2	Reply3	Total
AD1 (CS-S)	15	493	61[a]	14	583
AD2 (CS-I)	31	422	0	0	453
AD3 (QA- S)	64[a]	402	0	46[a]	512
AD4 (QA-I)	22	667[a]	28	3	720[a]
Mean	33.00	496.00	22.25	15.75	567.00
SD	21.68	120.50	29.01	21.05	115.02

[a] AD group segment count exceeds overall group segment count mean by one or more SD, [b] AD group segment count is below overall group segment count mean by one or more SD.

Two-way ANOVA analysis revealed statistically significant higher numbers of reply2 segment posting as influenced by the case study instructional tactic in combination with the social moderation style (p-value 0.0063). For reply3 segments, statistically significant differences were noted to be associated with the application of the question answer instructional tactic (p-value 0.0200). This latter influence is associated with a small number of segments presented for analysis and is therefore of questionable practical significance. The two-way ANOVA tables for segment posting by hierarchical level are presented in Appendix U-7 through U-11.

Interaction Segments by Interaction Type

As can be seen in Table 9, the number of segments of the eight interaction types that were posted by participants varied considerably. These differences occurred in the combined total number of each type and the number of each type of segment across the four groups, the four reply levels, and the four general interaction types. Participant mean data for interactions are provided in Appendix U-12. The two-way ANOVA analyses (Appendices U-13 through U-20) indicate statistically significant differences in five areas of analysis, which are summarized in Figure 3.

Table 9
TAT Interaction Segments by AD Group and Interaction Type

	1A	1B[S]	2A	2B	3	4	5A	5B
AD1 (CS-S)	6	17[a]	285	13[a]	242	12	4	4
AD2 (CS-I)	25	0	378	10	33[b]	3	2	2
AD3 (QA- S)	17	2	293	4	171	20	1	4
AD4 (QA-I)	26	3	503[a]	8	145	24	5[a]	9[a]
Mean	18.50	5.50	364.75	8.75	147.75	14.75	3.00	4.75
SD	9.26	7.77	101.32	3.77	86.79	9.29	1.83	2.99

[a]AD group segment count exceeds overall group segment count mean by one or more SD, [b]AD group segment count is below overall group segment count mean by one or more SD.

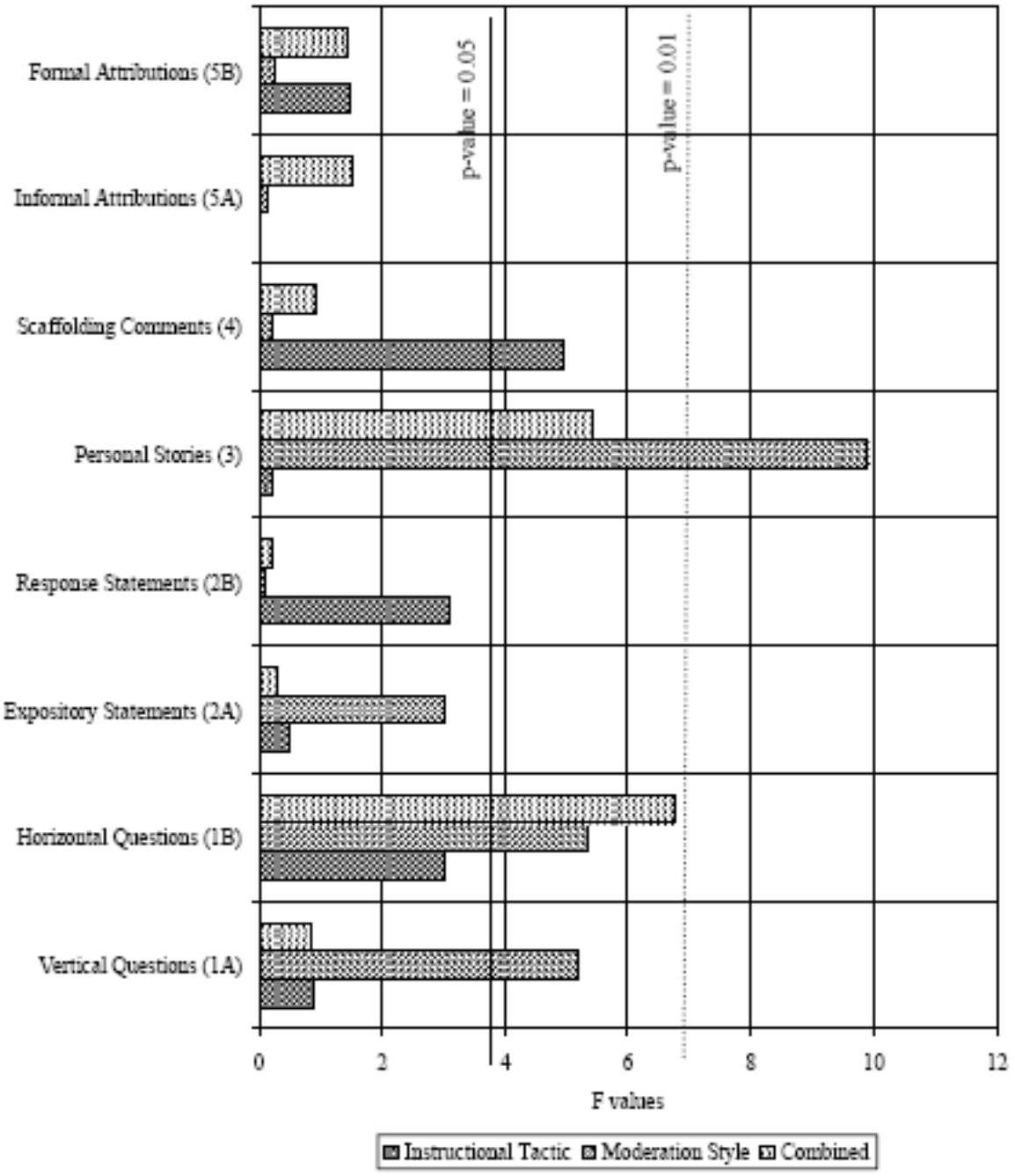

Figure 3. Two-way ANOVA F values by TAT interaction types.

The data for interaction segment quantities were next combined into four general interaction types: (a) questions (vertical and horizontal questions—interaction types 1A + 1B); (b) statements (expository, personal, and reflective statements—interaction types 2A + 2B + 3); (c) scaffolding statements (interaction type 4); and (d) referenced statements (paraphrased attributions and formal attributions—interaction types 5A + 5B). The combined interaction segment descriptive data are provided in Table 10. The participant mean data for combined interaction types are provided in Appendix U-21. The purpose of this examination was to analyze the rhetorical types of the segments posted by the AD groups in a more general way than provided by the TAT to determine other possible patterns in the discussions. Two-way ANOVA analysis of these results (Appendices U-22 through U-25) revealed no significant differences associated with instructional tactic, moderation style, or combined IT and MS, except that there was a significantly higher number of scaffolding segments (interaction type 4) associated with the application of the instrumental moderation style (p-value 0.0290).

Table 10
TAT Interaction Segments by AD Group and Combined Interaction Type

	Questions	Statements	Scaffolds	Attributions
AD1 (CS-S)	23	540	12	8
AD2 (CS-I)	25	421	3[b]	3
AD3 (QA- S)	18[b]	468	20	5
AD4 (QA-I)	29[a]	653[a]	24[a]	14[a]
Mean	24.00	520.50	14.75	7.50
SD	4.16	100.98	9.29	4.80

[a]AD group segment count exceeds overall group mean by one or more SD, [b]AD group segment count is below overall group mean by one or more SD.

Focus Group Findings

Focus group interviews were held the week immediately following the AD discussions. Only two of the six meetings were attended, and those by a total of five people (two in one meeting and three in another). Although the number of participants was small, they represented all four AD groups. The meetings were recorded and transcribed and then analyzed for common topics and insights about the AD instruction in the four AD groups. Three general topics were discussed in the focus group interviews: the level of AD group engagement in the discussion, the success of the AD in helping participants learn unit content, and the participation of the instructor. This section presents the comments of participants (identified by AD group membership) on each of these topics.

Group Engagement

Focus group attendees had varying opinions about the level of engagement in their AD groups. While a CS-I (AD2) group member stated that "Not enough people were engaged," a QA-I (AD4) group member reported that her group had been very engaged. According to the CS-I (AD2) group member, the quality of the discussion evolved over the 3 weeks of the AD: "Our group started out pretty quiet, and then after we had responded to the instructor's assignment, we started posting and talking to each other a lot more." A QA-I (AD4) group member felt it was easier to engage with the student-generated threads than the instructor threads.

All focus group participants indicated that they needed more orientation to and structure within the AD assignment, as they had not been sure what to do in an online discussion. For example, a CS-S (AD1) group member felt that the "rules for participation should have been more extensive." Two focus group attendees commented that they felt the discussion was too motivated by the number of points awarded toward their final grade, and others agreed that participants would have been more engaged in the ADs if the assignment had been worth more points. A QA-S (AD3) group member

felt that the instructor should have provided clearer participation expectations and that the importance of group collaboration should have received more emphasis in the initial AD instructions. A QA-I (AD4) group member felt that the assignment should "specify that we should use outside resources, not just our textbooks."

Four of the five focus group attendees noted that the discussion postings too often consisted of paraphrases and even direct quotations from assigned text materials. A CS-I (AD2) group member stated that "It was annoying that some people wrote the whole response, especially when it was really similar to the information provided in our textbook," implying that the group did not appear to understand that there was a preference for or need to collaborate in their AD group. A CS-S (AD1) group member suggested that "participants should ask more questions." Another CS-S (AD1) group member felt that the information (particularly the Web links) provided by the students was much more useful than the information provided by the instructor. A QA-S (AD3) group member agreed that the use of Web links in postings was helpful. Some attendees were frustrated that some groups got a case study (or some other information) that they did not, indicating that there was some face-to-face discussion of the AD assignments among participants and perhaps even direct over-the-shoulder observations of other ADs. The QA-I (AD4) attendee offered that providing online access for all participants to view all AD transcripts at the end of the discussion sessions just prior to the exam would have been useful, allowing everyone to benefit from any useful discussions that may have occurred in other AD groups. Several attendees were concerned that some of their fellow students might not have ready access to computer resources.

Learning Content

Focus group attendees had varying opinions about the AD's usefulness in learning the unit content and preparing for the unit exam. One CS-I (AD2) participant said bluntly that the amount of effort involved in reading and posting to the AD could have been better spent preparing for the exam by studying directly from text materials, noting that she found others' personal stories interesting but not particularly useful for preparing for

the exam. Conversely, a QA-I (AD4) group member stated, “I like the personal stories—they helped me remember the content, and I feel like they may ultimately be useful to being a nurse.” A QA-S (AD3) group member commented that “I was really frustrated by the clinical experience I had at _____. It was great to be able to discuss this with my classmates and have their support.” A CS-I (AD2) participant commented that the case study provided in their AD was helpful to her understanding of patient complexity. A QA-I (AD4) group member commented that she felt that case study discussions are more effective online than in small groups in class, as they give more people an opportunity to “feed off others’ comments and to share their perspectives.”

Instructor’s Role

When focus group participants were asked about the instructor’s role in the ADs, they often offered specific advice as to how the instructor could better moderate the discussions. A CS-S (AD1) group member offered that the instructor threads should have been more complex. While one CS-I (AD2) group member thought that the instructor should have asked more content-specific questions, another from the same group believed that the instructor’s questions should be more open-ended. The latter individual felt that the ADs should be a part of the course from the beginning because “We were too overwhelmed at this point in the semester to accept major changes in the class.” Another focus group participant agreed, adding that online discussions specific to each unit should be a regular part of the teaching for all units of instruction. A QA-S (AD3) group member suggested that the instructor could provide more feedback. Several people agreed that the level of instructor input beyond the posting of the initial instructional threads was too infrequent. A QA-I (AD4) group member offered that ADs “needed more instructor threads—4 wasn’t enough, 20 would be too many.” Several other focus group participants agreed that the instructor needed to be more involved in the discussions. One focus group participant offered that she felt that the target AD group size of 20 participants was too large and that 8 would have been better.

Summary

This chapter presented the quantitative and qualitative findings acquired in research on the influence of instructional tactics and moderation styles on asynchronous online discussion complexity. The research was performed in March of 2007 in an authentic instructional situation. Content analysis using the TAT designed by Fahy et. al (2001) and focus groups were deployed to generate the data.

CHAPTER 5
CONCLUSIONS

This chapter offers conclusions derived from a quasi-experimental, mixed methodology inquiry examining the influence of four instructional treatments—two instructional tactics (abstract and situated) and two moderation styles (social and instrumental)—on communication complexity in asynchronous online instructional discussion (AD). The present study was designed to address the research problem identified by Dysthe (2002) and discussed in chapter 2 that there has been little empirical examination of the influence of instructional tactics and moderation styles in AD. Del Valle et al. (2004) have also urged further research to identify instructional methods that can effectively facilitate critical thinking in an online environment, and Naidu and Jarvela (2006) have noted that close examination of AD also can also provide important insights into communicative complexity and productive collaboration.

The experimental data were gathered during and immediately following four parallel AD sessions that were conducted over a 3-week period in March of 2007. Transcripts of these discussions were analyzed using the TAT content analysis tool, and post-experimental focus group interviews were conducted with a small sample of participants. The following sections will first present conclusions drawn from the research data on the influence of the instructional treatment on communication, followed by a discussion of the study's limitations and recommendations for future research.

Communication Complexity

It was hypothesized that the CS-S treatment group (AD1), which combined instruction using a situated instruction tactic (case study) and a social moderation style, would produce the most complex discussion. The expectation that the social moderation style ("guide-on-the-side") should produce the highest complexity AD was predicated on the advocacy of many educators, but was specifically suggested by the findings of Weinberger et al. (2005). Since many educators have suggested that situated instructional

tactics produce more learning potential than abstract instructional tactics (Bransford et al., 1986; Herrington & Oliver, 2000; Hung & Der-Thanq, 2001; Jonassen et al., 1995; Lave, 1985, Scardamalia & Bereiter, 1996; Young & Barab, 1999), it was predicted that the case study ADs would produce a discussion with greater complexity. In the present research, however, if communication complexity in AD is measured by volume—by the total number of messages and segments and by communication intensity and density—the hypothesis is not supported by the findings. In fact, by those measures, the group demonstrating the greatest discussion complexity was the QA-I group (AD4), which used the opposite instructional techniques, abstract (question and answer) and instrumental.

Yet a different conclusion that can be drawn from these data is that discussion complexity is a richer concept than previously understood, which is consistent with research on the content analysis of AD that suggests that higher-order thinking and cognitive engagement are difficult to analyze with the currently available quantitative transcript analysis tools (De Weaver et. al 2006; Garrison et al., 2001; Gunawardena et. al 1997). If communication complexity is measured not by volume but by S-R ratio, thread persistence, participant exchange, and use of higher-order types of interaction, such as segments devoted to horizontal questioning, personal reflections, scaffolding, and formally cited attributions, the TAT results reveal that the CS-S treatment group (ADI) did in fact demonstrate greater AD complexity. Furthermore, the two-way ANOVA analysis indicates that statistically significant higher numbers of horizontal questioning and personal reflections were associated with the application of the situated instructional tactic and the social moderation style. These findings suggest that the definition of discussion complexity used by the TAT and in this study may need further refinement, as will be discussed later. The rest of this section discusses notable differences among the four treatment groups as revealed by the TAT analysis.

CS-S Group (AD1)

As noted above, it was hypothesized that the CS-S (AD1), which was treated with situated instruction (case study) and social moderation, would produce the most complex

discussion, a conclusion supposedly disproved by the higher number of messages and segments posted by the AD4 (QA-I) discussion group, as AD4's total messages, reply1 messages, and segment counts exceeded the mean by more than 1 standard deviation. (See Tables 6 and 7.) But a closer look at all the data reveals that AD1 did indeed produce a discussion consistent with higher-order thinking and extensive group collaboration. As shown in Table 6, AD1 posted the second highest total number of messages, the highest number of reply2 segments and reply3 messages, and a notably high level of thread persistence among the participants. The group also produced statistically significant higher numbers of horizontal question segments (p-value 0.0112) and had the highest participant mean for personal reflection segments among the groups, which was significant to a p-value of 0.0225 (see Appendix U-15). This increased thread persistence and higher-order cognition may also explain the finding that AD1 participants posted the fewest new threads of all the groups, instead operating primarily in the framework suggested to them in the instructor's threads.

CS-I Group (AD2)

The AD2 group also used case study situated instruction but with an instrumental moderation style. It had the lowest participant means for the total number of segments posted of all the groups (21.571), yet demonstrated the highest number of participant-generated threads (exceeding more than 1 standard deviation) and no horizontal question segments, appearing to post new threads instead of expanding the current discussion (see Tables 7 and 8). AD2 also posted the fewest personal reflection segments. This may suggest that the situated instruction used in AD1 and AD2 prompted more participant-generated discussion than in the instrumental instruction groups, but that the focus on content in the instrumental moderation style used in AD2 led to fewer personal stories being exchanged. (The research of Weinberger et. al [2005] also found that the instrumental moderation style produced an inhibiting effect on AD discussion.)

QA-S Group (AD3)

The treatment for this group consisted of question-answer (abstract) instruction and social moderation. AD3 provided the least discussion to analyze of all the AD groups, as demonstrated in their low numbers of total, reply1, reply2, and participant-generated thread messages and their low density and intensity values (see Tables 7 and 8). Like the other social moderation group, AD1, the group demonstrated a high level of thread persistence to the reply3 level (more than 1 standard deviation higher than the other groups; see Table 7). That they responded to each other more often than the instrumental moderation groups was also reflected in their relatively low instructor send-receive ratio and the highest participant thread reply3 persistence of all the AD groups (AD3's S-R_I = 0.114, overall *M* = 0.119, *SD* = 0.005; AD3's Reply3 TP = 10.53%, overall *M* = 5.53%; *SD* = 5.75%).

QA-I Group (AD4)

This group received question-answer (abstract) instruction but with an instrumental moderation style. AD4 presented the most active discussion of the four experimental groups, as demonstrated by their high number of messages (20% higher than the next-highest group, and beyond 1 standard deviation) and segments posted in total and at the reply1 level (25% higher than the next-highest group). As a result, AD4 also had the highest discussion density and intensity as well as notably high levels of reply1 and reply2 level thread persistence (see Table 6). Most of AD4's messages were posted in response to the instructor rather than to each other, as indicated by their high instructor send-receive ratio and the very low participant send-receive ratio (AD4's S-R_P = 0.548, overall *M* = 0.923; overall *SD* = 0.259). By these measures, its results were in fact the opposite of the high thread persistence and participant exchange rates of AD1 (see Table 6).

Cross-Group Comparisons

By examining the TAT data across the four groups, several other specific patterns can be found:

- When examining the *exchange values data*, though the numbers of messages for AD4 (abstract instructional tactic, instrumental moderation style) are higher for most exchange parameters, they do not reach the level of statistical significance. The only exception to this general analysis was that the combined influence of the situated instructional tactic with the social moderation style produced higher numbers of reply2 messages to a level of statistical significance (p-value 0.0489). The significance of this higher level of reply2 posting (as well as the significance of increases in reply3 postings in association with the social moderation style) are marginal and are not considered practically important findings because of the very low number of postings at these levels. The markedly increased density and intensity values of AD4 (QA-I) do not appear to have resulted from its question and answer format (QA) alone, as the other QA group, AD3, produced the lowest density and intensity values. Nor does it seem to be attributable solely to the instrumental moderation (I) style, as the density and intensity values of the other instrumental treatment group, AD2 (CS-I), are more similar to those of the group sharing its case study tactic but the social moderation style, AD 1 (CS-S). Thus the higher intensity and density values would seem to be attributable to the group's combination of treatments.
- The statistical analysis of the *interaction values data* revealed several interesting influences for the instructional treatments. As shown in Appendices U-11 through U-18 and in Figure 3, these include a significantly higher number of horizontal questions and personal reflections by the AD groups receiving social moderation—for which the effect is amplified by the interaction of social moderation and situated instruction. It is also interesting that in the present research situated instruction produced no significant difference in the posting of

any of the 8 interaction types but that abstract instruction (QA) groups posted higher numbers of scaffolding statements. This exception may be explained by an increased need for group participants to provide support for each other in risking a response to an instructor's question.

Limitations of the Study

Limitations relating to the reliability and generalizability of this study result from three factors: the methodology, the implementation of the pre-experimental survey and focus groups, and the limits of the statistical analysis used. In regard to methodology, the primary challenges to the generalizabilty of this research are that the sample size was relatively small, only four variables were tested, and the duration of the experimental sessions was short. The dimensions of the participant pool were controlled by convenience but more specifically by class sizes at the college where the research was performed. The primary researcher attempted to maximize the sample size by selecting courses with enrollments that allowed the formation of four AD groups of 15-20 participants each (based on suggested optimal AD group sizes and projected power considerations). The experimental AD session duration of 3 weeks was based on the amount of content to be learned and the course and curriculum design, and so therefore was also a design constraint presented by the opportunity to do research in an authentic setting. All of these experimental design limitations could be corrected for in future research.

The low return rate (approximately 50%—see Appendix T) for the initial survey and the low level of participation in the focus groups (five students) also present a limitation, as these elements of the study were intended to validate and expand the findings and to constitute the mixed methodological method recommended for educational research on instructional effectiveness. In the present research, strategies to better control the distribution and collection of the surveys would have helped increase the survey return rate, or much of the information it was intended to gather could have been obtained through other information-gathering strategies. The addition of a drawing

for a bookstore gift certificate was helpful in increasing focus group participation, and perhaps if used earlier might have been even more effective. Online ADs moderated to facilitate group interaction regarding the questions used in the focus groups also might have encouraged participation by students too busy to attend face-to-face focus group meetings.

Two final areas of limitation for the generalizabilty of the present research are the limited instructor engagement in the AD sessions and the learning task presented to the participants. Due to the size of the class and on-going traditional teaching responsibilities, the instructor in the present research posted minimal numbers of follow-up responses, an average of four per AD group across the 3 weeks of the experimental duration (the number of initial instructional threads were fixed at 4 threads in each AD). This level of instructor engagement in the AD sessions, while equally low across the four experimental groups, would not model the high levels of student engagement hoped for in the usual instructional AD session. The learning task in the AD would also influence the measures of exchange and interaction. Although the learning tasks for four experimental AD groups in the present research were similar, a different learning task might have led to a different level of student exchange and interaction.

Implications

As stated previously, the present research was not able to conclusively establish a statistically significant influence on both exchange and interaction values for any one combination of instructional tactic and moderation style. Two possible explanations are suggested for this conclusion. First, it may lend support to researchers such as Clark who have suggested that comparative research on instructional effectiveness is invalidated by confounding learning influences encountered by participants in different experimental contexts (Clark, 1985). The methodological design of the present research, however, circumvents these challenges to validity through the use of the quasi-experimental, mixed methodology approach, which, while not able to meet the standards of pure scientific experimentation (because it includes no control group), can provide empirical insights

about the effectiveness of instructional tactics and moderation styles. The validity of the present methodology (as previously argued by Joy and Garcia [2000] and based on research methodologies surveyed by Creswell [1994]) is predicated on the consistent experimental context of AD, on the outcome criterion (learning potential as a function of discussion complexity rather than learning), and on the simplified interaction (text-only) of AD analyzed by the content analysis of transcripts. Thus the most reasonable explanation for the findings and conclusions derived from the present research is that the four experimental treatments, as operationalized, did not have a sufficient influence on the behavior of the participants to produce a consistently statistically significant difference in discussion complexity. This section discusses some theoretical, methodological, and practical implications of these results for the design and application of future research on AD.

As discussed above, the analysis of the findings of this research reveals a lack of a comprehensive and context-specific definition of discussion complexity that would take into account both the volume of messages and the presence of higher-order thinking, which are both measured and assumed by the TAT instrument but which, these findings suggest, may not necessarily coincide. The definition of communications complexity and the theory behind it has also been identified as a methodological problem by other researchers studying AD content analysis methodologies, such as De Weaver et al. (2006), Hara et al. (2000), and Naidu et al. (2006). As reported above, the QA-I group (AD4) produced the greatest quantity of messages and segments, while the CS-S group (AD1) group produced many fewer messages and segments but more that could qualify as more complex, higher-level forms of communication. If one assumes that both high volume and higher-order thinking are desirable goals of AD instruction, the findings may suggest that employing some combination of all the four variables during the implementation of AD might enhance students' learning. This recommendation is consistent with the recommendations of Collison et al. (2000) and Salmon (2004).

Although the findings of the focus groups should be interpreted with caution because of the small number of participants, they also suggest some tension between

these two different measures of communication complexity, volume and higher-level thinking. Feedback from the AD4 focus group participants indicated that their group was satisfied with the AD, while feedback from the AD1 focus group participants indicated that their group considered it a distraction from other, more efficient learning activities. The level of satisfaction expressed by the focus group participants may indicate the participants' preference for high message volume, considerable scaffolding, and content-specific instructor interaction—attributes of good discussion from the participants' perspective, even though the message-volume view of AD success does not reflect the typical AD instructional objective, a wide and deep distribution of discussion and the encouragement of higher-order thinking. Some participants commented that they thought that the experience and quality of the AD discussions might have been enhanced had the instructor made clearer that group collaboration and sharing of outside sources and individual experiences were among the major goals of the assignment. The results may indeed reflect the students' primary concern with learning content that would help them pass the course exam and the small amount of credit they received for the assignment, illustrating the argument of Dysthe (2002) that the effectiveness of a particular instructional method employed in AD is highly individualized and context-dependent.

In terms of practice by instructor-moderators, although the results of this study do not definitively identify any one instructional tactic or moderation style or particular combination as superior in producing communication complexity, they do suggest that message volume should not be used as the only parameter for assessing the success of an AD. This finding supports the claim of De Wever et al. (2006) that the AD message volume is not by itself an effective measure of the quality of participant interaction. The researcher's experience in conducting this study also suggests that a more comprehensive and balanced understanding of communications complexity in AD could assist instructors in their use of the AD strategy, including improved AD orientation and assignment handouts for participants, and thus in formulating and deploying instructional tactics to respond to the specific situational context of the AD as it evolves.

Recommendations for Future Research

While the present research was unable to definitively identify the instructional tactic and moderation style influences on discussion complexity, replication of the study with different participant contexts, larger cohorts, longer AD sessions, or serial AD sessions might well provide more coherently significant results. The mixed methodology, quasi-experimental method applied in the present research proved to be a powerful and flexible tool that with some refinements may be amenable to use by other researchers in similar content analysis-based research. Mixed methodology approaches to AD research have also been recommended by many who have examined AD analysis closely, including Hara et al. (2000), Naidu and Jarvela (2006), and Schrire (2006). I specifically recommend that a refined version of the current research be replicated in course contexts in which the AD task assignment is a larger, longer, and more integrated component of the course.

I also recommend the development of an expanded definition of communicative complexity that specifically identifies the TAT interaction types associated with higher-order thinking and reports them as a measure along with the data for each of the specific rhetorical types. One method by which this could be accomplished using the current TAT interaction type scheme would be to provide a summed quantity for lower and higher communicative complexity interaction types. Based on the experience of this study, I also suggest that the TAT interaction definitions be refined to provide more specific guidance for the rater classification process, including more precise interaction definitions with examples and identification of interaction types that may require more careful rater analysis. Strijbos et al. (2004) have also noted that the reliability of content analysis is threatened by definitional overlap between interaction types. In the present research, raters rarely disagreed with some TAT interaction definitions, even when the segment counts were quite high (e.g., expository statements vs. personal reflections), while more often disagreed on others (e.g., vertical vs. horizontal questions). Clarifying these definitions is vital to the reliability of content analysis instruments in measuring higher-order participant interactions.

As for attempting to increase the power of the statistical tools used in the present research by increasing the numbers of participants, both the literature-recommended maximum number of AD participants and practical considerations limit AD group size. If additional AD groups are added to a future study, procedures would need to be developed to address the consistency of treatments and instructors across groups. In view of these challenges, I suggest that a more accessible approach to increasing the power of similar research methodologies would be to improve the focus group procedures used in the present research—especially strategies aimed at increasing participation. Additional research is also needed on the influence of situationally specific instructor responses and on serial or longer AD sessions on the development and evolution of discussion complexity. While literature indicates that AD is a common instructional strategy in undergraduate and professional education, there has been little discipline-specific content analysis research examining the influence of different disciplinary contexts on discussion complexity. Based on evidence that age or academic preparation may be related to the development of higher-order thinking, particularly that of Hara et al. (2000), which found vast differences between the ADs of graduate and undergraduate students, a study such as this one conducted with a group of students at each of these levels may be able to elaborate more interesting details about these claims.

There was evidence that the enticements offered in the present research were not sufficient to motivate attendance and participation in the focus group meetings. Additional research on developing effective focus group enticements would be helpful for future research using the focus group methodology. Two of the focus group participants in the present research also recommended that an online AD focus group would have been consistent with the research project and might have encouraged participation by students too busy to attend face-to-face focus group meetings. Again, more research would be needed to provide evidence that the group synergy of online AD focus groups is equivalent to that of face-to-face focus groups.

Summary

This chapter has presented conclusions based on the findings of this research study. The hypothesis that a combination of situated instruction and social moderation would produce more complex AD was rejected, with certain explanations and reservations relating primarily to the absence of a definition of discussion complexity that combines both volume and higher-order thinking measures. Conclusions regarding the results of each individual group and the data across groups were presented, and limitations and implications of the study were discussed. The chapter also concluded that, with some modifications, the TAT provides an effective, empirical research instrument for similar AD research, and closes with suggestions for future research.

APPENDIX A:
Informal compilation of online instructional tactics listed in ERIC 1995-2005

(Xs = times encountered)

1. starting a discussion with a common experience XXX
2. structured debate XXXXX
3. starting a discussion with questions XXXX
4. starting a discussion with case XXX
5. problem based learning XXX
6. role playing XXX
7. online guest access XX
8. reflection on what is being learned XXX
9. Socratic method XX
10. summarizing, weaving, reflective analysis XXXX
11. starting a discussion with a controversy
12. stages of development discussion
13. breaking problems into sub-problem
14. contact each student individually phone, email
15. posting an introductory lecture
16. mini-lectures XX
17. use of text, audio, multimedia presentation
18. announcements
19. make participation expectations clear XX
20. discuss rules for civility
21. informal practice discussions
22. sentence completion XX
23. students interview each other
24. visualization exercise
25. introductory exercise – "hook" – "what is the weirdest gift…"
26. playing a game – e.g., lifeboat exercise
27. asking about student motivations in course
28. "eight nouns that describe me" exercise – and explanatory stories – or any number – (Cummings 1998) e.g., runner, cyclist, clean-freak, cry-baby, etc.
29. conveyances of mood, tone
30. demonstrations of caring, encouragement
31. use of humor
32. group work
33. online practice tests
34. online testing
35. request substantiation for asserted knowledge

36. writing games
37. ask students to moderate, lead a discussion XXXX
38. play the devil's advocate – challenge, provoke a heated discussion
39. role model writing style
40. integrate web sites
41. portfolio/journaling
42. team teaching, learning
43. online feedback
44. public recognition
45. elicit responses from specific participants
46. explain benefits to participation XX
47. perform research among participants
48. provide indications that all input is valuable
49. run an online tutorial session before an exam
50. monitor/publish conference performance/participation
51. make deadlines
52. provide key information online
53. simulations
54. dramatizations
55. doing experiences, observing experiences – service learning, authentic projects
56. find a different delivery strategy for content, or consider giving students time to organize it themselves, quizzing
57. team-based learning small groups work to learn complex information, ideas, then works to transfer that to an experience.
58. instructors provide background information, context
59. facilitator should contribute less as the discussion progresses and intervene as needed to maintain discussion, promote interest, summarize
60. facilitator should role model engagement, appropriate learning style
61. starter-wrapper format
62. provide cues
63. journaling
64. interactive reading
65. reflective feedback
66. hypothetical thinking
67. assign different symbols
68. analyze a point of view
69. relationship analysis
70. contract for participation
71. solicit conflicting opinions
72. end message threads when they have run their course

73. moderator must use judgment as to when to post or when to let participants go on a topic
74. email non-participating students
75. remove misplaced or inappropriate messages and send them back to originator for discussion or reposting in correct location

APPENDIX B:
AD assignment

[College Name Redacted]
NURS328 -- Health Patterns II -- Renal

Online Discussion Guidelines:

Note: If you are having trouble entering your discussion board…
The BlackBoard Group Discussion Boards allow you to see all the groups that are active… but, you are only allowed to enter and participate in the one to which you are assigned. If you have trouble accessing a Group Discussion Board, be sure you are trying to enter the discussion group to which you are assigned. (you received an email about your group assignment).

The purpose of the online discussion is to support your learning and facilitate your "Thinking Nursing" in the care of patients with acute and chronic renal failure (See Unit Three, Objective 4).

A. Student-to-student discussion is central to clarify your thinking related to key renal concepts. We expect that you will make effective use of this online discussion as a learning tool–by contributing to and engaging in the discussion. Read the discussion postings often, reflect on the postings--and post your insights/thinking related to the topic. Post as much as you want. Facilitate learning in each other. Share your wisdom. We will also be monitoring the online discussion groups and responding to your posting.
B. Participation counts toward your course grade. There are 30 prep/ participation points assigned to the Online Discussion. The minimum participation requirements are:
    1. Post at least one response within each of the 4 threads (2 will be posted when you first visit the online discussion, and then 2 new ones will appear approximately a week later) = ***10 points***
    2. Post at least one new thread for the group to discuss. = ***10 points***
    3. Read new messages at least 4 times per week. = ***10 points***
C. Only quality postings count for meeting the minimum participation requirements. Quality postings are:
    - thoughtful, thought provoking, researched, insightful postings, they have substance and add meaning/clarity to the discussion. "Yes"/"no", "agree"/"disagee" responds with out rationale are not allowed/counted.
    - positive, polite, sensitive, caring, tolerant and patient.

APPENDIX C:
Teaching Script AD1
Case Study –Social Moderation Style

Experimental instructional design constraints: ***Instructor facilitates participant collaboration, group discussion and problem-solving ("guide on the side). Postings are formatted in a combination of statements and questions. Instructor provides frequent references to the case study.***
Starter Threads: Two posted at beginning of experimental period, two posted in week 2.
1.1. Collaborate to provide our group with a complete description of the renal diseases and related disorders that are of primary concern in Ms. Martin's case. CLICK REPLY TO POST YOUR RESPONSE -->
1.2. Collaborate to construct a nursing care plan for Ms. Martin. Describe any special issues or concerns you have about our patient that should be considered before developing a nursing care plan. CLICK REPLY TO POST YOUR RESPONSE -->
1.3. What if you were the primary care nurse for Ms. Martin and you discovered on day 3 that Ms. Martin has now decided to refuse dialysis? Share your reactions with our group, and describe some appropriate communications approaches for helping Ms. Martin re-consider such a decision. CLICK REPLY TO POST YOUR RESPONSE -->
1.4. Review and summarize the collaborative processes we employed to access, organize and manage the nursing care for Ms. Martin. Summarize the main points that arose in our discussion. Discuss any improvements that you would like to see implemented in future nursing care planning for similar renal patients. CLICK REPLY TO POST YOUR RESPONSE -->
Follow-up prompts: (to be posted as provided here) AD1   • Reflect on and state your impressions, thoughts and issues regarding the issues raised by _____.   • Please elaborate on…   • In the interest of more equitable discussion -- if you haven't raised your questions, shared your opinions or thoughts about our case or any issues relating to nursing care for renal nursing patients, please do so now.   • Restate the main points of our discussion to this point. Summarize a group consensus.   • Provide any personal perspectives or stories with us about renal diseases.

Mary Martin Case Study

ADMISSION DAY

Mary Martin, a 62-year-old female of Native American descent, is admitted to the hospital with increased fatigue, lethargy, and occasional confusion from chronic uremia secondary to End Stage Renal Disease (ESRD). Mary has a long history of diabetes mellitus resulting in permanent damage to her kidneys. Diagnostic tests ordered for Mary include:

Renal Scan
Renal Ultrasound
Hgb & Hct
BUN
Serum Creatinine
Creatinine Clearance
Serum Electrolytes
Urinalysis
Urine for C&S
Fasting Blood Glucose and finger-stick blood glucose levels before breakfast and at bedtime.

DAY THREE

Mary's renal status has continued to deteriorate. Creatinine clearance is 6 ml per minute and Mary is showing evidence of fluid intoxication despite conservative measures to restrict fluid. BP 160/96, weight has increased by 5 lbs. since admission, 2+ pitting edema noted in her ankles and feet, fine crackles are present bilaterally in bases of lungs on auscultation, jugular vein distention is evident. Mary's doctor has prepared her for the possibility of hemodialysis.

DAY OF DISCHARGE

Mary had an internal arteriovenous fistula surgically created two days ago. Mary will receive hemodialysis through a temporary access percutaneous cannula in her right subclavian until the fistula is ready for use. The nurse schedules Mary for hemodialysis at the outpatient dialysis center three times per week. She is scheduled for a doctor's appointment in one week at which time she will have serum electrolytes and a CBC drawn. The dietitian has met with Mary and instructed her on fluid, sodium, and potassium restrictions and a low protein, 2,000 calorie diabetic diet. Mary lives alone on a fixed income. She expresses concern regarding her ability to get to the dialysis center three times per week and her financial capabilities to afford hemodialysis.

APPENDIX D:
Teaching Script AD2
Case Study – Instrumental Moderation Style

Experimental instructional design constraints: ***Instructor postings are predominated by postings in the didactic-expert voice, providing subject/content-based information ("sage on the stage"). Postings are posed in both statements and questions. Instructor provides frequent references to the case study.***
Starter Threads: Two posted at beginning of experimental period, two posted in week 2.
2.1. Identify the common etiologies, assessment data and interventions for acute renal failure (ARF) pre-renal, intra-renal and post-renal disease -- relate these to Mary Martin's situation. Describe the primary differences between acute and chronic renal failure -- relate these differences to our patient case. CLICK REPLY TO POST YOUR RESPONSE -->
2.2. List and describe the signs, symptoms, etiology, and treatment for cystitis, pyelo-nephritis, and glomerulo-nephritis. Does Ms. Martin's situation provide you with any indication that these disorders are present? CLICK REPLY TO POST YOUR RESPONSE -->
2.3. Describe your initial reactions if you were told on day 3 that Ms. Martin had refused dialysis. Describe the possible reasons that Ms. Martin might possibly offer for refusing dialysis. Why do you think she consented to the surgical placement of a dialysis shunt -- if she were thinking of refusing dialysis? List any other individuals that should be involved in decisions to forego life saving treatment – describe your reasoning for involving these other stakeholders. Discuss the difference between facilitating Ms. Martin's re-consideration of her decision *vs.* "arguing," "advocating" or "coercing" Ms. Martin's into a different decision. CLICK REPLY TO POST YOUR RESPONSE -->
2.4. Discuss and summarize the issues presented by Ms. Martin. Discuss any special circumstances that were presented by Ms. Martin's situation. Were all the stakeholders' opinions represented in the case study? Describe any elements of the nursing care process that we used for Ms. Martin that would not apply or be appropriate in developing nursing care plans for patients with other diseases or disorders? CLICK REPLY TO POST YOUR RESPONSE -->
Follow-up prompts: (designed during the discussion, in response to student postings) AD2 • Case study related facts relevant to the threads/responses posted by the participants -- from reference resources and primary course faculty (subject matter experts). • Recommendations for disciplinary methods to analyze the problem or solve the problem. • Follow-up responses phrased predominantly as statements.

Mary Martin Case Study

ADMISSION DAY

Mary Martin, a 62 year-old female of Native American descent, is admitted to the hospital with increased fatigue, lethargy, and occasional confusion from chronic uremia secondary to End Stage Renal Disease (ESRD). Mary has a long history of diabetes mellitus resulting in permanent damage to her kidneys. Diagnostic tests ordered for Mary include:

Renal Scan
Renal Ultrasound
Hgb & Hct
BUN
Serum Creatinine
Creatinine Clearance
Serum Electrolytes
Urinalysis
Urine for C&S
Fasting Blood Glucose and finger-stick blood glucose levels before breakfast and at bedtime.

DAY THREE

Mary's renal status has continued to deteriorate. Creatinine clearance is 6 ml per minute and Mary is showing evidence of fluid intoxication despite conservative measures to restrict fluid. BP 160/96, weight has increased by 5 lbs. since admission, 2+ pitting edema noted in her ankles and feet, fine crackles are present bilaterally in bases of lungs on auscultation, jugular vein distention is evident. Mary's doctor has prepared her for the possibility of hemodialysis.

DAY OF DISCHARGE

Mary had an internal arteriovenous fistula surgically created two days ago. Mary will receive hemodialysis through a temporary access percutaneous cannula in her right subclavian until the fistula is ready for use. The nurse schedules Mary for hemodialysis at the outpatient dialysis center three times per week. She is scheduled for a doctor's appointment in one week at which time she will have serum electrolytes and a CBC drawn. The dietitian has met with Mary and instructed her on fluid, sodium, and potassium restrictions and a low protein, 2,000 calorie diabetic diet. Mary lives alone on a fixed income. She expresses concern regarding her ability to get to the dialysis center three times per week and her financial capabilities to afford hemodialysis.

APPENDIX E:
Teaching Script AD3
Question and Answer – Social Moderation Style

Experimental instructional design constraints: ***Instructor facilitates participant collaboration, group discussion and problem-solving ("guide on the side"). All instructor postings are in question form.***
Starter Threads: Two posted at beginning of experimental period, two posted in week 2.
3.1. What are the renal diseases and related disorders being studied in this unit? Can you collaborate to provide our discussion group with a complete description of each? CLICK REPLY TO POST YOUR RESPONSE -->
3.2. What are the essential elements of a generic nursing care plan for renal patients? What special nursing care challenges are presented by patients with renal diseases? CLICK REPLY TO POST YOUR RESPONSE -->
3.3. Could you share any insight you have with our group about circumstances where it may be reasonable for patients in chronic renal failure to refuse dialysis? What are some appropriate nursing communications approaches we should use to discuss this with patients, or to facilitate re-consideration of such a patient desire? CLICK REPLY TO POST YOUR RESPONSE -->
3.4. What were the collaborative processes we employed to access organize and manage the nursing care for patients with renal disease? What are the main points that arose during our discussions? Are there any improvements you would like to see implemented in developing future nursing care plans? CLICK REPLY TO POST YOUR RESPONSE -->
Follow-up prompts: (to be posted as provided here) AD3   • What are your impressions, thoughts and issues regarding the issues raised by _____?   • What else can be said about…?   • Could we hear from some of our quieter colleagues?   • Can we restate the main points of our discussion to this point? A group consensus?   • Do you have any clinical or personal experiences that you can share with the group?

APPENDIX F:
Teaching Script AD4
Question and Answer – Social Moderation Style

Experimental instructional design constraints: ***Instructor postings are predominated by postings in the didactic-expert voice, providing subject/content-based information ("sage on the stage"). All instructor postings are posed as questions. Instructor postings relate to the unit objectives.***
Starter Threads: Two posted at beginning of experimental period, two posted in week 2.
4.1. What are the common etiologies, assessment data and interventions for acute renal failure (ARF) pre-renal, intra-renal and post-renal disease? What are differences between acute and chronic renal failure? How are they diagnosed, differentiated, and what are the accepted treatments? CLICK REPLY TO POST YOUR RESPONSE -->
4.2. What are the signs, symptoms, etiology, diagnosis and treatment of cystitis, pyelo-nephritis, and glomerulo-nephritis? CLICK REPLY TO POST YOUR RESPONSE -->
4.3. Under what circumstances where it would be understandable, appropriate and acceptable for patients to refuse dialysis? What are the factors -- such as age or disease prognosis that might explain/justify/rationalize such a decision? What other factors do you foresee that might justify a decision to refuse dialysis? Aside from the patient, are there any other individuals that should be involved in decisions to forego life saving treatments – who are they? What are the significant differences between facilitating a patient's re-consideration of a decision – *vs.* "arguing," "advocating" or "coercing" a patient decision? CLICK REPLY TO POST YOUR RESPONSE -->
4.4. What were the most important points made in our group discussion over the past 3 weeks? What are the renal patho-physiologies, etiologies signs, symptoms and interventions we have discussed? What special treatment and care challenges were presented by patients with renal disease? What improvements can you suggest for future nursing care planning? CLICK REPLY TO POST YOUR RESPONSE -->
Follow-up prompts: (designed during the discussion, in response to student postings) AD4 • Unit 3 related facts relevant to the threads/responses posted by the participants -- from reference resources and primary course faculty (subject matter experts). • Recommendations for disciplinary methods to analyze the problem or solve the problem. • All follow-up responses phrased as questions.

Appendix G:
Demographic Survey

NAME_____
Instructions: Please circle your responses.

1. Did you receive an oral and written explanation about this research project?
    a. Yes
    b. No
2. What is your age range?
    a. 18-29
    b. 29-40
    c. 40+
3. What is the language you speak at home?
    a. English
    b. Other
4. What is your experience with online discussion boards, forums, groups?
    a. none
    b. 1-3 years
    c. 4-5 years
    d. 6-9 years
    e. 10+ years

5. Which context best describes your experience with online discussion boards, forums, groups?
    a. No experience
    b. Education
    c. Entertainment
    d. Help forum
6. The primary manifestation of acute renal failure is:
    a. oliguria
    b. proteinuria
    c. diuresis
    d. hematuria
7. In renal failure, the kidneys will continue to adapt until renal function reaches what percent of normal?
    a. 10%
    b. 25%
    c. 50%
    d. 75%

APPENDIX H :
Segmentation Rules (from Strijbos, et al., 2006, Table 2, p. 38)

1. Each message is first segmented in sentences by using a ‘full stop,’ ‘question mark,’ or ‘exclamation mark’ that the author of the message has written.
2. Each sentence that is followed by a ‘full stop’ constitutes a segment, regardless of whether a ‘finite form’ or ‘verb’ is missing.
3. Each compound sentence is split in segments using punctuation signs and symbols or signs that are used for punctuation purposes.
    a. Comma
    b. Semicolon
    c. Colon
    d. Brackets
    e. The word ‘and’
    f. Dash
    g. (…) or …
4. Segmentation is always subject to the criterion that each part of that compound sentence can be regarded as a ‘meaningful’ sentence in itself (regardless of the coding categories).
5. When determining whether a part of a compound sentence can be regarded as a ‘meaningful’ sentence in itself, the following rules apply:
    a. It is allowed to ignore the words that form the collocation.
    b. It is not allowed to add mentally a ‘finite form’ or ‘verbs,’ if it has not been written.
    c. It is not allowed to leave out words that are written.
    d. It is allowed to mentally rearrange the order of ‘verbs’ and ‘finite form’ to create a ‘meaningful’ sentence
    e. In case parts of a compound sentence share a conditional relationship, those parts are not regarded as separate segments.
    f. Statements between brackets are often in a telegraphic style, and thus they are difficult to rearrange in a ‘meaningful’ sentence. If either the ‘finite form’ or ‘verb’ is missing, the statement between parentheses will be regarded as a separate segment. The statement is not regarded as a separate segment if both are missing.
    g. Citations and hyperlinks that are included in the message are segmented according to the previous rules and examples below (see point five of this procedure that addresses the handling of summations (including summations of hyperlinks).
    h. If an abbreviation is used in the middle of a sentence, the sentence is not split after the ‘full stop’ at the end of that abbreviation.
    i. An introductory statement, two or three words, is not regarded as a separate segment (even if placed as such by the author) and is added to the next sentence that it introduces.
    j. An introductory sentence is regarded as a separate segment.

5. Segmentation of summations: textual and lists (or bullets)

a. If the majority of statements in a summation can be regarded as a ‘meaningful’ sentence in itself, each statement is treated as a separate segment.
b. If the majority of statements in a summation cannot be regarded as a ‘meaningful’ sentence in itself, all statements are treated as one segment.
c. If half of the statements in a summation can be seen as a ‘meaningful’ sentence in itself, all statements are treated as a separate segment.
d. In case the introductory sentence of a summation can be regarded as a ‘meaningful’ sentence in itself, this sentence is regarded as a separate segment. If not, this sentence is added to the first statement of the summation.
e. If the main point in a summation is divided in sub points (e.g., 2.1, 2.2, etc.), than the above rules (see a, b, c) apply. An exception is the ‘claw construction’ in a summation: the main point and sub points comprise separate segments and the sentences in between can be regarded as a ‘meaningful’ sentence in itself. They are not directly part of the summation and thus behave as an appropriation in a summation.

APPENDIX I:

Focus Group Guidelines

- Questions for FG are identical
- Questions should contextualize anticipated results for each AD – H_O and NSD.
- Conversation in FGs should be equitably distributed, no leading
- Group size max is 10, ask for FG volunteers, or divide the AD session groups up
- Audio tape proceedings, have a note taker.
- FG Purpose is to elicit information from participants in each AD session
    - Common comments, concerns.
    - Feelings about, preferences on instructors participation or instructional tactics or moderation styles as used in the experimental AD session.
    - Comments concerning the influence of instructor participation in the AD (ITs and MSs – especially any that explain, support or contradict quantitative data research findings)

Focus Group Questions

1. Were you satisfied with the level of participation in your online discussion group?
    a. Were you satisfied with the amount of discussion in the online discussion?
    b. Were you satisfied with the complexity of discussion in the online discussion?
2. What is your current impression of the success of your group's online discussion in generating the specific goals of your group's Fuzzy Situation inquiry?
3. At this time, do you feel that your group was successful in developing a realistic collaborative plan for the Fuzzy Situation project?
4. What did you perceive the role of the instructor-moderator to be in your online discussions?
    a. "traditional," "expert," "sage-on-the-stage" (instrumental)
    b. activator, facilitator, constructivist, "guide-on-the-side" (social)
5. How would you characterize the instructor-moderator's instructional technique in your online discussions? (situated, abstract)
6. What influence did the instructor-moderator have on your group's online discussion?
    a. What specific interactions do you remember that helped/impeded your group's discussion?
7. Did you feel that the participation of the instructor-moderator in your online discussions helped/impeded your group's ability to develop a specific focus on the topic of inquiry and to plan the next steps required to successfully complete the Fuzzy Situation project?

Appendix J:
Student as Principal Investigator Worksheet

Use this worksheet in collaboration with your academic advisor to demonstrate research preparedness of the student investigator.

To be completed by the Academic Advisor

1. Student academic level: (check all that apply)

☐ **Undergraduate**
☒ **Graduate:** ☐ Masters candidate ☒ PhD. candidate

2. Explain how the scope of the proposed project, including anticipated risks and benefits, is appropriate to student research?

The risks involved in this research are minimal and involve the possibility that participants will become more conscious of their online contributions. The benefits of this research is that participants will be provided with increased access to support from their peers and instructors for completion of the "Nursing Tree" assignment. Additionally, participation in this research will lead to the advancement of knowledge about the effective use of asynchronous online discussion, which can improve online learning.

3. Explain what experience, training or special preparation, the student researcher brings to the project from relevant coursework or professional exposure:

The student researcher has completed the Curriculum and Instruction department core requirements which included instruction on research methodologies and ethics. Additonally the student researcher has completed course work on ethnographic research and the required IRB online training (CITI) modules.

As Academic or project advisor for the named student investigator, I assume the roles and responsibilities required to oversee the conduct of this research, prevent harms to subjects and foster benefits to the subjects. I will report any changes in the project, adverse events, or incidents to the IRB which may affect the conduct of this project.

Simon Hooper, Ph.D, and Joan Hughes, Ph.D.	
Name of Academic Advisor (Printed)	
Electronic approval provided	
Academic Advisor Signature	**Date**

Advisors shoulder the responsibility for students engaged in independent research.

APPENDIX K:

RESEARCH INFORMATION FORM
A study of communications within online discussion forums.

The online discussion forums, which are provided to support your learning in Unit 3 in NURS 328 (Patterns in Health II), are also involved in a study of online communications conducted by John E. Boatright, a Ph.D. student in Learning Technology Program at the University of Minnesota. While your participation in an online discussion forum is a requirement of NURS 328, your participation in the research is voluntary. We ask that you read this information form and ask any questions.

Background Information
The purpose of this study is to analyze group communications in online discussion.

Procedures:
Consenting participants in this research will be asked to do the following things:
1. Complete a pre-experimental survey. The survey will take approximately 15 minutes to complete.
2. Participate in online discussion forum with your assigned discussion group. The experimental portion of the online discussion will last for approximately 2 weeks during March 2007.
3. Participate in a focus group interview meeting following the close of the online discussion forums. The focus group interview meeting is a face-to-face group discussion that will take approximately 45 minutes of your time (refreshments will be served). The focus group interviews will occur in a classroom on conference room on the College [Name Redacted]. *An additional focus group interview meeting will be added (April 12, 2007) in which attendees will be entered in a random drawing for a $50 gift certificate to the* [Name Redacted] *Bookstore. Attendees to the previous focus group meetings will be included in this random drawing.*

Risks and Benefits of being in the Study
This research has been reviewed by the Institutional Review Boards of both the University of Minnesota and the [Name Redacted] and has been determined to be a part of normal educational processes (IRB exempt) intended to improve the quality of instruction. The risks involved in this research have been determined to be minimal and involve the possibility that you may become more conscious of your online contributions.

The benefit of your participation in this research is that you will be provided with previously unavailable access to support from your peers and instructors to complete the "nursing tree" assignment and to learn the necessary course content in Unit 3 – Genitourinary, Renal and Reproductive Systems. Additionally, your participation in this research will lead to the advancement of knowledge about the effective use of asynchronous online discussion, which can improve online learning. There is no monetary benefit associated with participation in this research.

Confidentiality:
The records of this study will be kept private. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records. The focus group proceedings will be tape-recorded. The researcher will use these recordings to produce a summary of the proceedings, which may include direct quotations. Wherever direct quotations are used, anonymous numerical identification (rather than personal identifying information) will be used to protect your privacy. After the analysis and summaries are completed (within a year), transcripts of online discussions and written surveys will be destroyed, and the tapes of the focus group proceedings will be erased. The published use of the data derived from this study will be provided in aggregated, anonymous form. If it is necessary to provide direct quotations from the online discussions or focus group interviews in published accounts of this research, the quotations will be used without personal identifying information.

Voluntary Nature of the Study:
Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota or the [Name Redacted]. If you decide to participate, you are free to not answer any question or withdraw at any time with out affecting those relationships. You should also know that your NUR 328 course instructors will have no knowledge of who is and who is not participating in this research, so that your decision to not participate or to withdraw from this research will not affect your course grade in any way.

Due to the fact that this research is of such low risk and is done as a part of normal educational processes intended to improve the quality of instruction, the text transcripts of the online discussions forums will continue to be monitored and anonymously analyzed.

Should you determine that you do not wish to participate in the research, you must contact the primary researcher (John Boatright) to "opt out" of the research. Should you decide to opt out of the research you will be not be asked to complete the pre-experimental survey, nor will you be invited to participate in the focus group interview meetings.

Contacts and Questions:
The researcher conducting this study is John E. Boatright. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact him at The College of St. Catherine, 601 25th Ave S, Minneapolis, MN 55454 651.690.7819, boat0011@umn.edu. Faculty supervisors (University of MN) are Simon Hooper, Ph.D. and Joan Hughes, Ph.D. who may be reached through the Department of Curriculum and Instruction, Learning Technologies, 125 Peik Hall, #130C / 130A, 159 Pillsbury Drive SE., Minneapolis, MN 55455 612-625-0534, simon@umn.edu. [*Name Redacted]* is the

primary faculty member in NURS328 and may be contacted regarding this research at the [*Name Redacted]*

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

This information form is provided for you to keep for your records.

Thank you for considering this information and participating in this study.
John E. Boatright

APPENDIX L:
Verbal explanation script for request to participate in research.

You are invited to participate in a research project on communications in online discussion. The primary researcher for this research is (me) John Boatright, a Ph.D. a student in Learning Technologies at the University of Minnesota. The University of Minnesota faculty advisors for this research are Simon Hooper Ph.D., and Joan Hughes, Ph.D. [Name Redacted] is the primary [*Name Redacted]* advisor for this research.

Participation in this research involves completing a 10 minute survey, and participation in a focus group interview meeting (30-60 minutes – pizza and pop will be served). Participation in the online discussion forums associated with this research is an expected and important component of NURS 328. Your NURS 328 course instructors will monitor and participate in the online discussion forums, but will not be informed of your agreement or non-agreement to participate in the research. Therefore, while your grade in NURS 328 may be affected by your participation and engagement in the online discussion forums -- your agreement to participate in the research project will not affect your grade on this assignment or in the course. Your fellow students will also not be informed of your consenting (or not consenting) to participate in this research.

Access to any personal identification information associated with participation in this research (the online discussions or focus group interviews) will be strictly limited to the primary researcher and his UofMN advisors. While quotations from the online discussions and focus group interviews may be published, no personal identification information obtained in this research will be maintained or published.

Since this research is done as a part of the normal process of educational improvement, and has been determined to be of little or no risk to you by the Institutional Research Board, your consent to participate in the research is assumed. If you decide that you do not wish to participate in the research, you must contact [*Name Redacted]*, your instructor, or me, and state that you wish to opt-out of the research.

APPENDIX M:
Copy of University of Minnesota IRB Application

Research Exempt from IRB Committee Review
Category 2:
SURVEYS/INTERVIEWS, STANDARD EDUCATION TESTS & OBSERVATIONS OF PUBLIC BEHAVIOR
1.1 Project Title (Project title must match grant title. If different, also provide grant title):
THE INFLUENCE OF INSTRUCTIONAL TACTIC SELECTION AND MODERATION STYLE ON PARTICIPANT INTERACTION AND EXCHANGE IN ASYNCHRONOUS THREADED ONLINE DISCUSSION
1.2 Principal Investigator (PI)
Name (Last name, First name MI):
Boatright, John E.
Highest Earned Degree: MA
Phone Number: 651.690.7819 O, 651.698.2287 H
Pager or Cell Phone Number: 651.398.4155 C
Mailing Address:
1283 Goodrich Ave.
St. Paul, MN 55105
Fax: 651.690.7849
U of M Employee/Student ID: 1375201
Email: boat0011@umn.edu
U of M x.500 ID (ex. smith001):
boat0011
University Department (if applicable):
Occupational Position:
Faculty Staff Student Fairview Researcher Gillette Researcher Other:
Indicate the training and education completed in the protection of human subjects or human subjects records. Training is required
for all research. Category two research projects require human subjects training. HIPAA training alone is not sufficient.
*Refer to training links at the end of this section
Human Subjects Training (one of these must be checked)
CITI FIRST Investigator 101 Other
HIPAA Training (Required if Data Contains PHI)
HIPAA
As Principal Investigator of this study, I assure the IRB that the following statements are true:
The information provided in this form is correct. I will seek and obtain prior written approval from the IRB for any substantive modifications in
the proposal, including changes in procedures, co-investigators, funding agencies, etc. I will promptly report any unexpected or otherwise significant adverse events or unanticipated problems or incidents that may occur in the course of this study. I will

report in writing any significant new findings which develop during the course of this study which may affect the risks and benefits to participation. I will not begin my research until I have received written notification of final IRB approval. I will comply with all IRB requests to report on the status of the study. I will maintain records of this research according to IRB guidelines. The grant that I have submitted to my funding agency which is submitted with this IRB submission accurately and completely reflects what is contained in this application. If these conditions are not met, I understand that approval of this research could be suspended or terminated.
Date:11-22-2006

1.3 If you do not have outside funding, then an additional department head notification is necessary.
Electronically submitted protocols must be carbon copied (Cc) to a department head if you do not have outside funding. This secure electronic notification using password protected authentication, has been deemed by the University of Minnesota to constitute a legal signature.
Department Head notification is only required if you do not have outside funding. If you do have outside funding you must complete appendix A.
As Department Head, I acknowledge that this research is in keeping with the standards set by my department and I assure that the Principal
Investigator has met all departmental requirements for review and approval of this research.
Ruth G. Thomas
Typed Name of Dept. Head, Director of Research Fairview, or Director of Gillette Research Administration
Date: 11-23-2006

1.4 Are there additional Co-Investigators and Staff?
Yes. Download an extra personnel sheet and include it with your application.
No. Continue to 1.5.

1.5 Is the PI of this research a student?
Yes.
Electronically submitted protocols must be carbon copied (Cc) to their advisor as secure electronic notification using password protected authentications, which have been deemed by the University of Minnesota to constitute a legal signature.
No. Continue to 2.
As Academic Advisor to the Student Investigator, I assume responsibility for ensuring that the student complies with University of Minnesota policies and federal regulations regarding the use of human subjects in research
Advisor's Name (Last name, First name MI):
Hooper, Simon
Hughes, Joan E.
University Department:

Curriculum and Instruction, Learning Technologies
Phone Number: 612-625-0534, 612-625-4331
Email: simon@umn.edu, joanh@umn.edu
Mailing Address:
125 Peik Hall, #130C / 130A
159 Pillsbury Drive SE
Minneapolis, MN 55455-0208

Date: 11-22-2006

2. Funding
2.1 Is this research funded by an internal or external agency?
Yes. *Include Appendix A.*
No. *Note you must obtain a department head signature in response to question 1.3*
If no, explain how costs of research will be covered:
no expenses are planned

3. Institutional Oversight
3.1 Is this research proposal being reviewed by any other institution or peer review committee?
Yes.
It is the responsibility of the PI to secure the appropriate approval from these committees and document that approval to the IRB. Attach a copy of documentation of approval, if received, and indicate committees below.
If yes, please list which committees will review this proposal:
[Name Redacted] - concurrent application UofMN IRB, Application is attached.
University of Minnesota and (*Name Redacted)*IRB applications are being concurrently submitted and reviewed; approvals will be provided to each IRB as soon as approval is granted and documentation is available.
No.

4. Conflict of Interest
4.1 Do any of the investigators or personnel listed on this research have a potential conflict of interest
associated with this study? Conflict of interest is defined in Appendix Y.
Yes. *Include Appendix Y.*
No.
5. Summary of Activities
Use lay language, do not cut and paste from or refer to a grant or an abstract.

5.1 Briefly state your research question.
What are the observed quantitative and qualitative influences of situated or abstract instructional tactics and social or instrumental moderation styles on communications complexity (participant interaction and exchange) in asynchronous online discussion?

5.2 Describe the tasks subjects will be asked to perform.
Describe the frequency and duration of procedures, psychological tests, educational tests, and experiments; including screening,
intervention, follow-up etc. *Reminder:* No personal or sensitive information can be sought under exempt guidelines. (If you intend to
pilot a process before recruiting for the main study please explain.)
This quasi-experimental research examines the influence of two instructional tactics and two instructional moderation styles on communications complexity in online asynchronous discussion among post-secondary education majors. The mixed-methodology research employs a pre-experimental survey (Appendix C) content analysis on the text logs of the online discussions, and focus group interviews (Appendix D). The experimental phase of this research will take place during the first 6-7 weeks of the winter semester 2007.
Participants will be recruited from EDUC 370 at the [Name Redacted], in which they are enrolled. During the experimental phase, the voluntary, consenting participants will be surveyed for basic demographic characteristics, prior experience with online instruction and knowledge about inquiry-based instruction. Following the survey, participants will be randomly assigned, in equal numbers to one of four online asynchronous discussion group. There will be approximately 20 participants assigned to each of the online asynchronous discussion groups. The instructional objective in all of the online discussion groups will be to facilitate group collaboration on a required group assignment, “the Fuzzy Situation Project.” Each online asynchronous discussion will be moderated by the same instructor (the primary researcher), who will apply the experimental treatments. A teaching script will be used to maintain the fidelity of the experimental treatments applied in the asynchronous online discussions by the moderator. The teaching scripts define, explain and provide examples for the selected instructional tactic and moderation style combinations under investigation. The transcripts of the online asynchronous discussions will be collected for content analysis.
Focus group interviews will follow the completion of the experimental online asynchronous discussions. The focus group interviews will ask the participants to reflect on the influence of the moderator, the instructional tactics and the moderation styles on the complexity of the online discussions.

Attach all surveys, instruments, interview questions, focus group questions etc.

5.3 Describe what non-participants will do during this period (activities and supervision if applicable):
If your subjects will be students, it is important that the study design not penalize students who will not be participating if not all students will be participating.
Students who decline to participate in this research, will be assigned randomly to one of the four instructional online asynchronous discussions -- where they may interact with the other participants in the usual way (consenting participants will not be aware of the

participation status of participants). In order to prevent any potential for grade evaluation consequences for non-participation in this research, course instructors will not be informed of which students have consented (or not consented) to participate in the research. Consenting participants will also not be aware of the participation status of their peers in order to prevent any effects this knowledge might have on the quality of discussions. At the end of the experimental period, postings from non-consenting individuals will be struck from the experimental log records and will not be analyzed. Nonparticipating students will also not be involved in the focus group interview process.

5.4 How long do you anticipate this research study will last from the time you are determined to meet the criteria for exempt research?
Exempt research is generally considered short-term in nature. This office routinely inactivates exempt applications after three years from the time it was determined to meet the exempt criteria. If you think your project will extend beyond three years, contact the IRB office (612-626-5654 or irb@umn.edu).
6-10 months

6. Participant Population
6.1 Expected Number of Participants: 80 # of Male: 30 # Female: 50
6.2 Expected Age Range
Please confirm subjects are at least 18 years old, checking all that apply (you may not conduct research with subjects younger than 18 under exempt category two, if you would like to include subjects younger than 18, you must complete the full IRB application requesting expedited review if appropriate):
18-65
65 and older

6.3 Describe the criteria for inclusion and exclusion of subjects in this research study.
Inclusion Criteria:
Enrollment in EDUC 370 at the [Name Redacted]
Exclusion Criteria: none

6.4 Location of Subjects during Research Data Collection
Check all that apply:
Elementary/Secondary Schools (*include Appendix M*)
Community Center, specify:
University Campus (non-clinical), specify:
Subject's Home, specify:
International Location (*include Appendix K*):
Other special institutions, specify: [Name Redacted]

7. Compensation
7.1 Will you give subjects gifts, payments, compensation, reimbursement, services without charge or extra

credit?
Yes.
No.
If yes, please explain:
Food and beverages will be served at the focus group meetings.

8. Recruitment
8.1 Are subjects chosen from records?
Yes. *Complete 8.1a-c*
No. *Continue to 8.2*

8.1a What type of records:
Medical
Educational
Employment
Other:

8.1b Are the records publicly available?
Yes. Proceed to question 8.2
No. Proceed to question 8.1c

8.1c Do you already have permissible access to the private records? (i.e. through your job, volunteer work, internship,
etc.)
Yes. Describe how you have permissible access.
not applicable
No. You must ask the custodian of the record to make initial contact for you (describe how they will do this in question 8.2) and let the potential subject contact you if they are interested. Attach a letter of cooperation from the custodian of the record indicating that they will make initial contact on your behalf. Please note that even if the custodian is willing to give you the private list, if you do not have permissible access to the records, the fact that the custodian will give you the list does not create permissible access. The custodian will still have to make initial contact.

8.2 Describe the recruitment process to be used:
Attach a copy of any and all recruitment materials to be used e.g. advertisements, bulletin board notices, e-mails, letters, phone
scripts, or URLs.
Participants will be asked (in writing and verbally) in association with the initial explanation of the course assignment (the Fuzzy Situation project), to participate in a study of communications in online asynchronous discussion. Potential participants will be informed that the instructors moderating the online asynchronous discussion sessions will be applying different instructional styles and tactics in each online discussion group.

See Consent Form -- Appendix A. The text of the oral explanation of this research and request for participation is provided in Appendix B.

8.3 Explain who will approach potential subjects to take part in the research study and what will be done to protect individuals' privacy in this process:
Initial contact of subjects identified through records search must be made by the official holder of the record, i.e. primary physician,
therapist, public school official.
The primary researcher, in combination with the course instructional team will approach course enrollees to participate in the present research. A "consent to participate" form will be used and will require personal identification (so that only consenting participant's interactions will be analyzed). See Consent Form -- Appendix A.

9. Confidentiality
See Protecting Private Data Guideline from the Office of Information Technology (OIT) for information about protecting the privacy of research data.

9.1 Describe provisions that will be taken to maintain confidentiality of data (e.g. surveys, video, audio tape, photos):
Personal identification data present in the transcripts of the experimental online asynchronous discussions will be made anonymous by the assignment of numerical identifiers. The data link between the personal identification information and the anonymous identification numbers will be maintained until the data analysis phase is completed and verified, at which time it will be destroyed (approximately one year). Aside from assuring that online asynchronous discussion cohorts are identifiable and segregated, personal identification data will not be collected on the pre-experimental surveys or in the focus group interviews.

9.2 Describe the security plan for data including where stored and for how long, noting that you may not keep identifiable data indefinitely:
The number-identified participant and group summary data will be maintained in locked filing cabinets located with the primary researcher for 7 years.

9.3 Will the PI have a link to identify subjects?
Yes.
No.

9.4 Will identifiable data be made available to anyone other than the PI?
Yes.
No.
If yes, explain who and why they will have access to the identifiable data:
During the analysis phase, personal identification data from the asynchronous online discussions will be available to the primary investigator's advisors, and other thesis committee members if needed. After a thorough verification of the segregation of online

discussion data has been completed -- the data link between personal identification information and the anonymous identification numbers will be destroyed. Only anonymous and summary data will be published in the dissertation and any other related future publishing.

10. Informed Consent Process
Reminder: If you are mailing a survey to subjects and asking them to return it to you, or doing a phone interview, you must send or read a consent statement which includes the same information as the consent form but is not signed.
10.1 Describe who will conduct the consent process with subjects and how consent will be obtained:
Primary researcher.

10.2 Recognizing that consent itself is a process of communication, describe what will be said to subjects to introduce the research: Do not say “see consent form”. Write the explanation in lay language.
If you are using telephone surveys, attach telephone scripts.
"You are invited to participate in a research project on communications in asynchronous online discussion. The primary researcher for this research is John Boatright, a Ph.D., a student in Learning Technologies at the University of Minnesota. The faculty advisors for this research are Simon Hooper Ph.D., and Joan Hughes, Ph.D. Should you consent to participate in this research, you will be asked to complete a survey and permit the researcher to collect and analyze your communications in online discussions relating to the Fuzzy Situation project over the next 6-7 weeks. Additionally, your participation in this research will involve attending a group interview meeting (30-60 minutes) near mid-semester. While participation in the online Fuzzy Situation discussion is an expected and important component of the assignment -- your consent to participate in this research project is voluntary and will not affect your grade on this assignment or in the course. Your course instructors will monitor and influence the researcher's moderation of the online discussions -- but they will not be informed of your agreement or non-agreement to participate in the research. Access to any personal identification information associated with participation in either the online discussion or the group interview will be strictly limited to the primary researcher and his advisors for analyzing online discussion. On completion of this research project, no personal identification information will be maintained or published."

10.3 Prepare and attach consent forms for review. For exempt category two research, it is not necessary to obtain signed documentation of consent (i.e. a signature). Please submit a ‘consent information sheet’ which does not include a signature line. The IRB office reserves the right to require that you obtain signatures, but in most cases it is not necessary.

APPENDIX N:
Copy of University of Minnesota IRB approval

From: <irb@umn.edu>
To: <boat0011@umn.edu>
Sent: Tuesday, December 05, 2006 2:14 PM
Subject: Notification of IRB Exempt Study

12/8/2006
The IRB: Human Subjects Committee determined that the referenced study is exempt from review under federal guidelines 45 CFR Part 46.101(b) category #1
INSTRUCTIONAL STRATEGIES IN EDUCATIONAL SETTINGS.
Study Number: 0612E97546
Principal Investigator: John Boatright

Title(s): The Influence of Instructional Tactic Selection and Moderation Style on Participant Interaction and Exchange in Asynchronous Threaded Online Discussion

This e-mail confirmation is your official University of Minnesota RSPP notification of exemption from full committee review. You will not receive a hard copy or letter.
This secure electronic notification between password protected authentications has been deemed by the University of Minnesota to constitute a legal signature.
The study number above is assigned to your research. That number and the title of your study must be used in all communication with the IRB office.
For research in schools: Any changes to this research must be approved by the IRB and school district involved before initiation. If you requested a waiver of consent or documentation of consent and you received this email, approval for the waiver has been granted. This exemption will last for three years from the date of this correspondence and will be filed inactive at that time. If this research will extend beyond three years, you must submit a new application to the IRB a month prior to the study's expiration.
Upon receipt of this email, you may begin your research. If you have questions, please call the IRB office at (612) 626-5654.You may go to the View Completed section of eResearch Central at http://eresearch.umn.edu/ to view further details on your study.
The IRB wishes you success with this research.

APPENDIX O:

Copy of [Name Redacted] IRB Application

[Name Redacted] **REQUEST FOR THE APPROVAL**
FOR THE USE OF HUMAN SUBJECTS IN RESEARCH
2006-2007 APPLICATION FORM
Human Subjects Code Number:_____
(assigned by IRB)

APPLICATION DATA

Date of application: 12-20-2006
Indicate type of review: X Exempt ___ Expedited ___ Full
For all exempt reviews, indicate which of the following categories apply:
__X_ 1. Normal Educational Practices
____ 2. Educational Tests
__X_ 3. Survey/Interview Procedures
__X_ 4. Observation
____ 5. Secondary Use of Data
____ 6. Evaluation of Federal Research/Programs
____ 7. Taste Tests

APPLICANT DATA

Investigator name(s):
John E. Boatright, Ph.D. Candidate, Department of Curriculum and Instruction, Learning Technologies, University of Minnesota

Project Title:
THE INFLUENCE OF INSTRUCTIONAL TACTIC SELECTION AND MODERATION STYLE ON PARTICIPANT INTERACTION AND EXCHANGE IN ASYNCHRONOUS THREADED ONLINE DISCUSSION.

Advisor:
External Advisors: Simon Hooper Ph.D. and Joan Hughes, Ph.D.
Department of Curriculum and Instruction, Learning Technologies, University of Minnesota

Internal Advisors: [Name Redacted]

Investigator Mailing Address:
1283 Goodrich Ave.
St. Paul, MN 55105

Investigator E-mail Address:
jeboatright@stkate.edu

Investigator Telephone:
651.690.7819 O, 651.698.2297 H, 651.398.4155 C

Dates of Project:
Jan 1, 2007- June 30, 2007

Has this research been reviewed by another IRB? _X_Yes ___No
University of Minnesota IRB (exempt) application approved - see attached
(If yes, please provide a copy of the letter of approval, or indicate the status of your application)
Will this research be reviewed by another IRB? ___Yes ____No
(If yes, please indicate your plans for review)

RESEARCH SUMMARY

Research Question: What are the observed quantitative and qualitative influences of situated or abstract instructional tactics and social or instrumental moderation styles on communications complexity (participant interaction and exchange) in asynchronous online discussion?

This quasi-experimental research examines the influence of two instructional tactics and two instructional moderation styles on communications complexity in online asynchronous discussion among post-secondary education majors. The mixed-methodology research employs a pre-experimental survey, content analysis on the text logs of the online discussions, and focus group interviews. The experimental phase of this research will last 2 weeks and take place between February 15th and March 15th 2007. Participants will be recruited from NURS 328 – HEALTH PATTERNS II at the [Name Redacted], in which they are enrolled. During the experimental phase, the voluntary, consenting participants will complete a six question, 5-10 minute, pre-experimental survey for basic demographic characteristics, prior experience with online instruction and knowledge about the instructional objectives planned for the discussion (see Appendix C). The survey data will also be used to assign equal numbers of prior- experienced and ethnically diverse participants into each group. Following the survey, participants will be randomly assigned, in equal numbers to an online asynchronous discussion group. There will be approximately 20 participants assigned to each of the four online asynchronous discussion groups. The pre-experimental survey data will be used to distribute equal numbers of prior- experienced and ethnically diverse participants into each asynchronous online discussion group. The instructional objective in all of the online discussion groups will be the same and will relate to the instructional objectives of the assignment. Each online asynchronous discussion will be moderated by the same instructor (the primary researcher), who will apply the experimental treatments. A teaching script will be used to maintain the fidelity of the experimental treatments applied in the four asynchronous online discussions by the moderator. The teaching scripts define, explain and provide examples for the selected instructional tactic and moderation style combinations under investigation. The transcripts of the online asynchronous discussions will be collected for the content analysis process. Focus group interviews will follow the completion of the experimental online asynchronous discussions (see Appendix D). The focus group interviews will ask the participants to reflect on the influence of the moderator, the instructional tactics and the moderation styles on the complexity of the online discussions.

SUBJECTS AND RECRUITMENT

Age Range of Subjects: 18-55
Number: 0 Male 84 Female 84 Total

Describe how you will recruit your subjects: be specific. Attach a copy of any advertisement, flyer, letter, or statement that you will use to recruit subjects.
Participants will be asked (in writing – Appendix A, and verbally - Appendix B) in association with the initial explanation of the course assignment, to participate in a study of communications in online asynchronous discussion. Potential participants will be informed that the instructor moderating the online asynchronous discussion sessions will be applying different instructional styles and tactics in each online discussion group. Potential participants will also be informed that they may withdraw from

the research at any time. See Consent Form -- Appendix A. The script for the oral explanation of this research and request for participation is provided in Appendix B.

Students, who decline to participate in this research, will be assigned randomly to one of the four instructional online asynchronous discussions -- where they may interact with the other participants in the usual way (consenting participants will not be aware of the participation status of participants). In order to prevent any potential for grade evaluation consequences for non-participation in this research, course instructors will not be informed of which students have consented (or not consented) to participate in the research. Consenting participants will also not be aware of the participation status of their peers in order to prevent any effects this knowledge might have on the quality of discussions. At the end of the experimental period, postings from non-consenting individuals will be struck from the experimental log records and will not be analyzed. Non-participating students will also not be involved in the focus group interview process.

Will the subjects be offered inducements for participation? If yes, explain.
Food and beverages will be served at the focus group meetings.

Please clearly identify any special populations or classes of subjects that you will include and provide a rationale for using them.
NA

RISKS AND BENEFITS OF PARTICIPATION

Check all that apply. Does the research involve:
___ Use of private records (medical or educational records)
___ Possible invasion of privacy of the subjects and/or their family
___ Manipulation of psychological or social variables
___ Probing for personal or sensitive information in surveys or interviews
___ Use of deception
___ Presentation of materials which subjects might consider offensive, threatening or degrading
___ Risk of physical injury to subjects
___ Other risks
If any of these are checked, describe the precautions taken to minimize the risks.
The risks involved in this research are minimal and involve the possibility that participants will become more conscious of their online contributions.

List any anticipated direct benefits to your subjects. If none, state that here and in the consent form.
The benefit of your participation in this research is that you will be provided with increased access to support from your peers and instructors in this required group assignment. Additionally, your participation in this research will lead to the advancement of knowledge about the effective use of asynchronous online discussion, which can improve online learning.

Justify the statement that the potential benefits of this research study outweigh any probable risks.
The risks of this research have been minimized by attention to any potential for breach of privacy issues. Since the assignment was originally conceived as an exercise that required the physical presence of students in the classroom, the provision of asynchronous online discussion for group work in this assignment represents a benefit previously unavailable to enrolled students.

CONFIDENTIALITY OF DATA

How will you maintain confidentiality of the information obtained from your subjects?
Personal identification data present in the transcripts of the experimental online asynchronous discussions will be made anonymous by the assignment of numerical identifiers. The data link between the personal identification information and the anonymous identification numbers will be maintained until the data analysis phase is completed and verified, at which time it will be destroyed (approximately one year). Aside from assuring that online asynchronous discussion cohorts are identifiable and segregated, personal identification data will not be collected on the pre-experimental surveys or in the focus group interviews.

Where will the data be kept, how long will it be kept, and who will have access to it?
The number-identified participant and group summary data will be maintained in locked filing cabinets located with the primary researcher for 7 years.

Will data identifying subjects be made available to anyone other than you or your advisor? Who?
During the analysis phase, personal identification data from the asynchronous online discussions will be available to the primary investigator's advisors, and other thesis committee members if needed. After a thorough verification of the segregation of online discussion data has been completed -- the data link between personal identification information and the anonymous identification numbers will be destroyed. Only anonymous and summary data will be published in the dissertation and any other related future publishing.

Will the data become a part of the medical or school record? If yes, explain.
No.

INFORMED CONSENT

How will you gain consent? State what you will say to the subjects to explain your research. Attach consent form or text of oral statement. (Note: if you propose to work with children ages 7-18 and you are gaining consent from their parents, you must also develop and attach an age-appropriate assent form.)
The primary researcher, in combination with the course instructional team will approach course enrollees to participate in the present research. The consent or non-consent information on the forms will be used by the primary researcher and will be used for striking communications by the non-consenting individuals from the online asynchronous discussion log. Non-consenting individuals will also not be invited to participate in the focus group interviews. Consenting individuals will also be informed that they may withdraw from the research study at any time. In order to prevent any potential for grade evaluation consequences for non-participation in this research, course instructors will not be informed of which students have consented (or not consented) to participate in the research. See Consent Form -- Appendix A.

When will you obtain consent (that day?, several days before the project?, a week before?)?
Participants will be asked (in writing and verbally) in association with the initial explanation of the course assignment, to participate in a study of communications in online asynchronous discussion. Potential participants will be informed that the instructors moderating the online asynchronous discussion sessions will be applying different instructional styles and tactics in each online discussion group. See Consent Form -- Appendix A. The text of the oral explanation of this research and request for participation is provided in Appendix B.

How will you assess that the subject understands what he/she has been asked to do?

A “consent to participate” form will be used and will require personal identification.

ASSURANCES AND SIGNATURES

The signatures below certify that:

- The information furnished concerning the procedures to be taken for the protection of human subjects is correct.
- The investigator, to the best of his/her knowledge, is complying with Federal regulations governing human subjects in research.
- The investigator will seek and obtain prior written approval from the Committee for any substantive modification in the proposal, including, but not limited to changes in cooperating investigators, procedures and subject population.
- The investigator will promptly report in writing to the Committee any unexpected or otherwise significant adverse events that occur in the course of the study.
- The investigator will promptly report in writing to the Committee and to the subjects any significant findings which develop during the course of the study which may affect the risks and benefits to the subjects who participate in the study.
- The research will not be initiated until the Committee provides written approval.
- The term of approval will be for one year. To extend the study beyond that term, a new application must be submitted.
- The research, once approved, is subject to continuing review and approval by the Committee.
- The researcher will comply with all requests from the IRB to report on the status of the study and will maintain records of the research according to IRB guidelines.
- If these conditions are not met, approval of this research may be suspended.

As primary investigator, I understand and will follow the above conditions.

J.E. Boatright, MA, RRT -- SUBMITTEED VIA EMAIL 12-20-2006
Signature of Investigator Date

As Advisor or Sponsor, I assume responsibility for ensuring that the investigator complies with College and federal regulations regarding the use of Human Subjects in research.

[Name Redacted] -- SUBMITTEED VIA EMAIL 12-20-2006
Signature of Advisor or Sponsor Date
(Student investigators must have an advisor. Staff and non-[Name Redacted] applicants must have a departmental sponsor)

As Department Chair, I acknowledge that this research is in keeping with the standards set by our department and assure that the investigator has met all departmental requirements for review and approval of this research.

[Name Redacted]. -- SUBMITTEED VIA EMAIL 12-20-2006
Signature of Department Chair Date
(necessary only for faculty and staff research at the Expedited and Full levels)

APPENDIX P:
Copy of [Name Redacted] IRB Approval Letter

From: [Name Redacted]
To: John E Boatright
cc: [Name Redacted]
Date: Friday, January 05, 2007 03:36PM
Subject: Fw: IRB 06-N-24 The Influence of Tactic Selection and Moderation Style - REVISIONS
RE: **06-N-24 The Influence of Instructional Tactic Selection and Moderation Style on Participant Interaction and Exchange in Asynchronous Threaded Online Discussion**

Dear John,
Thank you for promptly submitting revisions to your research proposal to the [Name Redacted] Institutional Review Board (IRB). You have met all of the stipulations requested in my letter of 1-05-07. As a result, your project is approved and you may proceed with your research as revised.
Please note that all research projects are subject to continuing review and approval. You must notify the IRB of any research changes that will affect your subjects. You should not initiate these changes until you receive written IRB approval. Also, you should report any adverse events to the IRB. **Please use the reference number listed above in any contact with the IRB.**

If you have questions or concerns about these stipulations, please feel free to contact me by phone (X 7739), email (jsschmitt@stkate.edu), or campus mail (mail stop MPLS).

We appreciate your work ensuring appropriate treatment of your research subjects. Good luck with your research.

Sincerely,
[Name Redacted]
Chair, Institutional Review Board

APPENDIX Q:
Copies of University of Minnesota IRB Amendments and Approvals

From: Rachel Blixt
To: 'UofMN email acct'
Sent: Monday, February 05, 2007 10:56 AM
Subject: RE: IRB# 0612E97546 request to amend
Hi John-
This is just to let you know that I have had a chance to review your requests, and your changes have been approved. I have added all updated materials to your file, so, you are good to go. Let me know if you have any questions. Thanks! Rachel
Rachel Blixt
Executive Office and Administrative Specialist, IRB
Research Subjects' Protection Programs, University of Minnesota
420 Delaware Street SE MMC 820
Minneapolis, MN 55455
612-625-9186 (direct line and voicemail)
612-626-5654 (RSPP main line)
612-626-6061 (fax)
blix0009@umn.edu
http://www.research.umn.edu/subjects/

From: UofMN email acct [mailto:boat0011@umn.edu]
Sent: Monday, February 05, 2007 10:34 AM
To: Rachelle Blixt
Cc: Joan E. Hughes; Simon Hooper; Michelle Everson
Subject: IRB# 0612E97546 request to amend
Dear Ms. Blixt,
Regarding: THE INFLUENCE OF INSTRUCTIONAL TACTIC SELECTION AND MODERATION STYLE ON PARTICIPANT INTERACTION AND EXCHANGE IN ASYNCHRONOUS THREADED ONLINE DISCUSSION.
IRB# 0612E97546
As we discussed last Friday, my University of Minnesota faculty dissertation research advisors are concerned that the stringent consent requirements that I planned in my dissertation research proposal (and the above referenced IRB application) would have detrimental impact on the findings. They asked that I discuss with you if any potentially acceptable consent methodology existed that could allow me to use the entire transcript of the online discussions--rather than a stripped-down version that excluded the postings from non-consenting participants. With this in mind, and in consultation with the Chair of the [Name Redacted] IRB, it has been suggested that due to the exempt status of the research, and the low risk to participants, a passive (opt-out) consent would be appropriate for the pre-experimental survey and focus group processes. It was also suggested that the transcript of the online discussions could be used in its entirety, given the measures that are planned for protection of identity, and the fact that this research is

intended to improve normal instructional techniques in a online discussion that would not otherwise be available were it not for the research associated with it.
I have attached documents reflecting this revision:
A revised UofM IRB application,
Appendix A -- Research information form (which replaces the previous consent signatory form),
Appendix B - The verbal presentation script,
Appendix C – The pre-experimental survey and
Appendix J – The student researcher form.
The revised [Name Redacted] IRB document
Please contact me if you have questions or there is any further documentation that will be helpful in accomplishing these changes. Thank you for your help and attention to this matter.
John E. Boatright
Ph.D. Candidate
University of Minnesota,
Department of Curriculum and Instruction
651.690.7819 O
651.698.2297 H
651.398.4155 C

From: "Rachel Blixt" <blix0009@umn.edu>
To: "'UofMN email acct'" <boat0011@umn.edu>
Sent: Friday, December 08, 2006 12:10 PM
Subject: RE: Requesting changes to IRB # 0612E97546
Mr. Boatright:
This is to let you know that your requests have been approved. You may implement these changes, and I will make the necessary changes to your file. Please forward copies of the consent form, survey, and focus group questions once all updates are complete. Let me know if you have any additional questions. Thanks.
Sincerely,
Rachel Blixt
Executive Office and Administrative Specialist, IRB
Research Subjects Protection Programs
University of Minnesota
420 Delaware Street SE MMC 820
Minneapolis, MN 55455
612.625.9186 (direct line and voicemail)
612.626.5654 (RSPP main line)
612.626.6061 (fax)
blix0009@umn.edu
http://www.research.umn.edu/subjects/

From: boat0011@umn.edu

Sent: Friday, December 08, 2006 11:53 AM
To: Rachelle Blixt
Cc: Joan E. Hughes; Simon Hooper
Subject: Requesting changes to IRB # 0612E97546
Dear Ms. Blixt,
I recently received University of Minnesota IRB approval (exempt) for my dissertation research entitled: THE INFLUENCE OF INSTRUCTIONAL TACTIC SELECTION AND MODERATION STYLEON PARTICIPANT INTERACTION AND EXCHANGE IN ASYNCHRONOUS THREADED ONLINE DISCUSSION.
IRB# 0612E97546
I need to use a different participant pool in the research -- and I am requesting that the IRB consider and approve the following changes to the original proposal:
-The new participant pool will consist of approximately 80 undergraduate day students, enrolled in NURS 328 at the [Name Redacted] in the winter semester 2007 (instead of EDUC370 - as previously planned). (Insertions to Q 5.2, 6.1 and 6.3)
-The gender composition of the participant pool will be almost entirely women. (Insertion to Q 6.1)
-The required assignment name is no longer "the Fuzzy Situation Project." The new assignment will be very similar to the previously proposed assignment, in that it will involve student online discussion, collaboration, problem-solving and decisions-making. (Insertions to Q 8.2,10.2)
-I will also need to edit the pre-experimental survey (Appendix C), consent script and form (Appendix A&B), focus group questionnaire (Appendix D) and the [Name Redacted]'s IRB application to reflect these changes.
There are no other changes required.
Thank you for you attention to this matter.
Please contact me if you have questions or there is any further documentation that will be helpful in this change.
John E. Boatright
Ph.D. Candidate
University of Minnesota,
Department of Curriculum and Instruction
651.690.7819 O
651.698.2297 H
651.398.4155 C

APPENDIX R:
Copies of [Name Redacted] IRB Amendment Requests and Approvals

From: [Name Redacted]
To: John E Boatright
cc: [Name Redacted]
Date: Sunday, April 08, 2007 10:08PM
Subject: Re: [Name Redacted]-IRB amendment 06-N-24
John, Thank you for the update on your research project, IRB #06-N-24. Your proposed plan is consistent with the project as originally stated and does not involve any additional risk. This notification gives you approval to proceed as stated below. We will note the changes in your IRB application. Thank you for working cooperatively with the IRB.
[Name Redacted]
-----John E Boatright wrote: -----
To: [Name Redacted]
From: John E Boatright
Date: 04/06/2007 11:15AM
cc: [Name Redacted]
Subject: Re: [Name Redacted]-IRB amendment 06-N-24
Re: 06-N-24 The Influence of Instructional Tactic Selection and Moderation Style on Participant Interaction and Exchange in Asynchronous Threaded Online Discussion
Dear Dr. Schmitt,
Thank you for your help and advice on the problem of low participant numbers for the focus group data gathering component in my dissertation research. After careful consideration with my UofM advisors and [Name Redacted] (the primary advisor to [Name Redacted] NURS328 -- the course in which my online discussions took place), it was been determined that the best approach would be to offer another focus group meeting with an increased participation enticement. The additional 45 minute focus group interview meeting will be scheduled for 12:30 pm on Thursday April 12th in [Name Redacted] -- a time and location that is highly convenient to the participants' attending their NURS328 class immediately following. I propose to offer to enter attendees in a random drawing for a $50 gift certificate at the [Name Redacted] bookstore, as an enticement for attend and participate in the meeting. (The previous focus group meetings had provided lunch.) I believe that this proposed plan offers the possibility of better participation due to the increased convenience of location and time, and the increased enticement for participants. I will be using the same focus group guidelines that were provided and previously approved by the [Name Redacted] IRB. I also will enter the previous focus group meeting attendees in the gift certificate drawing. I am also concurrently requesting that the University of Minnesota IRB consider this amendment. (approved UofMn IRB study # 0612E97546.)
I have attached the revised consent information form. Thank you again for your assistance.
John Boatright, MA, RRT

APPENDIX S:

Interaction Rater Form – Example showing TAT interaction classification decisions and two rater disagreements (in bold).

Thread Code	Partic.#	Reads	Rater 1	Rater 2	Segment
4.4.8.0.0.0.0	4.19	6	3	3	The topic that I thought was most important during this unit was learning about Glomerulo-nephritis.
			3	3	For me, having been able to identify the difference between what nephrotic syndrome and nephritic syndrome was a big help.
			3	3	Also, learning the overall nursing interventions for glomerulonephritis and how they relate to nephrotic or nephritis helped me paint a picture of what to expect as I continue in my future nursing career.
4.4.9.0.0.0.0	4.22	5	3	3	I really enjoyed the setup of the ACHE acronym.
			3	3	We were able to take a topic such as birthcontrol that we wernt very familiar with apply what we knew from this unit ans relate it to past units and prevoiis experiences. This was the most effective learning process for me
4.4.10.0.0.0.0	4.7	5	**3**	**2A**	The removal of renal calculi to aid the treatment of UTI relapse or first time UTI seems difficult!
			2A	2A	Surgery may leave partial stones or fragments behind.
			3	3	I began to consider discussing with patients this possibility.
			3	3	Often, on clinical rotation and through discussion with peers in the 350 experience, I noticed doctors enter and describe to a patient and ask for questions.
			4	4	Fine, dandy--
			3	3	I feel obligated to inquire what the patient knows of the procedures "causation" and the care he or she will have to take on with UTIs at home.
			3	**2A**	Too bad we cannot stick with low doses of oral antibiotics (to contend the possibility of E. coli or other possible rods).
			5B	5B	This PDF file shows some of the tools and procedures involved in open renal surgery of the calculi. http://radiographics.rsnajnls.org/cgi/reprint/5/2/149.pdf

APPENDIX T:
Pre-experimental survey responses (Questions 1-4) by participant pool and AD group

Sample wide (Return rate 47.06)											
Q1	#	%	Q2	#	%	Q3	#	%	Q4	#	%
1	39	97.50%	1	35	87.50%	1	35	87.50%	1	2	5.00%
2	1	2.50%	2	3	7.50%	2	5	12.50%	2	35	87.50%
			3	2	5.00%				3	2	5.00%
			4	0	0.00%				4	1	2.50%
AD1 (Return rate 47.62)											
1	9	90.00%	1	8	80.00%	1	7	70.00%	1	1	10.00%
2	1	10.00%	2	1	10.00%	2	3		2	9	90.00%
			3	1	10.00%				3	0	0.00%
			4	0	0.00%				4	0	0.00%
AD2 (Return rate 47.62)											
1	10	100.00%	1	9	90.00%	1	10	100.00%	1	0	0.00%
2	0	0.00%	2	0	0.00%	2	0	0.00%	2	9	90.00%
			3	1	10.00%				3	0	0.00%
			4	0	0.00%				4	1	10.00%
AD3 (Return rate 38.10)											
1	8	100.00%	1	8	100.00%	1	8	100.00%	1	0	0.00%
2	0	0.00%	2	0	0.00%	2	0	0.00%	2	7	87.50%
			3	0	0.00%				3	1	12.50%
			4	0	0.00%				4	0	0.00%
AD4 (Return rate 57.14)											
1	12	100.00%	1	10	83.33%	1	10	83.33%	1	1	8.33%
2	0	0.00%	2	2	16.67%	2	2	16.67%	2	10	83.33%
			3	0	0.00%				3	1	8.33%
			4	0	0.00%				4	0	0.00%

APPENDIX T (continued):
Pre-experimental survey responses (Questions 5-7) by participant pool and AD group

Sample-wide								
Q5	#	%	Q6	#	%	Q7	#	%
1	2	5.00%	1	14	35.00%	1	0	0.00%
2	31	77.50%	2	25	62.50%	2	21	65.63%
3	6	15.00%	3	1	2.50%	3	8	25.00%
4	1	2.50%	4	0	0.00%	4	3	9.38%
AD1								
1	1	10.00%	1	6	60.00%	1	3	30.00%
2	7	70.00%	2	4	40.00%	2	4	40.00%
3	1	10.00%	3	0	0.00%	3	1	10.00%
4	1	10.00%	4	0	0.00%	4	2	20.00%
AD2								
1	0	0.00%	1	5	50.00%	1	2	20.00%
2	8	80.00%	2	5	50.00%	2	6	60.00%
3	2	20.00%	3	0	0.00%	3	2	20.00%
4	0	0.00%	4	0	0.00%	4	0	0.00%
AD3								
1	0	0.00%	1	0	0.00%	1	3	37.50%
2	7	87.50%	2	7	87.50%	2	3	37.50%
3	1	12.50%	3	1	12.50%	3	2	25.00%
4	0	0.00%	4	0	0.00%	4	0	0.00%
AD4								
1	1	8.33%	1	3	25.00%	1	0	0.00%
2	9	75.00%	2	9	75.00%	2	8	66.67%
3	2	16.67%	3	0	0.00%	3	3	25.00%
4	0	0.00%	4	0	0.00%	4	1	8.33%

Appendix U:
Two-way ANOVA Tables for Instructional Tactics and Moderation Styles. Message Posting by Hierarchical Level

Two-way ANOVA Table U-1
Participant Thread Messages

		Moderation Styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	0.381	0.762	0.571
	CS	0.381	0.500	0.442
	Total	0.381	0.628	0.506

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	0.36	1	0.36	0.74	0.3922
Mod. Styles	1.30	1	1.30	2.69	0.1049
Interaction	0.38	1	0.38	0.79	0.3767
Error	39.21	81	0.48		
Total	41.25	84			

Two-way ANOVA Table U-2
Total Messages

		Moderation Styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	3.191	3.143	3.167
	QA	2.714	4.000	3.372
	Total	2.952	3.581	3.271

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	0.90	1	0.90	0.13	0.7194
Mod. Styles	8.41	1	8.41	1.22	0.2726
Interaction	9.37	1	9.37	1.36	0.2470
Error	556.1	81	6.87		
Total	574.78	84			

Two-way ANOVA Table U-3
Reply1 Messages

		Moderation Style		
	Means	Social	Instr.	Total
Instructional Tactics	CS	2.429	2.381	2.405
	QA	2.047	3.091	2.581
	Total	2.238	2.744	2.494

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	0.66	1	0.66	0.15	0.6996
Mod. Styles	5.44	1	5.44	1.23	0.2707
Interaction	6.28	1	6.28	1.43	0.2353
Error	356.87	81	4.41		
Total	369.25	84			

Two-way ANOVA Table U-4
Reply2 Messages

		Moderation Styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	0.047	0.000	0.024
	QA	0.000	0.364	0.186
	Total	0.024	0.186	0.106

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Styles	0.56	1	0.56	2.51	0.1170
Mod. Styles	0.56	1	0.56	2.51	0.1170
Interaction	0.89	1	0.89	4.00	0.0489 [b]
Error	18.04	81	0.22		
Total	20.05	84			

[a] Significant to p-value<0.01, [b] Significant to p-value<0.05

Two-way ANOVA Table U-5
Reply3 Messages

	Moderation Styles			
	Means	Social	Instr.	Total
Instructional Tactics	CS	0.333	0.000	0.167
	QA	0.286	0.046	0.163
	Total	0.310	0.023	0.165

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	0.00	1	0.00	0.00	1.0000
Mod. Styles	1.74	1	1.74	14.22	0.0003 [a]
Interaction	0.04	1	0.04	0.33	0.5673
Error	9.91	81	0.12		
Total	11.69	84			

[a] Significant to p-value<0.01, [b] Significant to p-value<0.05

Table U-6
Participant Means and Standard Deviations.
Segment Posting, Sample-wide, by AD group and Hierarchical Level.

	n	Total Segments		Threads		Reply1		Reply2		Reply3	
		Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
AD1 (CS-S)	21	27.8	22.72	0.7	1.06	23.5	20.90	2.9	5.92	0.7	3.06
AD2 (CS-I)	21	21.6	20.23	1.5	2.18	20.1	20.47	0.0	0.00	0.0	0.00
AD3 (QA-S)	21	24.4	23.33	3.0	5.99	19.1	17.95	0.0	0.00	2.2	4.30
AD4 (QA-I)	22	32.7	29.22	1.0	1.41	30.3	26.58	1.3	3.47	0.1	0.64
Sample wide	85	26.7	24.10	1.6	3.35	23.3	21.84	1.0	3.57	0.7	2.73

Appendix U (continued).

Two-way ANOVA Tables for Instructional Tactics and Moderation Styles Segment Posting by Hierarchical Level

Two-way ANOVA Table U-7
Participant Thread Segments

		Moderation Styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	0.714	1.476	1.095
	CS	3.048	1.000	2.000
	Total	1.881	1.233	1.553

	ANOVA table				
Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	17.39	1	17.39	1.61	0.2081
Mod. Styles	8.93	1	8.93	0.83	0.3650
Interaction	42.21	1	42.21	3.90	0.0517
Error	876.48	81	10.82		
Total	945.01	84			

Two-way ANOVA Table U-8
Total Segments

		Moderation Styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	27.762	21.571	24.667
	QA	24.381	32.727	28.651
	Total	26.071	27.279	26.682

	ANOVA table				
Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	337.32	1	337.32	0.58	0.4485
Mod. Styles	30.99	1	30.99	0.05	0.8236
Interaction	1119.84	1	1119.84	1.92	0.1697
Error	47318.27	81	584.18		
Total	48806.42	84			

Two-way ANOVA Table U-9
Reply1 Segments

		Moderation Style		
	Means	Social	Instr.	Total
Instructional Tactics	CS	23.476	20.095	21.786
	QA	19.143	30.318	24.861
	Total	21.310	25.326	23.341

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	200.87	1	200.87	0.42	0.5188
Mod. Styles	342.69	1	342.69	0.72	0.3986
Interaction	1119.16	1	1119.16	2.36	0.1284
Error	38396.39	81	474.03		
Total	40059.11	84			

Two-way ANOVA Table U-10
Reply2 Segments

		Moderation Styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	2.905	0.000	1.452
	QA	0.000	1.273	0.651
	Total	1.452	0.651	1.047

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Styles	13.64	1	13.64	1.16	0.2847
Mod. Styles	13.64	1	13.64	1.16	0.2847
Interaction	92.36	1	92.36	7.86	0.0063 [a]
Error	952.17	81	11.76		
Total	1071.81	84			

[a] Significant to p-value<0.01, [b] Significant to p-value<0.05

Two-way ANOVA Table U-11
Reply3 Segments

		Moderation Styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	0.667	0.000	0.333
	QA	2.191	0.136	1.1400
	Total	1.429	0.070	0.741

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	13.81	1	13.81	1.98	0.1632
Mod. Styles	39.23	1	39.23	5.63	0.0200 [b]
Interaction	10.77	1	10.77	1.55	0.2167
Error	564.5	81	6.97		
Total	628.31	84			

[a] Significant to p-value<0.01, [b] Significant to p-value<0.05

Table U-12
Participant Mean Segment Posting and Standard Deviations
Interaction Type—Sample-wide, by AD group at all hierarchical levels

	n	Type 1A		Type 1B		Type 2A		Type 2B	
		Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
AD1 (CS-S)	21	0.3	0.46	0.8	1.40	13.6	13.22	0.6	1.12
AD2 (CS-I)	21	1.1	1.58	0.0	0.00	18.0	19.74	0.5	1.17
AD3 (QA-S)	21	0.8	1.38	0.1	0.30	14.0	13.73	0.2	0.51
AD4 (QA-I)	22	1.2	1.40	0.1	0.47	22.9	22.58	0.2	0.53
Sample wide	85	0 .8	1.31	0.3	0.80	17.2	17.92	0.4	0.89
		Type 3		Type 4		Type 5A		Type 5B	
		Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
AD1 (CS-S)	21	11.5	10.93	0.6	1.12	0.2	0.40	0.2	0.51
AD2 (CS-I)	21	1.6	2.56	0.1	0.36	0.1	0.30	0.1	0.30
AD3 (QA-S)	21	8.1	10.49	1.0	1.36	0.0	0.22	0.2	0.40
AD4 (QA-I)	22	6.6	6.62	1.1	2.07	0.2	0.87	0.4	0.96

Two-way ANOVA Tables for Instructional Tactics and Moderation Styles. Segments by Interaction Type

Two-way ANOVA Table U-13
Vertical Questions (Interaction type 1A)

		Moderation Styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	0.286	1.191	0.738
	QA	0.810	1.182	1.000
	Total	0.548	1.186	0.871

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	1.46	1	1.46	0.87	0.3537
Mod. Styles	8.66	1	8.66	5.16	0.0258 [b]
Interaction	1.43	1	1.43	0.85	0.3593
Error	136.03	81	1.68		
Total	147.58	84			

[a] Significant to p-value<0.01, [b] Significant to p-value<0.05

Two-way ANOVA Table U-14
Horizontal Questions (Interaction type 1B)

		Moderation Style		
	Means	Social	Instr.	Total
Instructional Tactics	CS	0.810	0.000	0.405
	QA	0.095	0.136	0.116
	Total	0.452	0.070	0.259

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	1.77	1	1.77	3.01	0.0802
Mod. Styles	3.11	1	3.11	5.34	0.0212 [b]
Interaction	3.79	1	3.79	6.76	0.0112 [b]
Error	45.64	81	0.56		
Total	54.31	84			

[a] Significant to p-value<0.01, [b] Significant to p-value<0.05

Two-way ANOVA Table U-15
Expository Statements (Interaction type 2A)

		Moderation Styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	13.571	18.000	15.786
	QA	13.952	22.864	18.512
	Total	13.762	20.488	17.165

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Styles	157.88	1	157.88	0.50	0.4815
Mod. Styles	961.33	1	961.33	3.02	0.0860
Interaction	97.79	1	97.79	0.31	0.5792
Error	25760.69	81	318.03		
Total	26977.69	84			

Two-way ANOVA Table U-16
Referential Statements (Interaction type 2B)

		Moderation styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	0.619	0.476	0.548
	QA	0.191	0.227	0.209
	Total	0.405	0.349	0.377

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Styles	2.43	1	2.43	3.11	0.0816
Mod. Styles	0.07	1	0.07	0.09	0.7649
Interaction	0.16	1	0.16	0.20	0.6559
Error	63.29	81	0.78		
Total	65.95	84			

Two-way ANOVA Table U-17
Personal Reflections (Interaction type 3)

		Moderation Styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	11.524	1.571	6.548
	QA	8.143	6.591	7.349
	Total	9.833	4.1400	6.953

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Styles	13.64	1	13.64	0.20	0.6559
Mod. Styles	688.82	1	688.82	9.89	0.0023 [a]
Interaction	377.08	1	377.08	5.41	0.0225 [b]
Error	5644.27	81	69.68		
Total	6723.81	84			

[a] Significant to p-value<0.01, [b] Significant to p-value<0.05

Two-way ANOVA Table U-18
Scaffolding Statements (Interaction type 4)

		Moderation Styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	0.571	0.143	0.357
	QA	0.952	1.091	1.023
	Total	0.762	0.628	0.694

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Styles	9.43	1	9.43	4.94	0.0290 [b]
Mod. Styles	0.38	1	0.38	0.2	0.6559
Interaction	1.76	1	1.76	0.92	0.3403
Error	154.48	81	1.91		
Total	166.05	84			

[a] Significant to p-value<0.01, [b] Significant to p-value<0.05

Two-way ANOVA Table U-19
Paraphrased Attributions (Interaction type 5A)

		Moderation Styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	0.191	0.095	0.1429
	CS	0.048	0.227	0.140
	Total	0.119	0.163	0.141

	ANOVA table				
Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	0.00	1	0.00	0.00	1.0000
Mod. Styles	0.04	1	0.04	0.15	0.6996
Interaction	0.41	1	0.41	1.52	0.2212
Error	21.86	81	0.27		
Total	22.31	84			

Two-way ANOVA Table U-20
Formal Attributions (Interaction type 5B)

		Moderation Styles		
	Means	Social	Instr.	Total
Instructional Styles	CS	0.191	0.095	0.143
	QA	0.191	0.409	0.302
	Total	0.191	0.256	0.224

	ANOVA table				
Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Styles	0.54	1	0.54	1.48	0.2273
Mod. Styles	0.09	1	0.09	0.25	0.6184
Interaction	0.52	1	0.52	1.42	0.2369
Error	29.6	81	0.37		
Total	30.75	84			

Table U-21

Participant Mean Segment Posting and Standard Deviations Combined Interaction Types by AD group and Sample-wide (all hierarchical levels).

	n	Questions		Statements		Scaffolds		Referenced	
		Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
CS-S (AD1)	21	1.1	1.41	25.7	21.62	0.6	1.12	0.4	0.67
CS-I (AD2)	21	1.2	1.60	20.0	20.23	0.1	0.36	0.1	0.48
QA-S (AD3)	21	0.9	1.37	22.3	21.59	1.0	1.36	0.2	0.54
QA-I (AD4)	22	1.3	1.39	29.7	26.83	1.1	2.07	0.6	1.29
Sample-wide	85	1.1	1.43	24.5	22.66	0.7	1.41	0.4	0.83

Two-way ANOVA Tables for Instructional Tactics and Moderation Styles. Segments by Combined Interaction Types

Two-way ANOVA Table U-22
Questions (Interaction types 1A+1B)

	Moderation Styles		
Means	Social	Instr.	Total
Instructional Tactics: CS	1.095	1.191	1.143
Instructional Tactics: QA	0.905	1.318	1.116
Instructional Tactics: Total	1.000	1.256	1.1300

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	0.02	1	0.02	0.01	0.9206
Mod. Styles	1.39	1	1.39	0.66	0.4189
Interaction	0.54	1	0.54	0.26	0.6115
Error	169.63	81	2.09		
Total	171.58	84			

Two-way ANOVA Table U-23
Statements (Interaction types 2A+2B+3)

	Moderation Style		
Means	Social	Instr.	Total
Instructional Tactics: CS	25.714	20.048	22.881
Instructional Tactics: QA	22.286	29.682	26.067
Instructional Tactics: Total	24.000	24.977	24.494

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	216.05	1	216.05	0.42	0.5188
Mod. Styles	20.27	1	20.27	0.04	0.8420
Interaction	904.63	1	904.63	1.75	0.1896
Error	41978.30	81	518.25		
Total	43119.25	84			

Two-way ANOVA Table U-24
Scaffolding Statements (Interaction type 4)

	Moderation Styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	0.571	0.143	0.357
	QA	0.952	1.091	1.023
	Total	0.762	0.628	0.694

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	9.43	1	9.43	4.94	0.0290 [b]
Mod. Styles	0.38	1	0.38	0.20	0.6559
Interaction	1.76	1	1.76	0.92	0.3403
Error	154.48	81	1.91		
Total	166.05	84			

[a] Significant to p-value<0.01, [b] Significant to p-value<0.05

Two-way ANOVA Table U-25
Attributed Statements (Interaction types 5A+5B)

	Moderation Styles		
	Means	Social	Instr.	Total
Instructional Tactics	CS	0.381	0.143	0.262
	CS	0.238	0.636	0.442
	Total	0.310	0.395	0.353

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Instr. Tactics	0.69	1	0.69	1.03	0.3132
Mod. Styles	0.16	1	0.16	0.24	0.6255
Interaction	2.14	1	2.14	3.19	0.0778
Error	54.42	81	0.67		
Total	57.41	84			

Appendix V:
Effect Size (f) Tables for Significant Two-way ANOVA Findings

Data Set	Effect	SS Effect	SS Error	*f*-value	Effect size
Reply2 messages	Combined Influence	0.89	18.04	0.222114	23%
Reply3 messages	Moderation Style	1.74	9.91	0.419023	28%
Reply2 Segments	Combined Influence	92.36	952.17	0.311447	75%
Reply3 Segments	Moderation Style	39.23	564.50	0.263619	50%
Vertical Questions	Moderation Style	8.66	136.03	0.252314	38%
Horizontal Questions	Moderation Style	3.11	45.64	0.261040	36%
Horizontal Questions	Combined Influence	3.79	45.64	0.288169	38%
Personal Reflections	Moderation Style	688.82	5644.27	0.349341	45%
Personal Reflections	Combined Influence	377.08	5644.27	0.258472	61%
Scaffolding Statements	Instructional Tactic	9.43	154.48	0.247070	38%

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