



Relationships between the types and levels of instructors stated expectations for student participation in threaded discussions and actual student participation outcomes
by Kirk Patrick Lacy

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Education in Education
Montana State University
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Abstract:

The purpose of this ex-post facto study was to examine the relationships between the types and levels of an instructor's expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions occurring within the discussions. To address this purpose, a conceptual framework was introduced for analyzing different types and levels of an instructor's stated expectations for student participation in threaded discussions and the density, average level of participation, and degree of persistence of student participation occurring within the discussions.

Guided by this conceptual framework, descriptive quantitative analyses including frequencies, comparison of means, and one-way analysis of variance tests were used to answer the following five research questions considered in this study: ° What relationships exist between the types and levels of an instructor's stated expectations for student participation in threaded discussions and the discussion's overall density of student participation? 0 What relationships exist between the types and levels of an instructor's stated expectations for student participation in threaded discussions and the discussion's density of student participation in each discussion level? 0 What relationships exist between the types and levels of an instructor's stated expectations for student participation in threaded discussions and the overall discussion's average level of participation in learner interactions? 0 What relationships exist between the types and levels of an instructor's stated expectations for student participation in threaded discussions and the average level of participation in learner interactions in each discussion level? ° What relationships exist between the types and levels of an instructor's stated expectations for student participation in threaded discussions and the overall discussion's degree of persistence? In the results of this study, a number of relationships were shown to exist between the types and levels of an instructor's stated expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions within the discussions. The specific findings and respective conclusions are discussed in detail within the study. The study concludes with a discussion of contributions to theory, research and practice and a number of recommendations for further research are presented.

RELATIONSHIPS BETWEEN THE TYPES AND LEVELS OF INSTRUCTORS'
STATED EXPECTATIONS FOR STUDENT PARTICIPATION IN THREADED
DISCUSSIONS AND ACTUAL STUDENT PARTICIPATION OUTCOMES

by

Kirk Patrick Lacy

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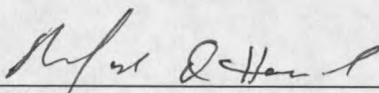
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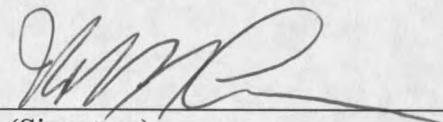
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ABSTRACT

The purpose of this ex-post facto study was to examine the relationships between the types and levels of an instructor's expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions occurring within the discussions. To address this purpose, a conceptual framework was introduced for analyzing different types and levels of an instructor's stated expectations for student participation in threaded discussions and the density, average level of participation, and degree of persistence of student participation occurring within the discussions.

Guided by this conceptual framework, descriptive quantitative analyses including frequencies, comparison of means, and one-way analysis of variance tests were used to answer the following five research questions considered in this study:

- What relationships exist between the types and levels of an instructor's stated expectations for student participation in threaded discussions and the discussion's overall density of student participation?
- What relationships exist between the types and levels of an instructor's stated expectations for student participation in threaded discussions and the discussion's density of student participation in each discussion level?
- What relationships exist between the types and levels of an instructor's stated expectations for student participation in threaded discussions and the overall discussion's average level of participation in learner interactions?
- What relationships exist between the types and levels of an instructor's stated expectations for student participation in threaded discussions and the average level of participation in learner interactions in each discussion level?
- What relationships exist between the types and levels of an instructor's stated expectations for student participation in threaded discussions and the overall discussion's degree of persistence?

In the results of this study, a number of relationships were shown to exist between the types and levels of an instructor's stated expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions within the discussions. The specific findings and respective conclusions are discussed in detail within the study. The study concludes with a discussion of contributions to theory, research and practice and a number of recommendations for further research are presented.

CHAPTER 1

INTRODUCTION TO THE STUDY

Introduction

Within the past decade, the percentage of postsecondary education institutions involved in the development and delivery of asynchronous Internet courses grew substantially with the Internet surpassing two-way interactive video and one-way prerecorded video as the distance education technology most used by higher education institutions in the United States (Mehotra, 2001; Lewis et al., 1999). Moreover, the National Center for Education Statistics reported that the growth in online education was likely to continue, stating that 82% of postsecondary institutions were planning to start or increase their use of asynchronous Internet instruction as a primary mode of delivery more than any other type of distance education technology (Lewis et al., 1999, p.52).

In the midst of this significant growth, Navarro and Shoemaker (2000, p.16) reported that “the strongest critics of the online revolution warn of the emergence of ‘digital diploma mills’ that lack crucial personal interactions, not only between students and professors, but also among students.” In response to these criticisms, Berge (1999) argued that the Internet allows for significantly faster interaction between students and faculty and among students compared with previous correspondence or mass communication models of distance education. Furthermore, recent research demonstrates

that in online education, “there are strategies that can be employed to ensure that interaction is maintained and learning is achieved” (Purcell-Robertson & Purcell, 2000, p. 17), and that increased academic achievement and greater retention rates are just a few of several positive outcomes that can be gained using interactive online learning technologies (Flottemesch, 2000).

At the center of this debate is a widely accepted premise that learning in distance education depends upon the student’s active participation in interactions with course content, the instructor, and with other learners (i.e. Becker, 2000; Berge, 1999; Flottemesch, 2000; McHenry & Bozik, 1995; Moore, 1989). Additionally, Funaro and Montell (1999, p. 1) state that, “as with other new educational technologies, it is not so much the tool that improves teaching and learning, but how the instructor integrates the tool into the curriculum and into the educational setting” that is most critical. Therefore, instead of debating whether or not online education “can” or “cannot” facilitate quality interaction, Berge (1999, p. 5) argues that the critical question should be “How can the technology be used to promote the types of interaction that facilitate learning at a distance?”

Applying this question to a specific context, literature reports that threaded discussions have become the primary tool that instructors use for facilitating interaction in online courses (Berge & Collins, 1993; Harasim, 1990; Muilenburg & Berge, 2000). Threaded discussions are a particular form of computer mediated communication using computer conferencing technologies that allow learners to communicate asynchronously, or not in real time, through messages that are stored in a central computer database

awaiting access by individual participants who may submit, review, and reply to messages at a time and pace most convenient to them (Berge, 1999; Harasim, 1990; Liaw & Huang, 2000). Because this mode of communication is so prevalent in current distance education practice, a critical question for educational researchers and practitioners becomes, "how can threaded discussion technologies be used to promote the types of interaction that facilitate learning at a distance?"

To adequately address this question, it is important to recognize that the methods for organizing and facilitating asynchronous online discussions are significantly different from those most appropriate for managing traditional face-to-face discussions (Mason, 1991). Because online instructors confront a number of special challenges that are not usually present in more traditional settings (Rohfeld & Hiemstra, 1995), online educators need to understand how to design and maintain an online discussion (Muilenburg & Berge, 2000) to promote student participation and to maintain student involvement (Rohfeld & Hiemstra, 1995) so that student interaction with course content, the instructor, and with other learners is maximized (Moore, 1989).

As stated in Ko and Rossen (2001, p. 222), "One of the most effective ways to promote student participation in an online class is to make it required and graded." Similarly, a review of the literature revealed that the primary recommendation given to instructors to promote student involvement in threaded discussions is to make student participation expectations clear and to require students to participate in the discussions (Berg, 1995; Eastmond & Ziegahn, 1995; Ko & Rossen, 2001; Moore, 2002; Palloff &

Pratt, 1999; Palloff & Pratt, 2001; Paulsen, 1995; Rohfeld & Hiemstra, 1995; Schrum & Hong, 2002).

This recommendation is based on research demonstrating that student participation in threaded discussions is greater when participation is required by the instructor (Bures, Abrami, & Amundson, 2000; Harasim, Hiltz, Teles, & Turoff, 1995; Vrasidas, 2002). Based on this research, Moore (2002, p. 63) concluded that within threaded discussions:

Participation in dialog is likely to be, to a considerable extent, related to course design. If course expectations with respect to discussion participation are specific, and participation is graded, then students are likely to participate at a high level. Course design, too, can directly affect nonparticipation. If explicit, detailed directions are not provided on what is expected and how to participate, participation is more likely to be low.

Statement of the Problem

The problem is that the research supporting this conclusion is limited in at least three important ways. First, the research identifies student participation as a single outcome and does not distinguish between participation in the form of interaction with course content, with the course instructor, and with other learners. Consequently, practitioners have no way of knowing how requiring student participation may be associated with each of the three specific types of learner interaction which have been deemed critical to student learning (Moore, 1989).

Second, prior research has not considered what, if any, differences may exist in student participation outcomes when an instructor requires different types and/or levels of

student participation. In other words, previous research has focused on an instructor's required participation as a constant variable. However, given that an instructor may require different types and levels of student participation, there is a need for additional research to examine how differences in an instructor's participation requirements may be associated with different student participation outcomes.

Finally, a third limitation is that prior research has investigated student participation within threaded discussion environments only from a holistic perspective, by examining the relationship between an instructor's required participation and the cumulative total of message contributions posted within a discussion. As stated in Fahy, Crawford, and Ally (2001, p.2), "significant gaps persist in our understanding of online interaction", and "for researchers, these gaps indicate a lack of a theoretically adequate account of how learners interact in online situations, and for practitioners, the gaps indicate the need for a model for managing online communications effectively." Given that message postings within a threaded discussion represent distinct interactions between students and course content, the instructor, and other learners; and that these interactions can occur at different stages or levels of a discussion's progression from start to finish; there is a need for research to examine more fully how an instructor's participation requirements are associated with student participation in learner interactions for an overall discussion, as well as within and across levels of a threaded discussion.

Purpose of the Study

To address these limitations in the literature, the purpose of this ex-post facto study was to examine the relationships between the types and levels of instructors' expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions occurring within the discussions.

Conceptual Framework

Given the exploratory nature of this study, the following section is intended to provide a conceptual framework for understanding the primary constructs under examination. The conceptual framework is divided into the following two sections, including: 1) an explanation of types and levels of an instructor's expectations for student participation in threaded discussions; and 2) an explanation of density and intensity of student participation in learner interactions occurring within threaded discussions.

Types and Levels of Instructor Expectations for Student Participation

As discussed previously, prior research has demonstrated that student participation in threaded discussions tends to increase when an instructor requires students to participate in the discussions (Bures, Abrami, & Amundson, 2000; Harasim, Hiltz, Teles, & Turoff, 1995; Vrasidas, 2002). However, one limitation of this research is that it has examined instructor's participation requirements as a single constant variable despite the fact that an instructor's requirements may entail different types and/or levels of required participation.

Types of Participation Requirements. For example, two different “types” of participation requirements may include “requirements for message contributions” and “requirements for interactions with other discussion participants.” In regard to requirements for message contributions, it is conceivable that an instructor’s requirements may be classified into one of the following three categories:

1. Student message contributions are not explicitly encouraged or required,
2. Student message contributions are encouraged but not required;
3. Students are required to contribute messages to the threaded discussion area.

In contrast to expectations calling for students to contribute messages to a discussion, an instructor’s requirements may specifically call for students to interact with other discussion participants. Requirements of this type may be classified into one of the following three categories:

1. Interactions with other participants are not explicitly encouraged or required;
2. Students are encouraged, but not required to interact with other participants;
3. Students are required to interact with other discussion participants.

Levels of Participation Requirements. Within each of these two types of instructor’s participation requirements, instructor’s expectations may also specify different levels of student participation. For example, in regard to requirements for student message contributions, required levels of message contributions could be classified as:

1. No minimum number of message contributions are explicitly required;
2. A minimum of one message contribution is required;

3. A minimum of two message contributions are required;
4. A minimum of three messages contributions are required;
5. etc.

Similarly, in regard to the second type of instructor requirements in which students are specifically expected to interact with other discussion participants, requirement levels could be classified as:

1. No minimum number of interactions are explicitly required;
2. Students are expected to interact with a minimum of one person;
3. Students are expected to interact with a minimum of two people;
4. Students are expected to interact with a minimum of three people,
5. etc.

Using the above classifications for types and levels of an instructor's participation requirements, any threaded discussion could be classified and then analyzed for actual student participation in learner interactions that occur within and across levels of the discussion. The results of such an analysis could provide researchers and practitioners with a more in-depth understanding of relationships that may exist between instructor requirements and actual student participation outcomes as compared with what previous research has provided.

Density and Intensity of Student Participation in Learner Interactions

With regard to measuring student participation outcomes in threaded discussion environments, literature identifies participation density and intensity as two related, but

distinct, participation outcomes that can be assessed (Fahy, Crawford, & Ally, 2001; Ridley & Avery, 1979). The first outcome, participation density, refers to the ratio of actual participants engaged in a discussion out of the total possible participants. For example, in a class consisting of 20 students, a discussion with 18 student participants has greater participation density than a discussion in the same class that involves only eight actual participants. An overall assessment of a discussion's participation density is an important measure of a discussion's participation outcomes as it reflects the degree to which possible participants in a discussion actually became involved in the discussion.

In addition to assessing participation density for an overall discussion, it is also possible to assess the density of discussion participation within each level of a threaded discussion. As Fahy, Crawford, and Ally (2001, p. 9) point out, threaded discussion levels are clearly illustrated in a discussion's transcript as each discussion level pursued is indented underneath the previous discussion level, as illustrated below:

Level 1 – Initial Message Posting

Level 2 - Response to a Level 1 Message

Level 3 - Response to a Level 2 Message

Level 4 - Response to a Level 3 Message

Level 5 - Response to a Level 4 Message

etc.

By analyzing both the overall discussion's participation density as well as the density of participation within each discussion level, valuable insight can be gained that cannot be gained by assessing a discussion's overall participation density alone. For

example, consider two discussions, each consisting of 18 participants out of 20 possible participants. Both discussions would reflect an equally high percentage of overall participation density. However, if further analyzed for density at each discussion level, one discussion may reflect that each of its 18 participants contributed a message at Level 1, but only two students responded at Level 2 and no student participation was exhibited at Level 3. Contrasting this with a second discussion with all 18 students posting a message at Level 1, 15 participants posting messages at Level 2, ten students posting messages at Level 3, and four students posting messages at Level 4, the density of student participation within each discussion level would be quite different from the first example. Accordingly, assessing a discussion's overall participation density and the participation density at each discussion level would not only illustrate the degree of actual versus possible participation for an overall discussion, but would also illustrate the degree to which actual participants sustained their involvement throughout the course of a discussion.

In addition to density, a second outcome referred to as participation intensity, includes two measures, including the average level of participation and the degree of persistence exhibited by participants within a discussion (Fahy, Crawford, & Ally, 2001). The first measure, average level of participation, refers to the extent of each individual student's involvement within a discussion, as measured by the average number of messages contributed by each participant. For example, a discussion in which each participant contributes an average of four messages has a greater average level of participation, and therefore greater participation intensity, than a discussion where each

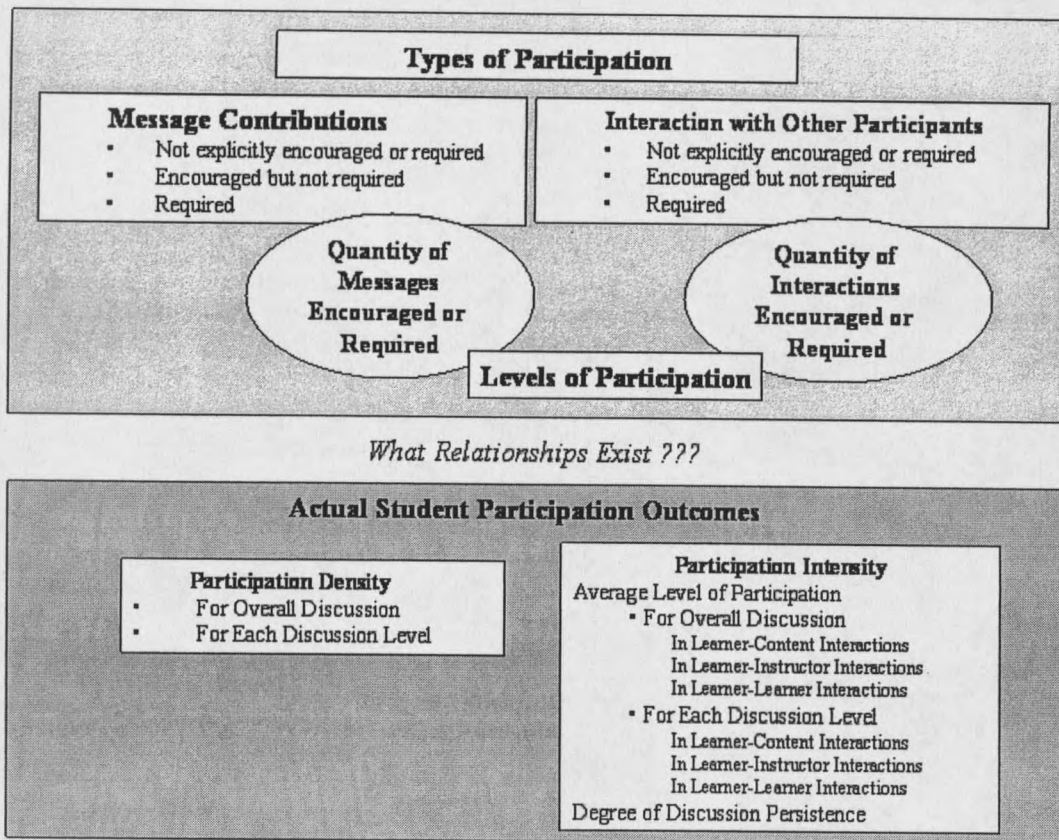
student contributes only two messages on average. Similar to the previous discussion of participation density, average level of participation can be assessed for both the overall discussion as well as for each discussion level. Accordingly, an assessment of participation intensity within a particular discussion may illustrate that students posted four messages on average for the overall discussion, with an average of one message posted at Level 1, two messages posted at Level 2, and one message posted at Level 3. Such an assessment would offer more insight into the participation outcomes of a threaded discussion than merely measuring a discussion's overall average level of participation alone.

Additionally, average levels of student participation may be further distinguished according to the three types of interaction that may occur within threaded discussion environments by classifying each discussion posting as an interaction with course content, with the course instructor, or with other students (Moore, 1989). In this regard, an analysis of a discussion may reveal, for example, that students posted an average of six messages to an overall discussion, with two of those messages representing learner-content interaction, three messages representing learner-learner interaction, and one message representing learner-instructor interaction. In this type of analysis, valuable insight can be gained with respect to assessing the intensity of a discussion's student participation in each type of learner interaction as they occur within and across levels of threaded discussion environments, as well as for an overall discussion.

In addition to analyzing the average level of student participation, another measure of participation intensity is the degree of persistence exhibited by participants in a discussion. Degree of persistence refers to the number of discussion levels that are pursued within a particular threaded discussion (Fahy, Crawford, & Ally, 2001). In this regard, threaded discussions in which participants pursue higher levels of discussion exhibit a greater degree of persistence, and thereby greater discussion intensity, than discussions in which participant's persistence ends at lower levels of the discussion (Fahy, Crawford, & Ally, 2001). Additionally, participation persistence inherently requires students to respond to other participant message contributions. For example, in order for a discussion to persist from Level 2 to Level 3, students must respond to a Level 2 message posting which had been posted by another participant. Accordingly, promoting participant persistence inevitable involves promoting student interaction with other discussion participants. Given this, valuable insight can be gained in assessing discussion persistence and in examining factors that may be correlated with this measure of participation intensity.

In summary, by combining all of the variables discussed previously for different types and levels of instructor participation expectations as well as density and intensity of student participation in learner interactions that may occur in threaded discussion environments, the conceptual framework for this study can be illustrated as follows:

Figure 1: Conceptual Framework for Types and Levels of Instructor Expectations for Student Participation and Participation Density and Intensity



Research Question

The question addressed in this study was: "What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions occurring within the discussions?"

In answering this primary research question above, the following secondary research questions were also answered:

1. What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the discussion's overall density of student participation?
2. What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the discussion's density of student participation in each level of the discussion?
3. What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the overall discussion's average level of participation in learner interactions?
4. What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the average level of participation in learner interactions in each discussion level?
5. What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the overall discussion's degree of persistence?

Context of the Study

The context for this study involved an ex-post facto analysis of archived transcripts of a random sample of 265 threaded discussions which were facilitated within 82 fully online undergraduate courses offered during the 2001-2002 academic year by a public postsecondary institution in the northwestern region of the United States.

To support the delivery of its fully online courses, the institution contracts with an external private corporation that hosts a proprietary online course development and delivery platform. This platform includes a variety of online education tools that enable an instructor to develop and deliver fully online courses, including a specific computer conferencing technology that can be used to create and manage individual asynchronous online discussions, referred to as "Threaded Discussions," within the framework of a password protected online course. The Threaded Discussion tool in this particular system is available for faculty to use at any time and with any frequency. However, only the instructor can create a Threaded Discussion area in the course system. In order for a Threaded Discussion to exist for student participation, the instructor must intentionally create the Threaded Discussion area, using the platform's course development tools, and purposefully place the discussion area within an instructional unit within the course. As part of normal course archiving procedures, transcripts recording all message contributions posted within these Threaded Discussion areas are permanently archived and stored in original form within the online course delivery system. These archived transcripts permitted the ex-post facto analysis of instructor expectations for student participation and actual student participation outcomes within the Threaded Discussions.

Specifically, during the 2001-2002 academic year, the institution delivered 92 fully online undergraduate course sections, with 82 of these including at least one Threaded Discussion area within the framework of their course design. Within these 82 undergraduate courses, a total of 637 Threaded Discussions were created and facilitated

during the 2001-2002 academic year. From this population of 637 discussions, a sample of 265 threaded discussions were randomly selected for analysis in this study.

Significance of the Study

Given that student participation in computer conferencing environments is fundamentally different from participation in traditional face-to-face learning environments (Berge & Collins, 1993; Berge & Muilenburg, 2000; Harasim, 1990), and given the increasing reliance on threaded discussions to facilitate critical learner interactions in online courses, there is a significant need for empirical research to investigate this largely unexplored area of online education (Fahy, Crawford, & Ally, 2001).

As Poole (2000, p. 162) points out, "the body of knowledge about how students engage in learning in online courses is rather modest at this time" and "the proliferation of online courses requires an understanding of the unique learning environment that computer-mediated communication facilitates" as awareness of student participation patterns can help online course designers and instructors capitalize on the strengths of the medium (Poole, 2000, p. 170). As discussed previously, with specific reference to how students participate in threaded discussions, Fahy, Crawford, and Ally (2001, p. 2) assert that despite a substantial research base in transcript analysis, significant gaps persist in our understanding of online interaction. The authors further argue that for researchers, these gaps indicate a lack of a theoretically adequate account of how learners interact in

online situations, and for practitioners, the gaps indicate the need for a model for managing online communications effectively (Fahy, Crawford, & Ally, 2001).

Accordingly, this study offers a number of important contributions to the current body of research in online education. First of all, through an assessment of student participation in learner interactions within threaded discussions, the study provides both researchers and practitioners a better understanding of the nature of student participation in critical learner interactions as they occur within threaded discussion environments. Additionally, the assessment of participation outcomes provides instructors and researchers new methods for analyzing important student participation outcomes, and potential relationships between those outcomes, where such a model did not previously exist in the literature. Moreover, in examining what, if any, relationships exist between instructors' stated expectations for student participation in threaded discussions and actual outcomes of student participation in learner interactions within those discussions, this study provides practitioners with research based guidelines for setting participation expectations toward fulfillment of particular instructional objectives for promoting critical learner interactions within threaded discussion environments.

More specifically, this study contributes to our understanding of how student participation density and intensity outcomes may be associated with different types and levels of instructors' stated expectations for student participation. For example, with regard to different types of instructor expectations for student participation, the study has assessed the extent to which the density and intensity outcomes of student participation in learner interactions are different in discussions where instructors explicitly require

students to contribute messages to a discussion as compared with when student message contributions were encouraged but not required, or in discussions where there were no explicitly stated expectations for student message contributions. Additionally, the study examined what differences existed in the intensity and density of student participation in learner interactions in discussions where instructor's expectations explicitly required students to interact with other discussion participants as compared with discussions where such interactions were encouraged but not required, and in discussions where there were no explicitly stated expectations for student interaction with other discussion participants.

With regard to different levels of instructors' participation expectations, the study examined what differences existed in the density and intensity of student participation in learner interactions in discussions where instructors' expectations called for students to contribute one message to a discussion area compared with discussions where expectations called for students to contribute two, three, or more messages or when there was not a specific number of message contributions explicitly called for. Additionally, the study investigated what differences existed in the density and intensity of student participation in learner interactions in discussions where instructors' expectations called for students to interact with one other discussion participant compared with discussions where expectations called for students to interact with two, three, or more discussion participants or when there was not a specific number of interactions with other participants explicitly called for.

In sum, as illustrated above, instructors' expectations for student participation in threaded discussions may involve different types and levels of student participation. In

order to organize and facilitate threaded discussions to maximize both the density and intensity of student participation in learner interactions, instructors must understand the potential relationship that may exist between different participation expectations and actual student participation density and intensity outcomes. Accordingly, there is a critical need for research to investigate potential relationships between the types and levels of instructors' stated expectations for student participation in threaded discussions and the actual density and intensity of student participation in learner interactions within the discussions. Therefore, this study offers an important contribution to the field by addressing this critical void in the literature.

Definition of Terms

The following definitions were used to operationalize the primary constructs within the research question guiding this study:

Threaded Discussion: In general, a threaded discussion is a type of online discussion facilitated by computer conferencing technologies which allow individuals to communicate asynchronously, or not in real time. In this study, the "Threaded Discussion" served as the primary unit of analysis and referred to an asynchronous online discussion, employing a specific proprietary computer conferencing technology, and facilitated within a fully online course offered by a public postsecondary institution in the northwestern region of the United States during the 2001-2002 year.

In order to ensure consistency in the comparison of student participation outcomes, only threaded discussions intended for whole-class discussion were considered

for analysis in this study. Accordingly, any threaded discussions that were intended for small group or dyadic discussion, and any discussions devoted to online "office hours" or to serving as "helpdesk" forums, were excluded from the present study.

Learner Interactions: Learner Interactions in this study were classified according to Moore's (1989) typology of three types of interaction in distance education, which includes: learner-content interaction, learner-instructor interaction, and learner-learner interaction. Specifically, learner-content interaction refers to interaction between the learner and the content or subject of study (Moore, 1989). Learner-instructor interaction refers to interaction between the learner and the expert who prepared the subject material, or some other expert acting as instructor (Moore, 1989). Learner-learner interaction refers to interaction between one learner and other learners, alone or in group settings, with or without the real-time presence of an instructor (Moore, 1989).

In this study, an interaction took the form of a message contribution to the threaded discussion area in the form of a respective type of interaction. Each message contribution was classified as only one type of interaction according to the following guidelines:

1. The initial question or discussion prompt for a threaded discussion was considered part of the course content. Accordingly, a learner-content interaction was considered to have occurred when a participant contributed a message in response to the initial question posted in the discussion area;
2. A learner-instructor interaction was considered to have occurred when a student contributed a message in response to a message posted by the instructor or when

an instructor contributed a message in response to a student's message contribution; and

3. A learner-learner interaction was considered to have occurred when a student contributed a message in response to another student's message contribution in the discussion.

Types & Levels of Instructor Stated Expectations for Student Participation: In this study, the types and levels of instructors' expectations for student participation in threaded discussions were classified as described previously in the conceptual framework section of this chapter. Additionally, only instructors' explicitly stated expectations for types and levels of student participation within threaded discussions, as stated directly in the discussion transcript or as stated in the course syllabus, which was electronically stored in each respective online course, were considered for analysis in this study.

Participation Density: Participation density refers to the ratio of actual number of participants interacting within a discussion out of the total number of possible participants. The following formula for calculating density was used by Fahy, Crawford, & Ally (2001, p. 7): $Density (D) = 2a / N (N-1)$, where "a" equals the actual number of participants engaging in the discussion and "N" equals the total number of possible discussion participants. However, Fahy, Crawford, and Ally (2001, p. 8) also pointed out that density is highly associated with the size of the participant group. For example, in two classes with a total of 30 students and 15 students respectively, if 24 of 30 students in the first class and 12 of the 15 students in the second class actually participate in the discussions, both classes would have 80% of the possible participants engaging in the

discussion. However, in using the above formula for density provided by Fahy, Crawford, and Ally (2001, p.7), the first discussion involving 24 of 30 participants would exhibit a density of 46.4 while the second discussion involving 12 of 15 participants would exhibit a density of 22.4. These differences led Fahy, Crawford and Ally (2001, p. 8) to conclude that comparisons of density values should not be made between groups of different sizes.

However, a minor adaptation of the formula referenced above would allow for comparison of density values between groups of different sizes. Specifically, each discussion can be assessed for two density values, including: "actual" density, representing the ratio of the actual number of participants interacting within a discussion out of the total number of possible participants, and a "potential" density value, representing the maximum possible density value that could be achieved if 100% of possible participants actually became engaged in that respective discussion.

Using the previous example, the discussion with 24 of 30 actual participants would exhibit an "actual" density of 46.4 out of a "potential" density value of 58.0, which could have been achieved if all 30 participants had engaged in the discussion. Similarly, the second discussion with 12 of 15 participants would exhibit an "actual" density of 22.4 out of a "potential" density value of 28.0. By dividing a discussion's "actual density" by that respective discussion's "potential" density, a "percentage of possible discussion density" value is acquired. Extending on the previous example, the first discussion with an actual density of 46.4 out of a possible density of 58.0 would result in a percentage of possible discussion density of 80%. Similarly, the discussion with an actual density of

22.4 out of a potential density of 28.0 would also result in a percentage of possible discussion density of 80%. Accordingly, by calculating each discussion's "percentage of possible discussion density," comparisons of density values between discussions of different group sizes can be made.

Accordingly, in this study, "density" was defined as the percentage of possible discussion density exhibited in discussions, as measured by dividing a discussion's actual density by the respective discussion's maximum possible density. The formula for density, presented in Fahy, Crawford, and Ally (2001) was used for measuring both actual density and potential density for each discussion examined in this study.

Participation Intensity: In this study, participation intensity was defined as the average level of participation and the degree of persistence exhibited by participants within a discussion (Fahy, Crawford, and Ally, 2001). The average level of participation was defined as the extent of each student's involvement within a discussion, as measured by the average number of messages contributed by each participant. In this study, the average level of participation was classified according to the intensity of participation exhibited in the overall discussion as well as within each distinct discussion level.

Additionally, the average level of participation was classified into three subcategories representing the three different types of interaction identified by Moore (1989) which includes learner-content interaction, learner-instructor interaction, and learner-learner interaction. Accordingly, the classification framework for the average level of participation in a threaded discussion for the current study included the following categories and sub-categories:

1. Average Level of Participation In Learner Interactions in the Discussion
 - a) Average Level of Participation in Learner-Content Interactions
 - b) Average Level of Participation in Learner-Instructor Interactions
 - c) Average Level of Participation in Learner-Learner Interactions
2. Average Level of Participation in Learner Interactions in Each Discussion Level
 - a) Average Level of Participation in Learner-Content Interactions
 - b) Average Level of Participation in Learner-Instructor Interactions
 - c) Average Level Participation in Learner-Learner Interactions

In addition to the average level of participation, participation intensity was also assessed according to each discussion's degree of persistence as measured by the number of discussion levels pursued by participants within a discussion.

Limitations and Delimitations of the Study

This study involved an exploratory ex-post facto analysis of instructors' stated expectations for student participation in threaded discussions and the actual density and intensity of student participation in learner interactions within the discussions.

Accordingly, the following limitations and delimitations were inherent in this study:

1. In assessing potential relationships between instructors' stated expectations for student participation and actual student participation outcomes, any relationships that were identified cannot be interpreted as cause-effect relationships. As an ex-post facto analysis of archived discussion transcripts, the study did not allow for a controlled manipulation of variables that would be required to infer causality.

2. A delimitation of the current study is that the analysis was limited to instructors' explicitly stated expectations for student participation as stated within the respective threaded discussion transcript or respective course syllabus. Any explicit or implicit statement of instructors' expectations made elsewhere within an online course or in other correspondence between an instructor and students was not included in the analysis of this study.
3. Similarly, the study did not distinguish between any differences that may have existed between what the instructor's actual expectations for student participation in threaded discussions may have been and the instructor's explicitly stated expectations for student participation that appeared within a threaded discussion transcript or course syllabus.
4. A delimitation was that this study focused on an examination of only whole-class threaded discussions. Consequently, discussions devoted to small group or dyadic dialogue or intended for instructor "office hours" or helpdesk forums were not considered for analysis in this study.
5. Another delimitation in this study was that the analysis of actual student participation density and intensity outcomes within threaded discussions was based on an assessment of the quantity of student message contributions and learner interactions that appeared within a discussion's transcript. As such, this analysis did not consider or interpret the quality of message contributions or interactions that occurred. Therefore, any relationships identified in this study did

not allow for assumptions or inferences with regard to the quality of student participation in learner interactions within the discussions.

6. An additional delimitation of this study was that it focused on student participation in learner interactions as evidenced by student's individual message contributions within a threaded discussion. Because the study only acknowledged message contributions as behavioral evidence of student participation in interactions within a discussion transcript, it did not account for the quantity or quality of effort that a student may have invested in the discussion area apart from the archived message contributions.
7. Similarly, this study was limited to an analysis of participant message contributions which were archived within a particular Threaded Discussion area itself. The computer conferencing technology used to facilitate threaded discussions in this study allowed participants to respond to a message posting privately by sending a response to the recipients e-mail rather than posting a message response to the public threaded discussion area. Because any private messages were not archived in the threaded discussion area, any student participation in learner interactions that may have taken place privately were not included in the analysis for this study.
8. Finally, although the computer conferencing technology used to facilitate threaded discussions in this study allowed instructors to create several distinct Threaded Discussion areas within a single instructional unit within an online course, the population of this study included only the first Threaded Discussion area within a

particular instructional unit. Accordingly, additional Threaded Discussion areas contained within a single instructional unit were not included in this study.

Chapter Summary

In order to organize and facilitate threaded discussions to maximize both the density and intensity of student participation in learner interactions, instructors must understand the potential impact that different types and levels of instructors' participation expectations may have on actual student participation outcomes. However, the problem is that there has been no research investigating potential relationships between instructors' stated expectations for student participation in threaded discussions and the actual density and intensity of student participation in learner interactions within the discussions.

Accordingly, the purpose of this exploratory study was to examine what, if any, relationships existed between the types and levels of instructors' stated expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions within the discussions. Through an ex-post facto analysis of a random sample of 265 threaded discussions taken from a population of 637 discussions facilitated within 82 fully online undergraduate courses offered during the 2001-2002 academic year by a public postsecondary institution in the northwestern region of the United States, the following research question guided this study:

What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions within the discussions?

In this chapter, a number of secondary research questions were identified and the significance and context of the current study has been discussed. Additionally, the primary constructs contained within the research questions guiding this study have been operationally defined and important limitations of the study have been acknowledged. In the remaining chapters of this study, a review of literature relevant to the present study is presented in Chapter 2, a detailed explanation of the research methodology used to conduct the study is provided in Chapter 3, the results of the study are presented in Chapter 4, followed by Chapter 5 which presents conclusions drawn from the results of this study and recommendations for further research.

CHAPTER 2

REVIEW OF RELATED LITERATURE

Introduction

The purpose of this ex-post facto study was to examine what relationships existed between the types and levels of instructors' stated expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions within the discussions. Although a review of the literature revealed no prior research that has specifically addressed this study's purpose, related literature offers important theoretical foundations and research implications for this exploratory study.

Therefore, this chapter includes a review of relevant literature and is organized as follows: first, an overview of the substantial base of literature emphasizing the importance of student academic involvement and instructor's high expectations for student learning in traditional undergraduate education contexts provides an important theoretical foundation for the current study. Second, building upon this theoretical foundation, a review of the literature demonstrating the important role of student interactions for learning in distance education contexts provides an important rationale and framework for understanding and analyzing student involvement in learner interactions in online courses. Third, an overview of the literature focused on the nature of computer conferencing technologies used to facilitate asynchronous online discussions

provides an important understanding of the educational context of this study. Fourth, a review of the literature discussing the important roles and responsibilities of the instructor for organizing and managing asynchronous online discussions offers valuable insight into the pedagogical challenges confronted by educators in this context. Finally, an overview of the literature recommending that instructor's require student participation as a means of promoting student involvement in threaded discussions is provided, including a discussion of important limitations or gaps in this literature that provide the primary rationale and direction for the present study.

Student Involvement, High Expectations and Learning

In a landmark report entitled "Involvement in Learning: Realizing the Potential of American Higher Education," the Study Group on the Conditions of Excellence in American Higher Education (1984) concluded that institutions of higher education can most effectively improve undergraduate education by focusing educational resources and efforts on the conditions which best foster and promote student learning and development. Specifically, the Study Group cited student involvement and high expectations as two of the three critical conditions of excellence for promoting learning and student development in undergraduate education (1984, p.17). What follows is an overview of some of the most relevant literature focused on each of these themes and a discussion of their implications as theoretical foundations for the current study.

Student Involvement and Learning

With regard to student involvement, several recent models of learning and student development have suggested the importance of student involvement or engagement as a key determinant of the outcomes of education (Pascarella & Terenzini, 1991).

Referencing years of empirical research and literally hundreds of studies of undergraduate students, Astin (1984) proposed a "theory of student involvement" predicated on the premise that the more time and effort students invest in the learning process and the more intensely they engage in their own education, the more they learn. Stated simply, Astin (1984) declared that "student involvement refers to the amount of physical and psychological energy that the student devotes to the academic experience" (p.297) and summarized his theory by concluding "students learn by becoming involved" (1985, p.133). More specifically, Astin's (1984, p. 298) theory of student involvement presented the following five basic postulates:

1. Involvement refers to the investment of physical and psychological energy in various objects. The objects may be highly generalized (the student experience) or highly specific (preparing for a chemistry examination).
2. Regardless of the object, involvement occurs along a continuum; that is, different students manifest different degrees of involvement in a given object, and the same student manifests different degrees of involvement in different objects at different times.
3. Involvement has both quantitative and qualitative features. The extent of a student's involvement in academic work, for instance, can be measured

quantitatively (how many hours a student spends studying) and qualitatively (whether the student reviews and comprehends reading assignments or simply stares at the textbook and daydreams).

4. The amount of student learning and personal development associated with any educational program is directly proportional to the quality and quantity of student involvement in that program.
5. The effectiveness of any educational policy or practice is directly related to the capacity of that policy or practice to increase student involvement.

Astin argued that the last two postulates are the most critical for educators to consider as they provide clues for designing more effective educational programs for students (1984).

Providing further direction, Astin clarified that student involvement includes a behavioral component, stating that "it is not so much what the individual thinks or feels, but what the individual does, how he or she behaves, that defines and identifies involvement" (1984, p.298). Given this, Astin contends that for a particular educational practice to promote student learning, the student must not be placed in a passive role, but instead, the theory of student involvement emphasizes active participation of the student in the learning process (1984, p. 301). Finally, Astin challenged educators to use the theory by focusing more of their effort on finding ways to promote student involvement as the intended outcome of their pedagogical efforts (1984, p. 305).

Although almost 20 years has passed since Astin's theory of student involvement was introduced and after the Study Group (1984) released its final report, research

continues to support the premise that student learning requires student involvement in the academic experience (Astin, 1999). As a result of the extensive research to support the premise, educational literature consistently cites student involvement as a vital condition for learning. For example, Garrison (1990, p. 50) asserts that "the effectiveness of educational transactions requires the active involvement of the learner" and Becker (2000, p. 5) states that "students' attention, effort, and engagement in academic tasks is a critical intervening variable in determining whether learning outcomes are achieved."

As Astin points out, the recommendations that were originally set forth are just as relevant today as they were when they were first proposed by the Study Group in 1984 with much of the research that has been done since the report, not only reinforcing the original recommendations, but also allowing elaboration in more specific ways (1999). For example, citing research conducted by the Higher Education Research Institute, involving a longitudinal study of large national samples of undergraduate students over a 20-year period, Astin reports that "results strongly support the importance of student involvement as a powerful means of enhancing almost all aspects of the undergraduate student's cognitive and affective development" (1999, p. 590). More specifically, he extends upon his earlier research in specifying that the three most potent forms of student involvement turn out to be academic involvement, involvement with faculty, and involvement with student peers.

Accordingly, based on the extensive empirical support discussed previously, student involvement continues to be cited as a condition of excellence in undergraduate education and promoting students' active involvement with educational activities,

interaction with faculty, and with student peers are widely recognized as essential principles of good practice for undergraduate teaching (Chickering & Gamson, 1991).

For the current study, the theory of student involvement provides an important theoretical foundation for exploring student involvement in a new arena. Although Astin's (1999) research focused on the study of student involvement of undergraduate students in traditional education contexts, by examining student involvement in an online education context, the current study follows up on Astin's challenge for additional research in which he called for studies "to explore ways of assessing different forms of involvement" (Astin, 1984, p. 305), "to assess how much time students devote to various activities" to better understand patterns of student involvement in different contexts (Astin, 1999, p. 596), and to address the important pedagogical question for educational practitioners of "how do you get students involved" (Astin, 1984, p. 301).

High Expectations and Student Learning

As stated previously, in addition to student involvement, the Study Group on the Conditions of Excellence in American Higher Education (1984) also cited high expectations as an additional critical condition of excellence for undergraduate education (1984, p.17). Specifically, the Study Group concluded that at institutional, program, and individual course levels, student performance will rise to meet the level of reasonable expectations that are communicated to them (p. 20). Similarly, Chickering and Gamson (1991) also cite communicating high expectations as one of the seven principles of good practice for undergraduate teaching.

According to the Study Group (1984), there is an important difference between holding high expectations for students and actually communicating high expectations to students. Therefore, the Study Group clarifies, as do Chickering and Gamson (1991), that institutional and faculty expectations about the requirements that students are expected to fulfill must be communicated publicly so that students know clearly what is expected and how well they are required to perform to satisfy institutional, program, and course level standards.

Additionally, though the Study Group (1984) clearly suggests that institutional and faculty expectations of student performance should be set at high levels, the report also cautions that “when educators expect too much—when we as teachers are unrealistic—student learning and persistence suffers” (p.20). Similarly, Cross (1996) reports that research on cognition and motivation suggests that there is an optimal level of expectation; if expectations are set too low, students will do less than they are capable of; if expectations are set too high, students will engage in any number of counterproductive ego-protective devices (p.25). Therefore, it is critical that high standards for student performance are deemed reasonable by students in order to promote effective student learning and development.

The premise that communicating high expectations for student performance is important for promoting student learning in undergraduate education is also central to the theoretical foundation and rationale for the current study. By analyzing types and levels of instructors’ stated expectations for student participation in threaded discussions in online courses, this study explores the potential relationships between student’s actual

level of participation in the discussions and the expected level of participation that had been communicated by the instructor. As a result, this study may contribute to a better understanding of what types and levels of instructor's participation expectations may be deemed too low, optimal, or too high and how different types and levels of progressively higher expectations are associated with student's actual participation outcomes.

In summary, this section has reviewed literature on the importance of student involvement and high expectations for student learning which provides important theoretical foundations for the current study. The literature reviewed in this section clearly establishes that both student involvement and high expectations are critical for student learning. However, following up on Astin's (1984) assertion that practitioners must find ways to promote student involvement as the intended outcome of educational activities, the current study combines these two "conditions of excellence" together in an exploration of how an instructor's high expectations for student involvement in a particular education context may be associated with actual student involvement outcomes.

Student Interaction and Learning in Distance Education

Whereas Astin (1984) emphasized the construct of "student involvement" in his research in traditional education contexts, Moore (1989) emphasized the importance of "student interaction" for learning in distance education environments. Though the constructs may not be identical, a closer analysis of their definitions and research findings illustrate potentially close relationships that offer important implications for this study.

Acknowledging that "interaction is another important term that carries so many meanings as to be almost useless unless specific submeanings can be defined and generally agreed upon," Moore (1989) declared that at a minimum, "distance educators need to agree on the distinctions between three types of interaction" including: 1) learner-content interaction, in which the learner interacts with the content or subject of study; 2) learner-instructor interaction, when the student interacts with the course instructor or expert who prepared the subject material; and 3) learner-learner interaction, when a student interacts with other students, alone or in group settings, with or without the real-time presence of an instructor.

Other typologies for classifying or distinguishing between types of interaction have also been presented in the literature. For example, Berge (1999) contends that learning takes place only through intrapersonal interaction, in which the student interacts with course content, and interpersonal interaction, in which the student has opportunities for interaction with other students and the course instructor. Similarly, several authors have distinguished social interaction from instructional, or content, interaction as two types of interaction deemed critical for student learning (Gilbert & Moore, 1998; Liaw & Huang, 2000; Northrup, 2001). Though these two-type schemas use slightly different terms to reference the different types of interaction, they appear to be describing the same constructs as Moore's (1989) three-type model with interaction between students and instructors and other students simply combined into one category.

Based on Moore's typology of interaction above, there is a substantial base of educational literature declaring that learning in distance education contexts depends upon

students' active participation in interactions with course content, the course instructor, and with other learners (Becker, 2000; Berge, 1999; Flottemesch, 2000; King & Doerfert, 1996; McHenry & Bozik, 1995; Moore, 1989). More specifically, King and Doerfert (1996) note that research indicates that interaction is important for various types of learning, to learning satisfaction, and assists in maintaining persistence of distance students. Furthermore, Flottemesch (2000) cites several recent studies which have demonstrated positive relationships between interaction in distance education environments and a number of desired educational outcomes, including: academic achievement (Lenning & Ebbers, 1999; Niebuhr & Niebuhr, 1999); motivation (Hornbeck, 1990); critical thinking and problem solving skills (Hart, 1990; Hornbeck, 1990); course, instructor, and learning satisfaction (Jones, 1996; Zhang & Fulford, 1994); and greater student retention rates (Lenning & Ebbers, 1999).

Based on this extensive empirical support, Flottemesch (2000, p. 46) concludes that "the literature reveals that creating interaction in the classroom is essential to student learning and to the overall success and effectiveness of distance education". Accordingly, Berge (1999, p. 9) argues that "regardless of the media used, it is the responsibility of the institution and the instructor to provide a learning environment in which the learner has the opportunity for appropriate interactions with content, the instructor, and other students." Furthermore, Moore (1989) declares that "it is vitally important that distance educators in all media do more to plan for all three kinds of interaction" (p. 6) and "that educators need to organize programs to ensure maximum effectiveness of each type of interaction" (p. 5).

In comparing the literature on student involvement discussed previously with this research focused on interaction, at least two important similarities surface. First, both bodies of literature emphasize the importance of student's active participation or engagement with course content, instructors, and student peers as being vital for student learning (Astin, 1999; Moore, 1989). Additionally, both bodies of literature emphasize the importance of the institution's and instructor's role in organizing and managing educational activities to maximize the level of a student's active engagement in these three forms of involvement (Astin, 1999) or three forms of interaction (Moore, 1989) as a desired educational outcome that should be viewed as a central focus of an instructor's pedagogical efforts.

Given these similarities, for the current study, the author views student involvement and student interaction not as identical constructs, but instead as closely related and interdependent variables in student learning. Specifically, this study is based at least in part on the premise that interaction in distance education settings does not simply occur, but instead must be intentionally designed by the instructor into the instructional program (Berge, 1999). However, purposefully planning opportunities for learners to interact with course content, the course instructor, and with other learners does not, automatically ensure that critical learner interactions will occur. In other words, the instructor's intentional planning of interaction opportunities is a necessary, but not sufficient, condition for interaction in that, ultimately, students may or may not actually engage in the planned interaction opportunities.

Accordingly, it is important to acknowledge the difference between potential interaction, as a planned interaction opportunity designed into an educational program, and actual interaction, as an educational outcome which may represent varying levels of actual student engagement achieved in a planned interaction opportunity. Viewing interaction in this way, it is evident that student involvement is the critical variable that makes the difference between potential and actual interaction.

Furthermore, recalling Astin's (1984) contention that student involvement inherently includes a behavioral component, that "it is not so much what the individual thinks or feels, but what the individual does, or how he or she behaves, that defines and identifies involvement" (p.298), it is also logical to contend that interaction with course content, course instructor's, and with other learners represent three behavioral manifestations of student involvement in distance education contexts.

From this perspective, given Moore's (1989) contention "that educators need to organize programs to ensure maximum effectiveness of each type of interaction" (p. 5) and Astin's (1984) contention that the effectiveness of any educational practice is directly related to the capacity of that practice to increase student involvement, the challenge for distance education researchers and practitioners is to identify and employ instructional strategies that can influence the level of student involvement in interactions with course content, the course instructor, and with student peers. By exploring the potential relationships between instructors' expectations for student participation in learner interactions and student's actual participation in a specific distance education context, this study will provide an initial examination of this important area of study.

Computer Conferencing for Asynchronous Discussions

Moore (1973) explains that the nature of distance education requires any educational interaction to be mediated by the use of print or electronic, mechanical, or other communication devices. Accordingly, Hillman, Willis, and Gunawardena (1994, p. 31) proposed "learner-interface interaction" as a fourth type of interaction that is critical for educators to consider because, as the authors point out, in order for learners to interact with course content, the course instructor, or with other learners in distance education contexts, they must effectively interact with a technological interface that supports and mediates these three critical types of interaction.

Although a variety of educational technologies exist to mediate learner interaction in distance education contexts, the National Center for Education Statistics recognized online education—or instruction relying on computer mediated communication via the Internet—as currently the most prominent form of distance education practiced by postsecondary education institutions in the United States (Lewis et al., 1999). Additionally, literature reports that threaded discussions, or asynchronous online discussions utilizing computer conferencing technologies, have become the primary tool that instructors use for facilitating interaction in online courses (Berge & Collins, 1993; Harasim, 1990; Muilenburg & Berge, 2000).

Berge (1999, p.5) points out that "the technology employed for instruction sets parameters on the type of interaction and the convenience of the interactions in which students are engaged." Because learner interactions must be purposefully designed into

instructional programs by employing different technologies that are inherently characterized by different benefits and constraints, Berge (1999) argues that effective instructional design requires that those benefits and constraints be known and accounted for by the instructor (p. 5). Similarly, Poole (2000, p. 9) contends that "the proliferation of online courses requires an understanding of the unique learning environment that computer-mediated communication facilitates." Given that computer conferencing technologies are so prominently used in current distance education practice, an examination of the unique capacities and constraints of these technologies for supporting interaction in asynchronous online discussions will provide an understanding of this unique context for the present study.

Harasim (1990) notes that the direct ancestry of online education lies in computer conferencing, defined by Gunawardena et. al. (1997, p. 397) as "the exchange of messages among a group of participants by means of networked computers, for the purpose of discussing a topic of mutual interest." Similarly, Waggoner (1992) defines computer conferencing as "group discussion and private individual interactions that take place over computer-mediated communication networks, facilitated by sophisticated software residing on a host computer that is connected to one or more networks."

Harasim (1990, p. 45) further describes it as:

Conferencing software, which automatically files notes into topical discussions and updates users on any new comments in a topic, is designed to support "collective intelligence" and meeting of minds through the topical structure of the system. The structure provides the shared space essential to group interaction: all members of an online group has access, and can read comments and make responses. The shared file holds the individual members of the group together and enables "conversation" to take place.

In effect, while the physical classroom provides a shared space for conversation to occur in traditional face-to-face educational settings, computer conferencing technologies provide a shared electronic space for conversations to occur between geographically and temporally separated participants (Harasim, 1990). An additional advantage of computer conferencing, not possible in face-to-face discussions, is that computer conferencing systems maintain a written transcript of the entire proceedings which is permanently stored on a host computer for future reference and which can be retrieved, searched, and reviewed at a later date (Harasim, 1990).

A number of studies have examined the barriers and benefits associated with computer conferencing technologies (Harasim, 1990; Hiltz, 1994 cited in Murphy et.al., 1998, p. 239). An extensive review is provided in Harasim (1990, p.42) which notes that "to study or design online education most effectively, educators need to take into account the attributes that the environment offers for educational interaction." Accordingly, Harasim (1990) presents five attributes that are unique to online education, made possible by computer conferencing technologies, which represent a fundamental change in the potential and practice of distance education. These include: 1) computer mediated communication; 2) the capacity for many-to-many communication; 3) place independence; 4) time independence; and 5) text-based interaction. A brief overview of each of these attributes is provided below.

The first unique attribute of computer conferencing technologies, computer mediated communication, is the most important according to Harasim (1990), since all of the other attributes hinge upon it. As Berge (1999, p.5) explains, computer mediated

communication using the Internet allows for significantly faster interaction between student and faculty and among students during teaching and learning compared with correspondence and mass communication models of distance education. Through computer conferencing software, individuals with a computer and Internet connection are able to communicate, interact, and engage in learning collaborations with other participants who also have access to a computer and the Internet, anywhere in the world. To Harasim (1990), this represents a powerful new mode of communication that is distinct from all previous forms of distance education in that it is highly interactive, it encourages active learner involvement, is revisable, archivable, and retrievable, and maximizes the learner's control over the substance and process of their learning experience.

The second unique attribute of computer conferencing technologies is its capacity to support many-to-many communication and interactions (Harasim, 1990). Traditional distance education models throughout history have relied heavily on one-to-one correspondence between an instructor and an individual student or one-to-many mass communication, emphasizing information transmission from a single instructor to multiple students (Harasim, 1990). However these models have often been criticized and viewed as inferior to traditional face-to-face education because they lack the capacity for group learning and collaborations and tend to place students primarily in a passive role (Harasim, 1990). In this regard, the capacity of computer conferencing to support many-to-many communication is a unique attribute to online education that makes a variety of forms of communication and interaction possible which had previously only been

possible in face-to face educational contexts (Harasim, 1990). Additionally, Harasim (1990) argues that due to this important attribute, online computer conferencing allows for the student to engage as an active participant in the learning process and for critical group collaboration and inter-learner interactions to be sustained.

A third unique attribute of computer conferencing technologies, according to Harasim (1990) is that it enables place-independent learning and collaboration. Harasim (1990) explains further that other distance education technologies, prior to online education, including two-way audio and video telecommunications, allowed for group activities and collaborations but required participants to participate from specific geographical locations where the telecommunication technologies resided (p. 46). In contrast, online education allows for learners to access and collaborate with experts and peers anywhere, regardless of location, provided that they have a computer and Internet access. Though participation is still limited in this regard, the capacity of online education to bridge geographic boundaries in ways that have not been possible with previous technologies is an important attribute unique to this modality of distance education.

A fourth important attribute that is unique to computer conferencing technologies is time-independence (Harasim, 1990). As Berge (1999) explains, online education utilizing computer conferencing technologies enables participants to communicate and interact either synchronously or asynchronously. Synchronous communication occurs in real time, with all participants needing to be electronically connected to a computer conferencing system, at the same time, through their individual computers, even though

they may be geographically dispersed. In contrast, computer conferencing also allows for learners to communicate asynchronously, or not in real time, through messages that are stored in a central computer database awaiting access by individual participants who may submit, review, and reply to messages at a time and pace most convenient to them (Berge, 1999; Harasim, 1990; Liaw & Huang, 2000). The capacity of computer conferencing technologies to support asynchronous communication and interaction is vitally important to understanding the context of the current study. Accordingly, a more in-depth review of the unique advantages and limitations of this attribute is provided below.

Although computer conferencing technologies allow for both synchronous communication, often referred to as chats, or asynchronous communication, often referred to as threaded discussions, the most common form of computer conferencing in online education occurs asynchronously (Harasim, 1990). Harasim (1990, p.46) explains further the many benefits of asynchronous online discussions in stating:

The "24-hour classroom" is always open; this facilitates self-pacing and self-directed learning. Asynchronicity expands user control over the time of the interaction, and increases the time available to read and re-read a message and formulate a comment. One need neither wait through a slow speaker's delivery nor ask a hasty speaker to repeat. Similarly the user may write a response immediately or take time to reflect, perhaps accessing a reference or other information resource in the interim. Learning exchanges and interactions can occur over a period of time. A class discussion no longer need be limited to two to three hours per week for the entire group; a meeting can extend for as long as required to cover the material and allow each member to participate. Asynchronous group learning can reduce competition for air-time among participants. Because the system can accept and display input from all participants, there is no concern that time restrictions or turn taking will limit expression or opportunities to speak. Participants who require additional time to present their ideas are not interrupted by more assertive individuals. Each user can access the system at the time/day of her/his choice, and as frequently and for as long as required.

In addition to the many advantages that computer conferencing technologies offer for threaded discussion participants, several drawback or limitations are also acknowledged in the literature. For example, communication anxiety can occur when a participant receives no immediate response to ideas or comment (Harasim, 1990). Additionally, participants may feel they have lost an opportunity to contribute to a particular discussion thread if they access a discussion "late" and the conversation appears to have moved on to other topics (Harasim, 1990). Additionally, students who prefer real time conversation may express dissatisfaction with asynchronous dialogue which may seem disjointed and awkward in comparison. Moreover, participants may find that asynchronous discussion, through allowing for more time for interaction, also requires more time to review, sort, and navigate through a substantial set of message contributions that may be submitted in a lengthy discussion (Northrup, 2001).

A fifth unique attribute of computer conferencing technologies is that it relies on text-based communication. As Harasim (1990, p. 49) explains, "communication and interaction among participants in online education is mediated by the keyboard and video display terminal screen and conducted solely through text—that is by sending and receiving messages typed into the system." This attribute also presents a number of unique benefits and limitations for participant interaction in threaded discussions. One benefit is that communicating through text-based interaction inherently requires participants to translate their thoughts and words into written form, thereby contributing to greater reflection than talking in a face-to-face class or telephone conference (Berge & Collins, 1993; Harasim, 1990). In addition to potentially taking more time to compose

messages, participants also are provided more time to review, consider, and reflect upon messages posed by others as compared with what is allowed when one receives messages which are communicated verbally. Additionally, text-based communication eliminates many of the potential distractions that are found in verbal and visual cues of face-to-face conversation such as race, gender, handicap, physical characteristics, social status, facial expressions, voice intonation, gestures, and the like (Harasim, 1990).

Many of these benefits of computer conferencing characteristics may also be perceived as limitations by some participants. For example, participants may be dissatisfied, frustrated or confused when relying solely on text based messages that lack verbal and visual cues often deemed necessary or appropriate for translation or interpretation (Harasim, 1990). Additionally, though composing messages in text allows participants more time for reflection, participants may become frustrated that putting their thoughts into written form may take more time and energy than if they could simply verbally convey what is on their minds. Moreover, participants may become anxious about having their textual communication preserved and stored in an electronic transcript. Additionally, participants may become frustrated with or may lack the skills to effectively utilize the technology interface itself, thereby limiting the participant's motivation to engage in communication and interaction through the interface (Harasim, 1990).

In summary, despite the limitations and barriers that may be inherent in computer conferencing, Harasim (1990) argues that it is the most appropriate form of distance education currently available due to its unique potential for supporting learning collaborations through computer mediated, many-to-many, text-based communication

which can be both place and time-independent. Understanding these unique attributes of computer conferencing technologies, as well as their inherent advantages and limitations, is important for understanding the context of the current study which examines participant interaction in asynchronous online discussions utilizing these technologies.

Roles and Responsibilities of the Instructor in Asynchronous Discussions

Given the power and potential of computer conferencing technologies as described in the previous section, a fundamental question for educators and learners, then, is how educational applications of computer conferencing technologies can best improve learning (Harasim, 1990). As Funaro and Montell (1999, p. 1) point out, "as with other new educational technologies, it is not so much the tool that improves teaching and learning, but how the instructor integrates the tool into the curriculum and into the educational setting" that is most critical. Berge (1999, p. 5) concurs, stating that "it is the instructional design, not the delivery system that frequently sets the limits on the quality of instruction" and therefore, the critical question becomes "How can technology be used to promote the types of interaction that facilitate learning at a distance."

Toward addressing this question, the literature provides a number of models and recommendations describing the roles and responsibilities that instructors should consider when organizing and facilitating asynchronous online discussions (Berge, 1995; Collins & Berge, 1996; Mason, 1991; Paulsen, 1995; Rohfeld & Hiemstra, 1995). For example, Mason (1991) describes three primary roles for instructors as moderators of online discussions including: an organizational role, a social role, and an intellectual role. Berge

(1995) extends upon this model by classifying moderator roles into pedagogical, social, managerial, and technical categories, with a detailed list of specific recommendations for the instructor to consider within each category. In contrast to classifying instructor roles and responsibilities into functional categories as described above, Rohfeld and Hiemstra (1995) provide guidelines for instructors to follow in moderating different stages of a discussion, including strategies for organizing or preparing for a discussion, for initiating or starting a discussion, for maintaining a discussion, and for reenergizing a discussion during periods of inactivity. In addition to this literature offering broad conceptual models and recommendations for organizing and facilitating threaded discussions in general, other literature has focused on specific challenges commonly encountered by instructors, such as designing effective discussion questions (Berge & Muilenburg, 2000), and for keeping asynchronous discussions on topic (Beaudin, 1999).

Although the literature outlines a variety of important roles and responsibilities that an instructor must consider when organizing and facilitating threaded discussions, Rohfeld and Hiemstra (1995) point out that one of the primary challenges that educators face centers around encouraging learner participation and maintaining viable discussions. Accordingly, Rohfeld and Hiemstra (1995, p. 92) contend that "all along the way, the facilitator must find the means to guide and maintain involvement in productive discussion." Similarly, Berge (1995, p. 25) argues that one of the facilitator's primary responsibilities is "to use whatever means necessary to guide and maintain involvement in productive discussion."

However, though much of the literature acknowledges the important responsibility that the instructor has for promoting students' active involvement in discussion, there is very little attention given in the literature to providing educators with specific research based guidelines that can be followed to successfully fulfill this responsibility. In the literature that does exist on this issue, the primary recommendation provided to instructors is to promote student involvement by encouraging or requiring students to participate in the discussions (Berge, 1995; Eastmond & Ziegahn, 1995; Ko & Rossen, 2001; Moore, 2002; Palloff & Pratt, 1999; Palloff & Pratt, 2001; Paulsen, 1995; Rohfeld & Hiemstra, 1995; Schrum & Hong, 2002). As Moore (2002, p. 63) explains, within threaded discussions:

Participation in dialog is likely to be, to a considerable extent, related to course design. If course expectations with respect to discussion participation are specific, and participation is graded, then students are likely to participate at a high level. Course design, too, can directly affect nonparticipation. If explicit, detailed directions are not provided on what is expected and how to participate, participation is more likely to be low.

Limitations in this literature, discussed in greater detail in the next section of this chapter, provide the primary rationale for the current study.

Requiring Student Participation in Threaded Discussions

Although research has shown that student participation in threaded discussions tends to be greater when participation is required by the instructor as part of the course grade (Bures, Abrami, & Amundson, 2000; Harasim, Hiltz, Teles, & Turoff, 1995; Vrasidas, 2002), the literature does not address how different types or levels of

instructors' participation expectations may be associated with different student participation outcomes. Accordingly, in the absence of empirical research to guide instructors in setting student participation requirements, different authors have cited different, and sometimes contradictory, recommendations.

For example, Eastmond and Ziegahn (1995) declare that students should be online several times a week to keep up with current conversations, and that students should be required to post an average of three substantive messages to a current discussion topic. Paulsen (1995, p. 85) also suggests that the instructor should "require regular participation" in discussions but specifies that "to maintain an active dialogue, it is necessary to exhort students to log on at least twice a week." Paulsen (1995) also recommends that instructor's setup student interaction by encouraging participants to direct messages specifically to other students and to the instructor and not just to post messages to the discussion area in general. Rohfeld and Hiemstra (1995, p. 97) also offer the following suggestions based on their personal experience:

In a credit course, instructors can require students to sign on a certain number of times and make contributions on a regular basis. We indicated in our syllabi that each week we expected students to sign on at least twice and make three contributions to the discussions. Such requirements help assure that participants will keep up with the course and engage in active discussion.

Although these examples suggest that the instructor should require a minimum level of student participation and interaction in the discussions, they provide different parameters with regard to the recommended minimum requirements. Some recommendations suggest requiring student "attendance," or requirements for logging into the online discussion area, while others suggest requiring students to post messages

to the discussion in progress, and still others require both attendance and message contributions. Moreover, different authors recommend differing quantities of minimum attendance or message contributions. Additionally, some recommendations specify that student contributions should be focused on answering the original discussion topic, while others require students to focus on interacting with other participants in the discussion, and still others do not specify what the target of student's contributions should be.

Additionally, while the recommendations above recommend minimum participation requirements, there is no mention of a recommended limit or maximum participation requirement. Liaw and Huang (2000, p. 44) argue that, "from the viewpoint of interactivity, it can be assumed that the more interactions that occur between learners and instructors or among learners, the more learners are able to learn." Given this, one could argue that "the more participation in discussions, the better" and that there is not an upper limit to the amount of student participation that is desirable for student learning. However, Berge (1999) cautions that a misuse of interaction, synchronicity, and technology can have negative impacts on student learning, including loss of student's attention, boredom, information overload, and frustration. Relating this caution directly to asynchronous online discussions, Funaro and Montell (1999) acknowledge that "requiring students to post too often may cause resentment and discourage voluntary participation above the minimum required." Accordingly, in any effort to maximize student participation in learner interactions within these discussion environments, the instructor should consider what threshold might be most appropriate. However, there are no specific recommendations in the literature with regard to what level of participation

encouragement or requirement may be "too high" and counterproductive to the objective of maximizing student participation within a threaded discussion.

Furthermore, the literature states that "students may require special preparation and clear guidelines to participate effectively" in discussions, but Berge (1995, p. 28) cautions that the "instructor should not give too much direction" because "learners will rebel if the structural design of the conference is excessive." However, no explanation is provided, with regard to how much direction is "too much" direction.

Another limitation is that the potential impact of different levels of instructor participation in online discussions on student participation outcomes is also only generally addressed in the literature without providing specific research-based guidelines. For example, Berge (1995, p. 23) acknowledges that "computer conferencing relies greatly on the involvement of teacher and student." Accordingly, Berge (1995) and Paulsen (1995) suggest that the instructor should be an active participant in the discussion, stating that one of the responsibilities of the instructor is to "be responsive" by responding quickly to individual student's contributions or responding to several students' contributions at once by weaving them together. However, Paulsen (1995) also cautions the instructor to "remember the 'law' of proportionality" and recommends that faculty limit their contributions to one-quarter to one-half of the contributions in the discussion. In contrast, Muilenburg and Berge (2000) caution against the instructor responding too frequently within a discussion, stating that:

If things are going well, the best action to take is no action! It is best not to interfere. Resist the temptation, if it exists, to post a public response to the question until conversation is waning. The best course of action then is to either summarize the key points to end discussion on the topic or ask some prompting questions to recharge the discussion.

Clearly there cannot be learner-instructor interaction in threaded discussions unless the instructor is an active participant along with students. Additionally, student participation in the other types of interaction may hinge on the degree to which the instructor is, or is not, also an active participant in the discussion. However, other than the general suggestions above, the literature does not address how instructors may need to design their own participation in interactions within an online discussion in order to maximize the level of student's participation within those discussions.

Furthermore, while the importance of student's active participation and interaction in online discussions is explicitly acknowledged in much of this literature, the constructs of "participation" and "interaction" in many cases are used interchangeably without recognizing their important distinctions and potential relationships. For example, if an instructor encourages or even requires participation in the form of a student's regular "attendance" in a discussion, this does not inherently result in any of the three critical types of learner interaction. Additionally, when participation is encouraged or required in the form of posting a certain number of message "contributions" to the discussion, a student could technically contribute to the discussion by posting multiple replies to the initial discussion question without ever engaging in interactions with the course instructor or other learners. Similarly, the student required to make a certain number of contributions may post messages directed only to the instructor, thereby avoiding critical

learner-learner interaction, or vice-versa.

Finally, there is no specific consideration in the literature of any potential relationships that may exist between required or encouraged levels of participation, in the form of attendance or message contributions, and resulting levels of student participation in learner interactions. Conversely, potential relationships between required or encouraged types of interaction and resulting levels of learner participation are not addressed in the literature. Additionally, potential relationships between encouraged or required levels of initial participation in discussions and the levels of sustained participation throughout the discussion to its conclusion have also yet to be addressed through empirical research.

Without empirical research to support the different recommendations reported in the literature, instructor's are unable to determine what participation requirements, or combination of requirements, may be more effective than others for maximizing the active participation of students in learner interactions within threaded discussion environments. Accordingly, the present study will contribute to addressing this void in the literature.

Chapter Summary

This chapter has provided a review of some of the literature most relevant to the current study intended to explore potential relationships between the types and levels of instructors' stated expectations for student participation in threaded discussions and the

density and intensity of student participation in learner interactions within the discussions. Specifically, the substantial base of literature emphasizing the importance of student academic involvement and instructor's high expectations for student learning was reviewed as an important theoretical foundation for the current study. A review of the literature demonstrating the important role of student interactions for learning in distance education contexts was also provided. Additionally, an overview of literature related to the nature of computer conferencing technologies used to facilitate asynchronous online discussions was provided for understanding the educational context of the present study. Furthermore, a review of literature discussing the important roles and responsibilities of the instructor for organizing and managing asynchronous online discussions provided an overview of some of the pedagogical challenges confronted by educators in this context. Finally, an overview of literature recommending that instructor's require student participation to promote student involvement in threaded discussions, and a discussion of important limitations in this literature, was provided as a rationale for the current study.

In the remaining chapters of this study, a detailed explanation of the research methodology used to conduct the study is provided in Chapter 3, followed by a review of the results of the study being presented in Chapter 4, with Chapter 5 presenting conclusions drawn from the results of this study and recommendations for further research.

CHAPTER 3

METHODOLOGY

Introduction

The purpose of this ex-post facto study was to examine what relationships existed between the types and levels of instructors' stated expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions within the discussions. Within this chapter, a detailed explanation of the research design and methodology employed for this study is provided, including a description of the population studied, sampling method, variables, research design, and important limitations and delimitations inherent in the study.

Population Studied

This ex-post facto study involved an examination of archived transcripts of threaded discussions which were conducted within fully online undergraduate courses offered during the 2001-2002 academic year by a public post-secondary institution in the northwestern region of the United States. During the 2001-2002 academic year, 92 fully online undergraduate course sections were offered by this institution. Among the 92 course sections offered, 82 courses included at least one threaded discussion area within the framework of their course design.

Within these 82 undergraduate course sections, 637 individual instructional units were created that included at least one threaded discussion. The archived transcripts of these 637 threaded discussions contained within the 82 undergraduate course sections offered at this institution during the 2001-2002 academic year served as the population for this study.

Sampling Method

A sample of 265 threaded discussions was randomly selected for analysis from the total population of 637 threaded discussions. This sample size is consistent with guidelines reported in Gay and Airasian (2000) for obtaining a representative random sample from a population size of up to 850. The sample of 265 transcripts was selected following the guidelines for simple random sampling, as outlined in Gay and Airasian (2000). According to the guidelines, the first step in simple random sampling was to list all members of the population and assign all members on the list a consecutive number from 000 to 636 (Gay & Airasian, 2000). Next, using a table of random numbers, a random sample of 265 transcripts was selected following the selection steps outlined in Gay and Airasian (2000, p. 124).

For each of the 265 threaded discussions selected for examination in this study, the archived transcript of the threaded discussion was printed for analysis with each printed transcript coded with a unique identification that could be traced back to the original online course and respective archived threaded discussion. In order to ensure consistency in the comparison of student participation outcomes within the selected

threaded discussions, only threaded discussions intended for whole-class discussion were considered for analysis in this study. Accordingly, any threaded discussions that were intended for small group or dyadic discussion, and any discussions devoted to online “office hours” or to serving as “helpdesk” forums, were excluded from the study’s sample. In these instances, the disqualified discussions were discarded from the sample and another discussion was randomly selected from the population until the desired sample of 265 threaded discussions was successfully identified.

Variables

Once the random sample of threaded discussions was selected, each of the threaded discussion transcripts was analyzed using the following variables and respective classification systems.

Types of Instructor Stated Expectations for Student Participation

In this study, only instructors’ stated expectations for student participation, as stated within the threaded discussion transcript or respective course syllabus, were considered for analysis. Accordingly, the types of instructors’ stated expectations for student participation for each threaded discussion were classified into the following two distinct categories:

1. The first category of types of instructor expectations refers to expectations for student message contributions, and included the following three subcategories:
 - No expectation for student message contributions was stated

- Student message contributions were encouraged but not required
 - Student message contributions were required.
2. The second category of types of instructor expectations for student participation refers to expectations for student interactions with other discussion participants, and included the following three subcategories:
- No expectation for student interactions with other participants was stated
 - Student interactions with other participants were encouraged but not required
 - Student interaction with other participants was required.

Levels of Instructor Stated Expectations for Student Participation

As stated previously, only instructors' explicitly stated expectations for student participation, as stated within the threaded discussion transcript or respective course syllabus, were considered for analysis in this study. Accordingly, levels of instructor expectations for student participation for each threaded discussion in the study's sample were classified within the following two distinct categories:

1. The first category refers to instructor explicitly stated expectations for minimum levels of student message contributions, and includes the following subcategories which can expand as needed to accommodate progressively higher levels of instructor expectations:
- No minimum number of message contributions are explicitly stated
 - Students are expected to contribute a minimum of one message
 - Students are expected to contribute a minimum of two messages

- Students are expected to contribute a minimum of three messages
 - etc.
2. The second category of levels of instructor expectations for student participation refers to instructor explicitly stated expectations for minimum levels of student interactions with other discussion participants, and includes the following subcategories which can expand as needed to accommodate progressively higher levels of instructor expectations:
- No minimum number of interactions are explicitly stated
 - Students are expected to interact with a minimum of one person
 - Students are expected to interact with a minimum of two people
 - Students are expected to interact with a minimum of three people
 - etc.

Learner Interactions

Learner Interactions in this study were classified according to Moore's (1989) typology of three types of interaction in distance education, which includes: learner-content interaction, learner-instructor interaction, and learner-learner interaction. Specifically, learner-content interaction refers to interaction between the learner and the content or subject of study (Moore, 1989). Learner-instructor interaction refers to interaction between the learner and the expert who prepared the subject material, or some other expert acting as instructor (Moore, 1989). Learner-learner interaction refers to interaction between one learner and other learners, alone or in group settings, with or

without the real-time presence of an instructor (Moore, 1989).

In this study, an interaction took the form of a message contribution to the threaded discussion area in the form of a respective type of interaction. Each message contribution was classified as only one type of interaction according to the following guidelines. The initial question or discussion prompt for a threaded discussion was considered part of the course content. Accordingly, a learner-content interaction occurs when a participant contributes a message in response to the initial question posted in the discussion area. A learner-instructor interaction occurred when a student contributed a message in response to a message posted by the instructor or when an instructor contributed a message in response to a student's message contribution. A learner-learner interaction occurred when a student contributed a message in response to another student's message contribution.

Participation Density

In this study, participation density referred to the ratio of actual number of participants interacting within a discussion out of the total number of possible participants. The following formula for calculating density used by Fahy, Crawford, and Ally (2001, p. 7) was adapted for use in this study: $Density (D) = \frac{2a}{N(N-1)}$, where "a" equals the actual number of participants engaging in the discussion and "N" equals the total number of possible discussion participants.

As Fahy, Crawford, and Ally point out, density is highly associated with the size of the participant group (2001). Accordingly, the above formula had to be adapted to

allow for comparisons of participation density values between discussions with different participant group sizes. For example, in two classes with a total of 30 students and 15 students respectively, if 24 of 30 students in the first class and 12 of the 15 students in the second class actually participate in the discussions, both classes would have 80% of the possible participants engaging in the discussion. However, in using the above formula for density provided by Fahy, Crawford, and Ally (2001, p.7), the first discussion involving 24 of 30 participants would exhibit a density of 46.4 while the second discussion involving 12 of 15 participants would exhibit a density of 22.4.

In this study, a minor adaptation of the formula referenced above allowed for comparison of density values between groups of different sizes. Specifically, each discussion was assessed for two density values, including: "actual" density, representing the ratio of the actual number of participants engaging within a discussion out of the total number of possible participants, and a "potential" density value, representing the maximum possible density value that could be achieved if 100% of the possible participants actually became engaged in that respective discussion.

Using the previous example, the discussion with 24 of 30 actual participants would exhibit an "actual" density of 46.4 and a "potential" density value of 58.0, which would have been achieved if all 30 possible participants had engaged in the discussion. Similarly, the second discussion with 12 of 15 participants would exhibit an "actual" density of 22.4 and a "potential" density value of 28.0, which would have been achieved if all 15 possible participants had actually become engaged in the discussion.

By dividing a discussion's "actual density" by that respective discussion's "potential" density, a "percentage of possible discussion density" value is acquired.

Extending on the previous example, the first discussion with an actual density of 46.4 out of a possible density of 58.0 would result in a percentage of possible discussion density of 80%.

Similarly, the discussion with an actual density of 22.4 out of a potential density of 28.0 would also result in a percentage of possible discussion density of 80%. Accordingly, by assessing discussions for "percentage of possible discussion density," comparisons of density values between discussions of different group sizes was made possible. Accordingly, in this study, "density" was defined as the percentage of possible discussion density exhibited in discussions, as measured by dividing each discussion's actual density by the respective discussion's maximum possible density. The formula for density, presented in Fahy, Crawford, and Ally (2001) was used for measuring both actual density and potential density for each discussion examined in this study.

To calculate the density of student participation for the overall discussion, the number of possible participants was derived from headcount of the total student enrollment of the course from which the respective threaded discussion transcript was taken, as recorded in the institution's enrollment records. The total actual number of participants in the threaded discussion was calculated by the headcount of the number of individual student participants who contributed at least one message in the overall discussion.

To calculate the density of student participation within each discussion level, the number of possible participants was calculated the same as for the overall discussion, as described above, and the number of actual participants was calculated as the headcount of the number of individual student participants who contributed at least one message in the respective discussion level.

Participation Intensity

In this study, participation intensity refers to the average level of participation and the degree of persistence exhibited by participants within a discussion (Fahy, Crawford, and Ally, 2001). The average level of participation refers to the extent of each student's involvement within a discussion, as measured by the average number of messages contributed by each participant. In this study, the average level of participation was classified according to the intensity of participation exhibited in the overall discussion as well as within each distinct discussion level.

Additionally, the average level of participation was classified into three subcategories representing the three different types of interaction identified by Moore (1989) which includes learner-content interaction, learner-instructor interaction, and learner-learner interaction. Accordingly, the classification framework for the average level of participation in a threaded discussion for the current study included the following categories and sub-categories:

1. Average Level of Participation In Learner Interactions in the Discussion
 - Average Level of Participation in Learner-Content Interactions

- Average Level of Participation in Learner-Instructor Interactions
 - Average Level of Participation in Learner-Learner Interactions
2. Average Level of Participation in Learner Interactions in Each Discussion Level
- Average Level of Participation in Learner-Content Interactions
 - Average Level of Participation in Learner-Instructor Interactions
 - Average Level Participation in Learner-Learner Interactions

To calculate the average level of participation in learner interactions for the overall discussion, the total number of learner-content, learner-learner, and learner-instructor interactions was divided by the total number of actual discussion participants. Additionally, the average level of participation in each of the three types of interaction was calculated by dividing the total number of each type of interaction by the total number of participants in the discussion. Similarly, the calculations for the average level of participation in learner interactions within each discussion level was derived by dividing the total number of interactions occurring at that discussion level by the number of participants for that discussion level. Finally, the average level of participation in each of the three types of learner interaction in each discussion level was calculated by dividing the total number of each type of interaction occurring in each level of the discussion by the number of participants for that respective discussion level.

In addition to the average level of participation, a second measure of participation intensity, degree of persistence, was assessed in this study as measured by the number of discussion levels pursued by participants within a threaded discussion (Fahy, Crawford, & Ally, 2001).

Instrumentation

This ex-post facto exploratory study was an attempt to examine relationships between the types and levels of instructors' stated expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions within the discussions. By combining the different variables and classification systems outlined in the previous section of this chapter, a Threaded Discussion Analysis Worksheet included in Appendix A of this study was used to classify the types and levels of instructor expectations for student participation and to calculate the density and intensity of student participation in learner interactions exhibited in each discussion transcript in the study's sample.

Specifically, each discussion was first classified according to the types and levels of instructors' stated expectations for student participation in the threaded discussion, as stated in the threaded discussion transcript or within the respective course syllabus. Next, the overall density and intensity of each discussion was calculated, including an assessment of the overall discussion's participation density and intensity in three types of learner interactions. Following the analysis of density and intensity of the overall discussion, the density and intensity of each level of the discussion was calculated, including an assessment of the participation density and intensity of three types of learner interactions exhibited within each respective discussion level.

After each threaded discussion transcript was analyzed according to the procedure outlined above, the classifications of types and levels of instructor stated expectations and

the calculations of overall discussion and individual discussion level density and intensity outcomes was entered into an SPSS database for statistical analysis. Once the classification data and calculations were entered into the database, statistical tests were conducted to answer the primary and secondary research questions in this study as described below.

Research Design

Following the collection, classification, and calculation of data for each of the threaded discussion transcripts in this study's sample, the data was entered into an SPSS database for statistical tests to answer the following primary research question guiding this study:

What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions within the discussions?

Given that the research question calls for an investigation of whether or not relationships existed between different variables, a correlational research design was used in this study to test for relationships between the different variables under consideration. Specifically, comparison of frequencies as well as comparison of means and one way analysis of variance tests were used to answer the following five research questions:

1. What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the discussion's overall density of student participation?

2. What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the discussion's density of student participation in each level of the discussion?
3. What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the overall discussion's average level of participation in learner interactions?
4. What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the average level of participation in learner interactions in each discussion level?
5. What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the overall discussion's degree of persistence?

Limitations and Delimitations

This study involved an exploratory ex-post facto analysis of instructors' stated expectations for student participation in threaded discussions and actual student participation outcomes within the discussions. Accordingly, what follows is an explanation of several limitations and delimitations inherent in this study:

1. In assessing potential relationships that may exist between instructors' stated expectations for student participation and actual student participation outcomes, any relationships that were identified cannot be interpreted as cause-effect relationships. As an ex-post facto analysis of archived data, the study does not

allow for the controlled manipulation of variables which would be required to infer causality.

2. A delimitation of the current study was that the analysis was limited to instructors' explicitly stated expectations for student participation as stated within the respective threaded discussion transcript or within the respective course syllabus. Any explicit or implicit statement of instructors' expectations made elsewhere within an online course or in other correspondence between an instructor and students was not included in the analysis of this study.
3. Similarly, the study did not distinguish between any differences that may have existed between what the instructor's actual expectations for student participation in threaded discussions may have been and the instructor's explicitly stated expectations for student participation that appeared within a threaded discussion transcript or syllabus.
4. A delimitation was that this study focused on an examination of only whole-class threaded discussions. Consequently, discussions devoted to small group or dyadic dialogue or intended for instructor "office hours" or helpdesk forums were not considered for analysis in this study.
5. Another delimitation in this study was that the analysis of actual student participation density and intensity outcomes within threaded discussions was based on an assessment of the quantity of student message contributions and learner interactions that occurred throughout the discussions. As such, this analysis did not consider or interpret the quality of message contributions or

interactions that occurred. Therefore, any relationships identified in this study do not allow for assumptions or inferences with regard to the quality of student participation outcomes exhibited within a discussion.

6. An additional delimitation of this study was that it focused on student participation in learner interactions as evidenced by student's individual message contributions within a threaded discussion. Because the study only acknowledged message contributions as behavioral evidence of student participation within a discussion transcript, it did not account for the quantity or quality of effort that a student may have invested in the discussion area apart from the archived message contributions.
7. Similarly, this study was limited to an analysis of participant message contributions which were archived within a particular threaded discussion area itself. The computer conferencing technology used to facilitate threaded discussions in this study allowed participants to respond to a message privately by sending a response to a recipient's e-mail rather than posting a message response to the public threaded discussion area. Because private messages were not archived in the threaded discussion area, any student participation in learner interactions that may have taken place privately was not included in the analysis for this study.
8. Finally, although the computer conferencing technology used to facilitate threaded discussions in this study allowed instructors to create several distinct threaded discussion areas within a single instructional unit within an online course, the

population of this study includes only the first Threaded Discussion area within a particular instructional unit. Accordingly, additional threaded discussion areas contained within a single instructional unit were not included for analysis in this study.

Chapter Summary

This chapter has provided a detailed explanation of the research methodology employed in this study, including an explanation of the study's population, sampling method, variables, instrumentation, research design and limitations inherent in this study. In the next chapter, the results of the completed study will be presented, followed by a final chapter providing conclusions and recommendations for further research.

CHAPTER 4

RESULTS

Introduction

This study was inspired by a widely accepted premise that learning in distance education contexts depends upon the student's active participation in interactions with course content, the instructor, and with other learners (i.e. Becker, 2000; Berge, 1999; Flottemesch, 2000; McHenry & Bozik, 1995; Moore, 1989). In applying this premise to the specific online education context of threaded discussions, which are reported to be the primary tool that instructors use for facilitating interaction in online courses (Harasim, 1990; Berge & Collins, 1993; Muilenburg & Berge, 2000), this study was intended to address the general question: "How can instructors use threaded discussion technologies to promote the types of interaction that facilitate learning at a distance?" More specifically, this study was intended to extend upon previous research reporting that student participation in threaded discussions tends to be greater when the instructor requires students to participate in the discussions.

The purpose of this study was to examine the relationships between different types and levels of instructors' stated expectations for student participation in threaded discussions and actual student participation outcomes occurring within the discussions.

Toward fulfilling this purpose, the primary research question for this ex-post facto study was:

“What relationships exist between the types and levels of instructors’ stated expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions occurring within the discussions?”

To answer this primary research question, the following five secondary research questions were specifically addressed in this study:

1. What relationships exist between the types and levels of instructors’ stated expectations for student participation in threaded discussions and the discussion’s overall density of student participation?
2. What relationships exist between the types and levels of instructors’ stated expectations for student participation in threaded discussions and the discussion’s density of student participation in each level of the discussion?
3. What relationships exist between the types and levels of instructors’ stated expectations for student participation in threaded discussions and the overall discussion’s average level of participation in learner interactions?
4. What relationships exist between the types and levels of instructors’ stated expectations for student participation in threaded discussions and the average level of participation in learner interactions in each discussion level?
5. What relationships exist between the types and levels of instructors’ stated expectations for student participation in threaded discussions and the overall discussion’s degree of persistence?

This chapter includes an overview of the results of this study including a descriptive analysis of frequencies, comparison of means, and one-way analysis of variance tests which were used to address each of the five secondary research questions. The reporting of results within this chapter is separated into five sections, one for each of the five research questions, with each section including the following: 1) a discussion of statistical procedures used for addressing the research question; 2) descriptive analysis of relationships being investigated within the research question; and 3) a discussion of the meaning of the results in relation to the study's population. Finally, the chapter will conclude with a summary of findings and discussion of meaning relative to the study's primary research question.

Foundations of Data Analysis

Each of the research questions addressed in this study involves an examination of the types and levels of an instructors stated expectations for student participation in threaded discussions. This involves an analysis of the same four independent variables within each research question, including: 1) instructor expectations for message contributions; 2) instructor expectations for student interactions; 3) expected minimum levels of message contributions; and 4) expected minimum levels of student interactions. Rather than repeating the description of these variables within each section of this chapter, a single description will be provided here.

Instructor Expectations for Message Contributions

One way that instructors can state their expectations for student participation in threaded discussions is to encourage or require students to contribute messages to a respective discussion. Accordingly, each of the threaded discussions analyzed in this study were classified into one of three categories of instructors' stated expectations for message contributions. These three categories included: 1) "No Expectations," representing discussions that did not have any explicitly stated expectations for message contributions, 2) "Encouraged," representing discussions in which an instructor explicitly encouraged but did not require student message contributions, and 3) "Required," representing discussions that explicitly required student message contributions.

Instructor Expectations for Student Interactions

Within threaded discussion environments, it is possible to contribute a message without specifically interacting with other discussion participants. Additionally, instructors' participation expectations may explicitly require message contributions, but not explicitly require students to interact with other discussion participants. Therefore, in addition to classifying each discussion according to instructors' expectations for message contributions, each discussion was also classified according to the instructor's stated expectations for student interactions.

Specifically, each discussion was classified into one of the following three categories of instructors' stated expectations for student interactions: 1) "No Expectations," representing discussions that did not have any explicitly stated

expectations for student interactions with other discussion participants; 2) "Encouraged," representing discussions in which an instructor explicitly encouraged but did not require student interactions with other discussion participants; and 3) "Required," representing discussions that had explicitly stated requirements for student interactions with other discussion participants.

Expected Minimum Levels of Message Contributions

Each discussion was also classified according to the instructor's stated expectations for minimum levels, or quantities, of message contributions. These classification levels included: 0) "No Messages Required," representing discussions that did not have any explicitly stated expectations for minimum message contributions; 1) "One Message Required," representing discussions that required students to contribute at least one message to the discussion area; 2) "Two Messages Required," representing discussions that required students to contribute at least two messages to the discussion area; and 3) "Three Messages Required," representing discussions that required students to contribute at least three messages to the discussion. Although the classification levels could have expanded to represent progressively higher levels of expected minimum message contributions, none of the discussions in the sample in this study exceeded three required message contributions.

Expected Minimum Levels of Student Interactions

In addition to classifying each discussion according to minimum expected levels, or quantities, of message contributions, each discussion was classified according to the

instructor's stated expectations for minimum levels, or quantities, of student interactions. These classification levels included: 0) "No Student Interactions Required," representing discussions that did not have any explicitly stated expectations for minimum student interactions; 1) "One Student Interaction Required," representing discussions that required students to interact with at least one other participant in a respective discussion, and 2) "Two Student Interactions Required," representing discussions that required students to interact with at least two other participants in a respective discussion. Although the classification levels could have expanded to represent progressively higher levels of expected minimum student interactions, none of the discussions in the sample in this study exceeded two required student interactions.

In sum, the descriptions of these four independent variables apply equally to each of the five research questions, and are provided here rather than being repeated in each section of this chapter. Each research question focuses on a different dependent variable, however, which will be described more fully in the respective sections that follow.

Question 1 Results

The first research question addressed in this study was: "What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the discussion's overall density of student participation?" To answer this question, each threaded discussion was classified according to the types and levels of the instructor's stated expectations for student participation as explained in the "Foundations for Data Analysis" section at the beginning of this chapter.

Additionally, the discussion's overall density of student participation, referred to below as a percentage of possible discussion density, was calculated by dividing the actual density of each discussion by the maximum possible density of the respective discussion. Taken together, what follows is a discussion of the findings of this study relative to Question 1.

Instructor Expectations for Message Contributions

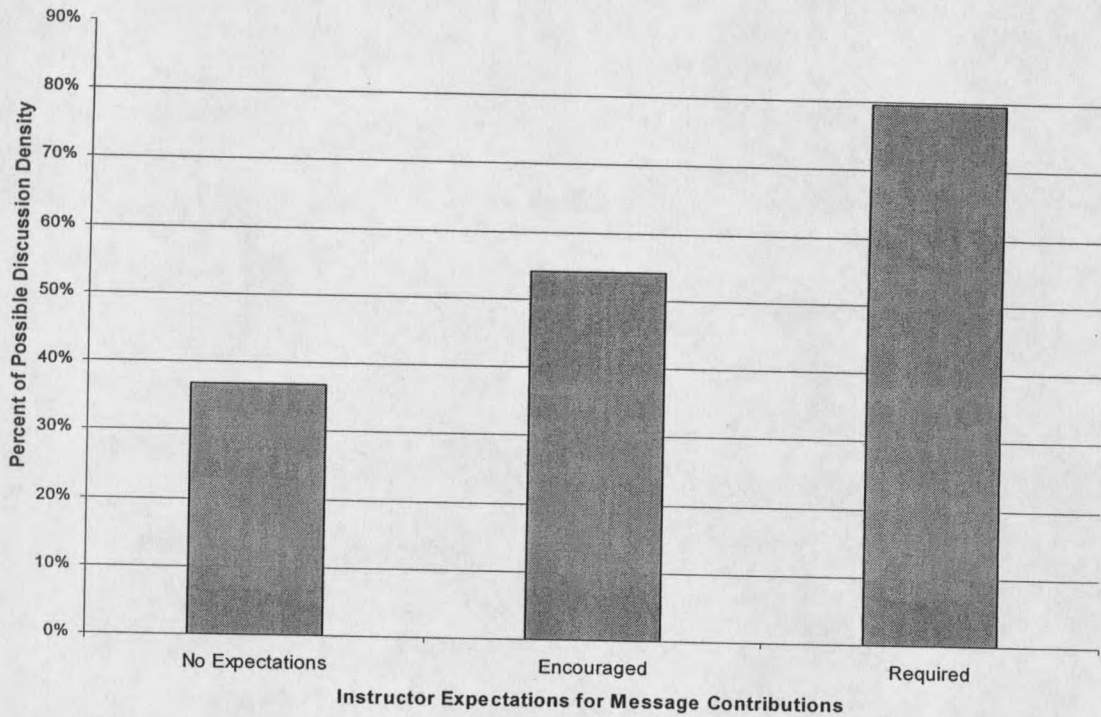
Table 1 includes a comparison of frequencies of discussions representing each of the three different types of instructors' stated expectations for message contributions. Also included in Table 1 are a comparison of means and the standard deviations of the percentage of possible density of student participation exhibited in the discussions representing each expectation type.

Table 1: Descriptive Statistics of the Percentage of Possible Density and Expectations for Message Contributions

	N	Mean	Std. Deviation
No Expectations	15	.36923	.238331
Encouraged	37	.54118	.202896
Required	213	.79646	.150381
Total	265	.73663	.206633

As illustrated in Table 1 and Figure 2, discussions representing each of the three types of instructors' stated expectations for student message contributions exhibited different means for percentage of possible discussion density.

Figure 2: Expectations for Message Contributions and Percentage of Possible Density



Specifically, discussions with “No Expectations” for message contributions exhibited an average of approximately 37% of possible discussion density while discussions that “Encouraged” student message contributions exhibited an average of 54% of possible discussion density and discussions that “Required” message contributions exhibited an average of approximately 80% of possible discussion density.

The results of a one-way analysis of variance (ANOVA) test, provided in Table 2, summarizes the relationships that exist between each of the three categories of expectations for message contributions and the percentage of possible density exhibited within the discussions. Based on these results, the null hypothesis was rejected indicating that a significant difference at the .05 level was shown to exist between discussions

representing at least two of the different types of expectations for message contributions and the corresponding percentage of possible discussion density exhibited in the discussions.

Table 2: ANOVA for Expectations for Message Contributions and Percentage of Possible Density

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.201	2	2.100	77.816	.000
Within Groups	7.071	262	.027		
Total	11.272	264			

H_0 = There is no difference between expectations for message contributions and percentage of possible density.

Finally, the results of post hoc tests in Table 3 indicate that there is a significant difference at the .05 level between all three types of expectations for message contributions and the percentage of possible discussion density exhibited within the respective discussions.

Table 3: Post Hoc Tests for Expectations for Message Contributions and Percentage of Possible Density

	(I) Expected Message Contributions	(J) Expected Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
Tukey HSD	No Expectations	Encouraged	-.17196(*)	.050287	.002
		Required	-.42723(*)	.043887	.000
	Encouraged	No Expectations	.17196(*)	.050287	.002
		Required	-.25527(*)	.029261	.000
	Required	No Expectations	.42723(*)	.043887	.000
		Encouraged	.25527(*)	.029261	.000
Scheffe	No Expectations	Encouraged	-.17196(*)	.050287	.003
		Required	-.42723(*)	.043887	.000
	Encouraged	No Expectations	.17196(*)	.050287	.003
		Required	-.25527(*)	.029261	.000
	Required	No Expectations	.42723(*)	.043887	.000
		Encouraged	.25527(*)	.029261	.000

* The mean difference is significant at the .05 level.

Specifically, a significant difference at the .05 level was shown to exist in the percentage of possible discussion density exhibited in the discussions where there were "No Expectations" for message contributions and discussions that "Encouraged" but did not require message contributions, as well as with discussions where message contributions were "Required." Additionally, a significant difference at the .05 level was shown to exist in the percentage of possible discussion density exhibited in the discussions where message contributions were "Encouraged" but not required and discussions that "Required" message contributions.

In summary, these results suggest that relationships do exist between discussions representing different instructor expectations for message contributions and the percentage of possible discussion density exhibited in the discussions. More specifically, the average percentage of possible density in the discussions where students were encouraged, but not required, to contribute messages was greater than those discussions that did not have any explicitly stated expectations for message contributions. Moreover, the average percentage of possible density in the discussions where students were required to contribute messages was greater than those discussions that did not have any explicitly stated expectations for message contributions, and was also greater than those discussions where message contributions were encouraged, but not required.

Instructor Expectations for Student Interactions

Table 4 includes a comparison of frequencies of discussions representing each of the three different types of instructors' stated expectations for student interactions. Also

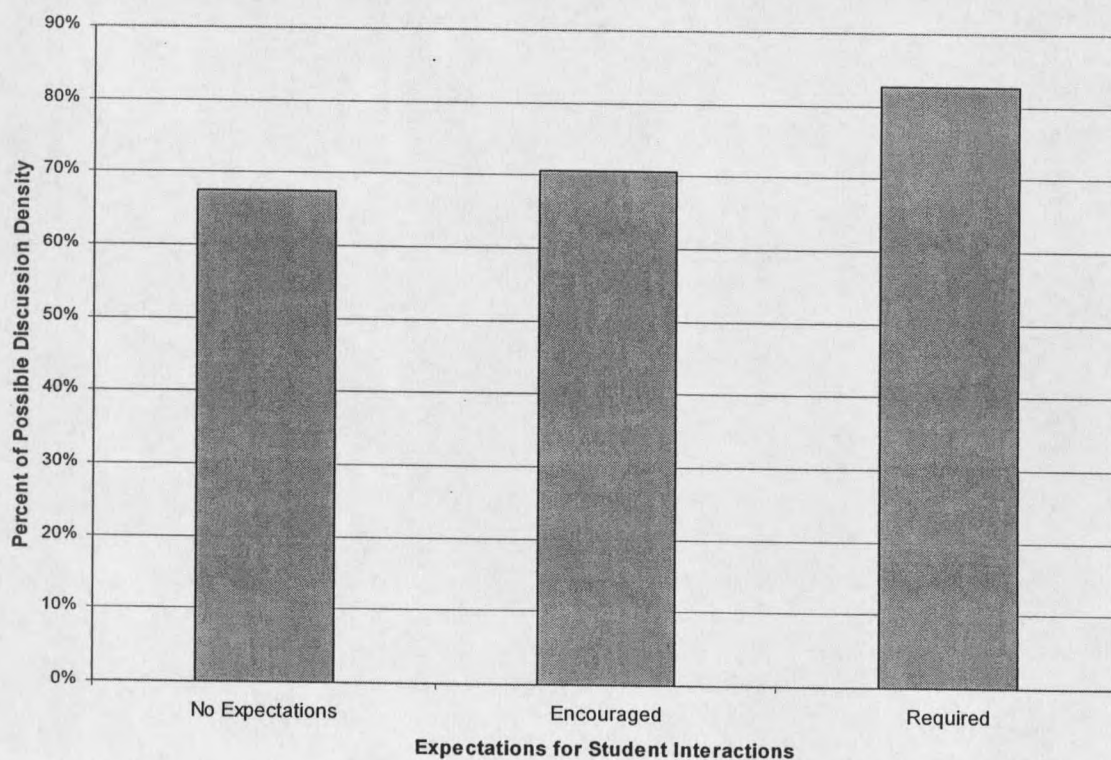
included in Table 4 are a comparison of means and standard deviations of the percentage of possible density of student participation exhibited in discussions representing each expectation type.

Table 4: Descriptive Statistics of Percentage of Possible Density and Expectations for Student Interactions

	N	Mean	Std. Deviation
No Expectations	149	.67511	.226319
Encouraged	11	.70578	.297397
Required	105	.82718	.114843
Total	265	.73663	.206633

As illustrated in Table 4 and Figure 3, discussions representing each of the three types of instructors' stated expectations for student interactions exhibited different means for percentage of possible discussion density.

Figure 3: Expectations for Student Interactions and Percentage of Possible Density



Specifically, discussions with "No Expectations" for student interactions exhibited an average of approximately 68% of possible discussion density while discussions that "Encouraged" student interactions exhibited an average of 70% of possible discussion density and discussions that "Required" student interactions exhibited an average of approximately 83% of possible discussion density.

Based on the results of a one-way analysis of variance (ANOVA) test, illustrated in Table 5, the null hypothesis was rejected, indicating that there was a significant difference at the .05 level between discussions representing at least two of the different types of expectations for student interactions and the corresponding percentage of possible discussion density exhibited in the discussions.

Table 5: ANOVA for Expectations for Student Interactions and Percentage of Possible Density

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.435	2	.718	19.115	.000
Within Groups	9.837	262	.038		
Total	11.272	264			

H_0 = There is no difference between expectations for student interactions and percentage of possible density.

Finally, Table 6 includes the results of post hoc tests indicating the differences that were shown to exist between the means of the percentage of possible discussion density exhibited in discussions representing each of the three types of expectations for student interactions.

Table 6: Post Hoc Tests for Expectations for Student Interactions and Percentage of Possible Density

	(I) Expected Student Interactions	(J) Expected Student Interactions	Mean Difference (I-J)	Std. Error	Sig.
Tukey HSD	No Expectations	Encouraged	-.03067	.060540	.868
		Required	-.15207(*)	.024689	.000
	Encouraged	No Expectations	.03067	.060540	.868
		Required	-.12140	.061406	.120
	Required	No Expectations	.15207(*)	.024689	.000
		Encouraged	.12140	.061406	.120
Scheffe	No Expectations	Encouraged	-.03067	.060540	.880
		Required	-.15207(*)	.024689	.000
	Encouraged	No Expectations	.03067	.060540	.880
		Required	-.12140	.061406	.144
	Required	No Expectations	.15207(*)	.024689	.000
		Encouraged	.12140	.061406	.144

* The mean difference is significant at the .05 level.

Specifically, as indicated in Table 6, a significant difference was shown to exist at the .05 level between the means of possible discussion density exhibited in those discussions where student interactions were "Required" and discussions with "No Expectations" for student interactions. However, the results do not show a significant difference between the means of possible discussion density achieved in discussions with "No Expectations" for student interaction and discussions that "Encouraged" student interactions. Similarly, no significant difference was exhibited between the means of possible discussion density exhibited in discussions that "Encouraged" student interactions and discussions that "Required" student interactions.

In summary, these results suggest that relationships do exist between discussions representing different instructor expectations for student interactions and the percentage of possible discussion density exhibited in the discussions. Specifically, the results

indicate that the percentage of possible density exhibited in discussions that required student interactions were significantly greater than discussions that had no explicitly stated expectations for student interactions.

Expected Minimum Levels of Message Contributions

Table 7 includes a comparison of frequencies of discussions representing each of the instructor's stated expectations for minimum levels of message contributions.

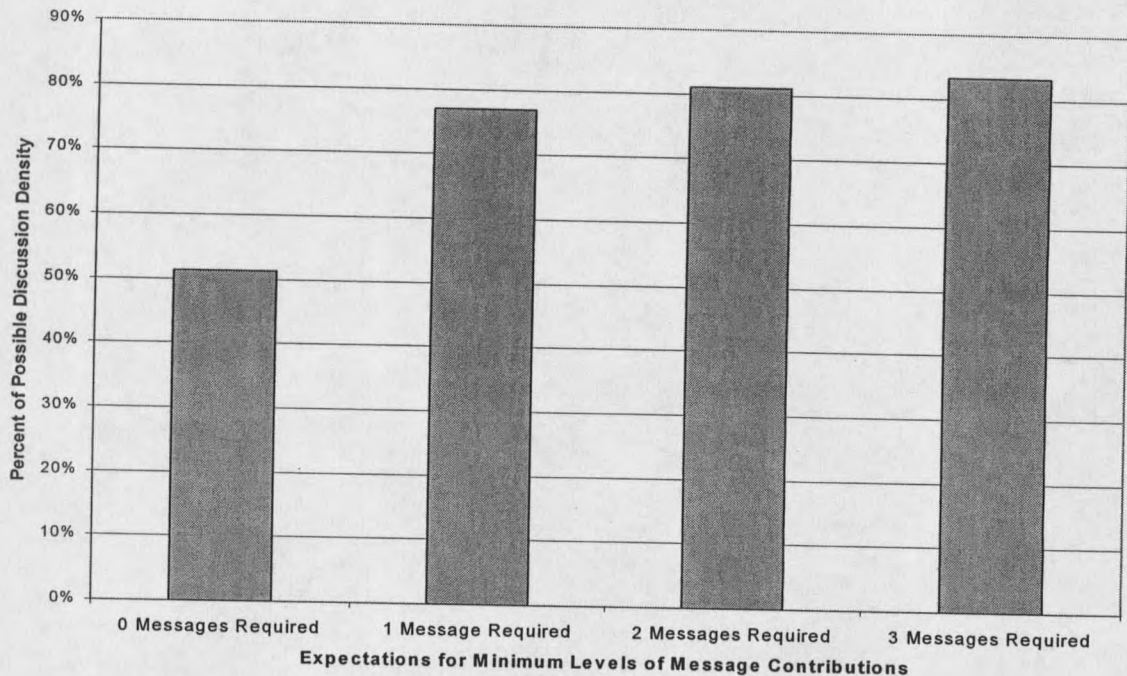
Additionally, Table 7 provides a comparison of means and standard deviations for the percentage of possible density of student participation exhibited in these discussions.

Table 7: Descriptive Statistics of Percentage of Possible Density and Minimum Levels of Message Contributions

	N	Mean	Std. Deviation
0 Messages Required	55	.51292	.237563
1 Message Required	98	.76934	.176778
2 Messages Required	79	.81159	.124318
3 Messages Required	33	.83293	.109012
Total	265	.73663	.206633

As illustrated in Table 7, the means of the percentage of possible density are greater in discussions that have progressively higher levels of minimum message contributions. Specifically, as illustrated in Figure 4, discussions with "No Messages Required" achieved an average of 51% of possible discussion density while discussions with "One Message Required" achieved an average of approximately 77% and discussions with "Two Messages Required" and "Three Messages Required" achieved an average of possible discussion density of 81% and 83% respectively.

Figure 4: Minimum Levels of Message Contributions and Percentage of Possible Density



Based on the results of a one-way analysis of variance (ANOVA) test included in Table 8, the null hypothesis was rejected, as significant differences were shown to exist between discussions representing at least two of the levels of minimum message contributions and the average possible density exhibited in the discussions.

Table 8: ANOVA for Minimum Levels of Message Contributions and Percentage of Possible Density

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.607	3	1.202	40.947	.000
Within Groups	7.665	261	.029		
Total	11.272	264			

H_0 = There is no difference between minimum levels of message contributions and percentage of possible density.

Finally, the results of post hoc tests summarized in Table 9 indicate that significant differences at the .05 level were shown to exist between discussions with

different minimum levels of message contributions and the percentage of possible density achieved in the respective discussions.

Table 9: Post Hoc Tests for Minimum Levels of Message Contributions and Percentage of Possible Density

	(I) Minimum Message Contributions	(J) Minimum Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
Tukey HSD	0 Messages Required	1 Message Required	-.25642(*)	.028872	.000
		2 Messages Required	-.29867(*)	.030094	.000
		3 Messages Required	-.32002(*)	.037734	.000
	1 Message Required	0 Messages Required	.25642(*)	.028872	.000
		2 Messages Required	-.04225	.025911	.363
		3 Messages Required	-.06359	.034490	.255
	2 Messages Required	0 Messages Required	.29867(*)	.030094	.000
		1 Message Required	.04225	.025911	.363
		3 Messages Required	-.02134	.035519	.932
	3 Messages Required	0 Messages Required	.32002(*)	.037734	.000
		1 Message Required	.06359	.034490	.255
		2 Messages Required	.02134	.035519	.932
Scheffe	0 Messages Required	1 Message Required	-.25642(*)	.028872	.000
		2 Messages Required	-.29867(*)	.030094	.000
		3 Messages Required	-.32002(*)	.037734	.000
	1 Message Required	0 Messages Required	.25642(*)	.028872	.000
		2 Messages Required	-.04225	.025911	.449
		3 Messages Required	-.06359	.034490	.336
	2 Messages Required	0 Messages Required	.29867(*)	.030094	.000
		1 Message Required	.04225	.025911	.449
		3 Messages Required	-.02134	.035519	.948
	3 Messages Required	0 Messages Required	.32002(*)	.037734	.000
		1 Message Required	.06359	.034490	.336
		2 Messages Required	.02134	.035519	.948

* The mean difference is significant at the .05 level.

In summary, these results suggest that relationships do exist between discussions representing different instructor expectations for minimum levels of message contributions and the percentage of possible discussion density exhibited in the discussions. Specifically, a significant difference was shown to exist in the percentage of

possible density exhibited in discussions that required students to contribute a minimum one, two, and three messages as compared with discussions that had no explicitly stated expectations for minimum message contributions.

Expected Minimum Levels of Student Interactions

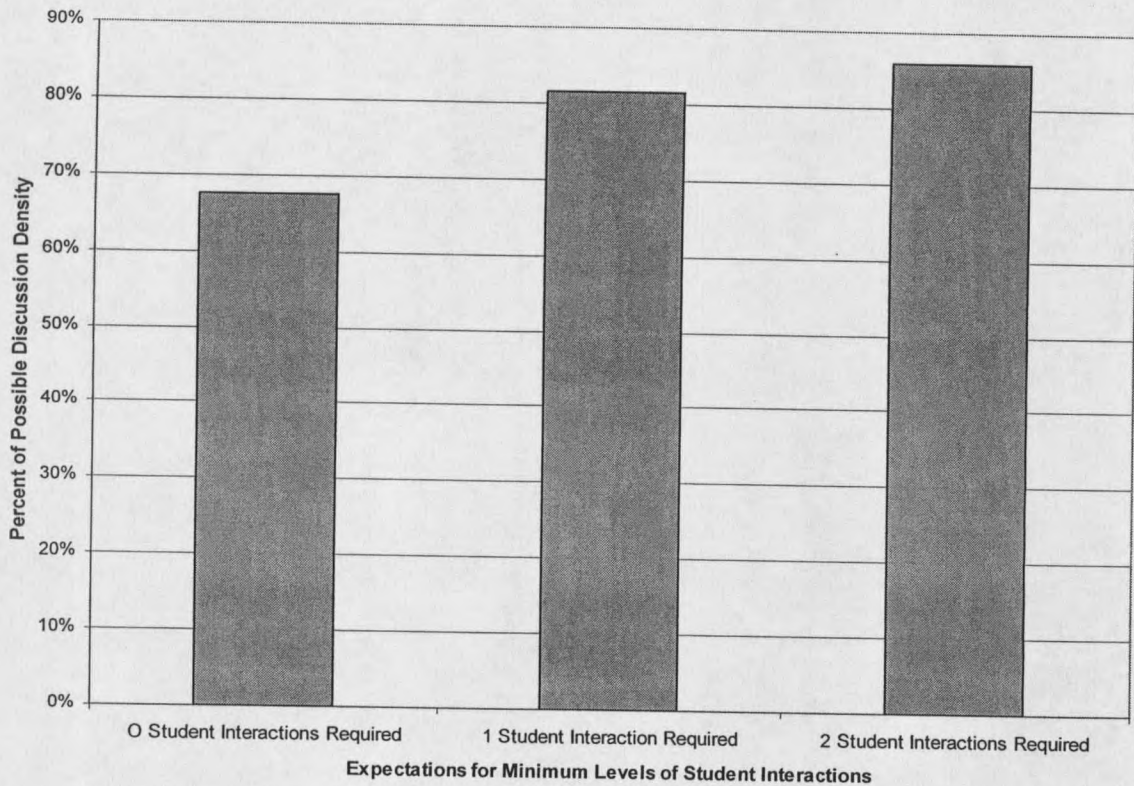
Table 10 includes a comparison of frequencies of the discussions representing different instructor's stated expectations for minimum levels of student interactions. Additionally, Table 10 includes a comparison of means and standard deviations of the percentage of possible density of student participation exhibited in these discussions.

Table 10: Descriptive Statistics of Percentage of Possible Density and Minimum Levels of Student Interactions

	N	Mean	Std. Deviation
0 Student Interactions Required	158	.67674	.232021
1 Student Interaction Required	82	.81492	.120808
2 Student Interactions Required	25	.85841	.090782
Total	265	.73663	.206633

Specifically, Table 10 and Figure 5 illustrate that discussions with "No Student Interactions Required" exhibited an average of 68% of possible discussion density while discussions with "One Student Interaction Required" exhibited an average of approximately 81% of possible discussion density, and discussions with "Two Student Interactions Required" exhibited an average of possible discussion density of 86%.

Figure 5: Minimum Levels of Student Interactions and Percentage of Possible Density



Based on the results of a one-way analysis of variance (ANOVA) test, provided in Table 11, the null hypothesis was rejected as a significant difference at the .05 level was shown to exist between discussions representing at least two of the expected minimum levels of student interactions and the average possible density exhibited within the discussions.

Table 11: ANOVA for Minimum Levels of Student Interactions and Percentage of Possible Density

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.440	2	.720	19.189	.000
Within Groups	9.832	262	.038		
Total	11.272	264			

H_0 = There is no difference between minimum levels of student interactions and percentage of possible density.

Finally, Table 12 includes the results of post hoc tests and identifies differences that were shown to exist between the means of the percentage of possible discussion density exhibited in discussions representing different expected minimum levels of student interactions. Specifically, the results indicate that a significant difference at the .05 level was shown to exist between the means of the percentage of possible density exhibited in discussions that had "No Student Interactions Required" as compared with discussions where students were required to interact with a minimum of both one and two other participants in a respective discussion.

Table 12: Post Hoc Tests for Minimum Levels of Student Interactions and Percentage of Possible Density

	(I) Minimum Student Interactions	(J) Minimum Student Interactions	Mean Difference (I-J)	Std. Error	Sig.
Tukey HSD	O Student	1 Student Interaction Required	-.13819(*)	.026366	.000
	Interactions Required	2 Student Interactions Required	-.18167(*)	.041696	.000
	1 Student Interaction Required	O Student Interactions Required	.13819(*)	.026366	.000
		2 Student Interactions Required	-.04349	.044257	.589
Scheffe	2 Student Interactions Required	O Student Interactions Required	.18167(*)	.041696	.000
		1 Student Interaction Required	.04349	.044257	.589
	O Student	1 Student Interaction Required	-.13819(*)	.026366	.000
	Interactions Required	2 Student Interactions Required	-.18167(*)	.041696	.000
	1 Student Interaction Required	O Student Interactions Required	.13819(*)	.026366	.000
		2 Student Interactions Required	-.04349	.044257	.618
	2 Student Interactions Required	O Student Interactions Required	.18167(*)	.041696	.000
		1 Student Interaction Required	.04349	.044257	.618

* The mean difference is significant at the .05 level.

In summary, these results suggest that relationships do exist between discussions with different instructor expectations for minimum levels of student interactions and the percentage of possible discussion density exhibited within the discussions. More specifically, the results indicate that there is a significant difference in the percentage of

possible density exhibited in discussions that required a minimum of one and two student interactions as compared with discussions that had no explicitly stated expectations for a minimum quantity of student interactions.

Question 1 – Summary

The results of this study suggest that significant relationships did exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the discussion's overall density of student participation. What follows is a summary of the significant relationships that were shown to exist relative to research Question 1.

In regard to instructors' expectations for message contributions, the average percentage of possible density in threaded discussions was greatest in those discussions where students were required to contribute messages in the respective discussions. Specifically, a significant difference was exhibited in the average percentage of possible density in discussions where students were encouraged, but not required, to contribute messages to a discussion as compared with discussions that did not have any explicitly stated expectations for message contributions. Additionally, a significant difference was exhibited in the average percentage of possible density in threaded discussions where students were required to contribute messages to a discussion as compared to discussions where message contributions were encouraged, but not required, and with discussions that did not have explicitly stated expectations for message contributions.

With regard to instructors' stated expectations for student interactions, the average percentage of possible density was greatest in those discussions where students were required to interact with other discussion participants. Specifically, a significant difference was exhibited in the percentage of possible density in discussions that required student interactions as compared with discussions that had no stated expectations for student interaction.

Significant relationships were also shown to exist between discussions representing different expected minimum levels of message contributions and the percentage of possible discussion density exhibited in the discussions. Specifically, a significant difference in the percentage of possible density was exhibited in discussions that required a minimum of one, two, and three message contributions compared with discussions that had no explicitly stated expectations for message contributions.

Finally, a significant relationship was also shown to exist between discussions representing different expected minimum levels of student interactions and the percentage of possible discussion density exhibited in the discussions. Specifically, a significant difference in the percentage of possible density was exhibited in discussions that required one and two student interactions as compared with discussions that had no explicitly stated expectations for a minimum quantity of student interactions.

Question 2 Results

The second research question addressed in this study was: "What relationships exist between the types and levels of instructors' stated expectations for student

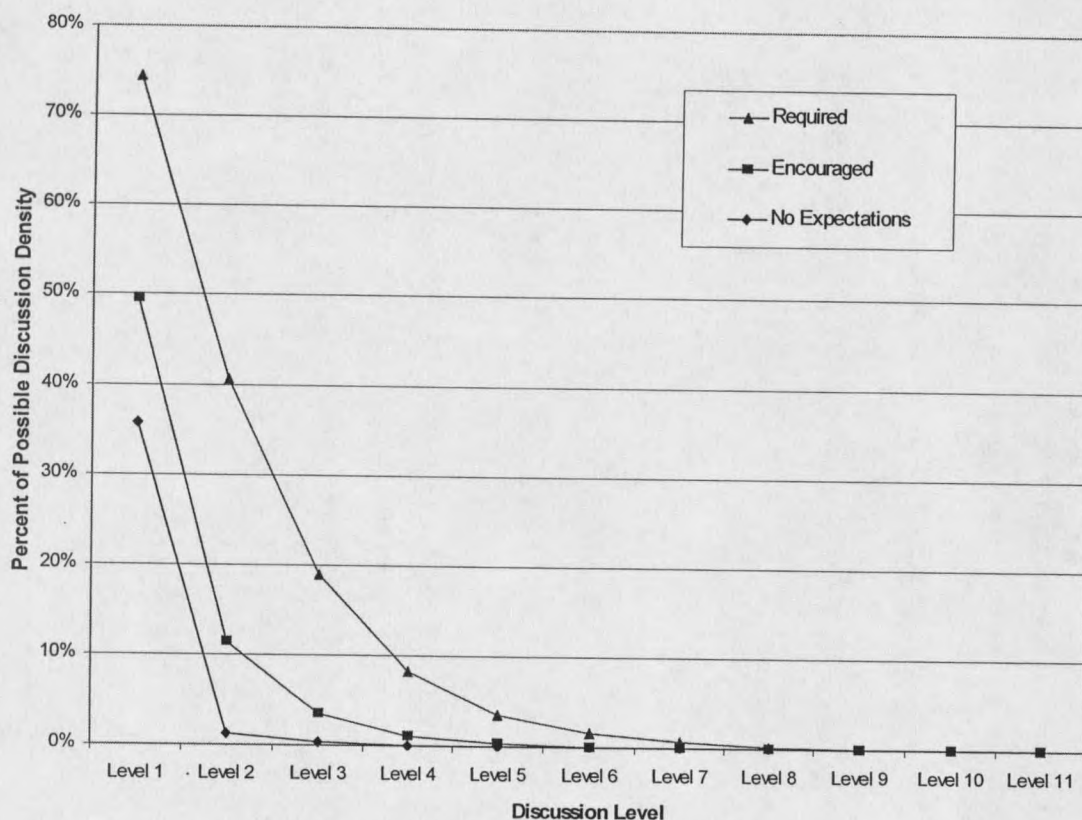
participation in threaded discussions and the discussion's density of student participation in each level of the discussion?" While the first research question focused on the discussion's overall discussion density as the dependent variable, this research question examines the discussion density exhibited within each level of a respective discussion.

To answer this question, each discussion was classified according to the types and levels of the instructor's stated expectations for student participation as explained in the "Foundations for Data Analysis" section at the beginning of this chapter. Additionally, the discussion's density of student participation in each level of the discussion, referred to below as a percentage of possible discussion density, was calculated by dividing the actual participation density exhibited at each discussion level by the maximum possible density of the respective discussion. Taken together, what follows is a discussion of the findings of this study relative to Question 2.

Instructor Expectations for Message Contributions

As illustrated in Figure 6, discussions representing each type of instructors' expectations for message contributions exhibited a different percentage of possible discussion density at each level of the respective discussions. Although all discussions appear to follow a pattern of decline in the percentage of possible density exhibited at each level of discussion, discussions representing the three different types of expectations for message contributions appear to exhibit different patterns of decline in participation density exhibited throughout a respective discussion's "life cycle."

Figure 6: Expectations for Message Contributions and Percentage of Possible Density at Each Discussion Level



Specifically, discussions that “Encouraged” message contributions appear to have a greater density at each respective discussion level as compared with discussions that had no explicitly stated expectations for message contributions. Moreover, the discussions that “Required” message contributions appear to exhibit a greater percentage of possible density at each discussion level as compared with discussions that only “Encouraged” message contributions, as well as with discussions that had “No Expectations” for message contributions.

These results extend upon the findings discussed previously in reference to Question 1, which focused on the density of an overall discussion, by illustrating the

potential relationships of different types of expectations for message contributions and participation density across different levels of a discussion's life-cycle. As illustrated in Figure 5, the percentage of possible discussion density exhibited in discussions with "Required" message contributions is not only greater for a discussion overall, but also appears to exhibit a greater percentage of possible discussion density throughout the life-cycle of the respective discussions as compared with discussions representing both of the other types of expectations for message contributions.

Table 13 includes a comparison of frequencies of the discussions representing each of the three types of expectations for message contributions. Additionally, Table 13 provides a comparison of means and standard deviations of the percentage of possible density exhibited at each level of the respective discussions.

Table 13: Descriptive Statistics of Percentage of Possible Density at Each Discussion Level and Expectations for Message Contributions

		N	Mean	Std. Deviation
L1 Percentage of Possible Density	No Expectations	15	.35653	.230480
	Encouraged	37	.49520	.198021
	Required	213	.74405	.177530
	Total	265	.68737	.217853
L2 Percentage of Possible Density	No Expectations	15	.01270	.024734
	Encouraged	37	.11296	.093855
	Required	213	.40603	.269952
	Total	265	.34285	.276721
L3 Percentage of Possible Density	No Expectations	15	.00278	.010758
	Encouraged	37	.03430	.050516
	Required	213	.18907	.188238
	Total	265	.15692	.181933
L4 Percentage of Possible Density	No Expectations	15	.00000	.000000
	Encouraged	37	.01086	.022536
	Required	213	.08209	.124297
	Total	265	.06750	.115568

L5 Percentage of Possible Density	No Expectations	15	.00000	.000000
	Encouraged	37	.00352	.012926
	Required	213	.03530	.075403
	Total	265	.02886	.068987
L6 Percentage of Possible Density	No Expectations	15	.00000	.000000
	Encouraged	37	.00000	.000000
	Required	213	.01523	.048752
	Total	265	.01224	.044106
L7 Percentage of Possible Density	No Expectations	15	.00	.000
	Encouraged	37	.00	.000
	Required	207	.01	.028
	Total	259	.01	.025
L8 Percentage of Possible Density	No Expectations	15	.00	.000
	Encouraged	37	.00	.000
	Required	213	.00	.012
	Total	265	.00	.011
L9 Percentage of Possible Density	No Expectations	15	.00	.000
	Encouraged	37	.00	.000
	Required	213	.00	.005
	Total	265	.00	.005
L10 Percentage of Possible Density	No Expectations	15	.00	.000
	Encouraged	37	.00	.000
	Required	213	.00	.004
	Total	265	.00	.004
L11 Percentage of Possible Density	No Expectations	15	.00	.000
	Encouraged	37	.00	.000
	Required	213	.00	.002
	Total	265	.00	.002

Based on the results of a one-way analysis of variance (ANOVA) test, illustrated in Table 14, the null hypothesis was rejected, as a significant difference at the .05 level was exhibited between discussions representing at least two of the types of instructors' stated expectations for message contributions and the average possible density exhibited in Level 1 through Level 5 of the discussions. Beyond discussion Level 5, however, the null hypothesis was confirmed, indicating that there no significant differences were found to exist between discussions with different instructor expectations for message

contributions and the percentage of possible discussion density exhibited in discussion Levels 6 through 11. None of the discussions examined in this study exhibited student participation beyond discussion Level 11.

Table 14: ANOVA for Expectations for Message Contributions and Percentage of Possible Density at Each Discussion Level

		Sum of Squares	df	Mean Square	F	Sig.
L1 Percentage of Possible Density	Between Groups	3.693	2	1.846	54.738	.000
	Within Groups	8.837	262	.034		
	Total	12.529	264			
L2 Percentage of Possible Density	Between Groups	4.441	2	2.220	36.876	.000
	Within Groups	15.775	262	.060		
	Total	20.216	264			
L3 Percentage of Possible Density	Between Groups	1.133	2	.566	19.514	.000
	Within Groups	7.605	262	.029		
	Total	8.738	264			
L4 Percentage of Possible Density	Between Groups	.232	2	.116	9.243	.000
	Within Groups	3.294	262	.013		
	Total	3.526	264			
L5 Percentage of Possible Density	Between Groups	.045	2	.023	4.874	.008
	Within Groups	1.211	262	.005		
	Total	1.256	264			
L6 Percentage of Possible Density	Between Groups	.010	2	.005	2.520	.082
	Within Groups	.504	262	.002		
	Total	.514	264			
L7 Percentage of Possible Density	Between Groups	.002	2	.001	1.572	.210
	Within Groups	.162	256	.001		
	Total	.164	258			
L8 Percentage of Possible Density	Between Groups	.000	2	.000	1.064	.347
	Within Groups	.030	262	.000		
	Total	.030	264			
L9 Percentage of Possible Density	Between Groups	.000	2	.000	.398	.672
	Within Groups	.006	262	.000		
	Total	.006	264			
L10 Percentage of Possible Density	Between Groups	.000	2	.000	.121	.886
	Within Groups	.004	262	.000		
	Total	.004	264			

L11 Percentage of Possible Density	Between Groups	.000	2	.000	.121	.886
	Within Groups	.004	262	.000		
	Total	.004	264			

H_0 = There is no difference between expectations for message contributions and percentage of possible density at each discussion level.

The results of post hoc tests, provided in Table 15, indicates where differences were shown to exist between discussions representing each type of expectation for message contributions and the means of the percentage of possible discussion density exhibited through the first five levels of the respective discussions.

Table 15: Post Hoc Tests for Expectations for Message Contributions and Percentage of Possible Density at Each Discussion Level

Dependent Variable		(I) Expected Message Contributions	(J) Expected Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
L1 Percentage of Possible Density	Tukey HSD	No Expectations	Encouraged	-.13867(*)	.056215	.038
			Required	-.38752(*)	.049061	.000
		Encouraged	No Expectations	.13867(*)	.056215	.038
			Required	-.24885(*)	.032710	.000
		Required	No Expectations	.38752(*)	.049061	.000
			Encouraged	.24885(*)	.032710	.000
	Scheffe	No Expectations	Encouraged	-.13867(*)	.056215	.049
			Required	-.38752(*)	.049061	.000
		Encouraged	No Expectations	.13867(*)	.056215	.049
			Required	-.24885(*)	.032710	.000
		Required	No Expectations	.38752(*)	.049061	.000
			Encouraged	.24885(*)	.032710	.000
L2 Percentage of Possible Density	Tukey HSD	No Expectations	Encouraged	-.10027	.075109	.377
			Required	-.39333(*)	.065549	.000
		Encouraged	No Expectations	.10027	.075109	.377
			Required	-.29307(*)	.043703	.000
		Required	No Expectations	.39333(*)	.065549	.000
			Encouraged	.29307(*)	.043703	.000
	Scheffe	No Expectations	Encouraged	-.10027	.075109	.411
			Required	-.39333(*)	.065549	.000
		Encouraged	No Expectations	.10027	.075109	.411
			Required	-.29307(*)	.043703	.000

L3 Percentage of Possible Density	Tukey HSD	Required	No Expectations	.39333(*)	.065549	.000
			Encouraged	.29307(*)	.043703	.000
		No Expectations	Encouraged	-.03152	.052151	.818
			Required	-.18630(*)	.045514	.000
		Encouraged	No Expectations	.03152	.052151	.818
			Required	-.15477(*)	.030345	.000
	Scheffe	Required	No Expectations	.18630(*)	.045514	.000
			Encouraged	.15477(*)	.030345	.000
		No Expectations	Encouraged	-.03152	.052151	.833
			Required	-.18630(*)	.045514	.000
		Encouraged	No Expectations	.03152	.052151	.833
			Required	-.15477(*)	.030345	.000
L4 Percentage of Possible Density	Tukey HSD	Required	No Expectations	.18630(*)	.045514	.000
			Encouraged	.15477(*)	.030345	.000
		No Expectations	Encouraged	-.01086	.034319	.946
			Required	-.08209(*)	.029951	.018
		Encouraged	No Expectations	.01086	.034319	.946
			Required	-.07123(*)	.019969	.001
	Scheffe	Required	No Expectations	.08209(*)	.029951	.018
			Encouraged	.07123(*)	.019969	.001
		No Expectations	Encouraged	-.01086	.034319	.951
			Required	-.08209(*)	.029951	.025
		Encouraged	No Expectations	.01086	.034319	.951
			Required	-.07123(*)	.019969	.002
L5 Percentage of Possible Density	Tukey HSD	Required	No Expectations	.08209(*)	.029951	.025
			Encouraged	.07123(*)	.019969	.002
		No Expectations	Encouraged	-.00352	.020813	.984
			Required	-.03530	.018164	.129
		Encouraged	No Expectations	.00352	.020813	.984
			Required	-.03178(*)	.012111	.025
	Scheffe	Required	No Expectations	.03530	.018164	.129
			Encouraged	.03178(*)	.012111	.025
		No Expectations	Encouraged	-.00352	.020813	.986
			Required	-.03530	.018164	.153
		Encouraged	No Expectations	.00352	.020813	.986
			Required	-.03178(*)	.012111	.033
		Required	No Expectations	.03530	.018164	.153
			Encouraged	.03178(*)	.012111	.033

* The mean difference is significant at the .05 level.

As summarized in Table 15, post hoc test results indicate that, at discussion Level 1, significant differences at the .05 level exist in the percentage of possible density exhibited in discussions representing each of the three types of expectations for message

contributions. More specifically, at discussion Level 1, discussions that “Encouraged” and “Required” message contributions exhibited a significantly greater percentage of possible discussion density as compared with discussions that had “No Expectations” for message contributions. Additionally, discussions with “Required” message contributions also exhibited a significantly higher percentage of possible discussion density compared with discussions that “Encouraged” but did not require student message contributions.

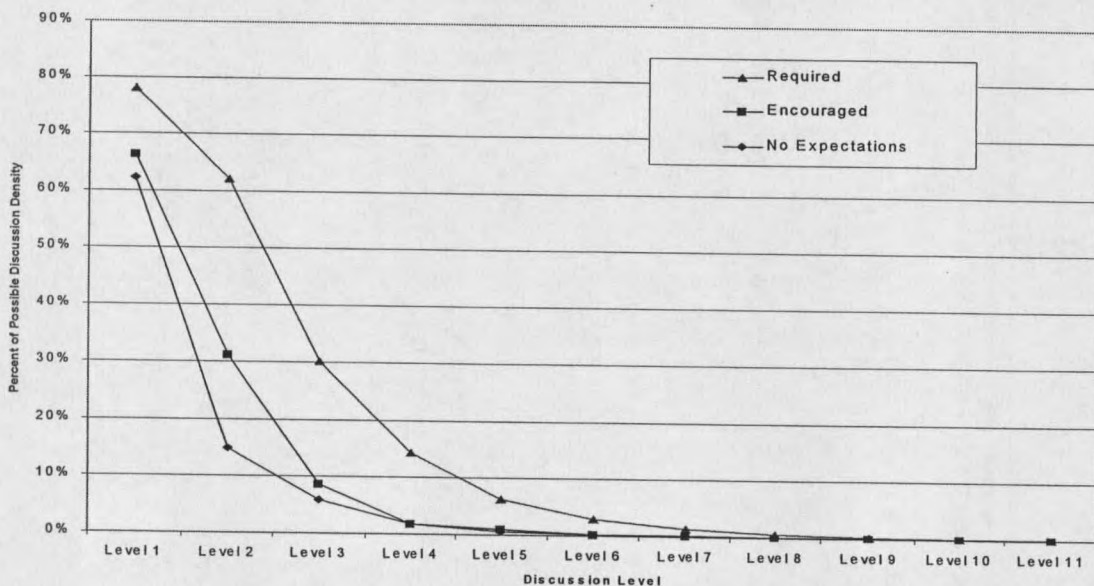
At discussion Level 2, Level 3, and Level 4, significant differences at the .05 level were shown to exist in those discussions with “Required” message contributions as compared with discussions that had “No Expectations” for message contributions as well as with discussions that “Encouraged” but did not require students to contribute messages to the respective discussions. Finally, at discussion Level 5, a significant difference at the .05 level was shown to exist in the percentage of possible discussion density exhibited in discussions that “Required” message contributions as compared with discussions that “Encouraged” but did not require message contributions.

Instructor Expectations for Student Interactions

As illustrated in Figure 7, discussions representing each type of instructors' expectations for student interactions exhibit a different percentage of possible discussion density at each level of the respective discussions. Although all discussions appear to follow a pattern of decline in the percentage of possible density exhibited at each level of discussion, discussions representing the three different types of expectations for student interactions appear to exhibit different patterns of decline in participation density exhibited throughout a respective discussion's “life cycle.”

Specifically, discussions that “Encouraged” student interactions appear to have a greater density at each respective discussion level as compared with discussions that had no explicitly stated expectations for student interactions. Moreover, the discussions that “Required” student interactions appear to exhibit a greater percentage of possible density at each discussion level as compared with discussions that only “Encouraged” student interactions, as well as with discussions that had “No Expectations” for student interactions with other discussion participants.

Figure 7: Expectations for Student Interactions and Percentage of Possible Density at Each Discussion Level



These results extend upon the findings discussed previously in reference to Question 1, which focused on the density of an overall discussion, by illustrating the potential relationships of different types of expectations for student interactions and participation density across different levels of a discussion's life-cycle. As illustrated in Figure 6, the percentage of possible discussion density exhibited in discussions with

"Required" student interactions is not only greater for a discussion overall, but also appears to exhibit a greater percentage of possible discussion density throughout the life-cycle of the respective discussions as compared with discussions representing both of the other types of expectations for student interactions.

Table 16: Descriptive Statistics of Percentage of Possible Density at Each Discussion Level and Expectations for Student Interactions

		N	Mean	Std. Deviation
L1 Percentage of Possible Density	No Expectations	149	.62350	.221864
	Encouraged	11	.66317	.280362
	Required	105	.78054	.167921
	Total	265	.68737	.217853
L2 Percentage of Possible Density	No Expectations	149	.14903	.141767
	Encouraged	11	.31329	.228043
	Required	105	.62098	.169607
	Total	265	.34285	.276721
L3 Percentage of Possible Density	No Expectations	149	.05930	.104711
	Encouraged	11	.08555	.069678
	Required	105	.30291	.179560
	Total	265	.15692	.181933
L4 Percentage of Possible Density	No Expectations	149	.01849	.062787
	Encouraged	11	.01832	.027506
	Required	105	.14219	.137447
	Total	265	.06750	.115568
L5 Percentage of Possible Density	No Expectations	149	.00636	.031317
	Encouraged	11	.00932	.023703
	Required	105	.06284	.093276
	Total	265	.02886	.068987
L6 Percentage of Possible Density	No Expectations	149	.00112	.013654
	Encouraged	11	.00233	.007731
	Required	105	.02906	.064761
	Total	265	.01224	.044106
L7 Percentage of Possible Density	No Expectations	149	.00	.000
	Encouraged	11	.00	.008
	Required	105	.01	.039
	Total	265	.01	.025
L8 Percentage of Possible Density	No Expectations	149	.00	.000
	Encouraged	11	.00	.000
	Required	105	.00	.017

	Total	265	.00	.011
L9 Percentage of Possible Density	No Expectations	149	.00	.000
	Encouraged	11	.00	.000
	Required	105	.00	.008
	Total	265	.00	.005
L10 Percentage of Possible Density	No Expectations	149	.00	.000
	Encouraged	11	.00	.000
	Required	105	.00	.006
	Total	265	.00	.004
L11 Percentage of Possible Density	No Expectations	149	.00	.000
	Encouraged	11	.00	.000
	Required	105	.00	.003
	Total	265	.00	.002

Table 16 includes a comparison of frequencies of the discussions representing each of the three types of expectations for student interactions. Additionally, Table 16 provides a comparison of means and standard deviations of the percentage of possible density exhibited at each level of the respective discussions.

Table 17: ANOVA for Expectations for Student Interactions and Percentage of Possible Density at Each Discussion Level

		Sum of Squares	df	Mean Square	F	Sig.
L1 Percentage of Possible Density	Between Groups	1.526	2	.763	18.165	.000
	Within Groups	11.004	262	.042		
	Total	12.529	264			
L2 Percentage of Possible Density	Between Groups	13.729	2	6.865	277.285	.000
	Within Groups	6.486	262	.025		
	Total	20.216	264			
L3 Percentage of Possible Density	Between Groups	3.714	2	1.857	96.829	.000
	Within Groups	5.024	262	.019		
	Total	8.738	264			
L4 Percentage of Possible Density	Between Groups	.970	2	.485	49.731	.000
	Within Groups	2.556	262	.010		
	Total	3.526	264			
L5 Percentage of Possible Density	Between Groups	.201	2	.100	24.924	.000
	Within Groups	1.056	262	.004		
	Total	1.256	264			

L6 Percentage of Possible Density	Between Groups	.049	2	.025	13.884	.000
	Within Groups		262	.002		
	Total	.514	264			
L7 Percentage of Possible Density	Within Groups	.012	2	.006	10.221	.000
	Between Groups	.152	256	.001		
	Total	.164	258			
L8 Percentage of Possible Density	Between Groups	.002	2	.001	6.933	.001
	Within Groups	.029	262	.000		
	Total	.030	264			
L9 Percentage of Possible Density	Between Groups	.000	2	.000	2.521	.082
	Within Groups	.006	262	.000		
	Total	.006	264			
L10 Percentage of Possible Density	Between Groups	.000	2	.000	.761	.468
	Within Groups	.004	262	.000		
	Total	.004	264			
L11 Percentage of Possible Density	Between Groups	.000	2	.000	.761	.468
	Within Groups	.001	262	.000		
	Total	.001	264			

H_0 = There is no difference between expectations for student interactions and percentage of possible density at each discussion level.

Based on the results of a one-way analysis of variance (ANOVA) test, illustrated in Table 17, the null hypothesis was rejected as significant differences at the .05 level were shown to exist between discussions representing at least two of the types of instructor expectations for student interactions and the average possible density exhibited at each discussion level through discussion Level 8. Accordingly, the results of post hoc tests, provided Appendix A, illustrates where differences at the .05 level were shown to exist between the percentage of possible density exhibited in discussions with different expectation for student interactions through the first eight levels of the respective discussions.

Specifically, at discussion Level 1, Level 6, Level 7, and Level 8, significant differences at the .05 level were shown to exist in the percentage of possible density

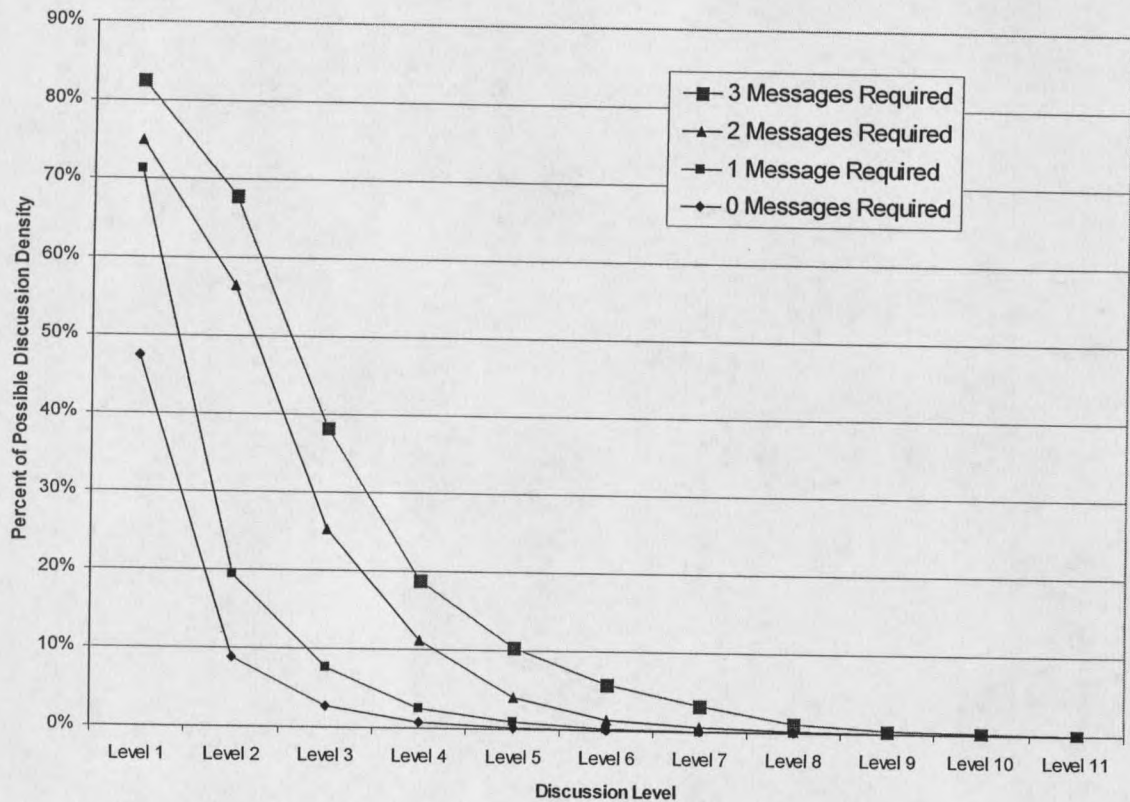
exhibited in discussions with "No Expectations" for student interactions compared with discussions that "Required" students to interact with other discussion participants. Additionally, at discussion Level 3, Level 4, and Level 5, significant differences at the .05 level were shown to exist in those discussions with "Required" student interactions as compared with discussions that had "No Expectations" for student interactions, as well as with discussions that "Encouraged" but did not require students to interact with other discussion participants.

Finally, at discussion Level 2, significant differences at the .05 level were shown to exist in the percentage of possible density exhibited in discussions representing each of the three types of expectations for student interactions. More specifically, at discussion Level 2, discussions that "Encouraged" and "Required" student interactions exhibited a significantly greater percentage of possible discussion density as compared with discussions that had "No Expectations" for student interactions. Additionally, discussions with "Required" student interactions also exhibited a significantly higher percentage of possible discussion density compared with discussions that "Encouraged" but did not require student interactions.

Expected Minimum Levels of Message Contributions

Illustrated in Figure 8, discussions representing each of the classifications of required minimum levels of message contributions exhibit a different percentage of possible discussion density at each level of the respective discussions.

Figure 8: Minimum Levels of Message Contributions and Percentage of Possible Density at Each Discussion Level



Although all discussions appear to follow a pattern of decline in the percentage of possible density exhibited at each level of discussion, discussions representing different expectations for minimum levels of message contributions appear to exhibit different patterns of decline in participation density exhibited throughout the respective discussion's "life cycle." For example, discussions requiring a minimum of one message contribution exhibited a greater density at each respective discussion level as compared with discussions that had no requirements for minimum message contributions. Moreover, the discussions that required two minimum message contributions exhibited a greater percentage of possible density at each discussion level as compared with

discussions that required only one message contribution. Finally, discussions that required a minimum of three message contributions exhibited a greater percentage of possible density at each discussion level compared with discussions representing all of the other levels of expected minimum message contributions.

These results extend upon the findings discussed previously in reference to Question 1, which focused on the density of an overall discussion, by illustrating the potential relationships between discussions representing different expectations for minimum levels of message contributions and the participation density exhibited across each of the different levels of a respective discussion's life-cycle.

Table 18 includes a comparison of frequencies of the discussions classified into each of four levels of instructors' stated expectations for minimum levels of message contributions. Table 18 also includes a comparison of means and standard deviations of the percentage of possible density of student participation exhibited in these discussions. Specifically, as illustrated in Table 18, the mean percentages of possible density exhibited in the discussions was progressively greater at each discussion level in those discussions requiring progressively higher levels of minimum message contributions.

Table 18: Descriptive Statistics of Percentage of Possible Density at Each Discussion Level and Minimum Levels of Message Contributions

		N	Mean	Std. Deviation
L1 Percentage of Possible Density	0 Messages Required	55	.47381	.225847
	1 Message Required	98	.71121	.183298
	2 Messages Required	79	.74882	.180762
	3 Messages Required	33	.82541	.121973
	Total	265	.68737	.217853

L2 Percentage of Possible Density	0 Messages Required	55	.08754	.094041
	1 Message Required	98	.19384	.169592
	2 Messages Required	79	.56551	.183215
	3 Messages Required	33	.67782	.172215
	Total	265	.34285	.276721
L3 Percentage of Possible Density	0 Messages Required	55	.02754	.047232
	1 Message Required	98	.07696	.120877
	2 Messages Required	79	.25204	.155605
	3 Messages Required	33	.38229	.207202
	Total	265	.15692	.181933
L4 Percentage of Possible Density	0 Messages Required	55	.00865	.021089
	1 Message Required	98	.02464	.075698
	2 Messages Required	79	.11083	.128716
	3 Messages Required	33	.18913	.142173
	Total	265	.06750	.115568
L5 Percentage of Possible Density	0 Messages Required	55	.00237	.010685
	1 Message Required	98	.00939	.038347
	2 Messages Required	79	.04034	.066447
	3 Messages Required	33	.10336	.124238
	Total	265	.02886	.068987
L6 Percentage of Possible Density	0 Messages Required	55	.00000	.000000
	1 Message Required	98	.00196	.017008
	2 Messages Required	79	.01425	.042032
	3 Messages Required	33	.05834	.089905
	Total	265	.01224	.044106
L7 Percentage of Possible Density	0 Messages Required	55	.00	.000
	1 Message Required	98	.00	.003
	2 Messages Required	76	.01	.023
	3 Messages Required	30	.03	.058
	Total	259	.01	.025
L8 Percentage of Possible Density	0 Messages Required	55	.00	.000
	1 Message Required	98	.00	.000
	2 Messages Required	79	.00	.009
	3 Messages Required	33	.01	.025
	Total	265	.00	.011
L9 Percentage of Possible Density	0 Messages Required	55	.00	.000
	1 Message Required	98	.00	.000
	2 Messages Required	79	.00	.003
	3 Messages Required	33	.00	.013
	Total	265	.00	.005

L10 Percentage of Possible Density	0 Messages Required	55	.00	.000
	1 Message Required	98	.00	.000
	2 Messages Required	79	.00	.000
	3 Messages Required	33	.00	.011
	Total	265	.00	.004
L11 Percentage of Possible Density	0 Messages Required	55	.00	.000
	1 Message Required	98	.00	.000
	2 Messages Required	79	.00	.000
	3 Messages Required	33	.00	.006
	Total	265	.00	.002

Based on results of a one-way analysis of variance (ANOVA) test, in Table 19, the null hypothesis was rejected as a significant difference at the .05 level was found between discussions representing different minimum levels of message contributions and the percentage of possible density exhibited through Level 9 of the discussions.

Table 19: ANOVA for Minimum Levels of Message Contributions and Percentage of Possible Density at Each Discussion Level

		Sum of Squares	df	Mean Square	F	Sig.
L1 Percentage of Possible Density	Between Groups	3.491	3	1.164	33.608	.000
	Within Groups	9.038	261	.035		
	Total	12.529	264			
L2 Percentage of Possible Density	Between Groups	13.381	3	4.460	170.32	.000
	Within Groups	6.835	261	.026		
	Total	20.216	264			
L3 Percentage of Possible Density	Between Groups	3.938	3	1.313	71.374	.000
	Within Groups	4.800	261	.018		
	Total	8.738	264			
L4 Percentage of Possible Density	Between Groups	1.007	3	.336	34.781	.000
	Within Groups	2.519	261	.010		
	Total	3.526	264			
L5 Percentage of Possible Density	Between Groups	.269	3	.090	23.738	.000
	Within Groups	.987	261	.004		
	Total	1.256	264			
L6 Percentage of Possible Density	Between Groups	.089	3	.030	18.252	.000
	Within Groups	.425	261	.002		
	Total	.514	264			

L7 Percentage of Possible Density	Between Groups	.026	3	.009	16.044	.000
	Within Groups	.138	255	.001		
	Total	.164	258			
L8 Percentage of Possible Density	Between Groups	.003	3	.001	10.585	.000
	Within Groups	.027	261	.000		
	Total	.030	264			
L9 Percentage of Possible Density	Between Groups	.000	3	.000	5.447	.001
	Within Groups	.006	261	.000		
	Total	.006	264			
L10 Percentage of Possible Density	Between Groups	.000	3	.000	2.380	.070
	Within Groups	.004	261	.000		
	Total	.004	264			
L11 Percentage of Possible Density	Between Groups	.000	3	.000	2.380	.070
	Within Groups	.001	261	.000		
	Total	.001	264			

H_0 = There is no difference between minimum message contributions and percentage of possible density at each discussion level.

Additionally, the results of post hoc tests, provided in Appendix B, indicates that differences at the .05 level were found to exist in the percentage of possible density exhibited in discussions with different expected minimum levels of message contributions through the first nine levels of the discussions examined in this study. More specifically, at discussion Level 1, a significant difference at the .05 level was shown to exist in the percentage of possible density exhibited between discussions with no messages required and discussions that required students to contribute a minimum of one, two, and three messages to a respective discussion. Additionally, a significant difference at the .05 level was shown to exist in the percentage of possible density exhibited between discussions requiring a minimum of one message contribution and discussions requiring a minimum of three message contributions.

At discussion Level 2, a significant difference at the .05 level was also shown to exist in the percentage of possible density exhibited between discussions with no messages required and discussions that required students to contribute a minimum of one, two, and three messages to a respective discussion. Additionally, at discussion Level 2, a significant difference at the .05 level was shown to exist in the percentage of possible density exhibited between discussions requiring a minimum of one message contribution and discussions requiring students to contribute a minimum of two and three messages to a respective discussion. Finally, at discussion Level 2, a significant difference at the .05 level was also shown to exist in the percentage of possible density exhibited between discussions requiring a minimum of two message contributions and discussions requiring students to contribute a minimum of three messages to a respective discussion.

At discussion Level 3, Level 4, and Level 5, a significant difference at the .05 level was shown to exist in the percentage of possible density exhibited between discussions with either no messages required or one message required and discussions that required students to contribute a minimum of two and three messages to a respective discussion. Moreover, at discussion Level 3, Level 4, and Level 5, a significant difference at the .05 level was also shown to exist in the percentage of possible density exhibited between discussions requiring a minimum of two message contributions and discussions requiring students to contribute a minimum of three messages to a respective discussion.

Finally, at discussion Level 6 through Level 9, a significant difference at the .05 level was shown to exist in the percentage of possible density exhibited between

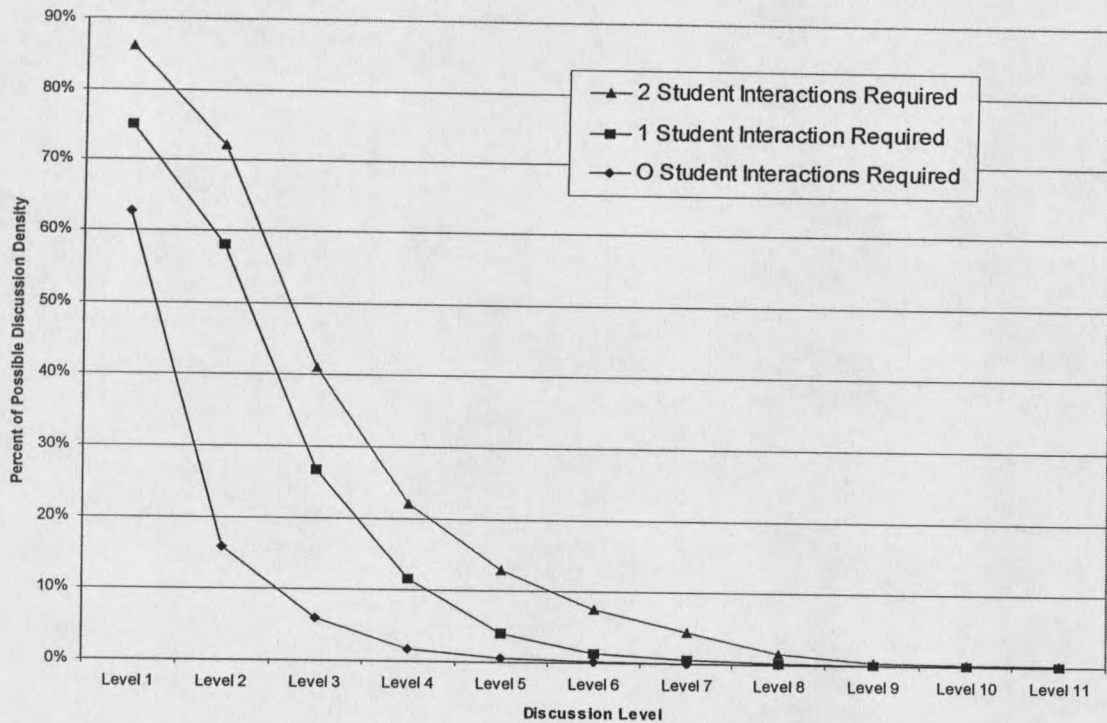
discussions requiring no messages, one message, or two messages and discussions requiring students to contribute a minimum of three messages to a respective discussion.

Expected Minimum Levels of Student Interactions

As illustrated in Figure 9, discussions representing each of the classifications of required minimum levels of student interactions exhibited a different percentage of possible discussion density at each level of the respective discussions. Additionally, though all discussions appear to exhibit a pattern of decline in the percentage of possible density across discussion levels, discussions representing each of the different instructor expectations for minimum levels of student interactions appear to exhibit different patterns of decline in the percentage of participation density exhibited throughout the respective discussion's "life cycle." More specifically, the discussions with progressively higher expectations for student interactions appear to exhibit progressively higher percentages of possible density at each level of the respective discussions.

Discussions requiring a minimum of one student interaction appear to have a greater density at each respective discussion level as compared with discussions that had no requirements for minimum student interactions. Moreover, the discussions that required two minimum student interactions appear to exhibit a greater percentage of possible density at each discussion level as compared with discussions that required only one student interaction as well as with discussions with no student interactions required.

Figure 9: Minimum Levels of Student Interactions and Percentage of Possible Density at Each Discussion Level



These results extend upon the findings discussed previously in reference to Question 1, which focused on the density of an overall discussion, by illustrating potential relationships between discussions representing different types of expectations for minimum student interactions and the participation density across different levels of a respective discussion's life-cycle.

Table 20: Descriptive Statistics of Percentage of Possible Density at Each Discussion Level and Minimum Levels of Student Interactions

		N	Mean	Std. Deviation
L1 Percentage of Possible Density	0 Student Interactions Required	158	.62653	.226829
	1 Student Interaction Required	82	.75159	.178134
	2 Student Interactions Required	25	.86128	.091767
	Total	265	.68737	.217853

L2 Percentage of Possible Density	O Student Interactions Required	158	.15900	.154448
	1 Student Interaction Required	82	.58147	.167845
	2 Student Interactions Required	25	.72209	.155901
	Total	265	.34285	.276721
L3 Percentage of Possible Density	O Student Interactions Required	158	.05997	.102887
	1 Student Interaction Required	82	.26667	.151235
	2 Student Interactions Required	25	.40963	.219306
	Total	265	.15692	.181933
L4 Percentage of Possible Density	O Student Interactions Required	158	.01825	.061176
	1 Student Interaction Required	82	.11572	.124561
	2 Student Interactions Required	25	.22061	.147427
	Total	265	.06750	.115568
L5 Percentage of Possible Density	O Student Interactions Required	158	.00665	.030989
	1 Student Interaction Required	82	.04086	.065842
	2 Student Interactions Required	25	.12989	.130639
	Total	265	.02886	.068987
L6 Percentage of Possible Density	O Student Interactions Required	158	.00122	.013402
	1 Student Interaction Required	82	.01418	.041385
	2 Student Interactions Required	25	.07553	.097251
	Total	265	.01224	.044106
L7 Percentage of Possible Density	O Student Interactions Required	158	.00	.002
	1 Student Interaction Required	79	.01	.023
	2 Student Interactions Required	22	.04	.064
	Total	259	.01	.025
L8 Percentage of Possible Density	O Student Interactions Required	158	.00	.000
	1 Student Interaction Required	82	.00	.009
	2 Student Interactions Required	25	.01	.029
	Total	265	.00	.011
L9 Percentage of Possible Density	O Student Interactions Required	158	.00	.000
	1 Student Interaction Required	82	.00	.003
	2 Student Interactions Required	25	.00	.015
	Total	265	.00	.005
L10 Percentage of Possible Density	O Student Interactions Required	158	.00	.000
	1 Student Interaction Required	82	.00	.000
	2 Student Interactions Required	25	.00	.013
	Total	265	.00	.004
L11 Percentage of Possible Density	O Student Interactions Required	158	.00	.000
	1 Student Interaction Required	82	.00	.000
	Total	265	.00	.002

Table 20 includes a comparison of frequencies of the discussions classified into each of the three levels of instructors' stated expectations for minimum levels of student interactions as well as a comparison of means and standard deviations of the percentage of possible density of student participation exhibited in these discussions. The percentage of possible density exhibited is progressively greater at each discussion level in the discussions requiring progressively higher levels of minimum student interactions.

Based on the results of a one-way analysis of variance (ANOVA) test, illustrated in Table 21, the null hypothesis was rejected as a significant difference at the .05 level was found between discussions representing at least two of the types of instructor expectations for minimum levels of student interactions and the percentage of possible density exhibited through all 11 levels of the respective discussions.

Table 21: ANOVA for Minimum Levels of Student Interactions and Percentage of Possible Density at Each Discussion Level

		Sum of Squares	df	Mean Square	F	Sig.
L1 Percentage of Possible Density	Between Groups	1.679	2	.840	20.273	.000
	Within Groups	10.850	262	.041		
	Total	12.529	264			
L2 Percentage of Possible Density	Between Groups	13.605	2	6.803	269.621	.000
	Within Groups	6.610	262	.025		
	Total	20.216	264			
L3 Percentage of Possible Density	Between Groups	4.069	2	2.035	114.180	.000
	Within Groups	4.669	262	.018		
	Total	8.738	264			
L4 Percentage of Possible Density	Between Groups	1.160	2	.580	64.229	.000
	Within Groups	2.366	262	.009		
	Total	3.526	264			

L5 Percentage of Possible Density	Between Groups	.345	2	.172	49.572	.000
	Within Groups	.912	262	.003		
	Total	1.256	264			
L6 Percentage of Possible Density	Between Groups	.120	2	.060	39.794	.000
	Within Groups	.394	262	.002		
	Total	.514	264			
L7 Percentage of Possible Density	Between Groups	.037	2	.019	37.792	.000
	Within Groups	.126	256	.000		
	Total	.164	258			
L8 Percentage of Possible Density	Between Groups	.005	2	.002	23.174	.000
	Within Groups	.026	262	.000		
	Total	.030	264			
L9 Percentage of Possible Density	Between Groups	.001	2	.000	11.603	.000
	Within Groups	.006	262	.000		
	Total	.006	264			
L10 Percentage of Possible Density	Between Groups	.000	2	.000	4.943	.008
	Within Groups	.004	262	.000		
	Total	.004	264			
L11 Percentage of Possible Density	Between Groups	.000	2	.000	4.943	.008
	Within Groups	.001	262	.000		
	Total	.001	264			

H_0 = There is no difference between minimum student interactions and percentage of possible density at each discussion level.

The results of post hoc tests, included in Appendix C, identify significant differences at the .05 level between discussions representing different levels of minimum student interactions through all 11 levels of the respective discussions. Of particular note, are the significant differences that exist through discussion Level 6 between each of the three levels of minimum student interactions. Beyond level 6, however, only discussions with "Two interactions required" represent significantly different participation density outcomes.

More specifically, at discussion Level 1 through Level 6, a significant difference at the .05 level was shown to exist in the percentage of possible density exhibited between discussions with no student interactions required and discussions that required students to interact with a minimum of one and two other discussion participants.

Additionally, at discussion Level 1 through Level 6, a significant difference at the .05 level was shown to exist in the percentage of possible density exhibited between discussions requiring a minimum of one student interaction and discussions requiring students to interact with a minimum of two other discussion participants within a respective discussion.

Finally, in discussion Level 7 through Level 11, a significant difference at the .05 level was shown to exist in the percentage of possible density exhibited between discussions with no student interactions required or one student interaction required and those discussions that required students to interact with a minimum of two other discussion participants.

Question 2 – Summary

These results suggest that significant relationships did exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the density of student participation at each level of the discussions examined in this study. What follows is a summary of the significant relationships that were shown to exist relative to research Question 2.

In regard to instructors' expectations for message contributions, the results showed significant differences existed in the percentage of possible density exhibited in the first five levels of discussions examine in this study. Specifically, significant differences were shown to exist between discussions where students were required to contribute messages as compared to discussions where message contributions were encouraged, but not required, and discussions where no message contributions were required.

With regard to instructors' expectations for student interaction, the results showed a significant difference between the percentages of possible density exhibited in each of the first six levels of the discussions. Specifically, significant differences were identified between discussions with "No Expectations" for student interaction and for discussions that "Encouraged" student interactions as compared with discussions that "Required" student interactions.

Results also showed significant differences in the percentage of possible density exhibited in the first five levels of discussions representing different expectations for minimum levels of message contributions. Specifically, significant differences were found between discussions that required two and three message contributions as compared with discussions that required one message contribution and with those that had no explicitly stated expectations for minimum message contributions. Additionally, beyond discussion Level 5, only discussions with "Three messages required" exhibited significantly different participation outcomes with respect to the percentage of possible discussion density exhibited in the discussions examined in this study.

Finally, significant differences were also identified in the percentage of possible density exhibited in discussions representing each of the three levels of minimum student interactions through Level 6 of the discussions. Beyond level 6, discussions with "Two interactions required" continued to exhibit significantly different participation density outcomes as compared with discussions with no student interactions required as well as with discussions requiring a minimum of one student interaction.

In contrast to the above discussions related to Questions 1 and 2 which have focused on participation density outcomes in threaded discussions, Questions 3 and 4 involve a discussion of average levels of participation in learner interactions and Question 5 involves an analysis of student participation persistence.

Question 3 Results

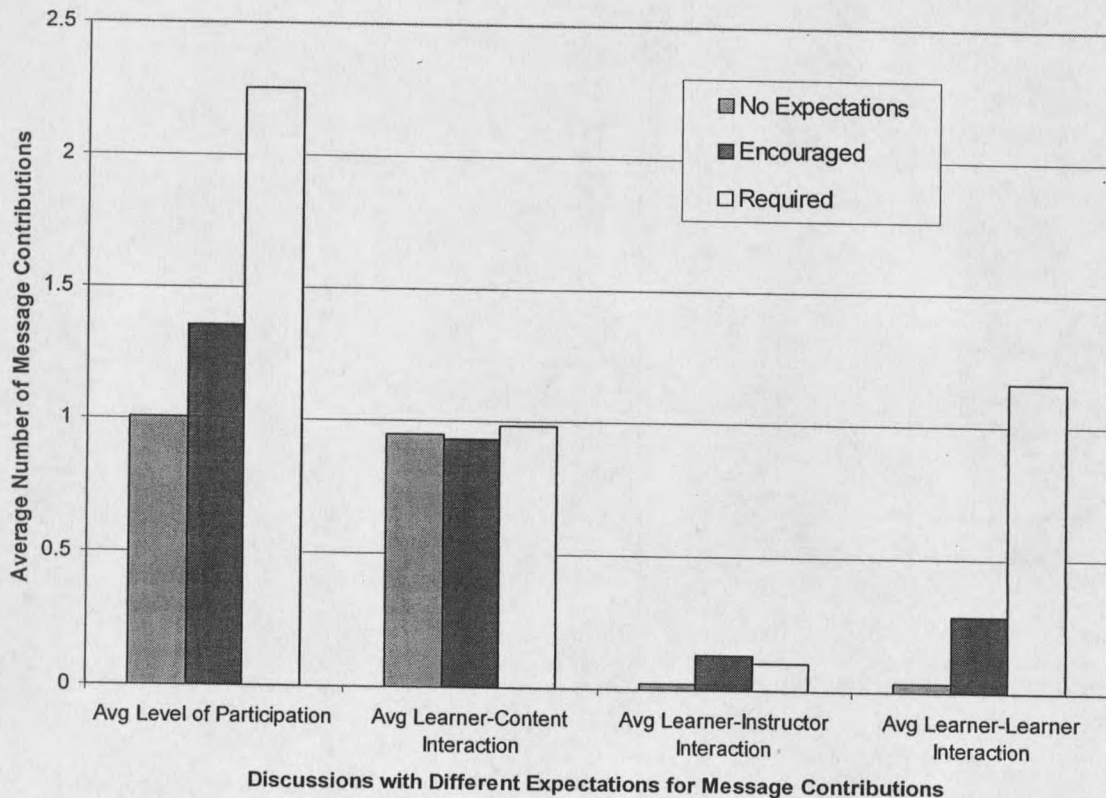
The third research question addressed in this study was: "What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the overall discussion's average level of participation in learner interactions?" To answer this question, each discussion was classified according to the types and levels of the instructor's stated expectations for student participation as explained in the "Foundations for Data Analysis" section at the beginning of this chapter. Additionally, the average level of participation was calculated by dividing the number of message interactions posted in an overall discussion by the number of actual participants in a discussion. Finally, the average level of participation in each of the three types of interaction, including learner-content interaction, learner-instructor interaction, and

learner-learner interaction, was also calculated by dividing the number of each type of message interaction posted in an overall discussion by the number of actual participants in the respective discussion.

Instructor Expectations for Message Contributions

Figure 10 illustrates potential relationships between discussions representing each of the types of instructors' expectations for message contributions and the discussion's overall average level of participation, as well as the average level of participation in each of the three types of interaction that occurred in the discussions examined in this study.

Figure 10: Expectations for Message Contributions and Average Level of Participation in Learner Interactions



As illustrated in Figure 10 and Table 22, discussions representing each of the three types of expectations for message contributions exhibited different means for the overall average level of participation in learner interactions exhibited in the discussions. More specifically, students in discussions with "No Expectations" for message contributions exhibited an average level of participation of approximately 1.00 message posting in the respective discussions, while students in discussions that "Encouraged" student message contributions exhibited an average level of participation of 1.35 message postings, and students in discussions that "Required" message contributions exhibited an average level of participation of 2.25 message postings in the respective discussions.

Table 22: Descriptive Statistics of Average Level of Participation in Learner Interactions and Expectations for Message Contributions

		N	Mean	Std. Deviation
Average Level of Participation	No Expectations	14	1.00670	.018092
	Encouraged	37	1.35619	.381684
	Required	213	2.25015	1.106788
	Total	264	2.05892	1.079547
Average Learner-Content Interactions	No Expectations	14	.94950	.097583
	Encouraged	37	.93059	.149301
	Required	213	.98655	.187426
	Total	264	.97675	.179598
Average Learner-Instructor Interactions	No Expectations	14	.02381	.089087
	Encouraged	37	.13350	.264862
	Required	213	.10495	.289728
	Total	264	.10465	.279507
Average Learner-Learner Interactions	No Expectations	14	.03339	.062838
	Encouraged	37	.29074	.231821
	Required	213	1.16132	1.014699
	Total	264	.97949	.989277

In regard to the average level of participation in each distinct type of learner-interaction, discussions with different expectations for message contributions do not appear to differ significantly in the average level of student participation in learner-content or learner-instructor interactions. However, there does appear to be a difference between discussions representing the different types of expectations for message contributions and the average level of student participation in learner-learner interactions.

More specifically, students in discussions with "No Expectations" for message contributions exhibited an average level of participation in learner-learner interactions of .03 message postings in the respective discussions, while students in discussions that "Encouraged" student message contributions exhibited an average level of participation in learner-learner interactions of .29 message postings, and students in discussions that "Required" message contributions exhibited an average level of participation in learner-learner interactions of 1.16 message postings in the respective discussions.

Based on the results of a one-way analysis of variance (ANOVA) test, in Table 23, the null hypothesis was rejected, as a significant difference at the .05 level was identified between discussions representing at least two of the different types of expectations for message contributions and the discussion's overall average level of participation, and in the average level of participation in learner-learner interactions.

Table 23: ANOVA for Average Level of Participation in Learner Interactions and Expectations for Message Contributions

		Sum of Squares	df	Mean Square	F	Sig.
Average Level of Participation	Between Groups	41.561	2	20.781	20.471	.000
	Within Groups	264.945	261	1.015		
	Total	306.506	263			
Average Learner-Content Interaction	Between Groups	.110	2	.055	1.710	.183
	Within Groups	8.374	261	.032		
	Total	8.483	263			
Average Learner-Instructor Interactions	Between Groups	.122	2	.061	.782	.459
	Within Groups	20.424	261	.078		
	Total	20.547	263			
Average Learner-Learner Interactions	Between Groups	37.126	2	18.563	21.996	.000
	Within Groups	220.264	261	.844		
	Total	257.390	263			

H_0 = There is no difference between expectations for message contributions and average level of participation in learner interactions.

The results of post hoc tests, provided in Table 24, identifies significant differences at the .05 level in the overall average level of participation in those discussions where message contributions were "Required" as compared with the discussions with "No Expectations" for message contributions and with discussions where message contributions were "Encouraged" but not required.

Table 24: Post Hoc Tests for Expectations for Message Contributions and Overall Average Level of Participation

Dependent Variable		(I) Expected Message Contributions	(J) Expected Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
Average Level of Participation	Tukey HSD	No Expectations	Encouraged	-.34949	.316139	.512
		No Expectations	Required	-1.24345(*)	.277982	.000
		Encouraged	No Expectations	.34949	.316139	.512
		Encouraged	Required	-.89396(*)	.179447	.000
		Required	No Expectations	1.24345(*)	.277982	.000
		Required	Encouraged	.89396(*)	.179447	.000

Scheffe	No	Encouraged	-.34949	.316139	.544
	Expectations	Required	-1.24345(*)	.277982	.000
	Encouraged	No	.34949	.316139	.544
		Expectations			
		Required	-.89396(*)	.179447	.000
	Required	No	1.24345(*)	.277982	.000
		Expectations			
		Encouraged	.89396(*)	.179447	.000

* The mean difference is significant at the .05 level.

Additionally, the results of post hoc tests, as presented in Table 25, identifies differences found between the average level of participation in each form of learner interaction and discussions representing the different types of expectations for message contributions. Specifically, results indicate that discussions with different expectations for message contributions did not exhibit a significant difference in the average level of participation in learner-content interactions or in learner-instructor interactions. However, the results do indicate that a significant difference at the .05 level was found in the average level of learner-learner interactions exhibited in discussions where message contributions were "Required" as compared with discussions with "No Expectations" for message contributions. Similarly, a significant difference at the .05 level was also found in the average level of learner-learner interactions exhibited in discussions where message contributions were "Required" as compared with discussions where message contributions were "Encouraged" but not required.

Table 25: Post Hoc Tests for Expectations for Message Contributions and Average Level of Participation in Learner Interactions

Dependent Variable		(I) Expected Message Contributions	(J) Expected Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
Average Learner- Content Interactions	Tukey HSD	No Expectations	Encouraged	.01891	.056202	.940
			Required	-.03705	.049419	.734
		Encouraged	No Expectations	-.01891	.056202	.940
			Required	-.05596	.031902	.187
		Required	No Expectations	.03705	.049419	.734
			Encouraged	.05596	.031902	.187
	Scheffe	No Expectations	Encouraged	.01891	.056202	.945
			Required	-.03705	.049419	.755
		Encouraged	No Expectations	-.01891	.056202	.945
			Required	-.05596	.031902	.217
		Required	No Expectations	.03705	.049419	.755
			Encouraged	.05596	.031902	.217
Average Learner- Instructor Interactions	Tukey HSD	No Expectations	Encouraged	-.10969	.087776	.425
			Required	-.08114	.077182	.545
		Encouraged	No Expectations	.10969	.087776	.425
			Required	.02855	.049823	.835
		Required	No Expectations	.08114	.077182	.545
			Encouraged	-.02855	.049823	.835
	Scheffe	No Expectations	Encouraged	-.10969	.087776	.459
			Required	-.08114	.077182	.576
		Encouraged	No Expectations	.10969	.087776	.459
			Required	.02855	.049823	.849
		Required	No Expectations	.08114	.077182	.576
			Encouraged	-.02855	.049823	.849
Average Learner- Learner Interactions	Tukey HSD	No Expectations	Encouraged	-.25736	.288252	.645
			Required	-1.12794(*)	.253461	.000
		Encouraged	No Expectations	.25736	.288252	.645
			Required	-.87058(*)	.163618	.000
		Required	No Expectations	1.12794(*)	.253461	.000
			Encouraged	.87058(*)	.163618	.000
	Scheffe	No Expectations	Encouraged	-.25736	.288252	.672
			Required	-1.12794(*)	.253461	.000
		Encouraged	No Expectations	.25736	.288252	.672
			Required	-.87058(*)	.163618	.000
		Required	No Expectations	1.12794(*)	.253461	.000
			Encouraged	.87058(*)	.163618	.000

* The mean difference is significant at the .05 level.

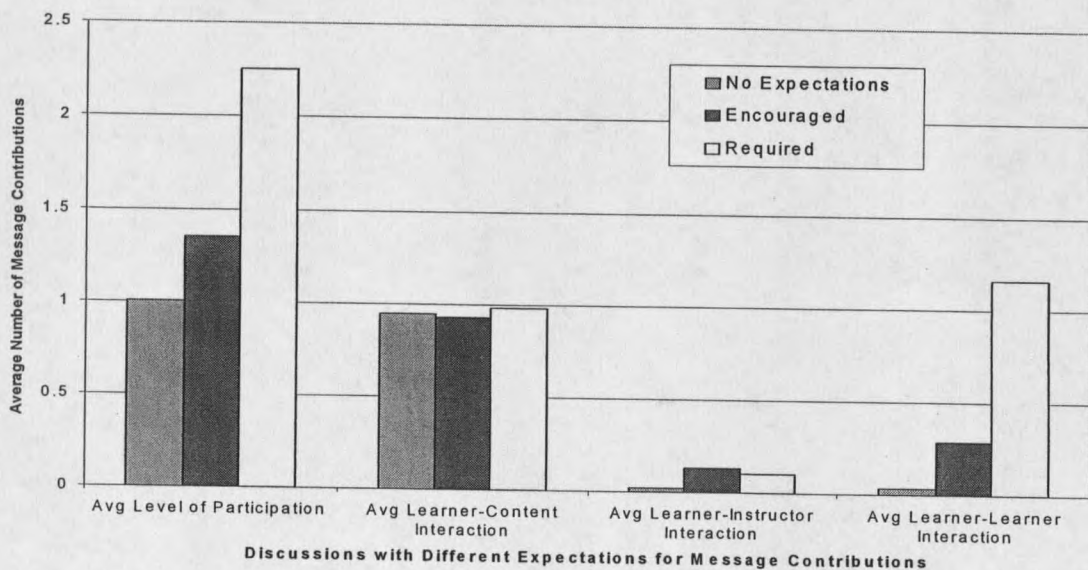
In sum, these results indicate that a significant difference at the .05 level was exhibited in the overall average level of participation, as well as in the average level of participation in learner-learner interactions, exhibited within discussions that “Required” message contributions, as compared with those that “Encouraged” messages or that had “No Expectations” for message contributions.

Instructor Expectations for Student Interactions

Figure 11 illustrates potential relationships between discussions representing each of the three types of instructors’ stated expectations for student interactions and the means of the overall average level of participation exhibited within the discussions.

Additionally, Figure 11 illustrates relationships between discussions representing each type of expectation for student interaction and the average level of participation in each of the three distinct types of interaction exhibited in the discussions

Figure 11: Average Level of Participation in Learner Interactions and Expectations for Student Interactions



As illustrated in Figure 11, discussions representing each of the three types of instructors' stated expectations for student interaction exhibited different means for the overall average level of participation exhibited in the discussions. More specifically, as summarized in Table 26, students in discussions with "No Expectations" for student interactions exhibited an average level of participation of approximately 1.43 message postings, while students in discussions that "Encouraged" student interactions exhibited an average level of participation of 1.75 message postings, and students in discussions that "Required" student interactions exhibited an average level of participation of 2.98 message postings in the respective discussions.

Table 26: Descriptive Statistics of Average Level of Participation in Learner Interactions and Expectations for Student Interactions.

		N	Mean	Std. Deviation
Average Level of Participation	No Expectations	148	1.42656	.680377
	Encouraged	11	1.75443	.321668
	Required	105	2.98213	.918445
	Total	264	2.05892	1.079547
Average Learner-Content Interactions	No Expectations	148	.97150	.180235
	Encouraged	11	.99460	.228069
	Required	105	.98227	.174781
	Total	264	.97675	.179598
Average Learner-Instructor Interactions	No Expectations	148	.10671	.317280
	Encouraged	11	.14399	.322226
	Required	105	.09763	.212306
	Total	264	.10465	.279507
Average Learner-Learner Interactions	No Expectations	148	.35351	.438268
	Encouraged	11	.61584	.397936
	Required	105	1.89992	.872481
	Total	264	.97949	.989277

Based on the results of a one-way analysis of variance (ANOVA) test, provided in Table 27, the null hypothesis was rejected as a significant difference at the .05 level was

found between discussions representing at least two of the types of expectations for student interactions and the respective discussion's overall average level of participation. A significant difference at the .05 level was also found between discussions representing at least two of the types of expectations for student interactions and the respective discussion's average level of participation in learner-learner interactions. However, no significant differences were exhibited between discussions representing each of the types of expectations for student interactions and their average level of participation in learner-content or learner-instructor interactions.

Table 27: ANOVA for Expectations for Student Interactions and Average Level of Participation in Learner Interactions

		Sum of Squares	df	Mean Square	F	Sig.
Average Level of Participation	Between Groups	149.695	2	74.847	124.57	.000
	Within Groups	156.811	261	.601		
	Total	306.506	263			
Average Learner-Content Interactions	Between Groups	.011	2	.005	.166	.847
	Within Groups	8.472	261	.032		
	Total	8.483	263			
Average Learner-Instructor Interactions	Between Groups	.023	2	.011	.145	.865
	Within Groups	20.524	261	.079		
	Total	20.547	263			
Average Learner-Learner Interactions	Between Groups	148.404	2	74.202	177.69	.000
	Within Groups	108.986	261	.418		
	Total	257.390	263			

H_0 = There is no difference between the average level of participation in learner interactions and expectations for student interactions.

The results of post hoc tests, summarized in Table 28, identify significant differences at the .05 level in the overall average level of participation in those discussions where message contributions were "Required" as compared with the

discussions with "No Expectations" for message contributions and with discussions where message contributions were "Encouraged" but not required.

Table 28: Post Hoc Tests for Expectations for Student Interactions and Overall Average Level of Participation

Dependent Variable		(I) Expected Student Interactions	(J) Expected Student Interactions	Mean Difference (I-J)	Std. Error	Sig.
Average Level of Participation	Tukey HSD	No Expectations	Encouraged	-.32786	.242237	.367
			Required	-1.55557(*)	.098902	.000
		Encouraged	No Expectations	.32786	.242237	.367
			Required	-1.22771(*)	.245644	.000
		Required	No Expectations	1.55557(*)	.098902	.000
			Encouraged	1.22771(*)	.245644	.000
	Scheffe	No Expectations	Encouraged	-.32786	.242237	.401
			Required	-1.55557(*)	.098902	.000
		Encouraged	No Expectations	.32786	.242237	.401
			Required	-1.22771(*)	.245644	.000
		Required	No Expectations	1.55557(*)	.098902	.000
			Encouraged	1.22771(*)	.245644	.000

* The mean difference is significant at the .05 level.

Additionally, the results of post hoc tests, in Table 29, identify significant differences at the .05 level in the average level of participation in each distinct type of learner interaction in discussions with different expectations for student interactions.

Table 29: Post Hoc Tests for Expectations for Student Interactions and Average Level of Participation in Learner Interactions

Dependent Variable		(I) Expected Student Interactions	(J) Expected Student Interactions	Mean Difference (I-J)	Std. Error	Sig.
Average Learner-Content Interactions	Tukey HSD	No Expectations	Encouraged	-.02311	.056306	.911
			Required	-.01078	.022989	.886
		Encouraged	No Expectations	.02311	.056306	.911
			Required	.01233	.057098	.975
		Required	No Expectations	.01078	.022989	.886
			Encouraged	-.01233	.057098	.975
	Scheffe	No Expectations	Encouraged	-.02311	.056306	.919
			Required	-.01078	.022989	.896
		Encouraged	No Expectations	.02311	.056306	.919
			Required	.01233	.057098	.977

Average Learner- Instructor Interactions	Tukey HSD	Required	No Expectations	.01078	.022989	.896
			Encouraged	-.01233	.057098	.977
		No Expectations	Encouraged	-.03727	.087636	.905
			Required	.00909	.035780	.965
		Encouraged	No Expectations	.03727	.087636	.905
			Required	.04636	.088868	.861
	Scheffe	Required	No Expectations	-.00909	.035780	.965
			Encouraged	-.04636	.088868	.861
		No Expectations	Encouraged	-.03727	.087636	.914
			Required	.00909	.035780	.968
		Encouraged	No Expectations	.03727	.087636	.914
			Required	.04636	.088868	.873
Average Learner- Learner Interactions	Tukey HSD	Required	No Expectations	-.00909	.035780	.968
			Encouraged	-.04636	.088868	.873
		No Expectations	Encouraged	-.26232	.201947	.397
			Required	-1.54641(*)	.082452	.000
		Encouraged	No Expectations	.26232	.201947	.397
			Required	-1.28409(*)	.204788	.000
	Scheffe	Required	No Expectations	1.54641(*)	.082452	.000
			Encouraged	1.28409(*)	.204788	.000
		No Expectations	Encouraged	-.26232	.201947	.431
			Required	-1.54641(*)	.082452	.000
		Encouraged	No Expectations	.26232	.201947	.431
			Required	-1.28409(*)	.204788	.000
		Required	No Expectations	1.54641(*)	.082452	.000
			Encouraged	1.28409(*)	.204788	.000

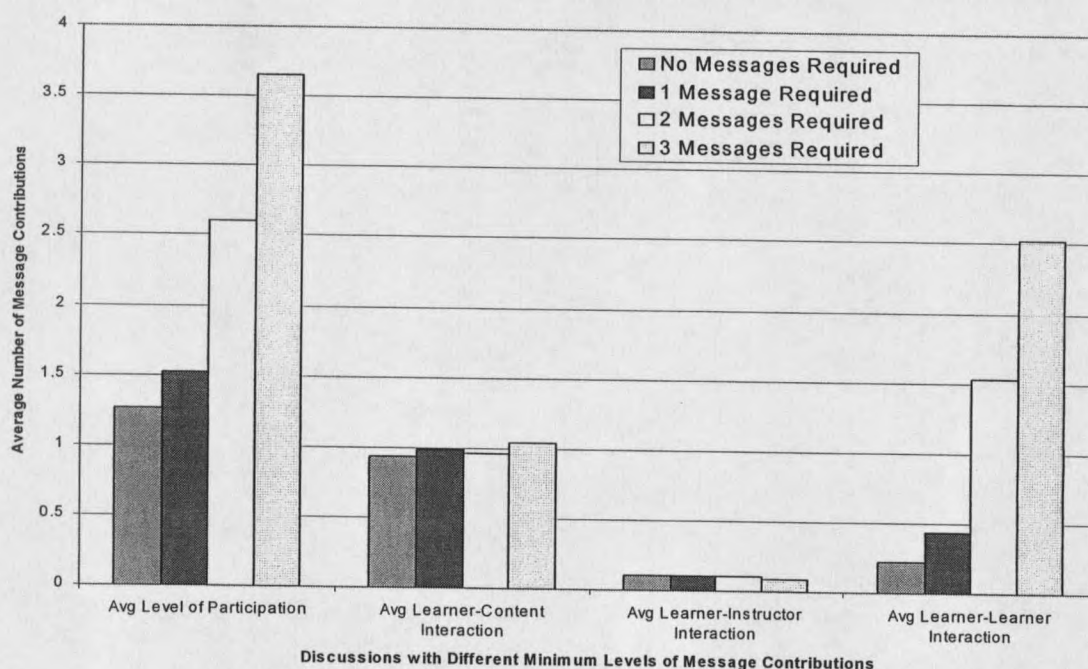
* The mean difference is significant at the .05 level.

Specifically, the results suggest that discussions with different expectations for student interactions did not exhibit a significant difference in the average level of participation in learner-content interactions or in learner-instructor interactions. However, the results do indicate that a significant difference at the .05 level was found in the average level of participation in learner-learner interactions exhibited in discussions where students were "Required" to interact with other discussion participants as compared with discussions with "No Expectations" for student interactions as well as with discussions where student interactions were "Encouraged" but not required.

Expected Minimum Levels of Message Contributions

Figure 12 illustrates potential relationships between discussions representing different instructor expectations for minimum levels of message contributions and the average level of participation exhibited within the respective discussions. Additionally, Figure 12 illustrates the average level of participation in each of the three distinct types of learner interaction exhibited within the discussions representing each of the instructor's expected minimum levels of message contributions.

Figure 12: Minimum Levels of Message Contributions and Average Level of Participation in Learner Interactions



As illustrated in Figure 12, discussions representing each of the levels of expected minimum message contributions exhibited different means for overall average level of participation. Specifically, as summarized in Table 30, students in discussions with "No

Messages Required" posted an average of 1.26 messages, while students in discussions with "One Message Required" posted an average of 1.52 messages, whereas students in discussions with "Two Messages Required" posted an average of 2.6 messages, and students in discussions with "Three Messages Required" posted an average of 3.65 messages in the respective discussions.

Table 30: Descriptive Statistics of Average Level of Participation in Learner Interactions and Minimum Levels of Message Contributions

		N	Mean	Std. Deviation
Average Level of Participation	0 Messages Required	54	1.26493	.355231
	1 Message Required	98	1.52441	.785415
	2 Messages Required	79	2.59741	.713050
	3 Messages Required	33	3.65639	.986782
	Total	264	2.05892	1.079547
Average Learner-Content Interactions	0 Messages Required	54	.93475	.133727
	1 Message Required	98	.99120	.207248
	2 Messages Required	79	.96056	.190547
	3 Messages Required	33	1.04128	.090701
	Total	264	.97675	.179598
Average Learner-Instructor Interactions	0 Messages Required	54	.10506	.232300
	1 Message Required	98	.10819	.364748
	2 Messages Required	79	.10835	.224331
	3 Messages Required	33	.08463	.162097
	Total	264	.10465	.279507
Average Learner-Learner Interactions	0 Messages Required	54	.22420	.234715
	1 Message Required	98	.43332	.508010
	2 Messages Required	79	1.52796	.742265
	3 Messages Required	33	2.52441	.864111
	Total	264	.97949	.989277

Based on the results of a one-way analysis of variance (ANOVA) test, presented in Table 31, the null hypothesis was rejected as a significant difference at the .05 level was found in the overall average level of participation exhibited in discussions representing at least two of the levels of minimum message contributions. Additionally, a

significant difference at the .05 level was also exhibited between discussions representing at least two of the levels of minimum message contributions and the average level of participation in learner-content and learner-learner interactions exhibited in the respective discussions. However, no significant difference was exhibited between discussions representing the different levels of expectations for minimum message contributions and the average level of participation in learner-instructor interactions.

Table 31: ANOVA for Minimum Levels of Message Contributions and Average Level of Participation in Learner Interactions

		Sum of Squares	df	Mean Square	F	Sig.
Avg. Level of Participation	Between Groups	169.163	3	56.388	106.746	.000
	Within Groups	137.343	260	.528		
	Total	306.506	263			
Avg. Learner-Content Interactions	Between Groups	.274	3	.091	2.891	.036
	Within Groups	8.209	260	.032		
	Total	8.483	263			
Avg. Learner-Instructor Interactions	Between Groups	.016	3	.005	.066	.978
	Within Groups	20.531	260	.079		
	Total	20.547	263			
Avg. Learner-Learner Interactions	Between Groups	162.568	3	54.189	148.587	.000
	Within Groups	94.822	260	.365		
	Total	257.390	263			

H_0 = There is no difference between the average level of participation in learner interactions and minimum levels of message contributions.

Table 32 summarizes the results of post hoc tests which identify the significant differences found in the average level of participation exhibited in discussions representing different expected minimum levels of message contributions. Specifically, these results indicate a significant difference at the .05 level was found in the overall average level of participation in those discussions where a minimum of two and three message contributions were required as compared with discussions that had no

expectations for minimum message contributions as well as with discussions that required a minimum of one message contribution. Additionally, a significant difference at the .05 level was also exhibited in the average level of participation in learner interactions between discussions that required two message contributions and discussions requiring a minimum of three message contributions.

Table 32: Post Hoc Tests for Minimum Levels of Message Contributions and Overall Average Level of Participation

Dependent Variable		(I) Minimum Message Contributions	(J) Minimum Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
Average Level of Participation	Tukey HSD	0 Messages Required	1 Message Required	-.25948	.123177	.154
			2 Messages Required	-1.33249(*)	.128331	.000
			3 Messages Required	-2.39146(*)	.160591	.000
		1 Message Required	0 Messages Required	.25948	.123177	.154
			2 Messages Required	-1.07300(*)	.109895	.000
			3 Messages Required	-2.13198(*)	.146279	.000
		2 Messages Required	0 Messages Required	1.33249(*)	.128331	.000
			1 Message Required	1.07300(*)	.109895	.000
			3 Messages Required	-1.05898(*)	.150645	.000
		3 Messages Required	0 Messages Required	2.39146(*)	.160591	.000
			1 Message Required	2.13198(*)	.146279	.000
			2 Messages Required	1.05898(*)	.150645	.000
	Scheffe	0 Messages Required	1 Message Required	-.25948	.123177	.221
			2 Messages Required	-1.33249(*)	.128331	.000
			3 Messages Required	-2.39146(*)	.160591	.000
		1 Message Required	0 Messages Required	.25948	.123177	.221
			2 Messages Required	-1.07300(*)	.109895	.000
			3 Messages Required	-2.13198(*)	.146279	.000
		2 Messages Required	0 Messages Required	1.33249(*)	.128331	.000
			1 Message Required	1.07300(*)	.109895	.000
			3 Messages Required	-1.05898(*)	.150645	.000
		3 Messages Required	0 Messages Required	2.39146(*)	.160591	.000
			1 Message Required	2.13198(*)	.146279	.000
			2 Messages Required	1.05898(*)	.150645	.000

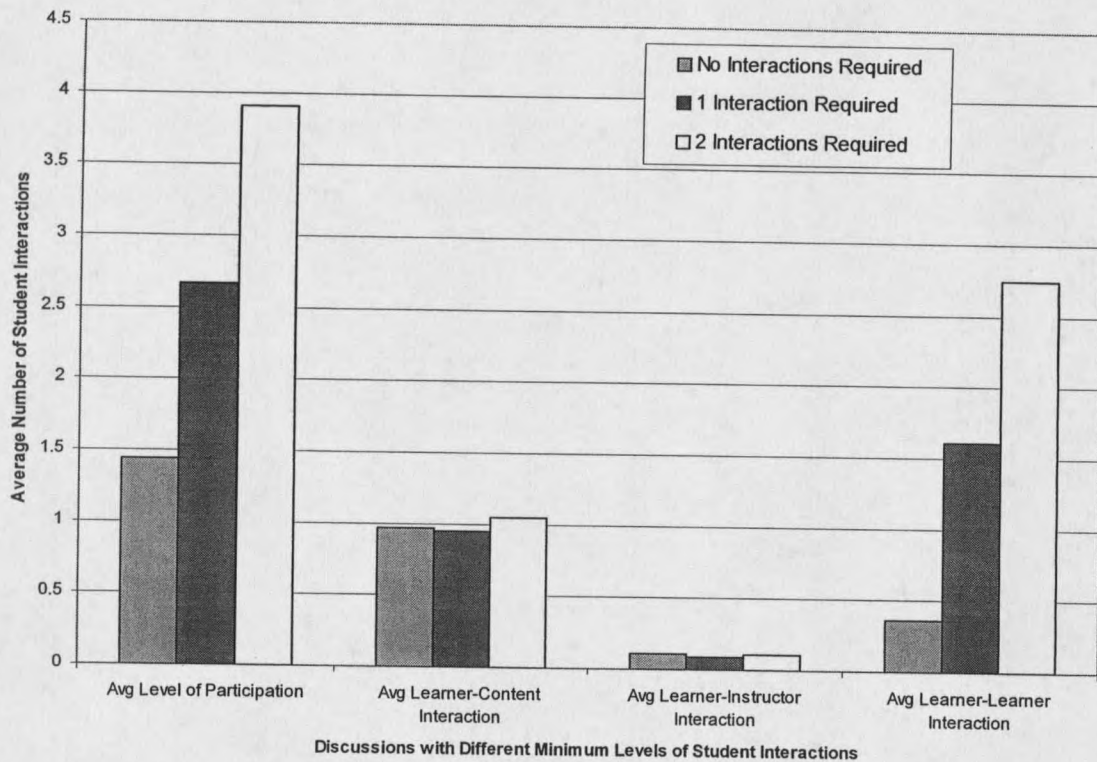
* The mean difference is significant at the .05 level.

Moreover, the results of Post Hoc tests, provided in Appendix D, identifies differences shown to exist in the average level of participation in each distinct type of learner interaction in discussions with different expectations for minimum levels of message contributions. Specifically, with regard to the average level of participation in learner-content interactions, a significant difference at the .05 level was exhibited between discussions with no minimum expectations for message contributions and discussions requiring a minimum of three message contributions. No significant differences were exhibited, however, between discussions with different minimum levels of message contributions and the average level of student participation in learner-instructor interactions. Additionally, significant differences were exhibited in the average level of student participation in learner-learner interactions between discussions with no expectations for message contributions as well as discussions with a minimum of one message contribution and those discussions with a minimum of two and three messages contributions. Finally, a significant difference at the .05 level was shown to exist in the average level of participation in learner-learner interactions exhibited between discussions requiring a minimum of two message contributions and discussions requiring three message contributions.

Expected Minimum Levels of Student Interactions

Figure 13 illustrates potential relationships between discussions representing different levels of instructor expectations for student interactions and the average level of participation exhibited within the discussions.

Figure 13: Average Level of Participation in Learner Interactions and Expectations for Minimum Levels of Student Interactions



Additionally, Figure 13 illustrates potential relationships between discussions representing each of the different levels of instructor expectations for minimum student interactions and the average level of participation in each of the three distinct types of learner-interaction exhibited in these respective discussions.

As illustrated in Table 33, discussions representing different expectations for minimum levels of student interactions had different means for overall average level of participation exhibited within the respective discussions. More specifically, students in discussions that did not require a minimum number of student interactions exhibited an average level of participation of 1.44 message postings, while students in discussions requiring a minimum of one student interaction exhibited an average level of

participation of 2.66 message postings, and students in discussions requiring at least two student interactions exhibited an average level of participation of 3.91 message postings.

Table 33: Descriptive Statistics of Average Level of Participation in Learner Interactions and Minimum Levels of Student Interactions

		N	Mean	Std. Deviation
Avg Level of Participation	0 Student Interactions Required	157	1.44542	.669268
	1 Student Interaction Required	82	2.66881	.682549
	2 Student Interactions Required	25	3.91126	.989994
	Total	264	2.05892	1.079547
Avg Learner-Content Interactions	0 Student Interactions Required	157	.97471	.183744
	1 Student Interaction Required	82	.95691	.187594
	2 Student Interactions Required	25	1.05461	.086939
	Total	264	.97675	.179598
Avg Learner-Instructor Interactions	0 Student Interactions Required	157	.11068	.318513
	1 Student Interaction Required	82	.09095	.220351
	2 Student Interactions Required	25	.11172	.178556
	Total	264	.10465	.279507
Avg Learner-Learner Interactions	0 Student Interactions Required	157	.36489	.437451
	1 Student Interaction Required	82	1.61799	.693275
	2 Student Interactions Required	25	2.74493	.864864
	Total	264	.97949	.989277

Based on the results of a one-way analysis of variance (ANOVA) test, presented in Table 34, the null hypothesis was rejected as a significant difference at the .05 level was found between discussions representing at least two of the levels of minimum student interactions and the overall average level of participation exhibited in the discussions. Additionally, a significant difference at the .05 level was also found between discussions representing different minimum levels of student interactions and their respective average levels of student participation in learner-learner interactions. However, no significant difference was exhibited between discussions representing the different minimum levels

of student interactions and the average level of student participation in learner-content interactions or in learner-instructor interactions.

Table 34: ANOVA for Average Level of Participation in Learner Interactions and Minimum Levels of Student Interactions

		Sum of Squares	df	Mean Square	F	Sig.
Avg Level of Participation	Between Groups	175.373	2	87.686	174.526	.000
	Within Groups	131.133	261	.502		
	Total	306.506	263			
Avg Learner-Content Interactions	Between Groups	.184	2	.092	2.901	.057
	Within Groups	8.299	261	.032		
	Total	8.483	263			
Avg Learner-Instructor Interactions	Between Groups	.022	2	.011	.142	.868
	Within Groups	20.524	261	.079		
	Total	20.547	263			
Avg Learner-Learner Interactions	Between Groups	170.654	2	85.327	256.762	.000
	Within Groups	86.736	261	.332		
	Total	257.390	263			

H_0 = There is no difference between the average level of participation in learner interactions and minimum levels of student interactions.

The results of post hoc tests, summarized in Table 35, identifies differences that were shown to exist between discussions with different expectations for minimum levels of student interactions and the overall average level of participation exhibited in these respective discussions. Specifically, the results indicate that significant differences at the .05 level were found between discussions representing each of the three different levels of expected minimum student interactions and the overall average level of student participation in the discussions.

Table 35: Post Hoc Tests for Minimum Levels of Student Interactions and Overall Average Level of Participation

Dependent Variable		(I) Minimum Interactions	(J) Minimum Interactions	Mean Difference (I-J)	Std. Error	Sig.
Average Level of Participation	Tukey HSD	0 Interactions Required	1 Interaction Required	-1.22339(*)	.096578	.000
			2 Interactions Required	-2.46584(*)	.152634	.000
		1 Interaction Required	0 Interactions Required	1.22339(*)	.096578	.000
			2 Interactions Required	-1.24245(*)	.161939	.000
		2 Interactions Required	0 Interactions Required	2.46584(*)	.152634	.000
			1 Interaction Required	1.24245(*)	.161939	.000
	Scheffe	0 Interactions Required	1 Interaction Required	-1.22339(*)	.096578	.000
			2 Interactions Required	-2.46584(*)	.152634	.000
		1 Interaction Required	0 Interactions Required	1.22339(*)	.096578	.000
			2 Interactions Required	-1.24245(*)	.161939	.000
		2 Interactions Required	0 Interactions Required	2.46584(*)	.152634	.000
			1 Interaction Required	1.24245(*)	.161939	.000

* The mean difference is significant at the .05 level.

Additionally, the results of post hoc tests summarized in Table 36 identifies differences that were shown to exist between discussions with different expectations for minimum levels of student interactions and the average level of participation in each distinct type of learner interaction. Specifically, with regard to the average level of participation in learner-content interactions, a significant difference at the .05 level was exhibited between discussions requiring a minimum of one student interaction and discussions requiring a minimum of two student interactions. No significant difference

was exhibited, however, between discussions with different minimum levels of student interactions and the average level of student participation in learner-instructor interactions. Significant differences were exhibited at the .05 level in the average level of student participation in learner-learner interactions between discussions with no expectations for student interactions and discussions with a minimum of one and two student interactions. Finally, a significant difference at the .05 level was also exhibited between discussions requiring a minimum of one student interaction and discussions requiring students to interact with at least two other discussion participants.

Table 36: Post Hoc Tests for Minimum Levels of Student Interactions and Average Level of Participation in Learner Interactions

Dependent Variable		(I) Minimum Interactions	(J) Minimum Interactions	Mean Difference (I-J)	Std. Error	Sig.
Average Learner-Content Interactions	Tukey HSD	0 Interactions Required	1 Interaction Required	.01779	.024296	.745
			2 Interactions Required	-.07990	.038397	.096
		1 Interaction Required	0 Interactions Required	-.01779	.024296	.745
			2 Interactions Required	-.09769(*)	.040738	.045
		2 Interactions Required	0 Interactions Required	.07990	.038397	.096
			1 Interaction Required	.09769(*)	.040738	.045
	Scheffe	0 Interactions Required	1 Interaction Required	.01779	.024296	.765
			2 Interactions Required	-.07990	.038397	.117
		1 Interaction Required	0 Interactions Required	-.01779	.024296	.765
			2 Interactions Required	-.09769	.040738	.058
		2 Interactions Required	0 Interactions Required	.07990	.038397	.117

Average Learner- Instructor Interactions	Tukey HSD	0 Interactions Required	1 Interaction Required	.01973	.038208	.863
			2 Interactions Required	-.00103	.060385	1.000
		1 Interaction Required	0 Interactions Required	-.01973	.038208	.863
			2 Interactions Required	-.02077	.064066	.944
		2 Interactions Required	0 Interactions Required	.00103	.060385	1.000
			1 Interaction Required	.02077	.064066	.944
	Scheffe	0 Interactions Required	1 Interaction Required	.01973	.038208	.875
			2 Interactions Required	-.00103	.060385	1.000
		1 Interaction Required	0 Interactions Required	-.01973	.038208	.875
			2 Interactions Required	-.02077	.064066	.949
		2 Interactions Required	0 Interactions Required	.00103	.060385	1.000
			1 Interaction Required	.02077	.064066	.949
Average Learner- Learner Interactions	Tukey HSD	0 Interactions Required	1 Interaction Required	-1.25311(*)	.078545	.000
			2 Interactions Required	-2.38004(*)	.124135	.000
		1 Interaction Required	0 Interactions Required	1.25311(*)	.078545	.000
			2 Interactions Required	-1.12694(*)	.131702	.000
		2 Interactions Required	0 Interactions Required	2.38004(*)	.124135	.000
			1 Interaction Required	1.12694(*)	.131702	.000
	Scheffe	0 Interactions Required	1 Interaction Required	-1.25311(*)	.078545	.000
			2 Interactions Required	-2.38004(*)	.124135	.000
		1 Interaction Required	0 Interactions Required	1.25311(*)	.078545	.000
			2 Interactions Required	-1.12694(*)	.131702	.000

2 Interactions Required	0 Interactions Required	2.38004(*)	.124135	.000
	1 Interaction Required	1.12694(*)	.131702	.000

* The mean difference is significant at the .05 level.

Question 3 – Summary

These results indicate that significant relationships did exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the average level of participation in learner interactions exhibited in the discussions examined in this study. What follows is a summary of the significant relationships that were shown to exist relative to research Question 3.

In regard to instructors' expectations for message contributions, a significant difference at the .05 level was found in the overall average level of participation exhibited within discussions that "Required" message contributions, as compared with those that "Encouraged" messages and that had "No Expectations" for message contributions. Similarly, a significant difference at the .05 level was also found in the average level of participation in learner-learner interactions exhibited within discussions that "Required" message contributions, as compared with those that "Encouraged" messages and that had "No Expectations" for message contributions.

With regard to instructors' expectations for student interaction, a significant difference was found in the overall average level of participation exhibited in discussions that "Required" student interactions as compared with those that "Encouraged" interactions and that had "No Expectations" for student interactions. Similarly, a significant difference at the .05 level was also found in the average level of participation

2 Interactions Required	0 Interactions Required	2.38004(*)	.124135	.000
	1 Interaction Required	1.12694(*)	.131702	.000

* The mean difference is significant at the .05 level.

Question 3 – Summary

These results indicate that significant relationships did exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the average level of participation in learner interactions exhibited in the discussions examined in this study. What follows is a summary of the significant relationships that were shown to exist relative to research Question 3.

In regard to instructors' expectations for message contributions, a significant difference at the .05 level was found in the overall average level of participation exhibited within discussions that "Required" message contributions, as compared with those that "Encouraged" messages and that had "No Expectations" for message contributions. Similarly, a significant difference at the .05 level was also found in the average level of participation in learner-learner interactions exhibited within discussions that "Required" message contributions, as compared with those that "Encouraged" messages and that had "No Expectations" for message contributions.

With regard to instructors' expectations for student interaction, a significant difference was found in the overall average level of participation exhibited in discussions that "Required" student interactions as compared with those that "Encouraged" interactions and that had "No Expectations" for student interactions. Similarly, a significant difference at the .05 level was also found in the average level of participation

in learner-learner interactions exhibited within discussions that "Required" student interactions, as compared with those that "Encouraged" interactions and that had "No Expectations" for student interactions.

Differences were also shown to exist between discussions representing different expectations for minimum levels of message contributions and the overall average level of participation exhibited within the respective discussions. More specifically, significant differences were found in the overall average level of participation in those discussions where a minimum of two and three message contributions were required as compared with discussions that had no expectations for minimum message contributions as well as with discussions that required a minimum of one message contribution. Additionally, a significant difference was exhibited in the overall average level of participation between discussions that required two message contributions and discussions requiring a minimum of three message contributions.

Furthermore, significant differences were found in the average level of participation in the distinct types of learner-interaction exhibited in discussions representing different minimum levels of message contributions. In regard to learner-content interactions, a significant difference was exhibited between discussions with no minimum expectations for message contributions and discussions requiring a minimum of three message contributions. No significant differences were exhibited, however, between discussions with different minimum levels of message contributions and the average level of student participation in learner-instructor interactions. Additionally, significant differences were exhibited in the average level of student participation in

learner-learner interactions between discussions with no expectations for message contributions as well as discussions with a minimum of one message contribution and those discussions with a minimum of two and three messages contributions required. Finally, a significant difference was shown to exist in the average level of participation in learner-learner interactions exhibited between discussions requiring a minimum of two message contributions and discussions requiring three message contributions.

Significant differences were also found in the overall average level of student participation exhibited in discussions representing each of the three different levels of expected minimum student interactions. Additionally, significant differences were shown to exist in the average level of participation in each distinct type of learner interaction exhibited in discussions with different expectations for minimum levels of student interactions.

Specifically, with regard to the average level of participation in learner-content interactions, a significant difference was exhibited between discussions requiring a minimum of one student interaction and discussions requiring a minimum of two student interactions. Moreover, no significant difference was exhibited between discussions with different minimum levels of student interactions and the average level of student participation in learner-instructor interactions. However, significant differences were exhibited in the average level of student participation in learner-learner interactions between discussions with no expectations for student interactions and discussions with a minimum of one and two student interactions required. Finally, a significant difference was shown to exist in the average level of student participation in learner-learner

interactions exhibited in discussions requiring a minimum of one student interaction compared with discussions requiring a minimum of two student interactions.

Question 4 Results

The fourth research question in this study was: "What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the average level of participation in learner interactions in each discussion level?" To answer this question, each discussion was classified according to the types and levels of the instructor's stated expectations for student participation as explained in the "Foundations for Data Analysis" section at the beginning of this chapter. Additionally, the average level of participation in each discussion level was calculated by dividing the number of messages posted in each level of a discussion by the number of actual participants in the discussion. Finally, the average level of participation in each of the three types of interaction was also calculated for each discussion level by dividing the number of each type of message interaction posted in each discussion level by the number of actual participants in the respective discussion.

Instructor Expectations for Message Contributions

Figure 14 illustrates potential relationships between discussions representing each type of instructors' expectations for message contributions and the means of the overall average level of participation through Level 5 of the discussions examined in this study.

Figure 14: Expectations for Message Contributions and Overall Average Level of Participation at Each Discussion Level

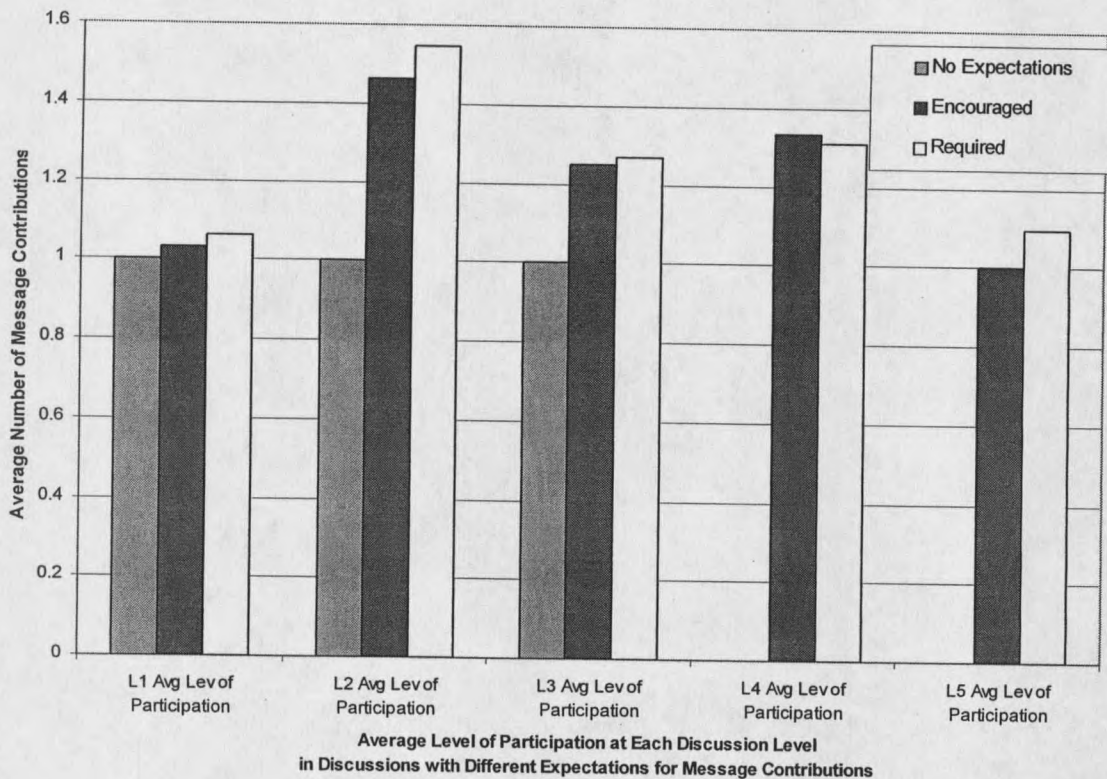


Table 37 summarizes the frequencies and differences in the means between discussions representing each of the three different types of expectations for message contributions and the overall average level of participation exhibited through Level 5 of the discussions examined in this study. It is important to note the low frequencies after discussion Level 2 of discussions representing “No Expectations” for message contributions, indicating that only 1 of the original 14 discussions with “No Expectations” for message contributions exhibited any student participation after discussion Level 2. Similarly, by discussion Level 5, only 3 of the original 37 discussions that “Encouraged” message contributions were still exhibiting student participation.

Table 37: Descriptive Statistics of Overall Average Level of Participation at Each Discussion Level and Expectations for Message Contributions

		N	Mean	Std. Deviation	Std. Error
L1 Average Level of Participation	No Expectations	14	1.00223	.008352	.002232
	Encouraged	37	1.02982	.113003	.018578
	Required	213	1.06213	.137604	.009428
	Total	264	1.05442	.131502	.008093
L2 Average Level of Participation	No Expectations	4	1.00000	.000000	.000000
	Encouraged	33	1.46248	.615030	.107063
	Required	198	1.54822	1.542503	.109621
	Total	235	1.52685	1.435459	.093639
L3 Average Level of Participation	No Expectations	1	1.00000	.	.
	Encouraged	21	1.25000	.512348	.111803
	Required	170	1.26990	.327771	.025139
	Total	192	1.26632	.350654	.025306
L4 Average Level of Participation	No Expectations	0	.	.	.
	Encouraged	9	1.33333	.500000	.166667
	Required	120	1.31023	1.748270	.159594
	Total	129	1.31184	1.690326	.148825
L5 Average Level of Participation	No Expectations	0	.	.	.
	Encouraged	3	1.00000	.000000	.000000
	Required	68	1.09592	.274236	.033256
	Total	71	1.09187	.268998	.031924

Based on the results of a one-way analysis of variance (ANOVA) test, provided in Table 38, the null hypothesis was confirmed as no significant differences at the .05 level were shown to exist between discussions representing different types of expectations for message contributions and the overall average level of participation exhibited at each level of these discussions.

Table 38: ANOVA for Expectations for Message Contributions and Overall Average Level of Participation at Each Discussion Level

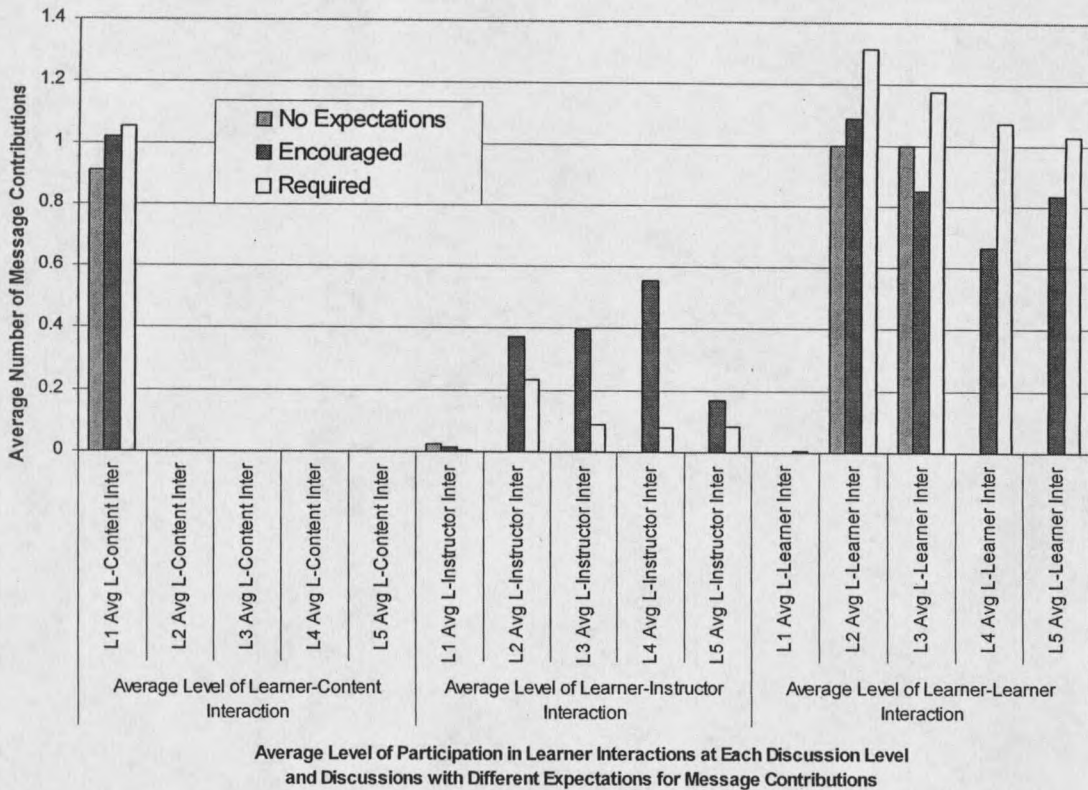
		Sum of Squares	df	Mean Square	F	Sig.
L1 Average Level of Participation	Between Groups	.073	2	.037	2.134	.120
	Within Groups	4.475	261	.017		
	Total	4.548	263			
L2 Average Level of Participation	Between Groups	1.337	2	.669	.323	.725
	Within Groups	480.829	232	2.073		
	Total	482.167	234			
L3 Average Level of Participation	Between Groups	.079	2	.039	.318	.728
	Within Groups	23.406	189	.124		
	Total	23.485	191			
L4 Average Level of Participation	Between Groups	.004	1	.004	.002	.969
	Within Groups	365.717	127	2.880		
	Total	365.722	128			
L5 Average Level of Participation	Between Groups	.026	1	.026	.362	.549
	Within Groups	5.039	69	.073		
	Total	5.065	70			

H_0 = There is no difference between the average level of participation in learner interactions at each discussion level and expectations for message contributions.

Because fewer than two discussions with "No Expectations" for message contributions exhibited participation at discussion Level 3, post hoc tests could not be performed beyond discussion Level 2. Additionally, because only discussions with "Required" message contributions exhibited participation beyond discussion Level 5, no statistical tests could be performed to examine relationships between discussions with different types of expectations for message contributions beyond discussion Level 5.

Although significant differences were not found in the overall average level of participation in discussion Levels 1 through 5, Figure 15 illustrates potential relationships that may exist between discussions representing the different types of expectations for message contributions and the average level of participation in each of the three types of learner interaction occurring at each discussion level.

Figure 15: Expectations for Message Contributions and Average Level of Participation in Learner Interactions at Each Discussion Level



As illustrated in Figure 15 and Table 39, the average level of participation in learner interactions at discussion Level 1 appears to almost exclusively represent student participation in learner-content interaction. In contrast, after discussion Level 1, the average level of participation in learner interactions appears to represent predominantly learner-learner interactions.

Accordingly, although there may not be a significant difference in the overall average level of interaction at each level of the discussions analyzed in this study, there appear to be potential differences between discussions representing different expectations for message contributions and the average level of participation in each of the specific

types of learner interaction that are exhibited throughout different levels of the respective discussions.

Table 39: Descriptive Statistics of Expectations for Message Contributions and Average Level of Participation in Learner Interactions at Each Discussion Level

		N	Mean	Std. Deviation	Std. Error
L1 Average Learner-Content Interactions	No Expectations	14	.90699	.276097	.073790
	Encouraged	37	1.01880	.114842	.018880
	Required	213	1.05374	.157056	.010761
	Total	264	1.04106	.163136	.010040
L1 Average Learner-Instructor Interactions	No Expectations	14	.02381	.089087	.023810
	Encouraged	37	.01359	.039300	.006461
	Required	213	.00370	.021535	.001476
	Total	264	.00615	.031730	.001953
L1 Average Learner-Learner Interactions	No Expectations	14	.00000	.000000	.000000
	Encouraged	37	.00000	.000000	.000000
	Required	213	.00469	.068519	.004695
	Total	264	.00379	.061546	.003788
L2 Average Learner-Content Interactions	No Expectations	4	.00000	.000000	.000000
	Encouraged	33	.00000	.000000	.000000
	Required	198	.00000	.000000	.000000
	Total	235	.00000	.000000	.000000
L2 Average Learner-Instructor Interactions	No Expectations	4	.00000	.000000	.000000
	Encouraged	33	.37432	.761041	.132480
	Required	198	.23284	1.630218	.115855
	Total	235	.24874	1.523185	.099362
L2 Average Learner-Learner Interactions	No Expectations	4	1.00000	.000000	.000000
	Encouraged	33	1.08816	.467444	.081372
	Required	198	1.31314	.378423	.026893
	Total	235	1.27621	.397349	.025920
L3 Average Learner-Content Interactions	No Expectations	1	.00000		
	Encouraged	21	.00000	.000000	.000000
	Required	170	.00000	.000000	.000000
	Total	192	.00000	.000000	.000000
L3 Average Learner-Instructor Interactions	No Expectations	1	.00000		
	Encouraged	21	.39881	.493107	.107605
	Required	170	.08887	.227396	.017440
	Total	192	.12230	.284066	.020501
L3 Average Learner-Learner Interactions	No Expectations	1	1.00000		
	Encouraged	21	.85119	.569565	.124289
	Required	170	1.17868	.367474	.028184
	Total	192	1.14193	.405036	.029231

L4 Average Learner-Content Interactions	No Expectations	0			
	Encouraged	9	.00000	.000000	.000000
	Required	120	.00000	.000000	.000000
	Total	129	.00000	.000000	.000000
L4 Average Learner-Instructor Interactions	No Expectations	0			
	Encouraged	9	.55556	.527046	.175682
	Required	120	.08001	.265436	.024231
	Total	129	.11319	.312498	.027514
L4 Average Learner-Learner Interactions	No Expectations	0			
	Encouraged	9	.66667	.707107	.235702
	Required	120	1.07188	.332842	.030384
	Total	129	1.04361	.380768	.033525
L5 Average Learner-Content Interactions	No Expectations	0			
	Encouraged	3	.00000	.000000	.000000
	Required	68	.00000	.000000	.000000
	Total	71	.00000	.000000	.000000
L5 Average Learner-Instructor Interactions	No Expectations	0			
	Encouraged	3	.16667	.288675	.166667
	Required	68	.08207	.278343	.033754
	Total	71	.08565	.277180	.032895
L5 Average Learner-Learner Interactions	No Expectations	0			
	Encouraged	3	.83333	.288675	.166667
	Required	68	1.02855	.306842	.037210
	Total	71	1.02031	.306696	.036398

As explained previously, because there is an inadequate number of cases of discussions representing "No Expectations" for message contributions and for discussions representing "Encouraged" message contributions remaining in the sample beyond discussion Level 2, statistical tests could not be performed to assess the differences that may exist between the average level of participation in each type of learner interaction at each discussion level.

For example, as summarized in Table 39, only 14 discussions with "No Expectations" for message contributions were included for analysis at Level 1 of the discussions analyzed in this study, compared with 37 discussions that "Encouraged" message contributions and 213 discussions where message contributions were

"Required." At discussion Level 2, only four of the original 14 discussions with "No Expectations" for message contributions remained in the sample, indicating that 10 of the original discussions did not exhibit learner interactions beyond discussion Level 1. In contrast, 33 of the original 37 discussions where message contributions were "Encouraged" but not required, and 198 of the 213 discussions where message contributions were "Required" remained for analysis at discussion Level 2.

This pattern of diminishing cases of discussions representing each type of expectation for message contributions continues across discussion levels. More specifically, at discussion Level 3, only one of the original 14 discussions with "No Expectations" for message contributions remained in the sample, while 21 of the 33 discussions that "Encouraged" message contributions and 170 of the 213 discussions with "Required" message contributions remained in the sample. By discussion Level 4, no discussions with "No Expectations" for message contributions remained in the sample, nine discussions that "Encouraged" message contributions, and 120 discussions with "Required" message contributions remained in the sample. At Level 5 of the discussions, only three of the original 37 discussions that "Encouraged" message contributions and 68 of the original 213 discussions that "Required" message contributions still remained in the sample. Finally, at Level 6 of the discussions, only discussions with "Required" message contributions remained in the sample.

Though this pattern of diminishing cases prevents statistical analysis of potential differences in the average level of participation in learner interactions in each level of discussions analyzed in this study, it does relate to a respective discussion's degree of

participation persistence, considered in Research Question #5, which will be discussed more fully later in this chapter.

In sum, these results indicate that there was not a significant difference at the .05 level between discussions with different types of expectations for message contributions and the average level of participation achieved at each level of the discussions analyzed in this study. However, there does appear to be a difference in the type of learner interaction that is exhibited at different discussion levels, with learner-content interaction representing the most prominent type of interaction taking place at discussion Level 1, and learner-learner interaction representing the most prominent type of interaction occurring in discussions beyond Level 1 of the discussions examined in this study.

Instructor Expectations for Student Interactions

Figure 16 illustrates potential relationships between discussions representing the three types of instructors' stated expectations for student interactions and the means of the overall average level of participation exhibited through Level 5 of the discussions.

As illustrated in Figure 16 and Table 40, discussions representing each of the three different types of expectations for student interactions do not appear to exhibit significantly different average levels of participation through the first five levels of the respective discussions.

Figure 16: Expectations for Student Interactions and Overall Average Level of Participation in at Each Discussion Level

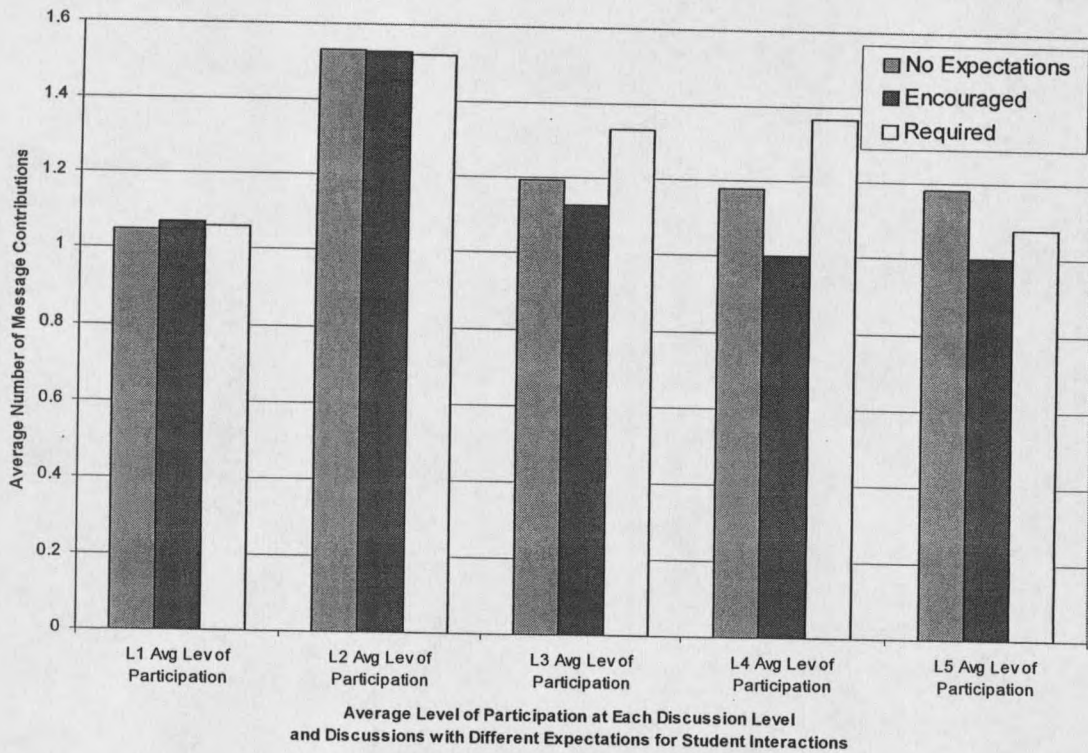


Table 40: Descriptive Statistics of Expectations for Student Interactions and Overall Average Level of Participation at Each Discussion Level

		N	Mean	Std. Deviation	Std. Error
L1 Average Level of Participation	No Expectations	148	1.05033	.131333	.010795
	Encouraged	11	1.06926	.200185	.060358
	Required	105	1.05863	.124228	.012123
	Total	264	1.05442	.131502	.008093
L2 Average Level of Participation	No Expectations	119	1.53162	1.982076	.181697
	Encouraged	22	1.52854	.712575	.214849
	Required	105	1.52126	.360362	.035168
	Total	235	1.52685	1.435459	.093639
L3 Average Level of Participation	No Expectations	78	1.19478	.389004	.044046
	Encouraged	9	1.12698	.330772	.110257
	Required	105	1.33140	.309141	.030169
	Total	192	1.26632	.350654	.025306
L4 Average Level of Participation	No Expectations	30	1.17778	.454718	.083020
	Encouraged	4	1.00000	.000000	.000000
	Required	95	1.36730	1.952917	.200365
	Total	129	1.31184	1.690326	.148825

L5 Average Level of Participation	No Expectations	11	1.18182	.404520	.121967
	Encouraged	2	1.00000	.000000	.000000
	Required	58	1.07798	.241041	.031650
	Total	71	1.09187	.268998	.031924

Based on the results of a one-way analysis of variance (ANOVA) test, provided in Table 41, the null hypothesis was confirmed as no significant differences at the .05 level were found between discussions representing each type of expectation for student interaction and the overall average level of participation exhibited through Level 5 of the discussions analyzed in this study, except for discussion Level 3 in which the null hypothesis was rejected.

Table 41: ANOVA for Expectations for Student Interactions and Overall Average Level of Participation at Each Discussion Level

		Sum of Squares	df	Mean Square	F	Sig.
L1 Average Level of Participation	Between Groups	.007	2	.003	.194	.824
	Within Groups	4.541	261	.017		
	Total	4.548	263			
L2 Average Level of Participation	Between Groups	.006	2	.003	.001	.999
	Within Groups	482.161	232	2.078		
	Total	482.167	234			
L3 Average Level of Participation	Between Groups	1.019	2	.509	4.285	.015
	Within Groups	22.466	189	.119		
	Total	23.485	191			
L4 Average Level of Participation	Between Groups	1.220	2	.610	.211	.810
	Within Groups	364.501	126	2.893		
	Total	365.722	128			
L5 Average Level of Participation	Between Groups	.117	2	.059	.804	.452
	Within Groups	4.948	68	.073		
	Total	5.065	70			

H_0 = There is no difference between the average level of participation in learner interactions at each discussion level and expectations for student interactions.

The results of post hoc tests, presented in Table 42, indicate that at discussion Level 3, a significant difference at the .05 level was found in the average level of

participation exhibited in discussions where there were "No Expectations" for student interaction as compared with discussions that "Required" student interactions.

Table 42: Post Hoc Tests for Expectations for Student Interactions and Average Level of Participation in Learner Interactions at Discussion Level 3

Dependent Variable		(I) Expected Student Interactions	(J) Expected Student Interactions	Mean Difference	Std. Error	Sig.
L3 Average Level of Participation	Tukey HSD	No Expectations	Encouraged	.06780	.121374	.842
			Required	-.13662(*)	.051537	.024
		Encouraged	No Expectations	-.06780	.121374	.842
			Required	-.20442	.119749	.205
		Required	No Expectations	.13662(*)	.051537	.024
			Encouraged	.20442	.119749	.205
	Scheffe	No Expectations	Encouraged	.06780	.121374	.856
			Required	-.13662(*)	.051537	.032
		Encouraged	No Expectations	-.06780	.121374	.856
			Required	-.20442	.119749	.236
		Required	No Expectations	.13662(*)	.051537	.032
			Encouraged	.20442	.119749	.236

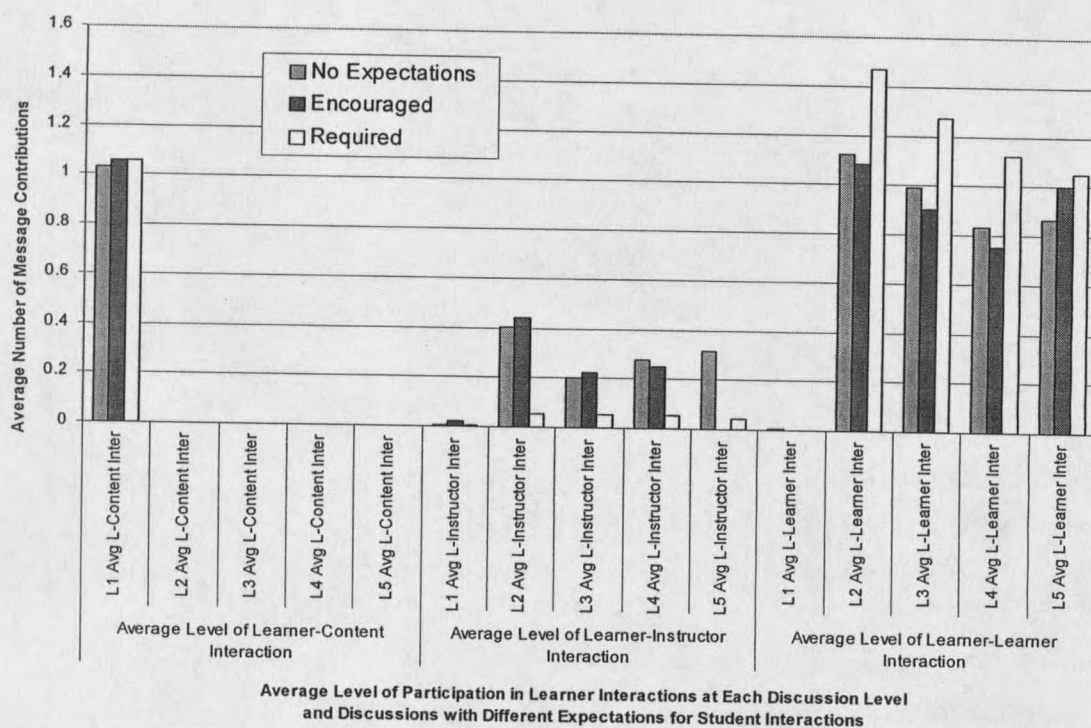
* The mean difference is significant at the .05 level.

In addition to examining potential differences in the discussion's overall average level of participation, Figure 17 illustrates potential relationships between discussions representing different expectations for student interactions and the average level of participation in each of the three distinct types of learner interaction through Level 5 of the discussions examined in this study. As illustrated in Figure 17, the average level of learner interaction at discussion Level 1 appears to almost exclusively represent student participation in learner-content interaction.

In contrast, after discussion Level 1, the average level of participation in learner interactions appears to represent predominantly learner-learner interactions. Accordingly, although there may not be significant differences in the overall average level of

participation at each discussion level, there appears to be differences in the type of learner interaction that is exhibited in all discussions at different levels of the respective discussions.

Figure 17: Expectations for Message Contributions and Average Level of Participation in Learner Interactions at Each Discussion Level



As illustrated in Figure 17, there appear to be differences between discussions representing different types of expectations for student interactions and the average level of participation in learner-instructor and learner-learner interactions exhibited at different levels of these respective discussions. Table 43 also includes a comparison of frequencies of discussions representing each of the three types of instructor expectations for student interactions and a comparison of means and standard deviations of the average level of participation in each type of learner interaction exhibited at each level of the discussions.

Table 43: Descriptive Statistics of Expectations for Student Interactions and Average Level of Participation in Learner Interactions at Each Discussion Level

		N	Mean	Std. Deviation	Std. Error
L1 Average Learner- Content Interactions	No Expectations	148	1.03085	.182047	.014964
	Encouraged	11	1.05628	.209543	.063180
	Required	105	1.05384	.126085	.012305
	Total	264	1.04106	.163136	.010040
L1 Average Learner- Instructor Interactions	No Expectations	148	.00597	.034362	.002825
	Encouraged	11	.02165	.049320	.014871
	Required	105	.00479	.024817	.002422
	Total	264	.00615	.031730	.001953
L1 Average Learner- Learner Interactions	No Expectations	148	.00676	.082199	.006757
	Encouraged	11	.00000	.000000	.000000
	Required	105	.00000	.000000	.000000
	Total	264	.00379	.061546	.003788
L2 Average Learner- Content Interactions	No Expectations	119	.00000	.000000	.000000
	Encouraged	11	.00000	.000000	.000000
	Required	105	.00000	.000000	.000000
	Total	235	.00000	.000000	.000000
L2 Average Learner- Instructor Interactions	No Expectations	119	.40414	2.106061	.193062
	Encouraged	11	.44318	1.017601	.306818
	Required	105	.05225	.132086	.012890
	Total	235	.24874	1.523185	.099362
L2 Average Learner- Learner Interactions	No Expectations	119	1.12374	.353434	.032399
	Encouraged	11	1.08535	.394298	.118885
	Required	105	1.46901	.361363	.035265
	Total	235	1.27621	.397349	.025920
L3 Average Learner- Content Interactions	No Expectations	78	.00000	.000000	.000000
	Encouraged	9	.00000	.000000	.000000
	Required	105	.00000	.000000	.000000
	Total	192	.00000	.000000	.000000
L3 Average Learner- Instructor Interactions	No Expectations	78	.20031	.361642	.040948
	Encouraged	9	.22222	.440959	.146986
	Required	105	.05579	.162832	.015891
	Total	192	.12230	.284066	.020501
L3 Average Learner- Learner Interactions	No Expectations	78	.98934	.423028	.047898
	Encouraged	9	.90476	.606092	.202031
	Required	105	1.27561	.316492	.030886
	Total	192	1.14193	.405036	.029231

L4 Average Learner-Content Interactions	No Expectations	30	.00000	.000000	.000000
	Encouraged	4	.00000	.000000	.000000
	Required	95	.00000	.000000	.000000
	Total	129	.00000	.000000	.000000
L4 Average Learner-Instructor Interactions	No Expectations	30	.27778	.511053	.093305
	Encouraged	4	.25000	.500000	.250000
	Required	95	.05545	.177796	.018241
	Total	129	.11319	.312498	.027514
L4 Average Learner-Learner Interactions	No Expectations	30	.83333	.510428	.093191
	Encouraged	4	.75000	.500000	.250000
	Required	95	1.12238	.291578	.029915
	Total	129	1.04361	.380768	.033525
L5 Average Learner-Content Interactions	No Expectations	11	.00000	.000000	.000000
	Encouraged	2	.00000	.000000	.000000
	Required	58	.00000	.000000	.000000
	Total	71	.00000	.000000	.000000
L5 Average Learner-Instructor Interactions	No Expectations	11	.31818	.550023	.165838
	Encouraged	2	.00000	.000000	.000000
	Required	58	.04450	.169887	.022307
	Total	71	.08565	.277180	.032895
L5 Average Learner-Learner Interactions	No Expectations	11	.86364	.510001	.153771
	Encouraged	2	1.00000	.000000	.000000
	Required	58	1.05072	.253359	.033268
	Total	71	1.02031	.306696	.036398

Based on the results of a one-way analysis of variance (ANOVA) test, included in Table 44, the null hypothesis was confirmed with respect to learner-content interactions as no significant difference at the .05 level were shown to exist between discussions with different expectations for student interactions and the average level of participation in learner-content interactions through Level 5 of the discussions analyzed in this study.

With regard to the average level of participation in learner-instructor interactions, the null hypothesis was confirmed at discussion Level 1 and Level 2, as no significant differences at the .05 level were shown to exist between discussions with different expectations for student interactions and the average level of participation in learner-

instructor interactions at these two levels of the discussions analyzed in this study. However, the null hypothesis was rejected in discussion Levels 3 through 5, as significant differences at the .05 level were shown to exist between discussions with different types of expectations for student interactions and the average level of participation in learner-instructor interactions exhibited in these levels of the respective discussions.

For the average level of participation in learner-learner interactions, the null hypothesis was confirmed for discussion Level 1 and Level 5, as no significant differences at the .05 level were shown to exist between discussions with different expectations for student interactions and the average level of participation in learner-learner interactions at these two levels of the discussions analyzed in this study. However, the null hypothesis was rejected for discussion Levels 2 through 4, as significant differences at the .05 level were shown to exist between discussions with different types of expectations for student interactions and the average level of participation in learner-learner interactions exhibited in these levels of the discussions.

Table 44: ANOVA for Expectations for Student Interactions and Average Level of Participation in Learner Interactions at Each Discussion Level

		Sum of		Mean		
		Squares	df	Square	F	Sig.
L1 Average Learner-Content Interactions	Between Groups	.035	2	.018	.658	.519
	Within Groups	6.964	261	.027		
	Total	6.999	263			
L1 Average Learner-Instructor Interactions	Between Groups	.003	2	.001	1.415	.245
	Within Groups	.262	261	.001		
	Total	.265	263			

L1 Average Learner-Learner Interactions	Between Groups	.003	2	.001	.390	.677
	Within Groups	.993	261	.004		
	Total	.996	263			
L2 Average Learner-Content Interactions	Between Groups	.000	2	.000		
	Within Groups	.000	232	.000		
	Total	.000	234			
L2 Average Learner-Instructor Interactions	Between Groups	7.344	2	3.672	1.591	.206
	Within Groups	535.558	232	2.308		
	Total	542.901	234			
L2 Average Learner-Learner Interactions	Between Groups	7.070	2	3.535	27.452	.000
	Within Groups	29.875	232	.129		
	Total	36.945	234			
L3 Average Learner-Content Interactions	Between Groups	.000	2	.000		
	Within Groups	.000	189	.000		
	Total	.000	191			
L3 Average Learner-Instructor Interactions	Between Groups	1.029	2	.514	6.760	.001
	Within Groups	14.383	189	.076		
	Total	15.412	191			
L3 Average Learner-Learner Interactions	Between Groups	4.199	2	2.099	14.622	.000
	Within Groups	27.136	189	.144		
	Total	31.334	191			
L4 Average Learner-Content Interactions	Between Groups	.000	2	.000		
	Within Groups	.000	126	.000		
	Total	.000	128			
L4 Average Learner-Instructor Interactions	Between Groups	1.204	2	.602	6.717	.002
	Within Groups	11.296	126	.090		
	Total	12.500	128			
L4 Average Learner-Learner Interactions	Between Groups	2.261	2	1.130	8.739	.000
	Within Groups	16.297	126	.129		
	Total	18.558	128			
L5 Average Learner-Content Interactions	Between Groups	.000	2	.000		
	Within Groups	.000	68	.000		
	Total	.000	70			
L5 Average Learner-Instructor Interactions	Between Groups	.708	2	.354	5.152	.008
	Within Groups	4.670	68	.069		
	Total	5.378	70			
L5 Average Learner-Learner Interactions	Between Groups	.324	2	.162	1.762	.179
	Within Groups	6.260	68	.092		
	Total	6.584	70			

H_0 = There is no difference between the average level of participation in learner interactions at each discussion level and expectations for student interactions.

Analyzing further the relationships related to the average level of participation in learner-instructor interactions, the results of post hoc tests are summarized in Table 45. These results indicate that at discussion Level 3, Level 4, and Level 5, a significant difference at the .05 level exists in the average level of participation in learner-instructor interactions exhibited in discussions where there were "No Expectations" for student interactions and discussions that "Required" student interactions.

Table 45: Post Hoc Tests for Expectations for Student Interactions and Average Level of Participation in Learner-Instructor Interactions at Each Discussion Level

Dependent Variable		(I) Expected Student Interactions	(J) Expected Student Interactions	Mean Difference (I-J)	Std. Error	Sig.
L3 Average Learner-Instructor Interactions	Tukey HSD	No Expectations	Encouraged	-.02191	.097116	.972
			Required	.14452(*)	.041237	.002
		Encouraged	No Expectations	.02191	.097116	.972
			Required	.16643	.095816	.194
		Required	No Expectations	-.14452(*)	.041237	.002
			Encouraged	-.16643	.095816	.194
	Scheffe	No Expectations	Encouraged	-.02191	.097116	.975
			Required	.14452(*)	.041237	.003
		Encouraged	No Expectations	.02191	.097116	.975
			Required	.16643	.095816	.224
		Required	No Expectations	-.14452(*)	.041237	.003
			Encouraged	-.16643	.095816	.224
L4 Average Learner-Instructor Interactions	Tukey HSD	No Expectations	Encouraged	.02778	.159374	.983
			Required	.22233(*)	.062705	.002
		Encouraged	No Expectations	-.02778	.159374	.983
			Required	.19455	.152825	.413
		Required	No Expectations	-.22233(*)	.062705	.002
			Encouraged	-.19455	.152825	.413
	Scheffe	No Expectations	Encouraged	.02778	.159374	.985
			Required	.22233(*)	.062705	.002
		Encouraged	No Expectations	-.02778	.159374	.985
			Required	.19455	.152825	.447
		Required	No Expectations	-.22233(*)	.062705	.002
			Encouraged	-.19455	.152825	.447

L5 Average Learner-Instructor Interactions	Tukey HSD	No Expectations	Encouraged	.31818	.201456	.261
			Required	.27368(*)	.086186	.006
		Encouraged	No Expectations	-.31818	.201456	.261
			Required	-.04450	.188481	.970
		Required	No Expectations	-.27368(*)	.086186	.006
			Encouraged	.04450	.188481	.970
	Scheffe	No Expectations	Encouraged	.31818	.201456	.294
			Required	.27368(*)	.086186	.009
		Encouraged	No Expectations	-.31818	.201456	.294
			Required	-.04450	.188481	.973
		Required	No Expectations	-.27368(*)	.086186	.009
			Encouraged	.04450	.188481	.973

* The mean difference is significant at the .05 level.

Analyzing further the relationships related to the average level of participation in learner-learner interactions, the results of post hoc tests are summarized in Table 46. These results indicate that at discussion Level 2, Level 3, and Level 4, significant differences were shown to exist at the .05 level in the average level of participation in learner-learner interactions exhibited in discussions where there were "No Expectations" for student interactions and discussions that "Required" student interactions. Additionally, at discussion Level 2 and Level 3, significant differences at the .05 level were also shown to exist in the average level of participation in learner-learner interactions exhibited in discussions where student interactions were "Encouraged" but not required and discussions that "Required" students to interact with other discussion participants.

Table 46: Post Hoc Tests for Expectations for Student Interactions and Average Level of Participation in Learner-Learner Interactions at Each Discussion Level

Dependent Variable		(I) Expected Student Interactions	(J) Expected Student Interactions	Mean Difference (I-J)	Std. Error	Sig.
L2 Average Learner-Learner Interactions	Tukey HSD	No Expectations	Encouraged	.03839	.113088	.938
			Required	-.34527(*)	.048047	.000
		Encouraged	No Expectations	-.03839	.113088	.938
			Required	-.38366(*)	.113724	.002
		Required	No Expectations	.34527(*)	.048047	.000
			Encouraged	.38366(*)	.113724	.002
	Scheffe	No Expectations	Encouraged	.03839	.113088	.944
			Required	-.34527(*)	.048047	.000
		Encouraged	No Expectations	-.03839	.113088	.944
			Required	-.38366(*)	.113724	.004
		Required	No Expectations	.34527(*)	.048047	.000
			Encouraged	.38366(*)	.113724	.004
L3 Average Learner-Learner Interactions	Tukey HSD	No Expectations	Encouraged	.08458	.133392	.802
			Required	-.28627(*)	.056640	.000
		Encouraged	No Expectations	-.08458	.133392	.802
			Required	-.37085(*)	.131606	.015
		Required	No Expectations	.28627(*)	.056640	.000
			Encouraged	.37085(*)	.131606	.015
	Scheffe	No Expectations	Encouraged	.08458	.133392	.818
			Required	-.28627(*)	.056640	.000
		Encouraged	No Expectations	-.08458	.133392	.818
			Required	-.37085(*)	.131606	.020
		Required	No Expectations	.28627(*)	.056640	.000
			Encouraged	.37085(*)	.131606	.020
L4 Average Learner-Learner Interactions	Tukey HSD	No Expectations	Encouraged	.08333	.191434	.901
			Required	-.28905(*)	.075319	.001
		Encouraged	No Expectations	-.08333	.191434	.901
			Required	-.37238	.183568	.110
		Required	No Expectations	.28905(*)	.075319	.001
			Encouraged	.37238	.183568	.110
	Scheffe	No Expectations	Encouraged	.08333	.191434	.910
			Required	-.28905(*)	.075319	.001
		Encouraged	No Expectations	-.08333	.191434	.910
			Required	-.37238	.183568	.132
		Required	No Expectations	.28905(*)	.075319	.001
			Encouraged	.37238	.183568	.132

* The mean difference is significant at the .05 level.

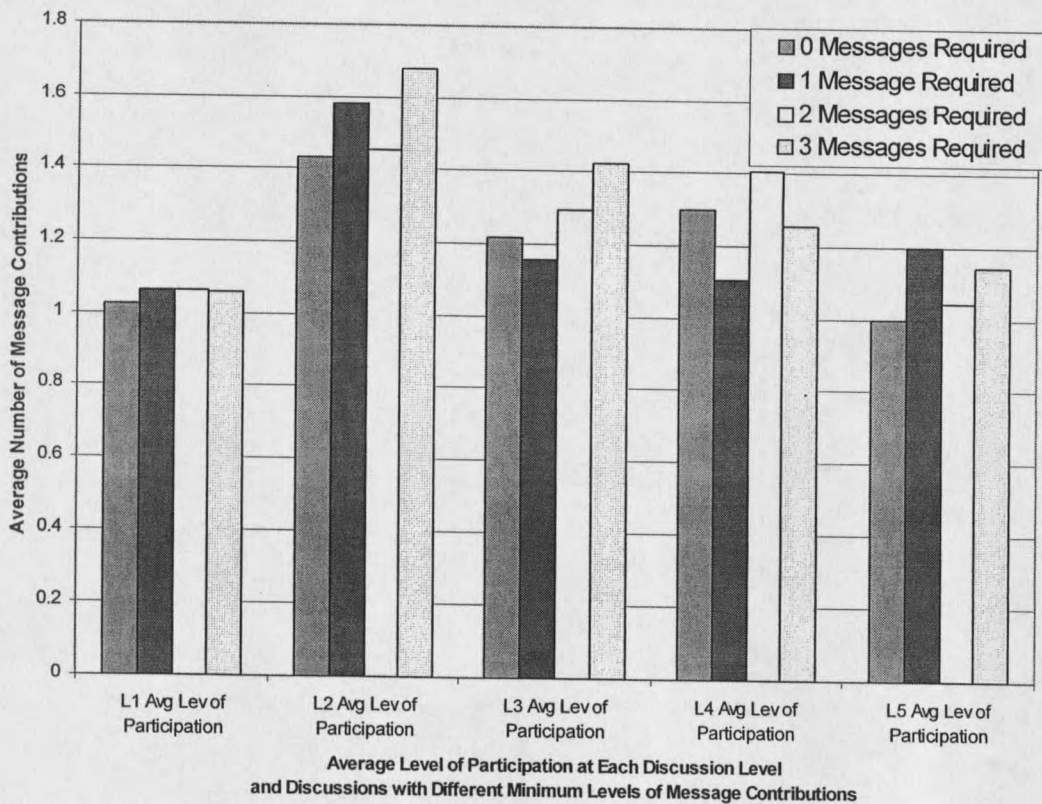
In sum, the previous discussion has examined the relationships between different types of expectations for student interactions in the discussions analyzed in this study and the average level of participation in learner interactions achieved at each level of the respective discussions. Specifically, a significant difference at the .05 level was shown to exist in the overall average level of participation exhibited at discussion Level 3 between discussions where there were "No Expectations" for student interactions and discussions that "Required" student interactions.

Moreover, with regard to the three different types of learner-interaction, no significant differences appeared to exist in the average level of participation in learner-content interactions at each level of the discussions analyzed in this study. However, significant differences at the .05 level were shown to exist at discussion Level 3, Level 4, and Level 5 in the average level of participation in learner-instructor interactions in discussions where there were "No Expectations" for student interactions and discussions that "Required" student interactions. Additionally, a significant difference at the .05 level was shown to exist in the average level of participation in learner-learner interactions at discussion Level 2, Level 3, and Level 4 in discussions where there were "No Expectations" for student interactions as compared with discussions that "Required" student interactions. Finally, at discussion Level 2 and Level 3, a significant difference at the .05 level was also shown to exist in the average level of participation in learner-learner interactions exhibited in discussions where student interactions were "Encouraged" but not required and discussions that "Required" students to interact with other discussion participants.

Expected Minimum Levels of Message Contributions

Figure 18 illustrates potential relationships between discussions representing different instructor stated expectations for minimum levels of message contributions and the means of the overall average level of participation exhibited at each of the first five levels of the discussions analyzed in this study.

Figure 18: Minimum Levels of Message Contributions and Average Level of Participation in Learner Interactions at Each Discussion Level.



As illustrated in Figure 18 and Table 47, discussions representing different levels of expected message contributions do not appear to exhibit significantly different average levels of participation in learner interactions through the first five levels of the respective discussions.

Table 47: Descriptive Statistics of Minimum Levels of Message Contributions and Overall Average Level of Participation at Each Discussion Level

		N	Mean	Std. Deviation	Std. Error
L1 Avg Level of Participation	0 Messages Required	54	1.02243	.094402	.012846
	1 Message Required	98	1.06453	.154921	.015649
	2 Messages Required	79	1.06171	.137426	.015462
	3 Messages Required	33	1.05933	.079900	.013909
	Total	264	1.05442	.131502	.008093
L2 Avg Level of Participation	0 Messages Required	39	1.42979	.589572	.094407
	1 Message Required	84	1.58348	2.340576	.255378
	2 Messages Required	79	1.45113	.364688	.041031
	3 Messages Required	33	1.67864	.252228	.043907
	Total	235	1.52685	1.435459	.093639
L3 Avg Level of Participation	0 Messages Required	24	1.21875	.485174	.099036
	1 Message Required	57	1.15865	.332848	.044087
	2 Messages Required	78	1.29302	.315207	.035690
	3 Messages Required	33	1.42377	.286553	.049882
	Total	192	1.26632	.350654	.025306
L4 Avg Level of Participation	0 Messages Required	10	1.30000	.483046	.152753
	1 Message Required	22	1.10606	.419579	.089454
	2 Messages Required	67	1.40658	2.320877	.283540
	3 Messages Required	30	1.25511	.309990	.056596
	Total	129	1.31184	1.690326	.148825
L5 Avg Level of Participation	0 Messages Required	3	1.00000	.000000	.000000
	1 Message Required	10	1.20000	.421637	.133333
	2 Messages Required	39	1.04579	.260728	.041750
	3 Messages Required	19	1.14405	.183364	.042067
	Total	71	1.09187	.268998	.031924

Based on the results of a one-way analysis of variance (ANOVA) test, provided in Table 48, the null hypothesis was confirmed as no significant differences at the .05 level were shown to exist between discussions representing different minimum levels of expected message contributions and the average level of participation exhibited through Level 5 of these discussions, with the exception of discussion Level 3 in which the null hypothesis was rejected.

Table 48: ANOVA for Minimum Levels of Message Contributions and Overall Average Level of Participation at Each Discussion Level

		Sum of Squares	df	Mean Square	F	Sig.
L1 Avg Level of Participation	Between Groups	.070	3	.023	1.360	.256
	Within Groups	4.478	260	.017		
	Total	4.548	263			
L2 Avg Level of Participation	Between Groups	1.850	3	.617	.297	.828
	Within Groups	480.317	231	2.079		
	Total	482.167	234			
L3 Avg Level of Participation	Between Groups	1.589	3	.530	4.547	.004
	Within Groups	21.896	188	.116		
	Total	23.485	191			
L4 Avg Level of Participation	Between Groups	1.631	3	.544	.187	.905
	Within Groups	364.091	125	2.913		
	Total	365.722	128			
L5 Avg Level of Participation	Between Groups	.277	3	.092	1.291	.285
	Within Groups	4.788	67	.071		
	Total	5.065	70			

H_0 = There is no difference between the average level of participation in learner interactions at each discussion level and minimum levels of message contributions.

Specifically, the results of a post hoc test, as summarized in Table 49, indicates that at discussion Level 3, a significant difference at the .05 level was shown to exist in the average level of participation exhibited in discussions where a minimum of one message contribution was expected as compared with discussions requiring a minimum of three message contributions.

Table 49: Post Hoc Tests for Minimum Levels of Message Contributions and Overall Average Level of Participation at Discussion Level 3

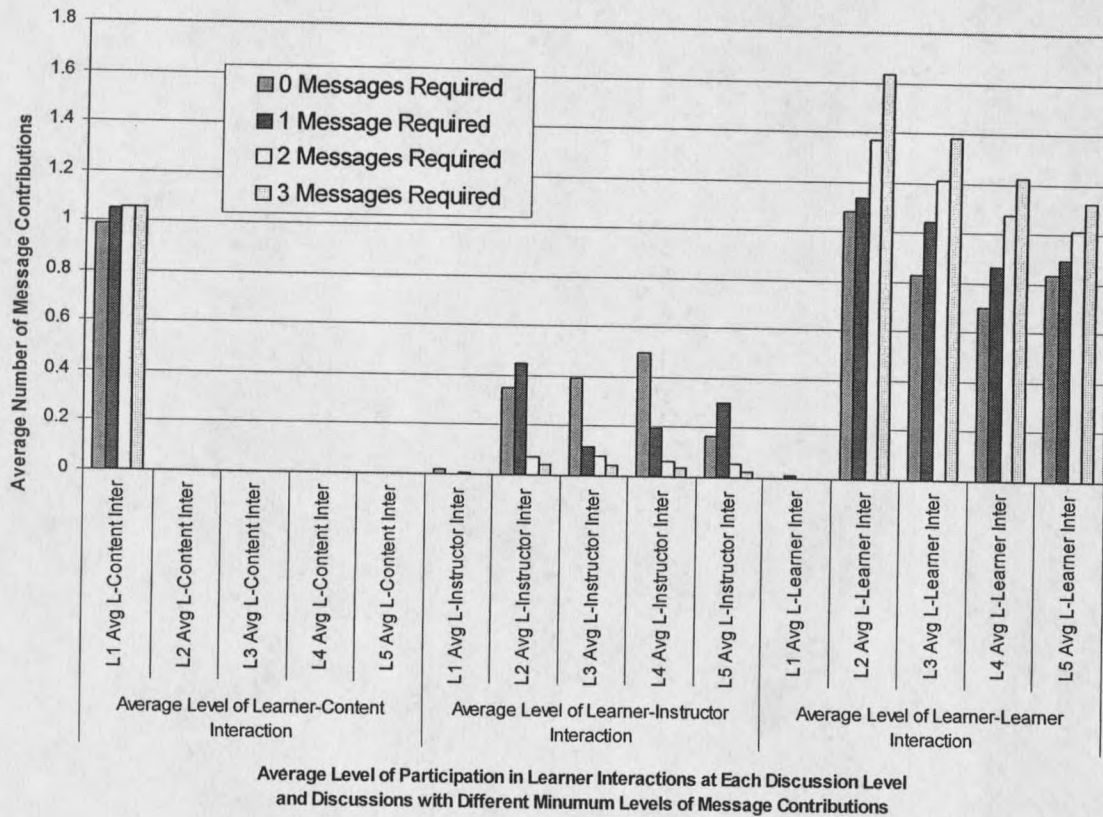
Dependent Variable		(I) Minimum Message Contributions	(J) Minimum Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
L3 Average Level of Participation	Tukey	0 Messages Required	1 Message Required	.06010	.083043	.888
			2 Messages Required	-.07427	.079662	.788
			3 Messages Required	-.20502	.091555	.116
	HSD	1 Message Required	0 Messages Required	-.06010	.083043	.888
			2 Messages Required	-.13438	.059469	.111
			3 Messages Required	-.26513(*)	.074650	.003

Scheffe	2 Messages Required	0 Messages Required	.07427	.079662	.788
		1 Message Required	.13438	.059469	.111
		3 Messages Required	-.13075	.070870	.256
	3 Messages Required	0 Messages Required	.20502	.091555	.116
		1 Message Required	.26513(*)	.074650	.003
		2 Messages Required	.13075	.070870	.256
	0 Messages Required	1 Message Required	.06010	.083043	.913
		2 Messages Required	-.07427	.079662	.833
		3 Messages Required	-.20502	.091555	.175
	1 Message Required	0 Messages Required	-.06010	.083043	.913
		2 Messages Required	-.13438	.059469	.168
		3 Messages Required	-.26513(*)	.074650	.007
	2 Messages Required	0 Messages Required	.07427	.079662	.833
		1 Message Required	.13438	.059469	.168
		3 Messages Required	-.13075	.070870	.336
	3 Messages Required	0 Messages Required	.20502	.091555	.175
		1 Message Required	.26513(*)	.074650	.007
		2 Messages Required	.13075	.070870	.336

* The mean difference is significant at the .05 level.

In addition to examining potential relationships related to discussion's overall average level of participation, Figure 19 illustrates potential relationships that exist between the different types of expectations for minimum levels of message contributions and the average level of participation in each of the three types of learner interaction exhibited at each discussion level, through Level 5 of the discussions analyzed in this study.

Figure 19: Minimum Levels of Message Contributions and Average Level of Participation in Learner Interactions at Each Discussion Level



As illustrated in Figure 19 and Table 50, the average level of learner interaction at discussion Level 1 appears to almost exclusively represent student participation in learner-content interaction. In contrast, after discussion Level 1, the average level of participation in learner interactions appears to represent predominantly learner-learner interactions. Accordingly, although there may not be a significant difference in the overall average level of interaction at each level of the discussions analyzed in this study, there appears to be differences in the type of learner interaction that is exhibited at different discussion levels. Additionally, discussions representing different levels of minimum expected message contributions appear to exhibit differences in the average level of

participation in the different types of learner interactions occurring at different levels of the respective discussions.

Table 50: Descriptive Statistics of Average Level of Participation in Learner Interactions at Each Discussion Level and Minimum Levels of Message Contributions.

		N	Mean	Std. Deviation	Std. Error
L1 Average Learner-Content Interactions	0 Messages Required	54	.99019	.173785	.023649
	1 Message Required	98	1.05199	.190034	.019196
	2 Messages Required	79	1.05504	.139416	.015686
	3 Messages Required	33	1.05835	.079624	.013861
	Total	264	1.04106	.163136	.010040
L1 Average Learner-Instructor Interactions	0 Messages Required	54	.01549	.055047	.007491
	1 Message Required	98	.00234	.017920	.001810
	2 Messages Required	79	.00666	.028868	.003248
	3 Messages Required	33	.00098	.005615	.000978
	Total	264	.00615	.031730	.001953
L1 Average Learner-Learner Interactions	0 Messages Required	54	.00000	.000000	.000000
	1 Message Required	98	.01020	.101015	.010204
	2 Messages Required	79	.00000	.000000	.000000
	3 Messages Required	33	.00000	.000000	.000000
	Total	264	.00379	.061546	.003788
L2 Average Learner-Content Interactions	0 Messages Required	39	.00000	.000000	.000000
	1 Message Required	84	.00000	.000000	.000000
	2 Messages Required	79	.00000	.000000	.000000
	3 Messages Required	33	.00000	.000000	.000000
	Total	235	.00000	.000000	.000000
L2 Average Learner-Instructor Interactions	0 Messages Required	39	.34878	.725038	.116099
	1 Message Required	84	.44563	2.486588	.271309
	2 Messages Required	79	.07580	.161234	.018140
	3 Messages Required	33	.04333	.096339	.016770
	Total	235	.24874	1.523185	.099362
L2 Average Learner-Learner Interactions	0 Messages Required	39	1.08101	.438454	.070209
	1 Message Required	84	1.13785	.321575	.035087
	2 Messages Required	79	1.36970	.371253	.041769
	3 Messages Required	33	1.63531	.266126	.046327
	Total	235	1.27621	.397349	.025920
L3 Average Learner-Content Interactions	0 Messages Required	24	.00000	.000000	.000000
	1 Message Required	57	.00000	.000000	.000000
	2 Messages Required	78	.00000	.000000	.000000
	3 Messages Required	33	.00000	.000000	.000000
	Total	192	.00000	.000000	.000000
L3 Average Learner-Instructor Interactions	0 Messages Required	24	.39063	.490830	.100190
	1 Message Required	57	.11540	.277148	.036709

	2 Messages Required	78	.07860	.207054	.023444
	3 Messages Required	33	.04238	.074697	.013003
	Total	192	.12230	.284066	.020501
L3 Average Learner-Learner Interactions	0 Messages Required	24	.82813	.561215	.114558
	1 Message Required	57	1.04325	.346029	.045833
	2 Messages Required	78	1.20929	.355273	.040227
	3 Messages Required	33	1.38139	.279587	.048670
	Total	192	1.14193	.405036	.029231
L4 Average Learner-Content Interactions	0 Messages Required	10	.00000	.000000	.000000
	1 Message Required	22	.00000	.000000	.000000
	2 Messages Required	67	.00000	.000000	.000000
	3 Messages Required	30	.00000	.000000	.000000
	Total	129	.00000	.000000	.000000
L4 Average Learner-Instructor Interactions	0 Messages Required	10	.50000	.527046	.166667
	1 Message Required	22	.19697	.489672	.104398
	2 Messages Required	67	.06287	.206357	.025211
	3 Messages Required	30	.03519	.072189	.013180
	Total	129	.11319	.312498	.027514
L4 Average Learner-Learner Interactions	0 Messages Required	10	.70000	.674949	.213437
	1 Message Required	22	.86364	.435332	.092813
	2 Messages Required	67	1.07505	.286555	.035008
	3 Messages Required	30	1.21992	.273331	.049903
	Total	129	1.04361	.380768	.033525
L5 Average Learner-Content Interactions	0 Messages Required	3	.00000	.000000	.000000
	1 Message Required	10	.00000	.000000	.000000
	2 Messages Required	39	.00000	.000000	.000000
	3 Messages Required	19	.00000	.000000	.000000
	Total	71	.00000	.000000	.000000
L5 Average Learner-Instructor Interactions	0 Messages Required	3	.16667	.288675	.166667
	1 Message Required	10	.30000	.576280	.182236
	2 Messages Required	39	.05556	.203526	.032590
	3 Messages Required	19	.02180	.056014	.012851
	Total	71	.08565	.277180	.032895
L5 Average Learner-Learner Interactions	0 Messages Required	3	.83333	.288675	.166667
	1 Message Required	10	.90000	.522340	.165179
	2 Messages Required	39	1.01587	.276498	.044275
	3 Messages Required	19	1.12224	.183968	.042205
	Total	71	1.02031	.306696	.036398

Based on the results of a one-way analysis of variance (ANOVA) test, provided in Table 51, the null hypothesis was confirmed with respect to learner-content interactions, as no significant differences were shown to exist at the .05 level between discussions with

different requirements for minimum levels of message contributions and the average level of participation in learner-content interactions through Level 5 of the discussions analyzed in this study.

Table 51: ANOVA for Minimum Levels of Message Contributions and Average Level of Participation in Learner Interactions at Each Discussion Level

		Sum of Squares	df	Mean Square	F	Sig.
L1 Average Learner-Content Interactions	Between Groups	.177	3	.059	2.245	.083
	Within Groups	6.823	260	.026		
	Total	6.999	263			
L1 Average Learner-Instructor Interactions	Between Groups	.007	3	.002	2.365	.071
	Within Groups	.258	260	.001		
	Total	.265	263			
L1 Average Learner-Learner Interactions	Between Groups	.006	3	.002	.562	.641
	Within Groups	.990	260	.004		
	Total	.996	263			
L2 Average Learner-Content Interactions	Between Groups	.000	3	.000		
	Within Groups	.000	231	.000		
	Total	.000	234			
L2 Average Learner-Instructor Interactions	Between Groups	7.402	3	2.467	1.064	.365
	Within Groups	535.500	231	2.318		
	Total	542.901	234			
L2 Average Learner-Learner Interactions	Between Groups	8.040	3	2.680	21.42	.000
	Within Groups	28.905	231	.125		
	Total	36.945	234			
L3 Average Learner-Content Interactions	Between Groups	.000	3	.000		
	Within Groups	.000	188	.000		
	Total	.000	191			
L3 Average Learner-Instructor Interactions	Between Groups	2.090	3	.697	9.833	.000
	Within Groups	13.322	188	.071		
	Total	15.412	191			
L3 Average Learner-Learner Interactions	Between Groups	5.165	3	1.722	12.37	.000
	Within Groups	26.170	188	.139		
	Total	31.334	191			
L4 Average Learner-Content Interactions	Between Groups	.000	3	.000		
	Within Groups	.000	125	.000		
	Total	.000	128			
L4 Average Learner-Instructor Interactions	Between Groups	2.003	3	.668	7.950	.000
	Within Groups	10.497	125	.084		
	Total	12.500	128			

L4 Average Learner-Learner Interactions	Between Groups	2.892	3	.964	7.692	.000
	Within Groups	15.666	125	.125		
	Total	18.558	128			
L5 Average Learner-Content Interactions	Between Groups	.000	3	.000		
	Within Groups	.000	67	.000		
	Total	.000	70			
L5 Average Learner-Instructor Interactions	Between Groups	.592	3	.197	2.762	.049
	Within Groups	4.786	67	.071		
	Total	5.378	70			
L5 Average Learner-Learner Interactions	Between Groups	.448	3	.149	1.630	.191
	Within Groups	6.137	67	.092		
	Total	6.584	70			

H_0 = There is no difference between the average level of participation in learner interactions at each discussion level and minimum levels of message contributions.

With regard to the average level of participation in learner-instructor interactions, as illustrated in Table 51, the null hypothesis was confirmed as no significant differences at the .05 level were shown to exist between discussions with different expectations for minimum levels of message contributions and the average level of participation in learner-instructor interactions in Level 1 and Level 2 of the discussions analyzed in this study. However, the null hypothesis was rejected for discussion Levels 3 through 5, as significant differences at the .05 level were shown to exist between discussions with different requirements for minimum levels of message contributions and the average level of participation in learner-instructor interactions exhibited in these levels of the respective discussions.

Specifically, the results of post hoc tests, as summarized in Table 52, indicate that significant differences at the .05 level were found in the average level of participation in learner-instructor interactions achieved in discussions with different requirements for minimum levels of message contributions. For example, at discussion Level 3 and at

discussion Level 4, a significant difference at the .05 level was shown to exist in the average level of participation in learner-instructor interactions exhibited in discussions that had no expectations for minimum message contributions and discussions that required a minimum of one, two, and three message contributions. Additionally, at discussion Level 5, a significant difference at the .05 level was shown to exist in the average level of participation in learner-instructor interactions exhibited in discussions that had no minimum message contributions and discussions requiring a minimum of three message contributions. It is important to note that the differences identified above indicate that the average level of participation in learner-instructor interactions were higher for those discussions with lesser minimum expectations for message contributions.

Table 52: Post Hoc Tests for Minimum Levels of Message Contributions and Average Level of Participation in Learner-Instructor Interactions

Dependent Variable		(I) Minimum Message Contributions	(J) Minimum Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
L3 Average Learner-Instructor Interactions	Tukey HSD	0 Messages Required	1 Message Required	.27523(*)	.0647	.000
			2 Messages Required	.31202(*)	.0621	.000
			3 Messages Required	.34824(*)	.0714	.000
		1 Message Required	0 Messages Required	-.27523(*)	.0647	.000
			2 Messages Required	.03680	.0463	.857
			3 Messages Required	.07302	.0582	.593
		2 Messages Required	0 Messages Required	-.31202(*)	.0621	.000
			1 Message Required	-.03680	.0463	.857
			3 Messages Required	.03622	.0552	.914

		3 Messages Required	0 Messages Required	-.34824(*)	.0714	.000
			1 Message Required	-.07302	.0582	.593
			2 Messages Required	-.03622	.0552	.914
Scheffe	0 Messages Required		1 Message Required	.27523(*)	.0647	.001
			2 Messages Required	.31202(*)	.0621	.000
			3 Messages Required	.34824(*)	.0714	.000
	1 Message Required		0 Messages Required	-.27523(*)	.0647	.001
			2 Messages Required	.03680	.0463	.890
			3 Messages Required	.07302	.0582	.666
	2 Messages Required		0 Messages Required	-.31202(*)	.0621	.000
			1 Message Required	-.03680	.0463	.890
			3 Messages Required	.03622	.0552	.934
	3 Messages Required		0 Messages Required	-.34824(*)	.0714	.000
			1 Message Required	-.07302	.0582	.666
			2 Messages Required	-.03622	.0552	.934
L4 Average Learner- Instructor Interactions	Tukey HSD	0 Messages Required	1 Message Required	.30303(*)	.1105	.035
			2 Messages Required	.43713(*)	.0982	.000
			3 Messages Required	.46481(*)	.1058	.000
		1 Message Required	0 Messages Required	-.30303(*)	.1105	.035
			2 Messages Required	.13410	.0712	.240
			3 Messages Required	.16178	.0813	.198
		2 Messages Required	0 Messages Required	-.43713(*)	.0982	.000
			1 Message Required	-.13410	.0712	.240
			3 Messages Required	.02768	.0636	.972
		3 Messages Required	0 Messages Required	-.46481(*)	.1058	.000
			1 Message Required	-.16178	.0813	.198

			2 Messages Required	-.02768	.0636	.972
Scheffe	0 Messages Required	1 Message Required	.30303	.1105	.062	
		2 Messages Required	.43713(*)	.0982	.000	
		3 Messages Required	.46481(*)	.1058	.000	
	1 Message Required	0 Messages Required	-.30303	.1105	.062	
		2 Messages Required	.13410	.0712	.319	
		3 Messages Required	.16178	.0813	.271	
	2 Messages Required	0 Messages Required	-.43713(*)	.0982	.000	
		1 Message Required	-.13410	.0712	.319	
		3 Messages Required	.02768	.0636	.979	
	3 Messages Required	0 Messages Required	-.46481(*)	.1058	.000	
		1 Message Required	-.16178	.0813	.271	
		2 Messages Required	-.02768	.0636	.979	
L5 Average Learner- Instructor Interactions	Tukey HSD	0 Messages Required	1 Message Required	-.13333	.1759	.873
			2 Messages Required	.11111	.1601	.899
			3 Messages Required	.14486	.1660	.819
		1 Message Required	0 Messages Required	.13333	.1759	.873
			2 Messages Required	.24444	.0947	.057
			3 Messages Required	.27820(*)	.1044	.046
		2 Messages Required	0 Messages Required	-.11111	.1601	.899
			1 Message Required	-.24444	.0947	.057
			3 Messages Required	.03375	.0747	.969
		3 Messages Required	0 Messages Required	-.14486	.1660	.819
			1 Message Required	-.27820(*)	.1044	.046
			2 Messages Required	-.03375	.0747	.969
Scheffe	0 Messages Required	1 Message Required	-.13333	.1759	.902	

	2 Messages Required	.11111	.1601	.923
	3 Messages Required	.14486	.1660	.858
1 Message Required	0 Messages Required	.13333	.1759	.902
	2 Messages Required	.24444	.0947	.094
	3 Messages Required	.27820	.1044	.079
2 Messages Required	0 Messages Required	-.11111	.1601	.923
	1 Message Required	-.24444	.0947	.094
	3 Messages Required	.03375	.0747	.977
3 Messages Required	0 Messages Required	-.14486	.1660	.858
	1 Message Required	-.27820	.1044	.079
	2 Messages Required	-.03375	.0747	.977

* The mean difference is significant at the .05 level.

With regard to the average level of participation in learner-learner interactions, as illustrated in Table 51, the null hypothesis was confirmed as no significant differences were shown to exist at the .05 level between discussions with different expectations for minimum levels of message contributions and the average level of participation in learner-learner interactions in Level 1 and Level 5 of the discussions analyzed in this study. However, the null hypothesis was rejected for discussion Levels 2 through 4 as significant differences were found at the .05 level between discussions with different requirements for minimum levels of message contributions and the average level of participation in learner-learner interactions exhibited in these levels of the respective discussions. More specifically, the results of post hoc tests, summarized in Table 53, identifies differences that exist in discussion Levels 2 with respect to the average level of

participation in learner-learner interactions exhibited in discussions with different requirements for minimum levels of message contributions.

Table 53: Post Hoc Tests for Minimum Levels of Message Contributions and Average Level of Participation in Learner-Learner Interactions at Discussion Level 2

Dependent Variable		(I) Minimum Message Contributions	(J) Minimum Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
L2 Average Learner-Learner Interactions	Tukey HSD	0 Messages Required	1 Message Required	-.05684	.068543	.841
			2 Messages Required	-.28870(*)	.069227	.000
			3 Messages Required	-.55430(*)	.083668	.000
		1 Message Required	0 Messages Required	.05684	.068543	.841
			2 Messages Required	-.23186(*)	.055440	.000
			3 Messages Required	-.49747(*)	.072674	.000
		2 Messages Required	0 Messages Required	.28870(*)	.069227	.000
			1 Message Required	.23186(*)	.055440	.000
			3 Messages Required	-.26561(*)	.073320	.002
		3 Messages Required	0 Messages Required	.55430(*)	.083668	.000
			1 Message Required	.49747(*)	.072674	.000
			2 Messages Required	.26561(*)	.073320	.002
	Scheffe	0 Messages Required	1 Message Required	-.05684	.068543	.876
			2 Messages Required	-.28870(*)	.069227	.001
			3 Messages Required	-.55430(*)	.083668	.000
		1 Message Required	0 Messages Required	.05684	.068543	.876
			2 Messages Required	-.23186(*)	.055440	.001

	3 Messages Required	-.49747(*)	.072674	.000
2 Messages Required	0 Messages Required	.28870(*)	.069227	.001
	1 Message Required	.23186(*)	.055440	.001
	3 Messages Required	-.26561(*)	.073320	.005
3 Messages Required	0 Messages Required	.55430(*)	.083668	.000
	1 Message Required	.49747(*)	.072674	.000
	2 Messages Required	.26561(*)	.073320	.005

* The mean difference is significant at the .05 level.

As Table 53 illustrates, at discussion Level 2, significant differences at the .05 level were found in the average level of participation in learner-learner interactions in discussions with no minimum message contributions and discussions that required a minimum of two and three message contributions. Similarly, significant differences at the .05 level were also found in the average level of participation in learner-learner interactions in discussions with one minimum message contribution and discussions that required a minimum of two and three message contributions. Additionally, a significant difference at the .05 level was also exhibited in the average level of participation in learner-learner interactions in discussions with two minimum message contributions and discussions that required a minimum of three message contributions.

Table 54: Post Hoc Tests for Minimum Levels of Message Contributions and Average Level of Participation in Learner-Learner Interactions at Discussion Level 3

Dependent Variable		(I) Minimum Message Contributions	(J) Minimum Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
L3 Average Learner-Learner Interactions	Tukey HSD	0 Messages Required	1 Message Required	-.21512	.090786	.087
			2 Messages Required	-.38117(*)	.087090	.000
			3 Messages Required	-.55326(*)	.100091	.000
		1 Message Required	0 Messages Required	.21512	.090786	.087
			2 Messages Required	-.16605	.065013	.055
			3 Messages Required	-.33814(*)	.081611	.000
		2 Messages Required	0 Messages Required	.38117(*)	.087090	.000
			1 Message Required	.16605	.065013	.055
			3 Messages Required	-.17210	.077478	.121
		3 Messages Required	0 Messages Required	.55326(*)	.100091	.000
			1 Message Required	.33814(*)	.081611	.000
			2 Messages Required	.17210	.077478	.121
	Scheffe	0 Messages Required	1 Message Required	-.21512	.090786	.136
			2 Messages Required	-.38117(*)	.087090	.000
			3 Messages Required	-.55326(*)	.100091	.000
		1 Message Required	0 Messages Required	.21512	.090786	.136
			2 Messages Required	-.16605	.065013	.092
			3 Messages Required	-.33814(*)	.081611	.001
		2 Messages Required	0 Messages Required	.38117(*)	.087090	.000
			1 Message Required	.16605	.065013	.092
			3 Messages Required	-.17210	.077478	.181

3 Messages Required	0 Messages Required	.55326(*)	.100091	.000
	1 Message Required	.33814(*)	.081611	.001
	2 Messages Required	.17210	.077478	.181

* The mean difference is significant at the .05 level.

At discussion Level 3, as illustrated in Table 54, significant differences at the .05 level were exhibited in the average level of participation in learner-learner interactions achieved in discussions with no minimum message contributions and discussions that required a minimum of two and three message contributions. Similarly, significant differences at the .05 level were also shown to exist in the average level of participation in learner-learner interactions achieved in discussions with one minimum message contribution and discussions that required a minimum of three message contributions.

Table 55: Post Hoc Tests for Minimum Levels of Message Contributions and Average Level of Participation in Learner-Learner Interactions at Discussion Level 4

Dependent Variable		(I) Minimum Message Contributions	(J) Minimum Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
L4 Average Learner-Learner Interactions	Tukey HSD	0 Messages Required	1 Message Required	-.16364	.135016	.620
			2 Messages Required	-.37505(*)	.120014	.012
			3 Messages Required	-.51992(*)	.129268	.001
		1 Message Required	0 Messages Required	.16364	.135016	.620
			2 Messages Required	-.21141	.086990	.077
			3 Messages Required	-.35628(*)	.099369	.003
		2 Messages Required	0 Messages Required	.37505(*)	.120014	.012
			1 Message Required	.21141	.086990	.077

		3 Messages Required	-.14487	.077770	.249
	3 Messages Required	0 Messages Required	.51992(*)	.129268	.001
		1 Message Required	.35628(*)	.099369	.003
		2 Messages Required	.14487	.077770	.249
Scheffe	0 Messages Required	1 Message Required	-.16364	.135016	.690
		2 Messages Required	-.37505(*)	.120014	.024
		3 Messages Required	-.51992(*)	.129268	.002
	1 Message Required	0 Messages Required	.16364	.135016	.690
		2 Messages Required	-.21141	.086990	.122
		3 Messages Required	-.35628(*)	.099369	.006
	2 Messages Required	0 Messages Required	.37505(*)	.120014	.024
		1 Message Required	.21141	.086990	.122
		3 Messages Required	-.14487	.077770	.329
	3 Messages Required	0 Messages Required	.51992(*)	.129268	.002
		1 Message Required	.35628(*)	.099369	.006
		2 Messages Required	.14487	.077770	.329

* The mean difference is significant at the .05 level.

At discussion Level 4, as illustrated in Table 55, significant differences at the .05 level were found in the average level of participation in learner-learner interactions exhibited in discussions with no minimum message contributions and discussions that required a minimum of two and three message contributions. Similarly, significant differences at the .05 level were also shown to exist in the average level of participation

in learner-learner interactions achieved in discussions with one minimum message contribution and discussions that required a minimum of three message contributions.

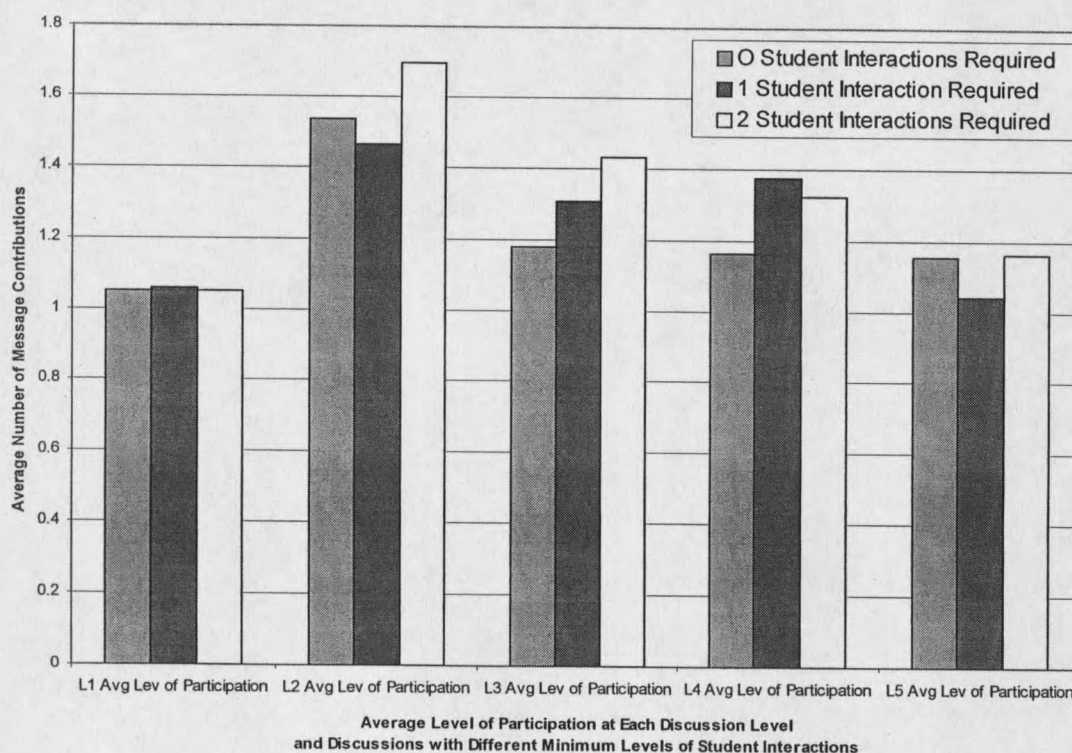
In sum, the previous discussion has examined the relationships between different expectations for minimum levels of message contributions in the discussions analyzed in this study and the average level of participation in learner interactions achieved at each level of the respective discussions. Specifically, a significant difference at the .05 level was shown to exist at discussion Level 3 in the overall average level of participation exhibited in discussions where a minimum of one message contribution was expected as compared with discussions requiring a minimum of three message contributions.

Additionally, with regard to the three different types of learner-interaction, no significant difference at the .05 level was shown to exist between discussions with different requirements for minimum levels of message contributions and the average level of participation in learner-content interactions through Level 5 of the discussions analyzed in this study. However, significant differences at the .05 level were shown to exist at discussion Level 3, Level 4, and Level 5 in the average level of participation in learner-instructor interactions in discussions with different expectations for minimum levels of message contributions. It is important to note that these differences indicate that the average level of participation in learner-instructor interactions were higher for those discussions with lesser minimum expectations for student message contributions. Finally, significant differences at the .05 level were also shown to exist in the average level of participation in learner-learner interactions at discussion Level 2, Level 3, and Level 4 in discussions with different expected levels of minimum message contributions.

Expected Minimum Levels of Student Interactions

Figure 20 illustrates potential relationships between the different levels of instructors' stated expectations for minimum student interactions and the means of the overall average level of participation exhibited through the first five levels of the discussions analyzed in this study.

Figure 20: Minimum Levels of Student Interactions and Overall Average Level of Participation at Each Discussion Level



As illustrated in Figure 20, discussions representing different expectations for minimum levels of student interactions did not appear to exhibit significantly different average levels of participation through Level 5 of the discussions. For further analysis, Table 56 includes a comparison of frequencies of discussions representing each level of

expected minimum student interactions as well as a comparison of means and standard deviations of the average level of participation exhibited in the respective discussions.

Table 56: Descriptive Statistics of Overall Average Level of Participation at Each Discussion Level and Minimum Levels of Student Interactions

		N	Mean	Std. Deviation	Std. Error
L1 Average Level of Participation	O Student Interactions Required	157	1.0523	.137153	.010946
	1 Student Interaction Required	82	1.0597	.135101	.014919
	2 Student Interactions Required	25	1.0503	.074053	.014811
	Total	264	1.0544	.131502	.008093
L2 Average Level of Participation	O Student Interactions Required	128	1.5338	1.920824	.169778
	1 Student Interaction Required	82	1.4643	.367786	.040615
	2 Student Interactions Required	25	1.6961	.257667	.051533
	Total	235	1.5268	1.435459	.093639
L3 Average Level of Participation	O Student Interactions Required	85	1.1804	.375829	.040764
	1 Student Interaction Required	82	1.3056	.325120	.035904
	2 Student Interactions Required	25	1.4294	.261343	.052269
	Total	192	1.2663	.350654	.025306
L4 Average Level of Participation	O Student Interactions Required	33	1.1616	.435979	.075894
	1 Student Interaction Required	73	1.3765	2.224524	.260361
	2 Student Interactions Required	23	1.3218	.322889	.067327
	Total	129	1.3118	1.690326	.148825
L5 Average Level of Participation	O Student Interactions Required	13	1.1538	.375534	.104154
	1 Student Interaction Required	41	1.0435	.254322	.039718
	2 Student Interactions Required	17	1.1609	.186886	.045326
	Total	71	1.0918	.268998	.031924

Based on the results of a one-way analysis of variance (ANOVA) test, provided in Table 57, the null hypothesis was confirmed as no significant differences were shown to exist at the .05 level between discussions representing each of the minimum levels of expected student interactions and the overall average level of participation exhibited through Level 5 of the discussions analyzed in this study, with the exception of discussion Level 3 in which the null hypothesis was rejected.

Table 57: ANOVA for Minimum Levels of Student Interactions and Average Level of Participation at Each Discussion Level

		Sum of Squares	df	Mean Square	F	Sig.
L1 Average Level of Participation	Between Groups	.003	2	.002	.099	.906
	Within Groups	4.545	261	.017		
	Total	4.548	263			
L2 Average Level of Participation	Between Groups	1.042	2	.521	.251	.778
	Within Groups	481.125	232	2.074		
	Total	482.167	234			
L3 Average Level of Participation	Between Groups	1.419	2	.710	6.078	.003
	Within Groups	22.066	189	.117		
	Total	23.485	191			
L4 Average Level of Participation	Between Groups	1.053	2	.527	.182	.834
	Within Groups	364.669	126	2.894		
	Total	365.722	128			
L5 Average Level of Participation	Between Groups	.227	2	.113	1.594	.211
	Within Groups	4.838	68	.071		
	Total	5.065	70			

H_0 = There is no difference between the average level of participation in learner interactions at each discussion level and minimum levels of student interactions.

Specifically, the results of a post hoc test, as summarized in Table 58, indicates that at discussion Level 3, a significant difference at the .05 level was found in the overall average level of participation exhibited in discussions where no minimum student interactions were required as compared with discussions where students were required to interact with a minimum of one and two other discussion participants.

Table 58: Post Hoc Tests for Minimum Levels of Student Interactions and Average Level of Participation in Learner Interactions at Discussion Level 3

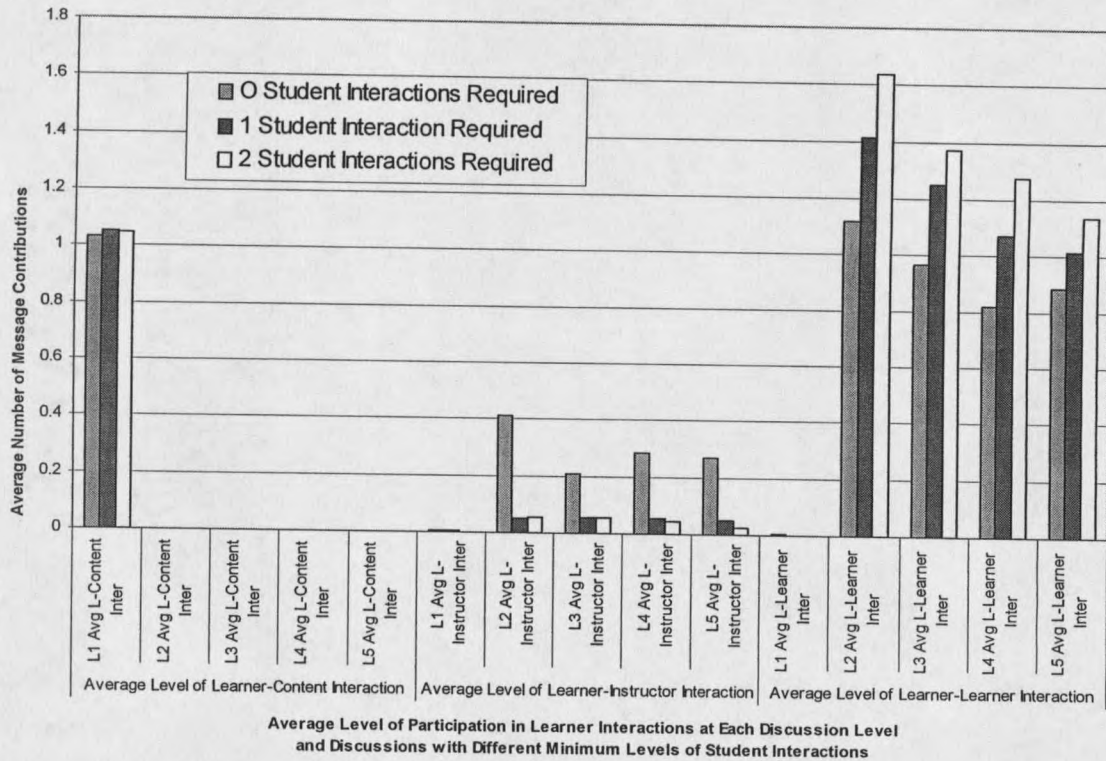
Dependent Variable		(I) Minimum Student Interactions	(J) Minimum Student Interactions	Mean Difference (I-J)	Std. Error	Sig.
L3 Average Level of Interaction	Tukey HSD	0 Student Interactions Required	1 Student Interaction Required	-.12521(*)	.052890	.049
			2 Student Interactions Required	-.24902(*)	.077740	.005

Scheffe	1 Student Interaction Required	O Student Interactions Required	.12521(*)	.052890	.049
		2 Student Interactions Required	-.12381	.078063	.254
	2 Student Interactions Required	O Student Interactions Required	.24902(*)	.077740	.005
		1 Student Interaction Required	.12381	.078063	.254
	O Student Interactions Required	1 Student Interaction Required	-.12521	.052890	.063
		2 Student Interactions Required	-.24902(*)	.077740	.007
	1 Student Interaction Required	O Student Interactions Required	.12521	.052890	.063
		2 Student Interactions Required	-.12381	.078063	.287
	2 Student Interactions Required	O Student Interactions Required	.24902(*)	.077740	.007
		1 Student Interaction Required	.12381	.078063	.287

* The mean difference is significant at the .05 level.

Additionally, Figure 21 below illustrates potential relationships between the different types of expectations for minimum levels of student interactions and the average level of participation in each of the three types of learner interaction through Level 5 of the discussions analyzed in this study.

Figure 21: Minimum Levels of Student Interactions and Average Level of Participation in Learner Interactions at Each Discussion Level



As illustrated in Figure 21 and Table 59, the average level of learner interaction at discussion Level 1 appears to almost exclusively represent student participation in learner-content interaction. In contrast, after discussion Level 1, the average level of participation in learner interactions appears to represent predominantly learner-learner interactions. Accordingly, there appears to be differences in all discussions in the types of learner interaction exhibited at different discussion levels. Additionally, discussions representing different levels of minimum expected levels of student interactions appear exhibit different average levels of participation in the different types of learner interaction through Level 5 of the respective discussions.

Table 59: Descriptive Statistics of Average Level of Participation in Learner Interactions at Each Discussion Level and Minimum Levels of Student Interactions

		N	Mean	Std. Deviation	Std. Error
L1 Average Learner-Content Interactions	0 Student Interactions Required	157	1.0330	.184588	.014732
	1 Student Interaction Required	82	1.0539	.137389	.015172
	2 Student Interactions Required	25	1.0490	.073489	.014698
	Total	264	1.0410	.163136	.010040
L1 Average Learner-Instructor Interactions	0 Student Interactions Required	157	.00714	.035834	.002860
	1 Student Interaction Required	82	.00574	.027827	.003073
	2 Student Interactions Required	25	.00129	.006452	.001290
	Total	264	.00615	.031730	.001953
L1 Average Learner-Learner Interactions	0 Student Interactions Required	157	.00637	.079809	.006369
	1 Student Interaction Required	82	.00000	.000000	.000000
	2 Student Interactions Required	25	.00000	.000000	.000000
	Total	264	.00379	.061546	.003788
L2 Average Learner-Content Interactions	0 Student Interactions Required	128	.00000	.000000	.000000
	1 Student Interaction Required	82	.00000	.000000	.000000
	2 Student Interactions Required	25	.00000	.000000	.000000
	Total	235	.00000	.000000	.000000
L2 Average Learner-Instructor Interactions	0 Student Interactions Required	128	.41381	2.049431	.181146
	1 Student Interaction Required	82	.04947	.137953	.015234
	2 Student Interactions Required	25	.05719	.107466	.021493
	Total	235	.24874	1.523185	.099362
L2 Average Learner-Learner Interactions	0 Student Interactions Required	128	1.1165	.356567	.031516
	1 Student Interaction Required	82	1.4149	.365384	.040350
	2 Student Interactions Required	25	1.6389	.277944	.055589
	Total	235	1.2762	.397349	.025920
L3 Average Learner-Content Interactions	0 Student Interactions Required	85	.00000	.000000	.000000
	1 Student Interaction Required	82	.00000	.000000	.000000
	2 Student Interactions Required	25	.00000	.000000	.000000
	Total	192	.00000	.000000	.000000
L3 Average Learner-Instructor Interactions	0 Student Interactions Required	85	.20734	.370744	.040213
	1 Student Interaction Required	82	.05439	.179298	.019800
	2 Student Interactions Required	25	.05595	.081542	.016308
	Total	192	.12230	.284066	.020501
L3 Average Learner-Learner Interactions	0 Student Interactions Required	85	.96837	.432650	.046927
	1 Student Interaction Required	82	1.2512	.337382	.037258
	2 Student Interactions Required	25	1.3734	.250823	.050165
	Total	192	1.1419	.405036	.029231
L4 Average Learner-Content Interactions	0 Student Interactions Required	33	.00000	.000000	.000000
	1 Student Interaction Required	73	.00000	.000000	.000000
	2 Student Interactions Required	23	.00000	.000000	.000000
	Total	129	.00000	.000000	.000000

L4 Average Learner-Instructor Interactions	O Student Interactions Required	33	.28283	.507726	.088384
	1 Student Interaction Required	73	.05770	.198335	.023213
	2 Student Interactions Required	23	.04590	.079722	.016623
	Total	129	.11319	.312498	.027514
L4 Average Learner-Learner Interactions	O Student Interactions Required	33	.81818	.509227	.088645
	1 Student Interaction Required	73	1.0723	.275825	.032283
	2 Student Interactions Required	23	1.2759	.286293	.059696
	Total	129	1.0436	.380768	.033525
L5 Average Learner-Content Interactions	O Student Interactions Required	13	.00000	.000000	.000000
	1 Student Interaction Required	41	.00000	.000000	.000000
	2 Student Interactions Required	17	.00000	.000000	.000000
	Total	71	.00000	.000000	.000000
L5 Average Learner-Instructor Interactions	O Student Interactions Required	13	.26923	.516122	.143146
	1 Student Interaction Required	41	.05285	.198743	.031038
	2 Student Interactions Required	17	.02437	.058851	.014273
	Total	71	.08565	.277180	.032895
L5 Average Learner-Learner Interactions	O Student Interactions Required	13	.88462	.468373	.129903
	1 Student Interaction Required	41	1.0151	.269519	.042092
	2 Student Interactions Required	17	1.1366	.189702	.046010
	Total	71	1.0203	.306696	.036398

Based on the results of a one-way analysis of variance (ANOVA) test, presented in Table 60, the null hypothesis was confirmed with respect to learner-content interactions as no significant differences at the .05 level were found between discussions with different requirements for minimum levels of student interactions and the average level of participation in learner-content interactions through Level 5 of the discussions analyzed in this study.

Table 60: ANOVA for Minimum Levels of Student Interactions and Average Level of Participation in Learner Interactions at Each Discussion Level

		Sum of Squares	df	Mean Square	F	Sig.
L1 Average Learner-Content Interactions	Between Groups	.025	2	.013	.476	.622
	Within Groups	6.974	261	.027		
	Total	6.999	263			
L1 Average Learner-Instructor Interactions	Between Groups	.001	2	.000	.375	.688
	Within Groups	.264	261	.001		
	Total	.265	263			

L1 Average Learner-Learner Interactions	Between Groups	.003	2	.001	.339	.713
	Within Groups	.994	261	.004		
	Total	.996	263			
L2 Average Learner-Content Interactions	Between Groups	.000	2	.000		
	Within Groups	.000	232	.000		
	Total	.000	234			
L2 Average Learner-Instructor Interactions	Between Groups	7.661	2	3.831	1.660	.192
	Within Groups	535.240	232	2.307		
	Total	542.901	234			
L2 Average Learner-Learner Interactions	Between Groups	8.131	2	4.065	32.732	.000
	Within Groups	28.815	232	.124		
	Total	36.945	234			
L3 Average Learner-Content Interactions	Between Groups	.000	2	.000		
	Within Groups	.000	189	.000		
	Total	.000	191			
L3 Average Learner-Instructor Interactions	Between Groups	1.103	2	.552	7.285	.001
	Within Groups	14.309	189	.076		
	Total	15.412	191			
L3 Average Learner-Learner Interactions	Between Groups	4.881	2	2.440	17.436	.000
	Within Groups	26.453	189	.140		
	Total	31.334	191			
L4 Average Learner-Content Interactions	Between Groups	.000	2	.000		
	Within Groups	.000	126	.000		
	Total	.000	128			
L4 Average Learner-Instructor Interactions	Between Groups	1.279	2	.639	7.178	.001
	Within Groups	11.221	126	.089		
	Total	12.500	128			
L4 Average Learner-Learner Interactions	Between Groups	2.979	2	1.490	12.047	.000
	Within Groups	15.579	126	.124		
	Total	18.558	128			
L5 Average Learner-Content Interactions	Between Groups	.000	2	.000		
	Within Groups	.000	68	.000		
	Total	.000	70			
L5 Average Learner-Instructor Interactions	Between Groups	.546	2	.273	3.843	.026
	Within Groups	4.832	68	.071		
	Total	5.378	70			
L5 Average Learner-Learner Interactions	Between Groups	.470	2	.235	2.616	.080
	Within Groups	6.114	68	.090		
	Total	6.584	70			

H_0 = There is no difference between the average level of participation in learner interactions at each discussion level and minimum levels of student interactions.

With regard to the average level of participation in learner-instructor interactions, as illustrated in Table 60, the null hypothesis was confirmed as no significant differences

at the .05 level were found between discussions with different expectations for minimum levels of student interactions and the average level of participation in learner-instructor interactions in Level 1 and Level 2 of the discussions analyzed in this study. However, the null hypothesis was rejected in discussion Levels 3 through 5, as significant differences at the .05 level were shown to exist between discussions with different requirements for minimum levels of student interactions and the average level of participation in learner-instructor interactions exhibited in these levels of the discussions.

Results of post hoc tests, summarized in Table 61, indicates that significant differences at the .05 level were found in the average level of participation in learner-instructor interactions exhibited in discussions with different requirements for minimum levels of student interactions. Specifically, Table 61 shows that at discussion Level 3, Level 4, and Level 5, significant differences at the .05 level were shown to exist in the average level of participation in learner-instructor interactions exhibited in discussions that had no minimum expectations for student interactions and discussions that required a minimum of one and two student interactions. It is important to note that the differences identified above indicate that the average level of participation in learner-instructor interactions were higher in discussions with no minimum expectations for student interactions as compared with the discussions requiring one or two student interactions.

Table 61: Post Hoc Tests for Minimum Levels Student Interactions and Average Level of Participation in Learner Interactions at Each Discussion Level

Dependent Variable		(I) Minimum Student Interactions	(J) Minimum Student Interactions	Mean Difference	Std. Error	Sig.
L3 Average Learner-Instructor Interactions	Tukey HSD	0 Student Interactions Required	1 Student Interaction Required	.15296(*)	.042591	.001
			2 Student Interactions Required	.15140(*)	.062603	.043
		1 Student Interaction Required	0 Student Interactions Required	-.15296(*)	.042591	.001
			2 Student Interactions Required	-.00156	.062863	1.000
		2 Student Interactions Required	0 Student Interactions Required	-.15140(*)	.062603	.043
			1 Student Interaction Required	.00156	.062863	1.000
	Scheffe	0 Student Interactions Required	1 Student Interaction Required	.15296(*)	.042591	.002
			2 Student Interactions Required	.15140	.062603	.056
		1 Student Interaction Required	0 Student Interactions Required	-.15296(*)	.042591	.002
			2 Student Interactions Required	-.00156	.062863	1.000
		2 Student Interactions Required	0 Student Interactions Required	-.15140	.062603	.056
			1 Student Interaction Required	.00156	.062863	1.000
L4 Average Learner-Instructor Interactions	Tukey HSD	0 Student Interactions Required	1 Student Interaction Required	.22513(*)	.062599	.001
			2 Student Interactions Required	.23693(*)	.081060	.011

		1 Student Interaction Required	O Student Interactions Required	-.22513(*)	.062599	.001
			2 Student Interactions Required	.01180	.071358	.985
		2 Student Interactions Required	O Student Interactions Required	-.23693(*)	.081060	.011
			1 Student Interaction Required	-.01180	.071358	.985
Scheffe	O Student Interactions Required	1 Student Interaction Required		.22513(*)	.062599	.002
		2 Student Interactions Required		.23693(*)	.081060	.016
	1 Student Interaction Required	O Student Interactions Required		-.22513(*)	.062599	.002
		2 Student Interactions Required		.01180	.071358	.986
	2 Student Interactions Required	O Student Interactions Required		-.23693(*)	.081060	.016
		1 Student Interaction Required		-.01180	.071358	.986
L5 Average Learner-Instructor Interactions	Tukey HSD	O Student Interactions Required	1 Student Interaction Required	.21639(*)	.084848	.034
			2 Student Interactions Required	.24486(*)	.098213	.040
		1 Student Interaction Required	O Student Interactions Required	-.21639(*)	.084848	.034
			2 Student Interactions Required	.02848	.076896	.927
		2 Student Interactions Required	O Student Interactions Required	-.24486(*)	.098213	.040

		1 Student Interaction Required	-.02848	.076896	.927
Scheffe	0 Student Interactions Required	1 Student Interaction Required	.21639(*)	.084848	.045
		2 Student Interactions Required	.24486	.098213	.051
		0 Student Interactions Required	-.21639(*)	.084848	.045
	1 Student Interaction Required	2 Student Interactions Required	.02848	.076896	.934
		0 Student Interactions Required	-.24486	.098213	.051
	2 Student Interactions Required	1 Student Interaction Required	-.02848	.076896	.934

* The mean difference is significant at the .05 level.

With regard to the average level of participation in learner-learner interactions, illustrated in Table 60, the null hypothesis was confirmed as no significant differences were found at the .05 level between discussions with different expectations for minimum levels of student interactions and the average level of participation in learner-learner interactions in Level 1 and Level 5 of the discussions analyzed in this study. However, the null hypothesis was rejected for discussion Levels 2 through 4, as significant differences at the .05 level were shown to exist between discussions with different requirements for minimum levels of student interactions and the average level of participation in learner-learner interactions exhibited in these levels of the respective discussions.

Specifically, results of post hoc tests, as summarized in Table 62, indicate that at discussion Level 2, significant differences at the .05 level were shown to exist in the

average level of participation in learner-learner interactions exhibited in discussions with no minimum expectations for student interactions and discussions that required a minimum of one and two student interactions. Similarly, significant differences at the .05 level were shown to exist in the average level of participation in learner-learner interactions exhibited in discussions with a minimum of one student interaction and discussions that required students to interact with a minimum of two other discussion participants.

Table 62: Post Hoc Tests for Minimum Levels of Student Interactions and Average Level of Participation in Learner-Learner Interactions at Discussion Level 2

Dependent Variable		(I) Minimum Student Interactions	(J) Minimum Student Interactions	Mean Difference	Std. Error	Sig.
L2 Average Learner-Learner Interactions	Tukey HSD	0 Student Interactions Required	1 Student Interaction Required	-.29840(*)	.0498	.000
			2 Student Interactions Required	-.52239(*)	.0770	.000
		1 Student Interaction Required	0 Student Interactions Required	.29840(*)	.0498	.000
			2 Student Interactions Required	-.22399(*)	.0805	.016
		2 Student Interactions Required	0 Student Interactions Required	.52239(*)	.0770	.000
			1 Student Interaction Required	.22399(*)	.0805	.016
	Scheffe	0 Student Interactions Required	1 Student Interaction Required	-.29840(*)	.0498	.000
			2 Student Interactions Required	-.52239(*)	.0770	.000

1 Student Interaction Required	O Student Interactions Required	.29840(*)	.0498	.000
	2 Student Interactions Required	-.22399(*)	.0805	.022
2 Student Interactions Required	O Student Interactions Required	.52239(*)	.0770	.000
	1 Student Interaction Required	.22399(*)	.0805	.022

* The mean difference is significant at the .05 level.

At discussion Level 3, as illustrated in Table 63, significant differences at the .05 level were found in the average level of participation in learner-learner interactions achieved in discussions with no minimum expectations for student interactions and discussions that required a minimum of one and two student interactions.

Table 63: Post Hoc Tests for Minimum Levels of Student Interactions and Average Level of Participation in Learner-Learner Interactions at Discussion Level 3

Dependent Variable		(I) Minimum Student Interactions	(J) Minimum Student Interactions	Mean Difference	Std. Error	Sig.
L3 Average Learner- Learner Interactions	Tukey HSD	O Student Interactions Required	1 Student Interaction Required	-.28287(*)	.0579	.000
			2 Student Interactions Required	-.40512(*)	.0851	.000
		1 Student Interaction Required	O Student Interactions Required	.28287(*)	.0579	.000
			2 Student Interactions Required	-.12225	.0854	.327
		2 Student Interactions Required	O Student Interactions Required	.40512(*)	.0851	.000

		1 Student Interaction Required	.12225	.0854	.327
Scheffe	0 Student Interactions Required	1 Student Interaction Required	-.28287(*)	.0579	.000
		2 Student Interactions Required	-.40512(*)	.0851	.000
	1 Student Interaction Required	0 Student Interactions Required	.28287(*)	.0579	.000
		2 Student Interactions Required	-.12225	.0854	.362
	2 Student Interactions Required	0 Student Interactions Required	.40512(*)	.0851	.000
		1 Student Interaction Required	.12225	.0854	.362

* The mean difference is significant at the .05 level.

Table 64 indicates that, at discussion Level 4, differences at the .05 level existed in the average level of participation in learner-learner interactions in discussions with no student interactions required and discussions that required a minimum of one and two interactions. Similarly, significant differences at the .05 level were found in the average level of participation in learner-learner interactions in discussions with one student interaction required and discussions that required a minimum of two student interactions.

Table 64: Post Hoc Tests for Minimum Levels of Student Interactions and Average Level of Participation in Learner-Learner Interactions at Discussion Level 4

Dependent Variable		(I) Minimum Student Interactions	(J) Minimum Student Interactions	Mean Difference	Std. Error	Sig.
L4 Average Learner-Learner Interactions	Tukey HSD	0 Student Interactions Required	1 Student Interaction Required	-.25413(*)	.073759	.002

		2 Student Interactions Required	-.45780(*)	.095512	.000
	1 Student Interaction Required	0 Student Interactions Required	.25413(*)	.073759	.002
		2 Student Interactions Required	-.20368(*)	.084080	.044
	2 Student Interactions Required	0 Student Interactions Required	.45780(*)	.095512	.000
		1 Student Interaction Required	.20368(*)	.084080	.044
Scheffe	0 Student Interactions Required	1 Student Interaction Required	-.25413(*)	.073759	.003
		2 Student Interactions Required	-.45780(*)	.095512	.000
	1 Student Interaction Required	0 Student Interactions Required	.25413(*)	.073759	.003
		2 Student Interactions Required	-.20368	.084080	.057
	2 Student Interactions Required	0 Student Interactions Required	.45780(*)	.095512	.000
		1 Student Interaction Required	.20368	.084080	.057

* The mean difference is significant at the .05 level.

In sum, the previous discussion has examined the relationships between different expectations for minimum levels of student interactions and the average level of participation in learner interactions exhibited at each level of the discussions examined in this study. Specifically, a significant difference was found at discussion Level 3 in the overall average level of participation exhibited in discussions where no minimum student

interactions were required as compared with discussions where students were required to interact with a minimum of one and two other discussion participants.

Moreover, with regard to the three different types of learner-interaction, no significant differences at the .05 level were shown to exist between discussions with different requirements for minimum levels of student interactions and the average level of participation in learner-content interactions through the first five levels of the discussions analyzed in this study. However, significant differences at the .05 level were shown to exist at discussion Level 3, Level 4, and Level 5 in the average level of participation in learner-instructor interactions exhibited in discussions with different expectations for minimum levels of student interactions. It is important to note that these differences indicated that the average level of participation in learner-instructor interactions were higher for those discussions with fewer student interactions required.

Finally, significant differences at the .05 level were also shown to exist in the average level of participation in learner-learner interactions for discussion Levels 2, Level 3, and Level 4 for those discussions with different expectations for minimum levels of student interactions.

Question 5 Results

The fifth research question addressed in this study was: "What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the overall discussion's degree of persistence?" To answer this question, each discussion was classified according to the types and levels of the

instructor's stated expectations for student participation as explained in the "Foundations for Data Analysis" section at the beginning of this chapter. Additionally, each discussion in this study was coded for the degree of persistence exhibited within it, as measured by the number of discussion levels pursued by participants within each respective discussion.

Instructor Expectations for Message Contributions

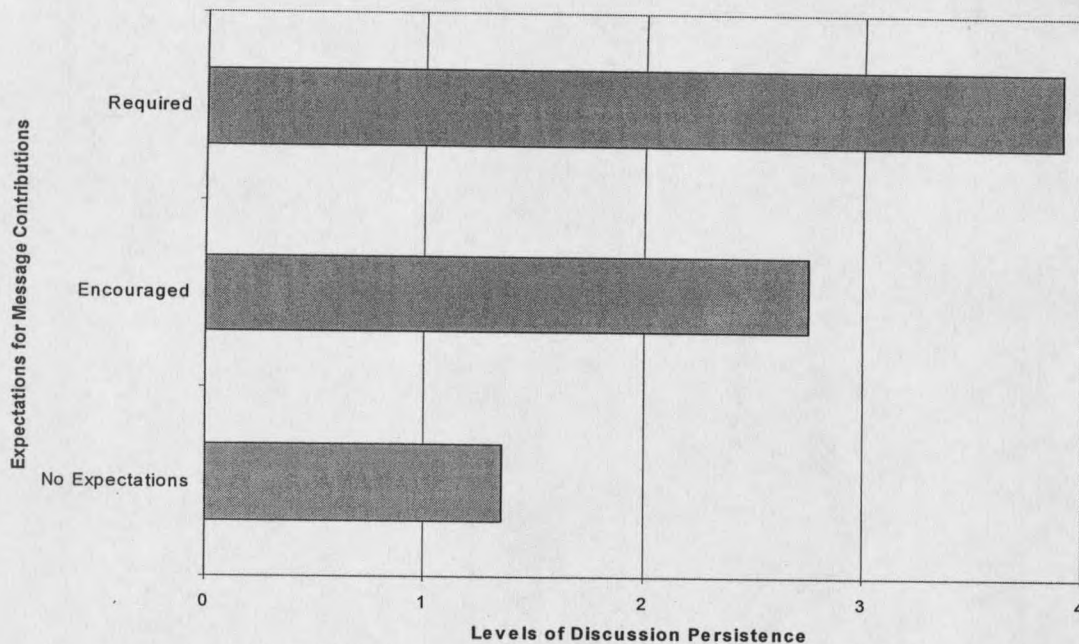
Table 65 includes a comparison of frequencies of discussions representing each of the three types of instructors' stated expectations for student message contributions as well as a comparison of means and standard deviations for the degree of persistence exhibited in the respective discussions.

Table 65: Descriptive Statistics of Expectations for Message Contributions and Degree of Persistence

	N	Mean	Std. Deviation	Std. Error
No Expectations	14	1.36	.633	.169
Encouraged	37	2.76	1.090	.179
Required	213	3.91	1.788	.123
Total	264	3.61	1.790	.110

Additionally, Figure 22 illustrated potential relationships between discussions representing each of the three types of instructors' stated expectations for message contributions and the overall degree of persistence exhibited within the respective discussions.

Figure 22: Expectations for Message Contributions and Degree of Persistence



As illustrated in Table 65 and Figure 22, discussions with “No Expectations” for message contributions exhibited an average degree of persistence of 1.36 discussion levels while discussions that “Encouraged” student message contributions exhibited an average degree of persistence of 2.76 discussion levels and discussions that “Required” message contributions exhibited an average degree of persistence of 3.9 discussion levels. Furthermore, based on the results of a one-way analysis of variance (ANOVA) test, presented in Table 66, the null hypothesis was rejected as significant differences at the .05 level were shown to exist between at least two of the different types of expectations for message contributions and the corresponding degree of persistence exhibited in discussions representing each expectation type.

Table 66: ANOVA for Expectations for Message Contributions and Degree of Persistence

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	116.667	2	58.334	20.967	.000
Within Groups	726.147	261	2.782		
Total	842.814	263			

H_0 = There is no difference between expectations for student interactions and degree of persistence

Finally, the results of post hoc tests presented in Table 67 identifies significant differences shown to exist between discussions representing the minimum levels of message contributions and the degree of persistence exhibited in these discussions. Specifically, the results indicate a significant difference at the .05 level was found in the degree of persistence exhibited in discussions where there were "No Expectations" for message contributions as compared with discussions where message contributions were "Encouraged" but not required, as well as with discussions that "Required" message contributions. Additionally, a significant difference at the .05 level was exhibited in the degree of persistence in discussions where message contributions were "Encouraged" but not required and discussions where message contributions were "Required."

Table 67: Post Hoc Tests for Expectations for Message Contributions and Degree of Persistence

	(I) Expected Message Contributions	(J) Expected Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
Tukey HSD	No Expectations	Encouraged	-1.40(*)	.523	.022
		Required	-2.55(*)	.460	.000
	Encouraged	No Expectations	1.40(*)	.523	.022
		Required	-1.15(*)	.297	.000
	Required	No Expectations	2.55(*)	.460	.000
		Encouraged	1.15(*)	.297	.000

Scheffe	No Expectations	Encouraged	-1.40(*)	.523	.029
		Required	-2.55(*)	.460	.000
	Encouraged	No Expectations	1.40(*)	.523	.029
		Required	-1.15(*)	.297	.001
	Required	No Expectations	2.55(*)	.460	.000
		Encouraged	1.15(*)	.297	.001

* The mean difference is significant at the .05 level.

In summary, these results suggest that the degree of persistence in threaded discussions is greatest in those discussions where students are required to contribute messages in the discussions. Specifically, the degree of persistence exhibited in threaded discussions where students were encouraged, but not required, to contribute messages is greater than those discussions that did not have any explicitly stated expectations for message contributions, but not as great as the discussions where message contributions were required.

Instructor Expectations for Student Interactions

Figure 23 illustrates potential relationships between the three types of instructors' stated expectations for student interactions and the overall degree of persistence exhibited within the respective discussions.

As illustrated in Figure 23 and Table 68, discussions representing each of the three types of instructors' stated expectations for student interactions exhibited different means for the degree of persistence in the respective discussions.

Figure 23: Expectations for Student Interactions and Degree of Persistence

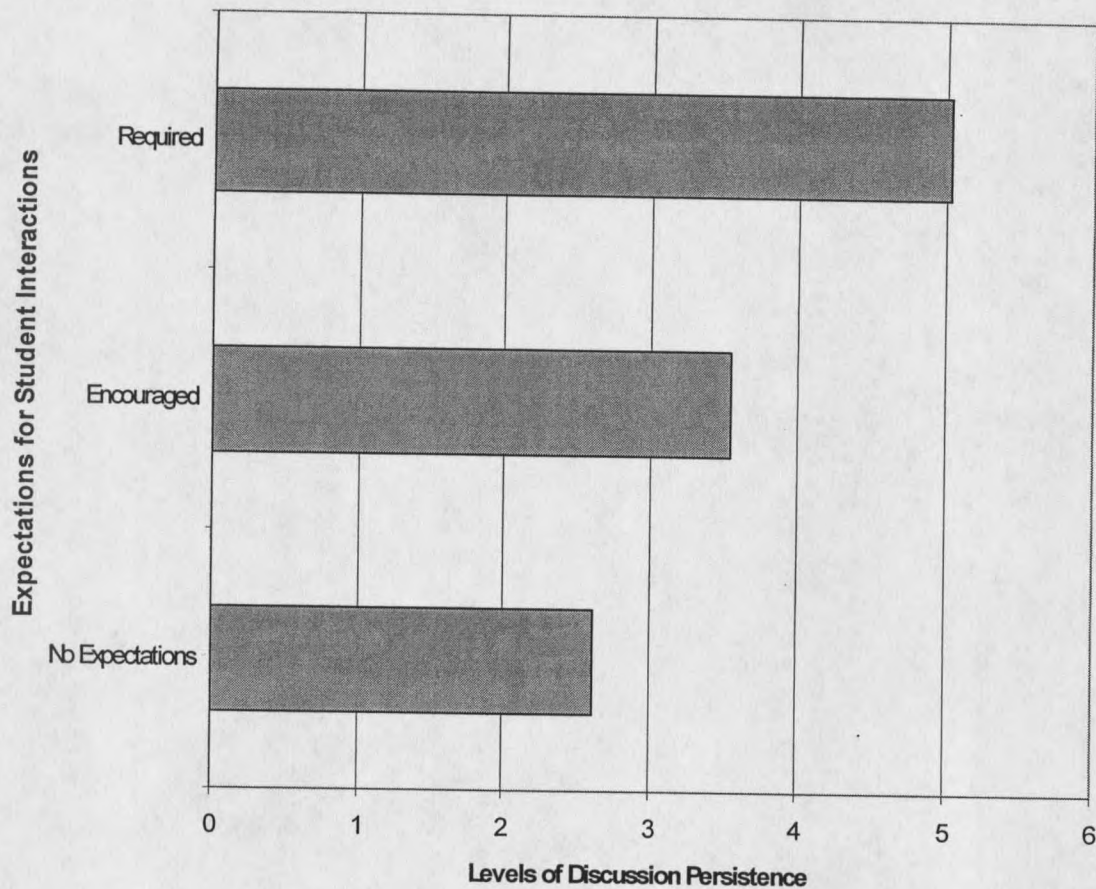


Table 68: Descriptive Statistics of Expectations for Student Interactions and Degree of Persistence

	N	Mean	Std. Deviation	Std. Error
No Expectations	148	2.61	1.170	.096
Encouraged	11	3.55	1.440	.434
Required	105	5.03	1.584	.155
Total	264	3.61	1.790	.110

Specifically, discussions with "No Expectations" for student interactions exhibited an average degree of persistence of 2.61 discussion levels while discussions

that "Encouraged" student message contributions exhibited an average degree of persistence of 3.55 discussion levels and discussions that "Required" message contributions exhibited an average degree of persistence of 5.03 discussion levels.

Based on the results of a one-way analysis of variance (ANOVA) test, illustrated in Table 69, the null hypothesis was rejected as a significant difference at the .05 level was found between discussions representing at least two of the different types of expectations for student interactions and the degree of persistence exhibited in the discussions.

Table 69: ANOVA for Expectations for Student Interactions and Degree of Persistence

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	359.903	2	179.951	97.259	.000
Within Groups	482.912	261	1.850		
Total	842.814	263			

H_0 = There is no difference between expectations for student interactions and degree of persistence

Finally, as summarized in Table 70, the results of post hoc tests identifies significant differences found to exist between discussions with different minimum levels of student interactions and the degree of persistence exhibited in the respective discussions. Specifically, the results indicate that a significant difference at the .05 level was found in the degree of persistence exhibited in discussions where there were "No Expectations" for student interactions as compared with discussions where student interactions were "Required." The results also indicate that a significant difference at the .05 level was shown to exist in the degree of persistence exhibited in discussions that

“Encouraged” but did not require student interactions as compared with discussions that “Required” students to interact with other discussion participants.

Table 70: Post Hoc Tests for Expectations for Student Interactions and Degree of Persistence

	(I) Expected Student Interactions	(J) Expected Student Interactions	Mean Difference (I-J)	Std. Error	Sig.
Tukey HSD	No Expectations	Encouraged	-.94	.425	.072
		Required	-2.42(*)	.174	.000
	Encouraged	No Expectations	.94	.425	.072
		Required	-1.48(*)	.431	.002
	Required	No Expectations	2.42(*)	.174	.000
		Encouraged	1.48(*)	.431	.002
Scheffe	No Expectations	Encouraged	-.94	.425	.090
		Required	-2.42(*)	.174	.000
	Encouraged	No Expectations	.94	.425	.090
		Required	-1.48(*)	.431	.003
	Required	No Expectations	2.42(*)	.174	.000
		Encouraged	1.48(*)	.431	.003

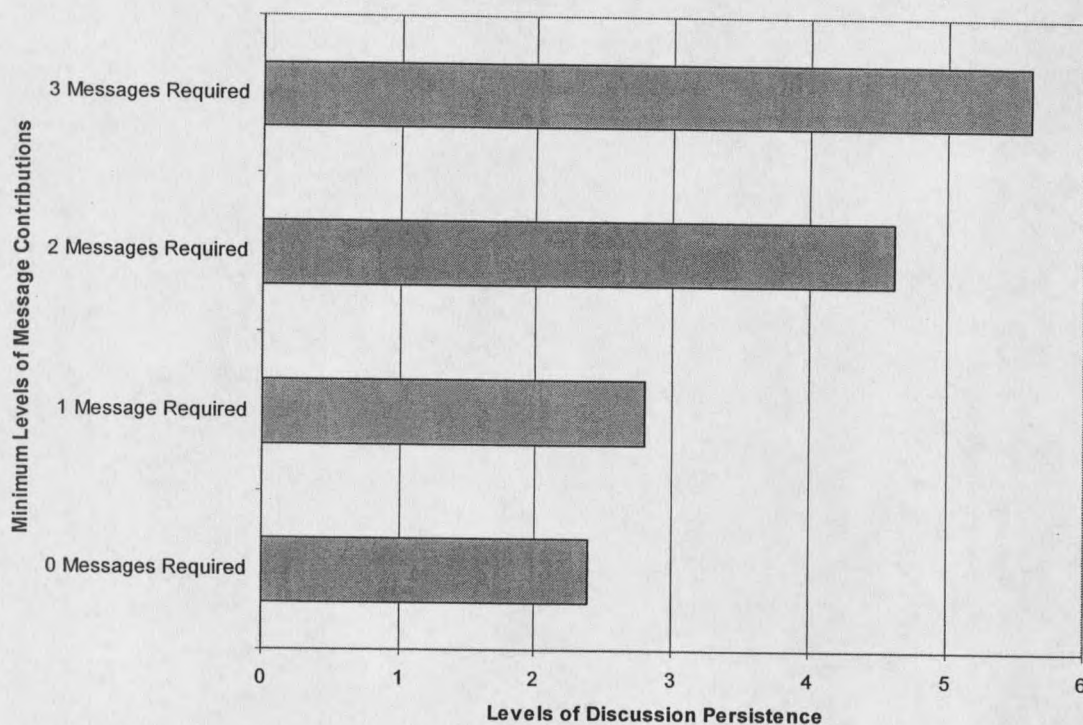
* The mean difference is significant at the .05 level.

In summary, these results suggest that the degree of persistence in discussions is greatest in those discussions where students are required to interact with other discussion participants. Specifically, the degree of persistence exhibited in discussions where student interactions were encouraged, but not required, was greater than discussions that did not have explicitly stated expectations for student interactions, but not as great as the discussions where student interactions were required.

Expected Minimum Levels of Message Contributions

Figure 24 illustrates potential relationships that exist between discussions representing different levels of expectations for minimum message contributions and the overall degree of persistence exhibited within the respective discussions.

Figure 24: Expectations for Minimum Levels of Message Contributions and Degree of Persistence



As illustrated in Figure 24 and Table 71, the average degree of persistence was progressively higher in discussions that had progressively higher levels of minimum message contributions. More specifically, discussions with "No Messages Required" exhibited an average degree of persistence of 2.39 discussion levels while discussions with "One Message Required" achieved an average degree of persistence of 2.8

discussion levels and discussions with "Two Messages Required" and "Three Messages Required" exhibited an average degree of persistence of 4.62 and 5.61 discussion levels respectively.

Table 71: Descriptive Statistics of Expectations for Student Interactions and Degree of Persistence

	N	Mean	Std. Deviation	Std. Error
0 Messages Required	54	2.39	1.172	.160
1 Message Required	98	2.80	1.235	.125
2 Messages Required	79	4.62	1.304	.147
3 Messages Required	33	5.61	2.030	.353
Total	264	3.61	1.790	.110

Based on the results of a one-way analysis of variance (ANOVA) test, presented in Table 72, the null hypothesis was rejected as a significant difference was shown to exist between at least two of the levels of minimum message contributions and the average degree of persistence exhibited within the respective discussions.

Table 72: ANOVA for Minimum Levels of Message Contributions and Degree of Persistence

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	357.576	3	119.192	63.865	.000
Within Groups	485.238	260	1.866		
Total	842.814	263			

H_0 = There is no difference between minimum levels of message contributions and degree of persistence

Finally, the results of post hoc tests, presented in Table 73, identifies significant differences found between discussions representing different minimum levels of message contributions and the degree of persistence exhibited in the respective discussions.

Table 73: Post Hoc Tests for Minimum Levels of Message Contributions and Degree of Persistence

	(I) Minimum Message Contributions	(J) Minimum Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
Tukey HSD	0 Messages Required	1 Message Required	-.41	.232	.296
		2 Messages Required	-2.23(*)	.241	.000
		3 Messages Required	-3.22(*)	.302	.000
	1 Message Required	0 Messages Required	.41	.232	.296
		2 Messages Required	-1.82(*)	.207	.000
		3 Messages Required	-2.81(*)	.275	.000
	2 Messages Required	0 Messages Required	2.23(*)	.241	.000
		1 Message Required	1.82(*)	.207	.000
		3 Messages Required	-.99(*)	.283	.003
	3 Messages Required	0 Messages Required	3.22(*)	.302	.000
		1 Message Required	2.81(*)	.275	.000
		2 Messages Required	.99(*)	.283	.003
Scheffe	0 Messages Required	1 Message Required	-.41	.232	.380
		2 Messages Required	-2.23(*)	.241	.000
		3 Messages Required	-3.22(*)	.302	.000
	1 Message Required	0 Messages Required	.41	.232	.380
		2 Messages Required	-1.82(*)	.207	.000
		3 Messages Required	-2.81(*)	.275	.000
	2 Messages Required	0 Messages Required	2.23(*)	.241	.000
		1 Message Required	1.82(*)	.207	.000
		3 Messages Required	-.99(*)	.283	.008
	3 Messages Required	0 Messages Required	3.22(*)	.302	.000
		1 Message Required	2.81(*)	.275	.000
		2 Messages Required	.99(*)	.283	.008

* The mean difference is significant at the .05 level.

In summary, these results suggest that the average degree of persistence was progressively higher in discussions with progressively higher expectations for minimum levels of message contributions. Specifically, significant differences at the .05 level were found in the average degree of persistence exhibited in discussions that required two and three message contributions as compared with discussions with no expectations for message contributions and discussions that required a minimum of one message contribution. Additionally, a significant difference at the .05 level was shown to exist in

the average degree of persistence exhibited in discussions requiring a minimum of two message contributions and discussions that required students to contribute a minimum of three messages to a respective discussion.

Expected Minimum Levels of Student Interactions

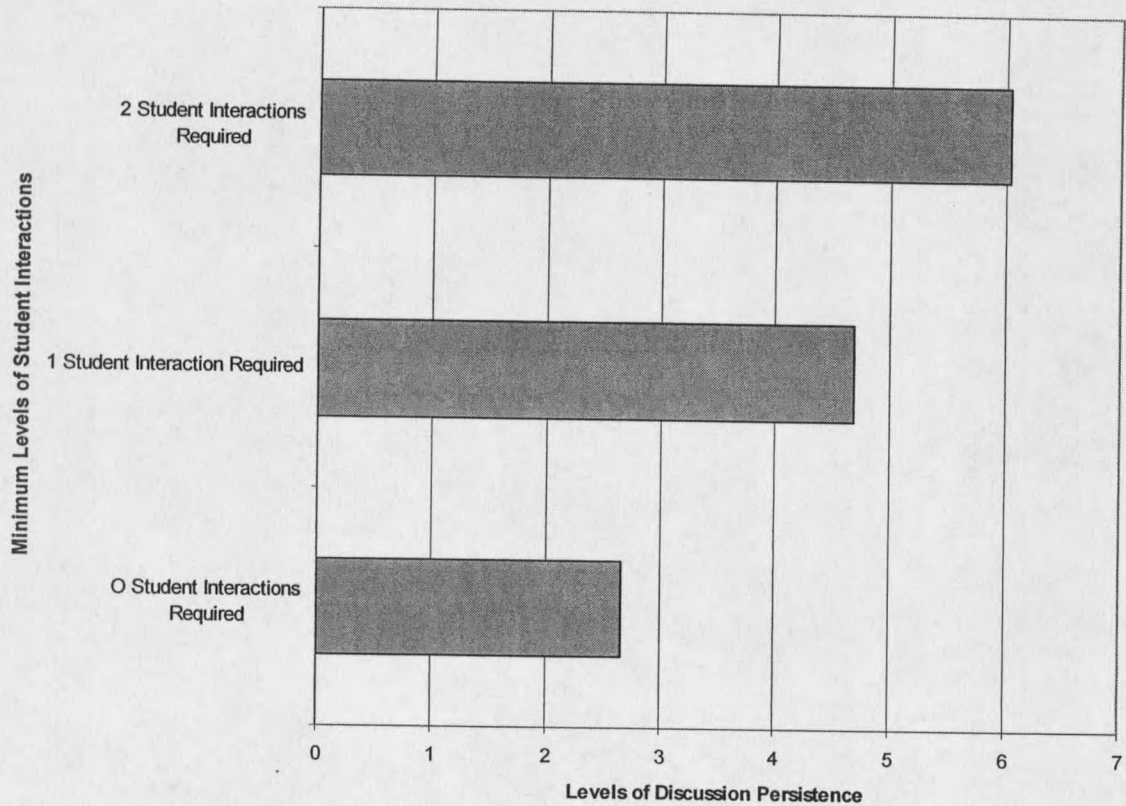
Table 74 includes a comparison of frequencies of discussions representing expectations for minimum levels of student interactions as well as a comparison of means and standard deviations of the degree of persistence exhibited in these discussions.

Table 74: Descriptive Statistics of Expectations for Minimum Levels of Student Interactions and Degree of Persistence

	N	Mean	Std. Deviation	Std. Error
0 Student Interactions Required	157	2.66	1.212	.097
1 Student Interaction Required	82	4.68	1.236	.137
2 Student Interactions Required	25	6.04	2.111	.422
Total	264	3.61	1.790	.110

Additionally, as illustrated in Figure 25, the average degree of persistence was progressively higher in discussions that had progressively higher levels of expected minimum student interactions. Specifically, discussions with "No Student Interactions Required" exhibited an average degree of persistence of 2.66 discussion levels while discussions with "One Student Interaction Required" exhibited an average degree of persistence of 4.68 discussion levels and discussions with "Two Student Interactions Required" exhibited an average degree of persistence of 6.04 discussion levels.

Figure 25: Expectations for Minimum Levels of Student Interactions and Degree of Persistence



Based on the results of a one-way analysis of variance (ANOVA) test, presented in Table 75, the null hypothesis was rejected as a significant difference was shown to exist between at least two of the levels of minimum expected student interactions and the average degree of persistence exhibited within the discussions examined in this study.

Table 75: ANOVA for Minimum Levels of Student Interactions and Degree of Persistence

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	382.990	2	191.495	108.694	.000
Within Groups	459.824	261	1.762		
Total	842.814	263			

H_0 = There is no difference between minimum levels of student interactions and degree of persistence

Finally, the results of post hoc test presented in Table 76 identifies differences shown to exist between the average degree of persistence exhibited in discussions classified into each level of expected minimum student interactions.

Table 76: Post Hoc Tests for Minimum Levels of Student Interactions and Degree of Persistence

	(I) Minimum Student Interactions	(J) Minimum Student Interactions	Mean Difference (I-J)	Std. Error	Sig.
Tukey HSD	0 Student Interactions Required	1 Student Interaction Required	-2.02(*)	.181	.000
		2 Student Interactions Required	-3.38(*)	.286	.000
	1 Student Interaction Required	0 Student Interactions Required	2.02(*)	.181	.000
		2 Student Interactions Required	-1.36(*)	.303	.000
	2 Student Interactions Required	0 Student Interactions Required	3.38(*)	.286	.000
		1 Student Interaction Required	1.36(*)	.303	.000
Scheffe	0 Student Interactions Required	1 Student Interaction Required	-2.02(*)	.181	.000
		2 Student Interactions Required	-3.38(*)	.286	.000
	1 Student Interaction Required	0 Student Interactions Required	2.02(*)	.181	.000
		2 Student Interactions Required	-1.36(*)	.303	.000
	2 Student Interactions Required	0 Student Interactions Required	3.38(*)	.286	.000
		1 Student Interaction Required	1.36(*)	.303	.000

* The mean difference is significant at the .05 level.

In summary, these results suggest that the average degree of persistence was progressively higher in discussions with progressively higher expectations for minimum levels of student interactions. Specifically, the results of the post hoc tests indicate that a significant difference at the .05 level was found in the average degree of persistence

exhibited in discussions that had no student interactions required as compared with discussions where students were required to interact with a minimum of both one and two other participants in the respective discussions. Additionally, the results indicate that a significant difference at the .05 level was found in the average degree of persistence exhibited in discussions that had required a minimum of one student interaction and discussions where students were required to interact with a minimum two other participants in a respective discussion.

Summary of Findings

Toward answering the primary research question addressed in this study, a number of relationships were shown to exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions occurring within the discussions examined. Accordingly, what follows are a summary of these findings relative to relationships identified between different types and levels of an instructors stated expectations for student participation in the discussions and the following three participation outcomes: 1) participation density, 2) average level of participation, and 3) degree of persistence.

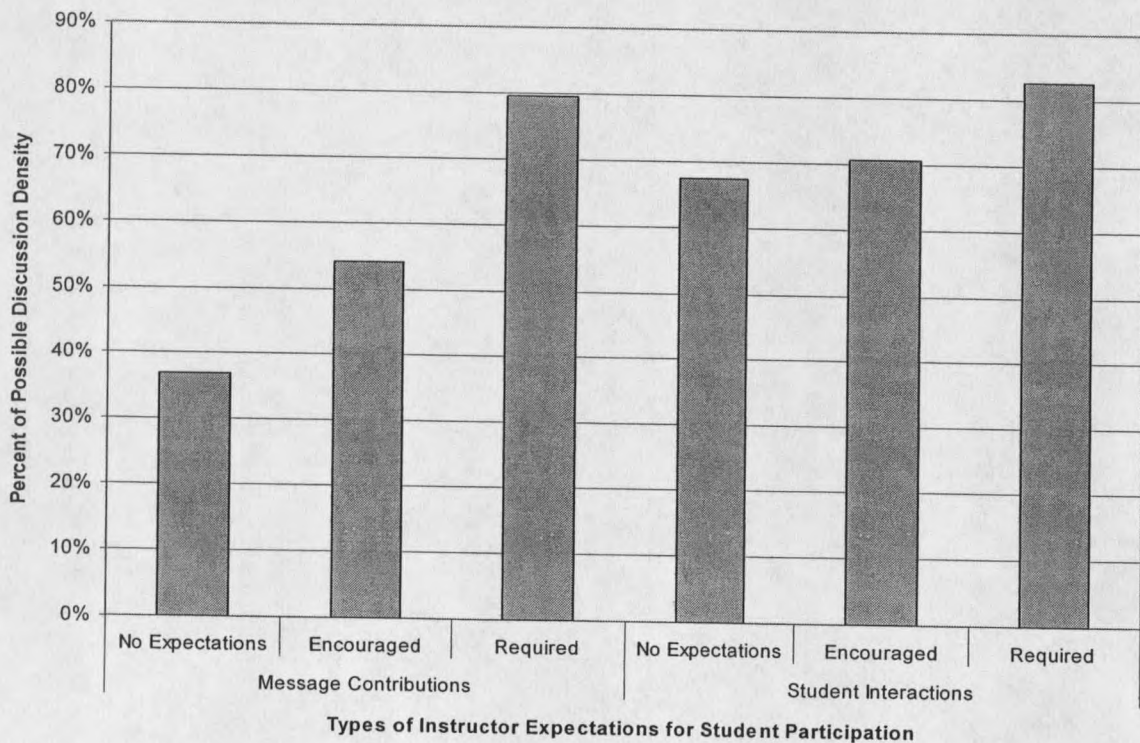
Findings Related to Participation Density

Participation density refers to the percentage of individuals who actually participate in a discussion out of the number of possible discussion participants. Based on

the results of this study, a number of relationships were found to exist between different types and levels of instructors' stated expectations for student participation in threaded discussions and the overall density of participation exhibited within the respective discussions, as well as in the density of participation exhibited within each level of the discussions. What follows are a summary of these findings.

Participation Density and Types of Instructor Expectations. The results of this study suggest that different types of instructor stated expectations for student participation in threaded discussions are associated with different levels of student participation density outcomes, as illustrated in Figure 26.

Figure 26: Comparison of Percentage of Possible Density and Different Types of Instructor Expectations for Student Participation

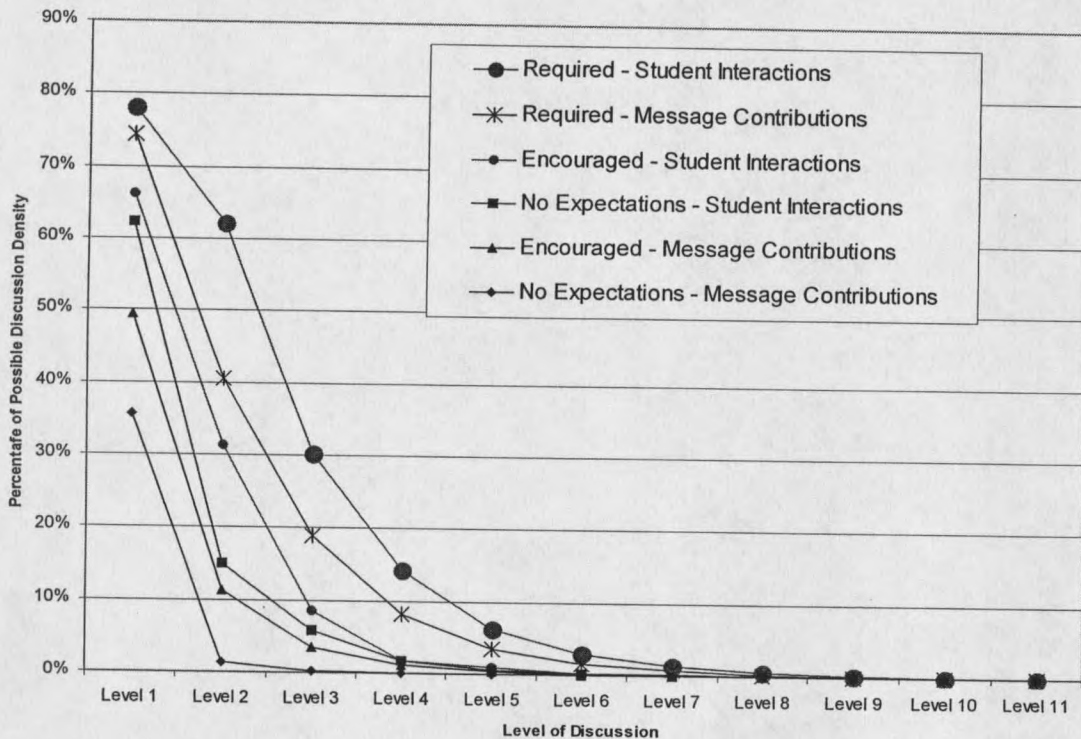


More specifically, the following relationships were identified in the results of this study:

1. Threaded discussions with required student message contributions were associated with greater student participation density outcomes compared with discussions that encouraged or that did not require message contributions.
2. Threaded discussions with encouraged or required student interactions were associated with greater student participation density outcomes compared with discussions that did not require student interactions.
3. Threaded discussions with required student interactions were associated with greater student participation density outcomes compared with discussions that required message contributions, but not student interactions.

The results of this study also suggest that these relationships identified above exist for participation density outcomes for an overall discussion as well as within each level of a respective discussion's "life cycle". With regard to an overall discussion's participation density outcomes, the results of this study indicate that discussions that required student message contributions and/or student interactions consistently exhibited a greater percentage of possible participants who actually became engaged in the overall discussion compared with discussions without stated message contribution or interaction requirements.

Figure 27: Comparison of Percentage of Possible Density at Each Discussion Level and Different Types of Instructor Expectations for Student Participation

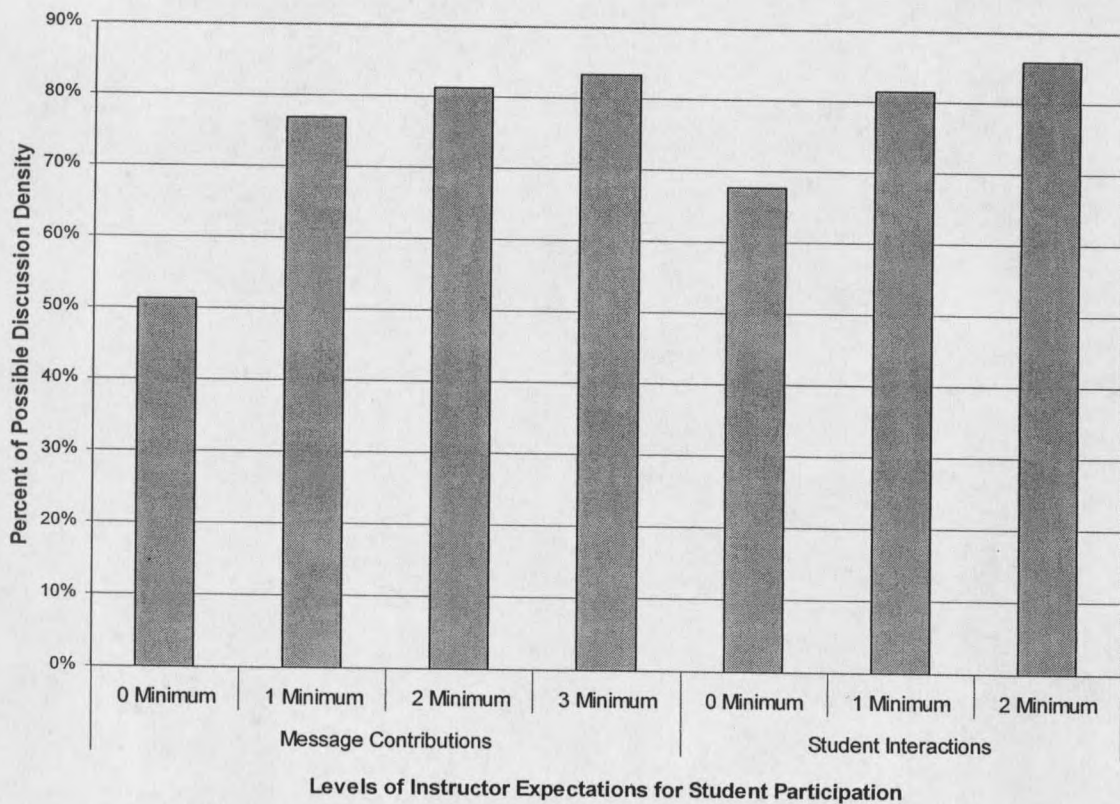


Moreover, as illustrated in Figure 27, with regard to participation density outcomes within different levels of a respective discussion's "life cycle," the results of this study suggest that discussions that required student message contributions and/or student interactions consistently exhibited a greater percentage of possible participants who remained engaged throughout the different levels of a discussion's life cycle compared with discussions without message contribution or interaction requirements.

Participation Density and Levels of Instructor Expectations. In addition to the relationships identified above which were associated with different types of instructors' stated expectations for student participation, results of this study, as illustrated in Figure 28, suggest that different levels of instructors' stated expectations for student

participation in threaded discussions were also associated with different student participation density outcomes in the discussions under examined in this study.

Figure 28: Comparison of Percentage of Possible Density and Different Levels of Instructor Expectations for Student Participation



More specifically, the following relationships were identified in the results of this study:

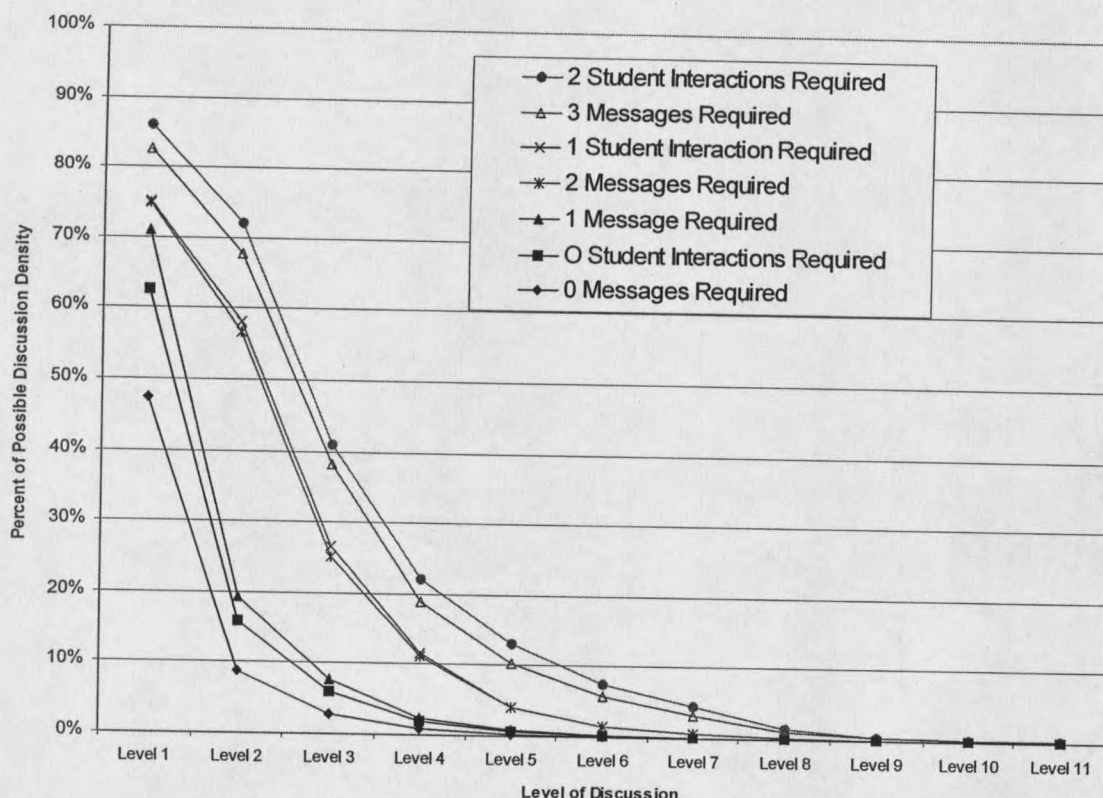
1. Threaded discussions with a higher minimum number of expected message contributions were associated with greater student participation density outcomes compared with discussions with fewer minimum expected message contributions.

2. Threaded discussions with a higher minimum number of expected student interactions were associated with greater student participation density outcomes compared with discussions with fewer minimum expected student interactions.
3. Threaded discussions with a minimum number of expected student interactions were associated with greater student participation density outcomes compared with discussions with the same minimum number of message contributions.

These results indicate that the relationships identified above exist both for participation density outcomes for an overall discussion as well as for participation density outcomes within each level of a respective discussion's "life cycle." With regard to an overall discussion's participation density outcomes, the results of this study indicate that discussions that required higher minimum levels of message contributions and/or student interactions consistently exhibited a greater percentage of possible participants who actually became engaged in the overall discussion compared with discussions with fewer minimum message contributions and/or student interaction requirements.

Furthermore, the results indicate that discussions that required a specific quantity of student interactions exhibited greater participation density outcomes compared with discussions that required that same quantity of message contributions, but that did not explicitly require student interactions.

Figure 29: Comparison of Percentage of Possible Density at Each Discussion Level and Different Levels of Instructor Expectations for Student Participation



Moreover, as illustrated in Figure 29 above, with regard to participation density outcomes within different levels of a respective discussion's "life cycle," the results of this study suggest that discussions that required higher minimum levels of message contributions and/or student interactions consistently exhibited a greater percentage of possible participants who remained engaged throughout the different levels of a threaded discussion's life cycle compared with discussions with fewer minimum message contributions and/or student interaction requirements. Additionally, discussions with requirements for a specific number of minimum student interactions consistently exhibited a greater percentage of possible participants remaining engaged throughout the

different levels of a threaded discussion's life cycle compared with discussions with the same minimum number of required message contributions.

Findings Related to Average Level of Participation

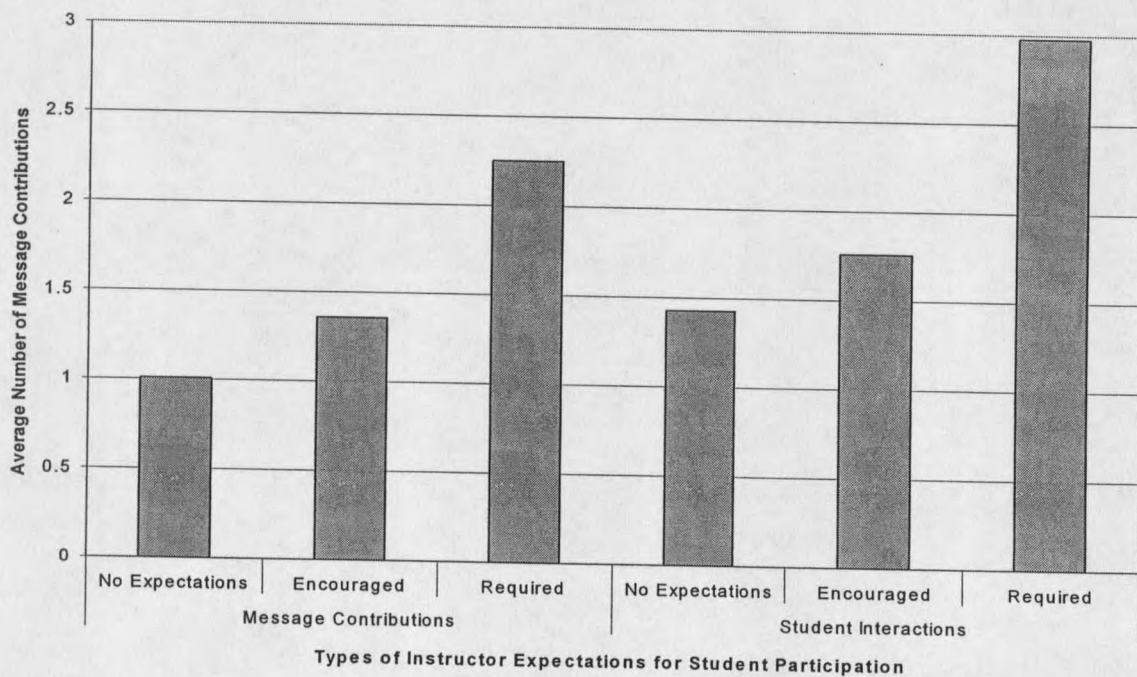
In contrast to participation density, a discussion's average level of participation is one measure of discussion intensity, or the degree of individual participant engagement within a discussion. While participation density measures the number of participants who actually engaged in a discussion out of the number of possible participants, the average level of participation indicates how much, on average, that each actual participant contributed messages to a respective discussion. In addition to measuring the overall average level of participation, discussions in this study were also measured for the average level of participation exhibited in each type of learner interaction, including learner-content interaction, learner-instructor interaction, and learner-learner interaction.

Accordingly, what follows are a summary of the study's findings in regard to relationships between the types and levels of instructors' stated expectations for student participation in threaded discussions and the average level of participation in learner interactions exhibited in the discussions.

Average Level of Participation and Types of Instructor Expectations. The results suggest that different types of instructor stated expectations for student participation are associated with different overall average levels of participation in the threaded discussions examined in this study. More specifically, as illustrated in Figure 30, the following relationships were identified in the results of this study:

1. Threaded discussions with required student message contributions were associated with greater overall average levels of participation in learner interactions compared with discussions that encouraged or that did not require message contributions.
2. Threaded discussions with required student interactions were associated with greater overall average levels of participation in learner interactions compared with discussions that encouraged or that did not require student interactions.
3. Threaded discussions with required student interactions were associated with greater overall average levels of participation in learner interactions compared with discussions that required message contributions, but not student interactions.

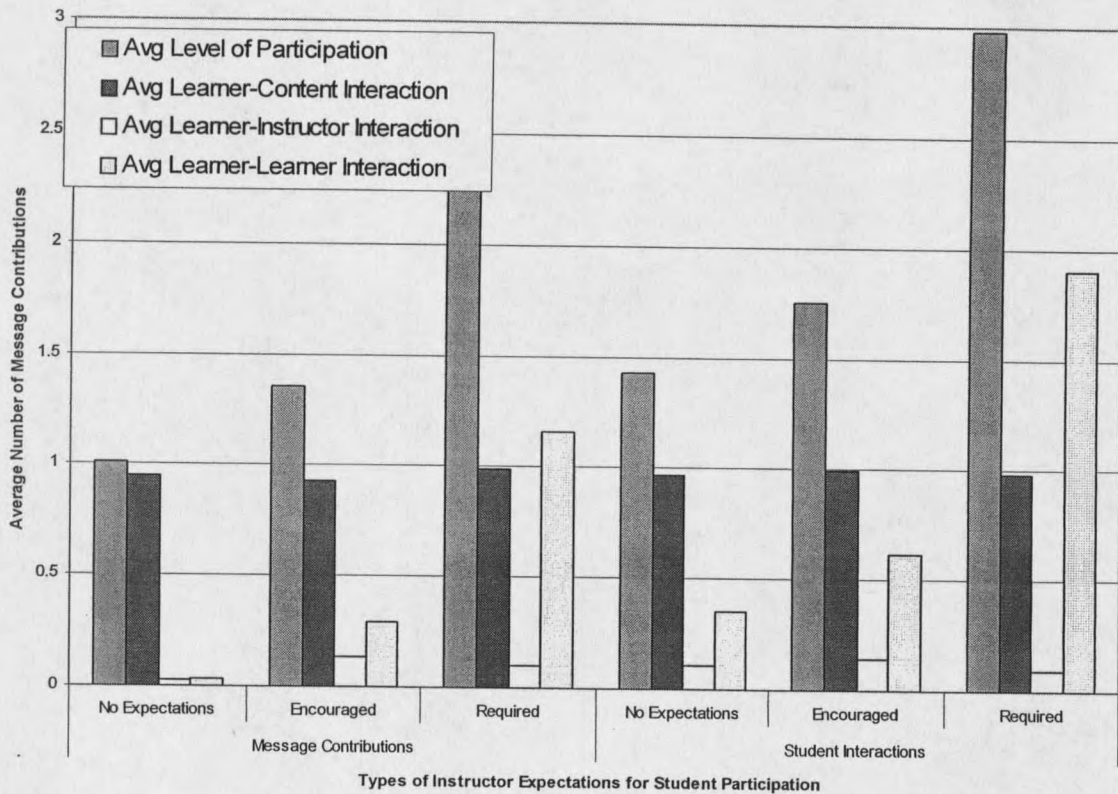
Figure 30: Comparison of Overall Average Level of Participation and Different Types of Instructor Expectations for Student Participation



In addition to these conclusions above related to a discussion's overall average level of participation, the results of this study also suggest that threaded discussions with different types of instructor expectations for student participation also exhibited different average levels of participation in the three different forms of learner interaction, including learner-content interaction, learner-instructor interaction, and learner-learner interaction. Specifically, as illustrated in Figure 31, the following relationships were identified in the results of this study:

1. Threaded discussions with required student message contributions were associated with greater average levels of participation in learner-learner interactions compared with discussions that encouraged or that did not require message contributions.
2. Threaded discussions with required student interactions were associated with greater average levels of participation in learner-learner interactions compared with discussions that encouraged or that did not require student interactions.
3. Threaded discussions with required student interactions were associated with greater average levels of participation in learner-learner interactions compared with discussions that required message contributions, but not student interactions.

Figure 31: Comparison of Average Level of Participation in Learner-Interactions and Different Types of Instructor Expectations for Student Participation



As illustrated in Figure 31, discussions with different types of expectations for student participation did not appear to exhibit different average levels of participation with respect to learner-content or learner-instructor interactions. On the contrary, the average level of participation in learner-content and learner-instructor interactions appears to be relatively consistent across all discussions examined in this study.

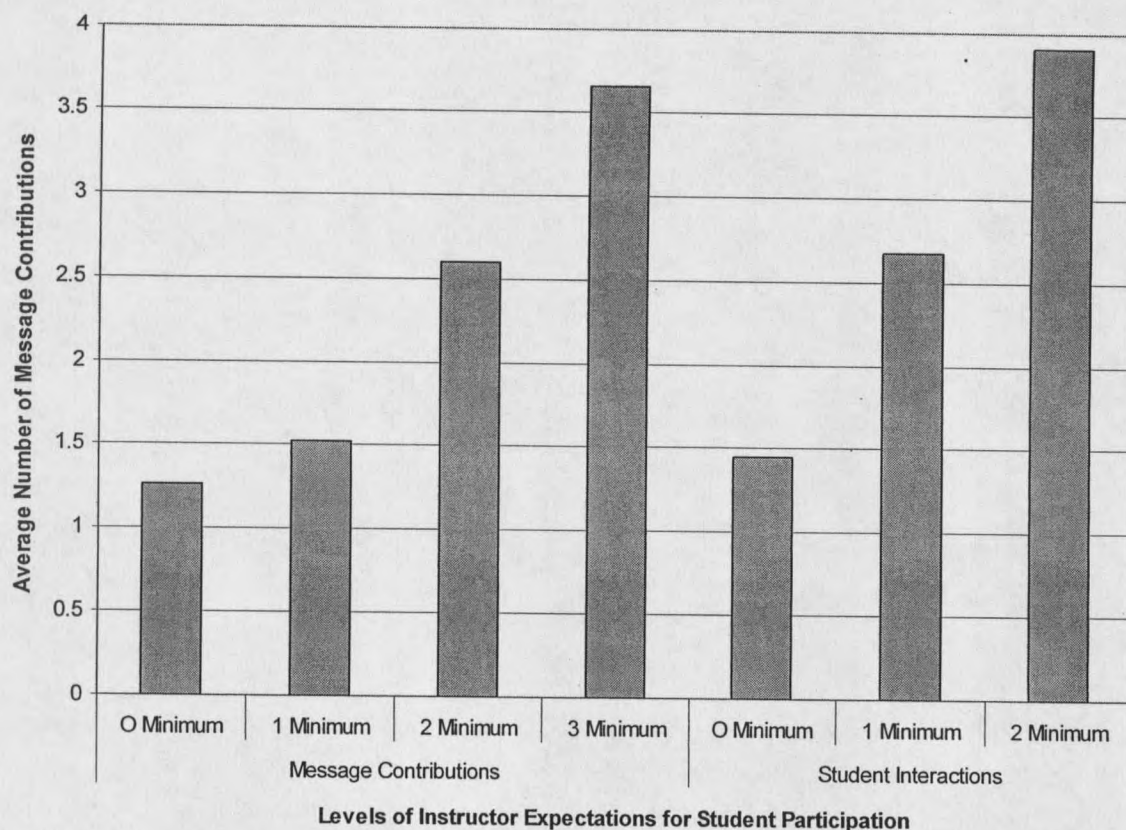
As illustrated in Figure 31 above, in discussions with no expectations for message contributions, students who did engage in the discussion posted an average of approximately one message to the discussion representing almost exclusively learner-content interactions. In contrast, discussions that required message contributions

exhibited an average level of participation of approximately two messages per participant, with one of these messages representing learner-content interaction and the other representing primarily learner-learner interaction. Moreover, discussions that required student interactions exhibited an average level of participation of approximately three messages per participant, with one message representing learner-content interaction and the other two messages representing primarily learner-learner interactions.

In sum, the results of this study suggest that discussions that required message contributions and/or student interactions were consistently associated with a greater overall average level of participation, and specifically with a greater average level of participation in learner-learner interactions, compared with discussions that did not require message contributions and/or student interactions. Moreover, discussions that required student interactions consistently exhibited a greater overall average level of participation, and specifically a greater average level of participation in learner-learner interactions, compared with discussions that required message contributions, but not student interactions.

Average Level of Participation and Levels of Instructor Expectations. Results also suggest that different levels of instructor stated expectations for student participation in threaded discussions were also associated with different average levels of participation in learner interactions as illustrated in Figure 32.

Figure 32: Comparison of Overall Average Level of Participation and Different Levels of Instructor Expectations for Student Participation



More specifically, the following relationships were identified in the results of this study:

1. Threaded discussions with a higher minimum number of expected message contributions were associated with greater overall average levels of participation compared with discussions with fewer minimum expected message contributions.
2. Threaded discussions with a higher minimum number of expected student interactions were associated with greater overall average levels of participation compared with discussions with fewer minimum expected student interactions.

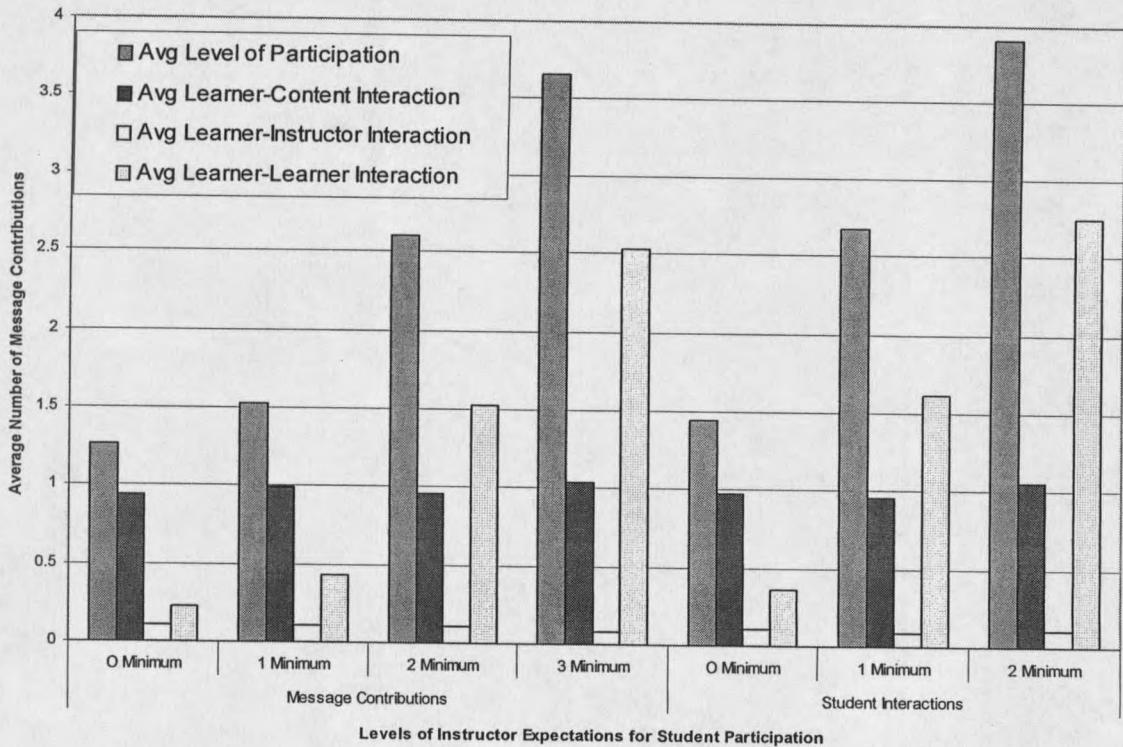
3. Threaded discussions with a minimum number of expected student interactions were associated with greater overall average levels of participation compared with discussions with the same minimum number of message contributions.

In addition to these conclusions above related to a discussion's overall average level of participation, the results of this study also suggest that threaded discussions with different levels of instructor expectations for student participation also exhibited different average levels of participation in the three different forms of learner interaction, including learner-content interaction, learner-instructor interaction, and learner-learner interaction.

More specifically, as illustrated in Figure 33, the following relationships were identified in the results of this study:

1. Threaded discussions with a higher minimum number of expected message contributions were associated with a greater average level of participation in learner-learner interactions compared with discussions with fewer minimum expected message contributions.
2. Threaded discussions with a higher minimum number of expected student interactions were associated with a greater average level of participation in learner-learner interactions compared with discussions with fewer minimum expected message contributions.
3. Threaded discussions with a higher minimum number of expected student interactions were associated with greater average levels of participation in learner-learner interactions compared with discussions with the same minimum number of message contributions.

Figure 33: Comparison of Average Level of Participation in Learner-Interactions and Different Levels of Instructor Expectations for Student Participation



As illustrated above, discussions with different levels of expectations for student participation did not appear to exhibit different average levels of participation with respect to learner-content or learner-instructor interactions. On the contrary, the average level of participation in learner-content and learner-instructor interactions appeared to be relatively consistent across all discussions examined in this study.

As explained in the previous section, it appears that in all of the threaded discussions examined in this study, individual participants typically contributed an average of one message to the original discussion topic, which represented learner-content interactions. However, beyond this initial message contribution, if participants continued to engage in the discussion, they did not typically contribute additional learner-

content related messages, but instead replied to or extended upon previously posted messages which resulted in learner-instructor or learner-learner interactions.

Based on this explanation, as illustrated in Figure 33, in discussions with no minimum expected message contributions, students who did engage in the discussions posted an average of approximately one message representing almost exclusively learner-content interactions. In contrast, discussions that required a minimum of one, two and three message contributions exhibited an average level of participation of 1.5, 2.5, and 3.5 messages respectively, with one of these messages representing learner-content interaction and the other messages representing primarily learner-learner interactions. This same pattern of relationships is also exhibited in discussions with progressively higher levels of minimum student interaction requirements.

In sum, the results of this study suggest that discussions that required a higher minimum number of message contributions and/or student interactions were consistently associated with a greater overall average level of participation, and specifically with a greater average level of participation in learner-learner interactions, compared with discussions that required fewer minimum messages and/or student interactions. Moreover, discussions that required a minimum number of student interactions consistently exhibited a greater overall average level of participation, and specifically a greater average level of participation in learner-learner interactions, compared with discussions requiring the same quantity of minimum message contributions.

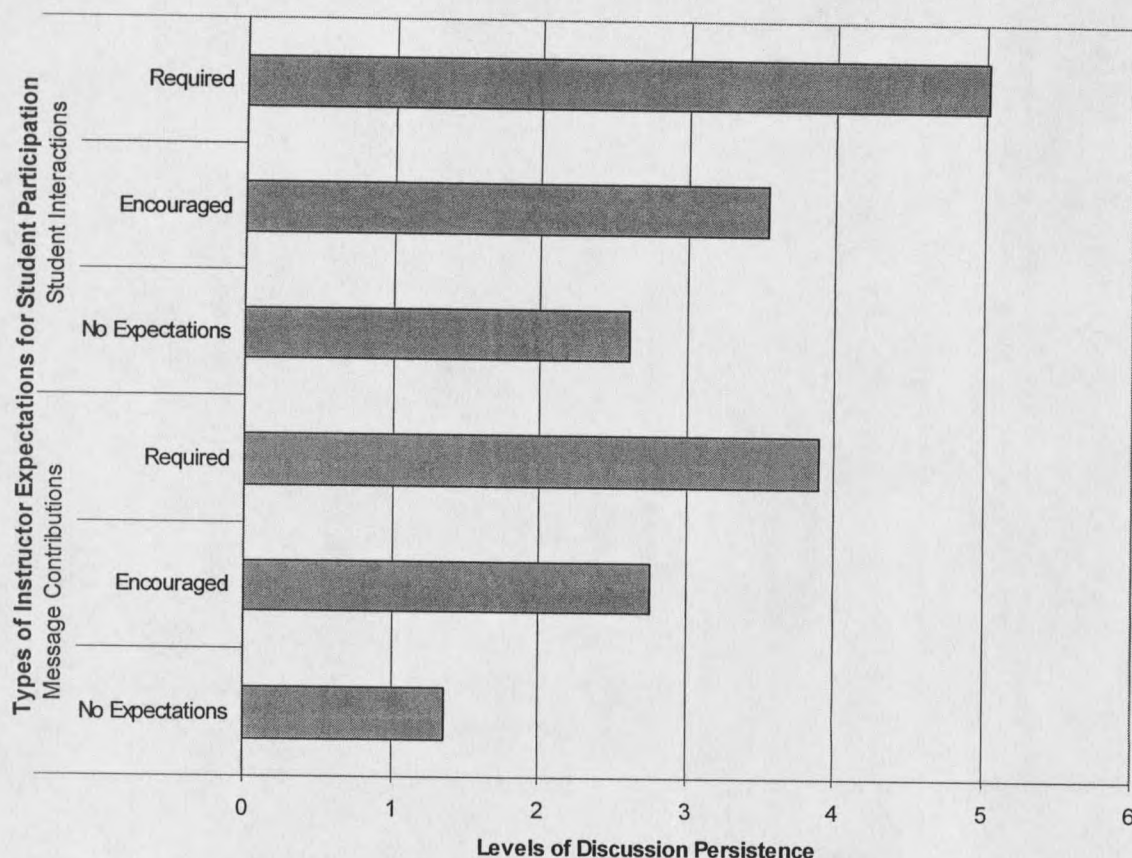
Findings Related to Degree of Persistence

As explained in the previous section, the average level of participation is one measure of a discussion's intensity, or the degree of individual participant engagement within a discussion. Another important measure of discussion intensity is the degree of persistence exhibited by participants within a discussion. While the average level of participation indicates how much, on average, that each actual participant contributed to a respective discussion, a discussion's degree of persistence is a measure of the number of levels of discussion that individuals participate in, or progress through, throughout a discussion's life cycle.

Based on the results of this study, a number of relationships were found to exist between different types and levels of instructors' stated expectations for student participation in threaded discussions and the degree of persistence exhibited within the respective discussions. What follows are a summary of these findings.

Degree of Persistence and Types of Instructor Expectations. The results of this study suggest that different types of instructor stated expectations for student participation are associated with different degrees of persistence exhibited by participants in the threaded discussions. Figure 34 illustrates a comparison of the degree of persistence exhibited in discussions representing different types of instructors' expectations for message contributions. Additionally, Figure 34 illustrates a comparison of the degree of persistence exhibited in discussions representing different types of instructors' expectations for student interactions.

Figure 34: Comparison of the Degree of Persistence and Different Types of Instructor Expectations for Student Participation



Specifically, as illustrated in Figure 34, the following relationships were identified in the results of this study:

1. Threaded discussions with required student message contributions were associated with a greater degree of persistence exhibited by discussion participants compared with discussions that encouraged or that did not require message contributions.
2. Threaded discussions with required student interactions were associated with a greater degree of persistence exhibited by discussion participants compared with discussions that encouraged or that did not require student interactions.

3. Threaded discussions with required student interactions were associated with a greater degree of persistence exhibited by discussion participants compared with discussions that required message contributions, but not student interactions.

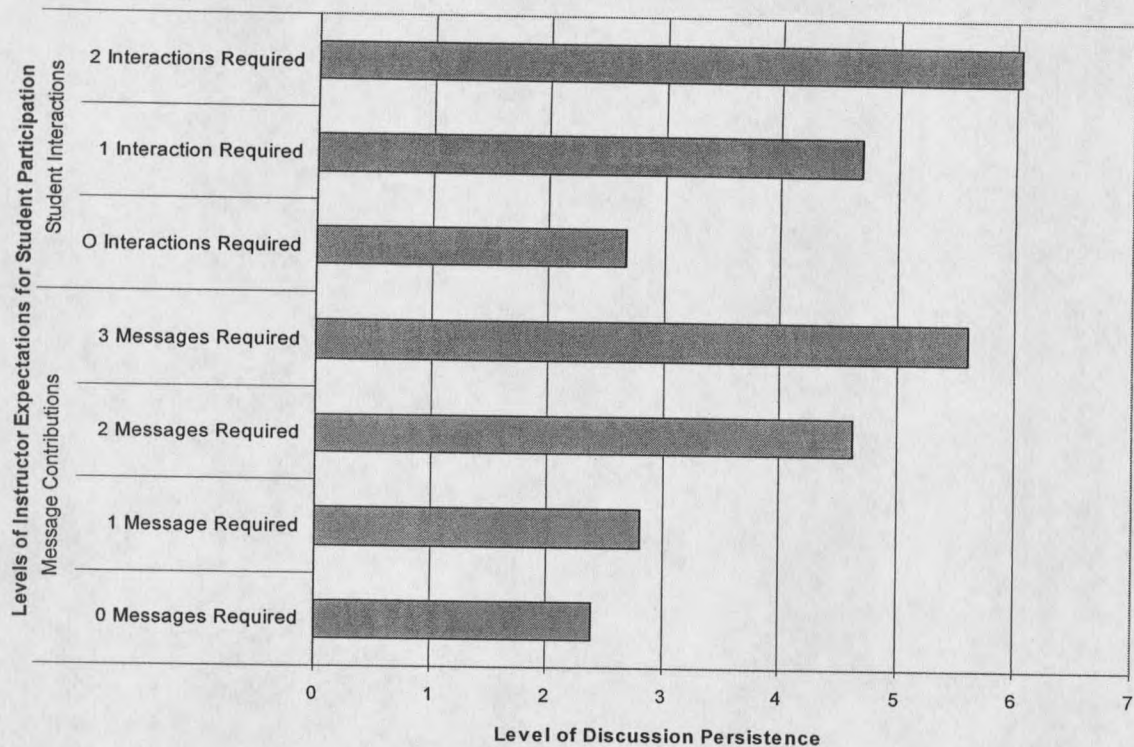
In sum, these results suggest that discussions that required message contributions and/or student interactions were consistently associated with a greater degree of persistence exhibited by participants in the respective discussions compared with discussions that did not require message contributions and/or student interactions. Moreover, discussions that required student interactions consistently exhibited a greater degree of persistence exhibited by discussion participants compared with discussions that required message contributions, but not student interactions.

Degree of Persistence and Levels of Instructor Expectations. As illustrated in Figure 35, results also suggest that different levels of instructor stated expectations for student participation were associated with different degrees of persistence exhibited by participants in the threaded discussions examined in this study.

More specifically, as illustrated in Figure 35, the following relationships were identified in the results of this study:

1. Threaded discussions with a higher minimum number of expected message contributions were associated with a greater degree of persistence exhibited by discussion participants compared with discussions with fewer minimum expected message contributions.

Figure 35: Comparison of the Degree of Persistence and Different Levels of Instructor Expectations for Student Participation



2. Threaded discussions with a higher minimum number of expected student interactions were associated with a greater degree of persistence exhibited by discussion participants compared with discussions with fewer minimum expected student interactions.
3. Threaded discussions with a higher minimum number of expected student interactions were associated with a greater degree of persistence exhibited by discussion participants compared with discussions with the same minimum number of message contributions.

In sum, the results of this study suggest that discussions that required a higher minimum number of message contributions and/or student interactions were consistently

associated with a greater degree of persistence exhibited by discussion participants compared with discussions that required fewer minimum messages and/or student interactions. Moreover, discussions that required a minimum number of student interactions consistently exhibited a greater degree of persistence exhibited by discussion participants compared with discussions requiring the same quantity of minimum message contributions.

CHAPTER 5

CONCLUSIONS

Introduction

This study was inspired by a widely accepted premise in education literature that learning in distance education depends upon the student's active participation in interactions with course content, the instructor, and with other learners (i.e. Becker, 2000; Berge, 1999; Flottemesch, 2000; McHenry & Bozik, 1995; Moore, 1989). Because threaded discussions have become the primary tool that instructors use for facilitating interaction in online courses (Harasim, 1990; Berge & Collins, 1993; Muilenburg & Berge, 2000), this study acknowledged that online educators need to understand how to design and maintain online discussions (Muilenburg & Berge, 2000) to promote student participation and to maintain student involvement (Rohfeld & Hiemstra, 1995) so that student interaction with course content, the instructor, and with other learners can be maximized (Moore, 1989).

A review of the literature revealed that the primary recommendation given to instructors to promote student involvement in threaded discussions is to make student participation expectations clear and to either encourage or require students to participate in discussions (Berg, 1995; Paulsen, 1995; Eastmond & Ziegahn, 1995; Rohfeld & Hiemstra, 1995). This recommendation is based on research demonstrating that student

participation in threaded discussions is greater when participation is required by the instructor (Harasim, Hiltz, Teles, & Turoff, 1995; Bures, Abrami, & Amundson, 2000).

Although this recommendation provides practitioners with some guidance for promoting interaction in online discussions, this study was intended to address three important limitations identified in the literature. First, prior research identified student participation as a single outcome and did not distinguish between participation in the form of interaction with course content, with the course instructor, and with other learners. To address this limitation, this study examined how requiring student participation may be associated with each of the three specific types of learner interaction which have been deemed critical to student learning (Moore, 1989).

Second, prior research had not considered what, if any, differences may exist in student participation outcomes when an instructor requires different types and/or levels of student participation. In other words, previous research had focused on instructors' required participation as a constant variable. However, given that an instructor may require different types and levels of student participation, this study examined how differences in instructors' participation requirements may be associated with different student participation outcomes.

Finally, prior research had investigated student participation within threaded discussion environments only from a holistic perspective, by examining the relationship between instructors' required participation and the cumulative total of message contributions posted within a discussion. Because messages within a threaded discussion represent distinct interactions that can occur at different stages or levels of a discussion's

progression from start to finish; this study examined more fully how instructors' participation requirements were associated with student participation in learner interactions for an overall discussion, as well as within and across levels of a threaded discussion.

To address these limitations in the literature, this study focused on answering the primary research question: "What relationships exist between the types and levels of instructors' stated expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions occurring within the discussions?" Toward answering this question, this final chapter is organized into the following three sections: 1) a discussion of the conclusions made based on the findings of this study; 2) a discussion of this study's contributions to related literature; and 3) a discussion of recommendations for further research.

Conclusions

Based on the results of this study, the central conclusion that can be made in relation to the primary research question is that a number of relationships were found to exist between different types and levels of instructors' stated expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions occurring within the discussions. Specifically, the results suggest that discussions with different types and levels of instructors' stated expectations for student participation exhibited different levels of each of the three student participation outcomes examined in this study, including: 1) participation density, 2) average levels of

involvement, and 3) degrees of persistence. Accordingly, what follows is a discussion of the primary relationships observed in the results relative to these three participation outcomes, and a discussion of the conclusions that can be made based on these findings.

Conclusions Related to Participation Density

With regard to participation density, the results indicate that discussions that required message contributions and/or student interactions consistently exhibited greater overall levels of participation density as compared with discussions that had no expectations for message contributions or student interactions, or with discussions that encouraged, but did not require message contributions and/or student interactions. Additionally, discussions that required student interactions consistently exhibited higher levels of participation density compared with discussions that required message contributions, but that did not explicitly require student interactions. Moreover, the results indicated that the overall average level of participation density were progressively higher in discussions that required progressively higher minimum levels of message contributions and/or student interactions as compared with discussions with lower expectations for minimum levels of message contributions and/or student interactions. Furthermore, discussions with progressively higher minimum levels of student interactions consistently exhibited greater participation density levels compared with discussions that required the same minimum levels of message contributions. Finally, these relationships were consistent for participation density for an overall discussion as well as within each level of discussion throughout the respective discussion's life cycle.

The primary conclusion that can be drawn from these results is that different types and levels of instructors' stated expectations for participation in threaded discussions may be associated with significantly different levels of student participation density outcomes. In other words, within the discussions examined in this study, the percentage of students who actually became initially engaged in a discussion, and the percentage of students who remained engaged throughout a discussion, were significantly related to the types and levels of the instructor stated expectations for student participation in the respective discussions.

Although the results of this ex-post facto study should not be used to infer causality, and cannot be generalized beyond the specific population being studied, the findings and respective conclusions may have important implications for other researchers and practitioners. For example, if students do not initially become engaged in a threaded discussion, there is no way for them to participate in learner interactions that have been deemed critical for student learning. Even for the students who do become engaged in a threaded discussion, their opportunities for interaction are limited by the number of other participants who engage in the discussion. Moreover, from the start of a discussion to its conclusion, a threaded discussion may progress through different levels of dialogue and interaction to the extent that participants reply to or extend upon previous participant's message contributions.

Therefore, one of the challenges for instructors seeking to maximize student participation in learner interactions in threaded discussions involves maximizing the number of actual participants who initially become involved in a discussion. Furthermore,

with regard to those participants who initially become engaged in a discussion, a second challenge for the instructor involves maximizing the percentage of actual participants who remain engaged throughout the "life cycle" of a discussion from beginning to end.

Accordingly, the results of this study suggest that instructors should carefully consider how they state their expectations for types and levels of student participation in threaded discussions as these expectations may be associated with different levels of students who initially become engaged in the discussion as well as with different levels of sustained student engagement throughout a discussion's life cycle.

Conclusions Related to Average Level of Participation

With regard to the average level of participation in learner interactions within threaded discussions, the results indicate that discussions that required message contributions and/or student interactions consistently exhibited greater overall average levels of participation, and particularly greater average levels of participation in learner-learner interactions, as compared with discussions that had no expectations for message contributions or student interactions, or with discussions that encouraged, but did not require message contributions and/or student interactions. Additionally, discussions that required student interactions consistently exhibited higher average levels of participation, particularly in the form of learner-learner interactions, compared with discussions that required message contributions, but that did not explicitly require student interactions. Moreover, results indicated that the overall average level of participation, particularly in the form of learner-learner interactions, was progressively higher in discussions that

required progressively higher minimum levels of message contributions and/or student interactions as compared with discussions with lower expectations for minimum levels of message contributions and/or student interactions. Furthermore, discussions with progressively higher minimum levels of student interactions consistently exhibited greater average levels of participation, and specifically greater average levels of participation in learner-learner interactions, compared with discussions that required the same minimum levels of message contributions.

The primary conclusion that can be drawn from these results is that different types and levels of instructors' stated expectations for participation in threaded discussions may be associated with significantly different overall average levels of student participation, particularly in the form of learner-learner interactions. In other words, within the discussions examined in this study, of the students who did engage in discussions, the degree to which students actually participated within the discussions was significantly related to the types and levels of the instructor stated expectations for student participation in the respective discussions.

Although the results of this ex-post facto study should not be used to infer causality, and cannot be generalized beyond the specific population being studied, the findings and respective conclusions may have important implications for other researchers and practitioners, as increasing the average level of participation of students in threaded discussions involves increasing the intensity of student engagement in the discussions. For example, once a student has initially become engaged in a discussion, the only way that students remain engaged is by contributing additional message

contributions to a respective discussion, thereby increasing the discussion's average level of participation. Additionally, by increasing the average level of student participation in learner-learner interactions, the intensity of learner engagement and the degree of actual dialogue or discussion that takes place between participants within the threaded discussion environment is greater than if students merely contribute messages to a discussion area without reading and responding to what other participants have contributed.

Therefore, because one of the challenges for instructors seeking to maximize student participation in learner interactions in threaded discussions involves maximizing the average level of participation in learner interactions exhibited by the individuals who become engaged in the discussions, the results of this study indicate that the types and levels of their stated expectations for student participation may be an important consideration for addressing the challenge. Specifically, instructors should consider that different participation outcomes may be associated with their decisions related to encouraging versus requiring student participation, expecting message contributions versus student interactions, and expecting different quantities or levels of message contributions and/or student interactions within threaded discussion environments.

Conclusions Related to Degree of Persistence

With regard to the degree of persistence exhibited by students within threaded discussions, the results indicate that discussions that required message contributions and/or student interactions consistently exhibited greater degrees of participation

persistence as compared with discussions that had no expectations for message contributions or student interactions, or with discussions that encouraged, but did not require message contributions and/or student interactions. Additionally, discussions that required student interactions consistently exhibited higher degrees of persistence compared with discussions that required message contributions, but that did not explicitly require student interactions. Moreover, results indicated that the degree of participation persistence was progressively higher in discussions that required progressively higher minimum levels of message contributions and/or student interactions as compared with discussions with lower expectations for minimum levels of message contributions and/or student interactions. Furthermore, discussions with progressively higher minimum levels of student interactions consistently exhibited greater degrees of participation persistence compared with discussions that required the same levels of message contributions.

These results support the conclusion that different types and levels of instructors' expectations for student participation in threaded discussions are associated with different degrees of persistence exhibited by discussion participants. Because one of the challenges for instructors seeking to maximize student participation in learner interactions in threaded discussions involves maximizing the degree of persistence exhibited by discussion participants, this conclusion may have potentially significant implications for practitioners. For example, once a student has initially become engaged in a discussion, the only way that students remain engaged is by contributing additional message contributions to a respective discussion. However, when contributing additional messages, a student can choose to post a message to the current discussion level, or to

extend the discussion to a new level of dialogue. By contributing a message at a new discussion level, the participant is inherently engaging in either learner-instructor or learner-learner interaction, while simultaneously contributing to the discussion's average level of participation, density, and degree of persistence. Accordingly, a discussion's degree of persistence is an important measure of participant engagement because it has important implications for all three participation outcomes examined in this study.

Accordingly, these results suggest that an instructor should carefully consider how they state their expectations for types and levels of student participation in threaded discussions as these expectations may be associated with different degrees of participation persistence within the discussions.

Contributions to Related Literature

Despite the significant growth of online education in the past decade, Fahy, Crawford, and Ally (2001, p.2) point out that "significant gaps persist in our understanding of online interaction". The authors further argue that "for researchers, these gaps indicate a lack of a theoretically adequate account of how learners interact in online situations, and for practitioners, the gaps indicate the need for a model for managing online communications effectively" (Fahy, Crawford, and Ally, 2001, p. 2). This study offers a number of contributions toward addressing these gaps in the literature. In the following section, a discussion of this study's contributions to the literature will be organized as follows: 1) contributions to theory; 2) contributions to research and teaching.

Contributions to Theory

Although this exploratory, ex-post facto study was not intended to test theory, the results of this study have potential important implications for literature which served as theoretical foundations for the current study. Specifically, this study contributes to theoretical literature related to student involvement and high expectations.

Student Involvement. In a landmark report entitled "Involvement in Learning: Realizing the Potential of American Higher Education," the Study Group on the Conditions of Excellence in American Higher Education (1984) concluded that institutions of higher education can most effectively improve undergraduate education by focusing educational resources and efforts on the conditions which best foster and promote student learning and development. Specifically, the Study Group cited student involvement as one of the three critical conditions of excellence for promoting learning and student development in undergraduate education (1984). Additionally, several recent models of learning and student development have suggested the importance of student involvement or engagement as a key determinant of the outcomes of education (Pascarella & Terenzini, 1991).

Specifically, referencing years of empirical research and literally hundreds of studies of undergraduate students, Astin (1984) proposed a "theory of student involvement" predicated on the premise that the more time and effort students invest in the learning process and the more intensely they engage in their own education, the more they learn. Stated simply, Astin (1984) declared that "student involvement refers to the amount of physical and psychological energy that the student devotes to the academic

experience" (p.297) and summarized his theory by concluding "students learn by becoming involved" (1985, p.133). Accordingly, Astin (1984) challenged educators to use the theory by focusing more of their effort on finding ways to promote student involvement as the intended outcome of their pedagogical efforts (p.305).

This study serves as one attempt to address Astin's (1984) challenge. Specifically, by examining the relationships between different types and levels of expectations for student participation in threaded discussions and actual student participation outcomes within the discussions, this study provides an application of Astin's theory (1984) to a new educational context, in an attempt to identify how online educators can promote student involvement within online discussion environments.

Although Astin's (1999) research focused on the study of student involvement of undergraduate students in traditional education contexts, by examining student involvement in an online education context, the current study follows-up on Astin's challenge for additional research in which he called for studies "to explore ways of assessing different forms of involvement" (Astin, 1984, p. 305), "to assess how much time students devote to various activities" to better understand patterns of student involvement in different contexts (Astin, 1999, p. 596), and to address the important pedagogical question for educational practitioners of "how do you get students involved" (Astin, 1984, p. 301).

More specifically, Astin (1999, p. 590) extended upon his earlier research in specifying that the three most potent forms of student involvement turn out to be academic involvement, involvement with faculty, and involvement with student peers.

Based on the extensive empirical support discussed previously, student involvement continues to be cited as a condition of excellence in undergraduate education and promoting student's active involvement with educational activities, interaction with faculty, and with student peers are widely recognized as essential principles of good practice for undergraduate teaching (Chickering & Gamson, 1991).

Accordingly, by providing a conceptual framework for examining the relationships between different types and levels of instructor expectations for participation in threaded discussions and actual student participation in learner interactions with course content, the course instructor, and with other learners, this study contributes a model for researchers and practitioners to examine, and potentially influence student involvement in a new educational context to achieve specific learner engagement outcomes that have been identified in the literature as indicators of excellence in undergraduate teaching and learning.

High Expectations. In addition to student involvement, the Study Group on the Conditions of Excellence in American Higher Education (1984) also cited high expectations as an additional critical condition of excellence for undergraduate education (1984, p.17). Specifically, the Study Group concluded that at institutional, program, and individual course levels, student performance will rise to meet the level of reasonable expectations that are communicated to them (p. 20). Similarly, Chickering & Gamson (1991) also cite communicating high expectations as one of the seven principles of good practice for undergraduate teaching.

The premise that communicating high expectations for student performance is important for promoting student learning in undergraduate education is also central to the theoretical foundation and rationale for the current study. By analyzing types and levels of instructors' stated expectations for student participation in threaded discussions in online courses, this study contributes to the literature by identifying a number of relationships between student's actual level of participation in threaded discussions and the expected level of participation that had been communicated by the instructor. More specifically, within the threaded discussion environments examined in this study, progressively higher expectations for student participation were associated with progressively higher levels of student participation. Accordingly, the results of this study support previous conclusions in the literature that student performance will rise to meet the level of expectations communicated to them (Study Group, 1984, p. 20).

According to the Study Group (1984), there is an important difference between holding high expectations for students and actually communicating high expectations to students. Therefore, the Study Group (1984) clarifies, as do Chickering and Gamson (1991) that institutional and faculty expectations about the requirements that students are expected to fulfill must be communicated publicly so that students know clearly what is expected and how well they are required to perform to satisfy institutional, program, and course level standards. The results of this study provide support for this premise within a new educational context and suggest that student participation outcomes are associated with instructors' explicitly stated participation expectations.

Taken together, the literature on student involvement and high expectations provided important theoretical foundations for the current study by clearly establishing that both student involvement and high expectations are critical for student learning. By following-up on Astin's (1984) assertion that practitioners must find ways to promote student involvement as the intended outcome of educational activities, the current study contributes to the literature by combining these two "conditions of excellence" together and identifying a number of potential relationships related to instructors' high expectations for student involvement and actual student involvement outcomes within threaded discussion environments.

Contributions to Research and Teaching

This study also offers a number of contributions to the current body of knowledge related to online education which have important implications for online education researchers and practitioners. Specifically, the study contributes to literature for research and teaching with respect to: 1) computer mediated communication, 2) online interaction, and 3) models and methods for organizing and facilitating threaded discussions.

Computer Mediated Communication. As Poole (2000, p. 162) points out, "the body of knowledge about how students engage in learning in online courses is rather modest at this time" and "the proliferation of online courses requires an understanding of the unique learning environment that computer-mediated communication facilitates" as awareness of student participation patterns can help online course designers and instructors capitalize on the strengths of the medium (Poole, 2000, p. 170). Accordingly,

this ex-post facto study contributes to the literature the results of one attempt at examining student participation patterns as they occurred naturally within threaded discussion environments.

More specifically, this study contributes to addressing an important limitation in the literature, as previously stated, that prior research has investigated student participation within threaded discussion environments only from a holistic perspective, by examining student participation as a cumulative total of message contributions posted within a discussion. Given that message postings within threaded discussions represent distinct interactions between students and course content, the instructor, and other learners; and that these interactions can occur at different stages or levels of a discussion's progression from start to finish; this study has addressed a need for research to examine more fully how student participation occurs in learner interactions for an overall discussion, as well as within and across levels of a threaded discussion. Accordingly, the results of this study suggest that examining student participation patterns throughout the various stages or levels a discussion's "life cycle" may provide researchers and practitioners with a more comprehensive understanding of the nature of learner engagement within this environment.

Online Interaction. Flottemesch (2000, p. 46) concluded that "the literature reveals that creating interaction in the classroom is essential to student learning and to the overall success and effectiveness of distance education." Accordingly, Berge (1999, p. 9) argues that "regardless of the media used, it is the responsibility of the institution and the instructor to provide a learning environment in which the learner has the opportunity for

appropriate interactions with content, the instructor, and other students." Furthermore, Moore (1989) declares that "it is vitally important that distance educators in all media do more to plan for all three kinds of interaction" (p. 6) and "that educators need to organize programs to ensure maximum effectiveness of each type of interaction" (p. 5).

Accordingly, this study has served as an initial attempt to identify relationships between how online educators organize threaded discussion environments and these desired online interaction outcomes.

One of the primary research problems addressed in this study was that prior research identified student participation in threaded discussions as a single outcome and did not distinguish between participation in the form of interaction with course content, with the course instructor, and with other learners. As a result, the literature reports that "significant gaps persist in our understanding of online interaction" (Fahy, Crawford, and Ally, 2001, p.2). Toward addressing this limitation, this study introduced a conceptual framework that allows for a more complete examination of student participation in each of the three forms of learner-interaction as it occurs naturally within threaded discussion environments. Additionally, the study contributes an initial application of this conceptual framework including an examination and description of online interaction as it occurred within 265 randomly selected threaded discussions. Accordingly, the results of the study contribute to the disciplines understanding of online interaction within this most widely utilized online educational context.

Additionally, this study was based, at least in part, on the premise that interaction in distance education settings does not simply occur, but instead must be intentionally

designed by the instructor into the instructional program (Berge, 1999, p. 5). The results of this study offer support for this premise, as online interaction within threaded discussions examined in this study could not have occurred unless the instructor intentionally created the threaded discussion area within the respective online course.

However, and perhaps more importantly, the results of this study also suggest that purposefully planning opportunities for learners to interact with course content, the course instructor, and with other learners, does not inherently ensure that critical learner interactions will occur within threaded discussion environments. In other words, the results of this study suggest that instructors' intentional planning of interaction opportunities in threaded discussions appears to be a necessary, but not sufficient, condition for interaction in that, ultimately, students may or may not actually engage in the planned interaction opportunities. Additionally, the results of this study suggest that different types and levels of instructors' stated expectations for student participation in threaded discussions are associated with different online interaction outcomes.

In sum, this study offers contributions to both understanding the nature of online interaction as it occurs within threaded discussion environments, as well as initial results of exploratory research on how different instructional strategies may be associated with changes in online interaction patterns.

Models and Methods for Facilitating Threaded Discussions. A fundamental question for educators and learners is how educational applications of computer conferencing technologies can best improve learning (Harasim, 1990). As Funaro and Montell (1999, p. 1) point out, "as with other new educational technologies, it is not so

much the tool that improves teaching and learning, but how the instructor integrates the tool into the curriculum and into the educational setting" that is most critical. Berge (1999, p. 5) concurs, stating that "it is the instructional design, not the delivery system that frequently sets the limits on the quality of instruction" and therefore, the critical question becomes "How can technology be used to promote the types of interaction that facilitate learning at a distance" (p. 5). This study has served as an initial attempt to address this question as it applies to the use of threaded discussion technologies.

Although the literature outlines a variety of important roles and responsibilities that an instructor must consider when organizing and facilitating threaded discussions, Rohfeld and Hiemstra (1995, p. 92) point out that one of the primary challenges that educators face centers around encouraging learner participation and maintaining viable discussions. Accordingly, Rohfeld and Hiemstra (1995, p. 92) contend that "all along the way, the facilitator must find the means to guide and maintain involvement in productive discussion." Similarly, Berge (1995, p. 25) argues that one of the facilitator's primary responsibilities is "to use whatever means necessary to guide and maintain involvement in productive discussion."

However, though much of the literature acknowledges the important responsibility that the instructor has for promoting student's active involvement in discussion, prior to this study, very little attention had been given in the literature to providing educators with specific research based guidelines that can be followed to successfully fulfill this responsibility. In the limited literature that does exist on this issue, the primary recommendation provided to instructors is to promote student involvement by

encouraging or requiring students to participate in the discussions (Berg, 1995; Paulsen, 1995; Eastmond & Ziegahn, 1995; Rohfeld & Hiemstra, 1995).

Although research has shown that student participation in threaded discussions tends to be greater when participation is required by the instructor as part of the course grade (Harasim, Hiltz, Teles, & Turoff, 1995; Bures, Abrami, & Amundson, 2000; Vrasidas & McIsaac, 1999), the literature has not previously addressed how different types or levels of instructors' participation expectations may be associated with different student participation outcomes. Accordingly, in the absence of empirical research to guide instructors in setting student participation requirements, different authors have cited different, and sometimes contradictory, recommendations. To address this limitation in the literature, this study presents a number of conclusions regarding relationships that may exist between different types and levels of instructors' expectations for student participation in threaded discussions and actual student participation in learner interactions occurring within the discussions. Although the conclusions presented in this study cannot be generalized beyond the study's specific population, and cannot be used to infer causality, they do serve as an important introductory examination of these relationships for researchers to build upon with further research and testing, and for practitioners to consider in facilitating online discussions.

Additionally, previous literature has not presented specific recommendations with regard to what level of participation requirements may be "too high" and counterproductive to the objective of maximizing student participation within a threaded discussion. Liaw and Huang (2000, p. 44) argue that, "from the viewpoint of

interactivity, it can be assumed that the more interactions that occur between learners and instructors or among learners, the more learners are able to learn." Given this, one could argue that "the more participation in discussions, the better" and that there is not an upper limit to the amount of student participation that is desirable for student learning.

However, Berge (1999) cautions that a misuse of interaction, synchronicity, and technology can have negative impacts on student learning, including loss of student's attention, boredom, information overload, and frustration. Accordingly, in any effort to maximize student participation in learner interactions within threaded discussion environments, the instructor should consider what threshold might be most appropriate. Although the ex-post facto nature of this study prevented manipulation of this variable, it is important to note that the results of this study did not identify an "upper limit" for instructor expectations, but did suggest that student participation outcomes continued to increase progressively as instructors' expectations for student participation progressively increased.

The literature states that "students may require special preparation and clear guidelines to participate effectively" in discussions, but Berge (1995, p. 28) cautions that the "instructor should not give too much direction" because "learners will rebel if the structural design of the conference is excessive". However, in previous literature, no explanation is provided with regard to how much direction is "too much" direction. Although this study was not intended to address this limitation specifically, it is important to note that the results of this study suggest that student participation outcomes were, generally, consistent with the level of abstraction in the instructors' stated expectations

for participation. In other words, in this study, discussions without any explicit requirements for message contributions or interactions exhibited no or minimal contributions or interactions. Conversely, discussions that explicitly required message contributions but not student interactions exhibited these outcomes while discussions that explicitly called for student interactions reflected student participation outcomes exhibiting greater levels of learner-learner interaction. Accordingly, the results of this study suggest that the clarity or ambiguity of instructors' stated expectations for student participation may be directly related to actual participation outcomes.

Another limitation in the current literature is that the potential impact of different levels of instructor participation in online discussions on student participation outcomes has only been generally addressed in the literature. For example, Berge (1995, p. 23) acknowledges that "computer conferencing relies greatly on the involvement of teacher and student." Accordingly, Berge (1995) and Paulsen (1995) suggest that the instructor should be an active participant in the discussion, stating that one of the responsibilities of the instructor is to "be responsive" by responding quickly to individual student's contributions or responding to several students' contributions at once by weaving them together. Clearly there cannot be learner-instructor interaction in threaded discussions unless the instructor is an active participant along with students. Additionally, student participation in the other types of interaction may hinge on the degree to which the instructor is, or is not, also an active participant in the discussion. However, other than the general suggestions above, previous literature has not addressed how instructors may need to design their own participation in interactions within an online discussion in order

to maximize the level of student's participation within those discussions.

In this regard, it is interesting to note that within the 265 threaded discussions analyzed in this study, aside from posting the initial question topic, instructors did not contribute messages in 204 or 77% of the discussions. Accordingly, the results of this study may call into question the premise reported in the literature that instructors' active involvement in discussions is critical for promoting learner interaction. Although the researcher would not argue that instructor involvement in threaded discussions is important, the results of this study clearly indicate that high levels of student participation and learner-learner interaction can be achieved in the absence of direct instructor involvement.

Summary of Contributions

Fahy, Crawford, and Ally (2001) argued that significant gaps exist in the literature related to online interaction and that "for researchers, these gaps indicate a lack of a theoretically adequate account of how learners interact in online situations, and for practitioners, the gaps indicate the need for a model for managing online communications effectively" (p. 2). By exploring the potential relationships between the types and levels of instructors' stated expectations for student participation in threaded discussions and student's actual participation in learner interactions within the discussions, this study contributes knowledge for both researchers and practitioners in the discipline by providing a number of contributions that begin to address these important limitations in the literature.

Recommendations for Further Research

This exploratory, ex-post facto study has resulted in a number of conclusions in regard to potential relationships between the types and levels of instructors' stated expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions occurring within the discussions. While the study offers a number of contributions to the literature as discussed in the previous section of this chapter, what follows are several recommendations for further research to build or extend upon the results of this study, as well as to address its inherent limitations. Specifically, recommendations for research include: 1) further refinement and application of the conceptual model introduced in this study for analyzing student participation expectations and outcomes in threaded discussion environments; and 2) additional empirical examination and testing of this study's conclusions; and 3) additional research to address the inherent limitations of the current study.

Research to Refine Conceptual Model

This study introduced a conceptual model for examining different types and levels of instructors' expectations for student participation in threaded discussions and the density and intensity of student participation in learner interactions occurring within the discussions. While the conceptual model was useful in addressing the study's primary research question, the researcher recommends that this conceptual model be refined.

Specifically, application of the original conceptual model required the researcher to classify instructor expectations types according to two different categories of "message

contributions” and “student interactions,” with each of these categories consisting of three additional classifications of “no expectations,” “encouraged,” and “required.” While future researchers may still want to distinguish instructor expectation types in this way, this researcher recognized during the course of this study a potential need to acknowledge instructor expectations that reflect potential combinations of these two categories and sub-classifications.

For example, as each threaded discussion was analyzed in this study, the researcher classified the different types of instructor expectations separately, with each discussion coded according to its stated expectations related to message contributions and a separate code for its stated expectations related to student interactions. However, in many of the discussions analyzed in this study, the instructor required student message contributions and also required student interactions. However, because these expectation types were coded separately, the results of this study do not specifically reflect potential differences that may exist between student participation outcomes in discussions that required only one or the other type of participation as compared with discussions that required both types.

Additionally, the original conceptual model required separate classification of instructor expectations that “encouraged” message contributions or student interactions as distinct from those that had “no expectations” or that “required” these forms of participation. Although future research may still benefit from this separate classification schema, there may also be a desire to simplify the conceptual model by examining instructor expectations according to a dichotomized classification of “not required” or

“required.”

Finally, the original conceptual model required an examination of actual student participation outcomes of participation density and average level of participation both for an overall discussion as well as for each level of a threaded discussion’s “life cycle.”

While the results of this study suggest that important relationships were exhibited between different instructor expectations and participation density for an overall discussion as well as within each discussion level of a threaded discussion, the results of this study do not suggest that value was gained in assessing average level of participation in learner interactions at each discussion level. In other words, given the extensive amount of effort required by the researcher to assess the average level of involvement in each type of learner interaction within each level of a respective discussion, the results of that assessment offered very little empirical value in this study. Instead, assessment of a discussion’s overall average level of involvement as well as the discussion’s average level of involvement in each form of learner interaction may suffice in future research without conducting a separate assessment for each discussion level.

Research to Further Examine and Test Study’s Conclusions

In addition to refining the conceptual model introduced in this study, other recommendations may be made for future research relative to further examination and testing of the current study’s conclusions. First of all, given that a number of relationships were identified in this study between different types and levels of instructors’ stated expectations for student participation in threaded discussions and the density and intensity

of student participation in learner interactions occurring within the discussions, additional research is warranted to further examine and test this study's findings and related conclusions.

Furthermore, this study has focused on three distinct participation outcomes of participation density, average level of involvement, and degree of persistence as exhibited within threaded discussion environments. While the current study examined these outcomes separately, valuable insight could be gained through further research that investigates potential relationships between these distinct participation outcomes. For example, researchers may want to investigate how the participation density achieved within an overall discussion may influence or be related to the average level of participation and/or degree of persistence exhibited within the respective discussion. Similarly, researchers could examine how the density exhibited at one level of a discussion influences or is related to the density of subsequent levels. Results from research on these issues may contribute to the disciplines understanding of the nature of these desired student participation outcomes within this unique education environment.

Finally, the literature could benefit from further research that extends upon the results and conclusions made from this study. For example, given the conclusions in this study that suggest that different types and levels of instructors' stated expectations for student participation are associated with different participation outcomes, further research could focus on identifying exactly what types and levels, or combinations of types and levels, of instructor expectations are consistently associated with higher student participation and interaction outcomes. This research could also identify different

examples or models of instructor stated expectations that are associated with desired participation and interaction outcomes so that instructors may consider an array of options when setting their student participation expectations.

Research to Address Study's Limitations

Further research is also recommended to address a number of limitations and delimitations that were inherent in this study, including:

1. As an ex-post facto analysis of archived discussion transcripts, this study did not allow for the controlled manipulation of variables that would be required in order to infer causality. Accordingly, the relationships that were identified in this study cannot be interpreted as cause-effect relationships. Therefore, further research is recommended to determine if different types and levels of instructor expectations for student participation actually influence or promote student participation outcomes.
2. An important delimitation in this study is that the analysis of actual student participation density and intensity outcomes within threaded discussions was based on an assessment of the quantity of student message contributions and learner interactions that appeared within a respective discussion's transcript. As such, this analysis did not consider or interpret the quality of message contributions or interactions that occurred. Therefore, the relationships identified in this study do not allow for assumptions or inferences with regard to the quality of student participation in learner interactions within the discussions.

Accordingly, it is recommended that further research be conducted to examine how different types and levels of instructors' expectations for student participation in threaded discussion may be associated with quality of student participation and interaction.

3. Another delimitation was that this study focused on an examination of only whole-class threaded discussions, with discussions devoted to small group or dyadic dialogue or for instructor "office hours" or helpdesk forums not being considered for analysis in this study. Accordingly future research may be needed to examine relationships between instructor expectations for student participation in these other forms of threaded discussions and actual participation outcomes within them.
4. An additional delimitation of this study is that it focused on student participation in learner interactions as evidenced by student's individual message contributions within a threaded discussion. Because the study only acknowledged message contributions as behavioral evidence of student participation in interactions within a discussion transcript, it did not account for the quantity or quality of effort that a student may have invested in the discussion area apart from the archived message contributions. Accordingly, future research may also want to consider student participation outcomes as evidenced by forms of involvement other than, or in addition to, message contributions.
5. Similarly, this study was limited to an analysis of participant message contributions which were archived within a particular Threaded Discussion area

itself. Accordingly, any student participation in learner interactions that may have taken place outside of the threaded discussion environment under examination was not included in the analysis of this study. Therefore, additional research is recommended to examine student participation in learner interactions in other online educational environments separate from, and in addition to the threaded discussion context.

6. This study focused on student participation in learner interactions within individual Threaded Discussion areas contained within different online courses. Accordingly, the conclusions made in this study do not consider how instructors' stated expectations for student participation within threaded discussions for the overall course may be associated with student participation outcomes throughout the respective online course. In other words, while the results of this study suggest that different types and levels of instructor expectations for student participation were associated with specific participation outcomes within the respective discussion, there is no way of knowing how student participation outcomes are exhibited throughout the rest of the online course. Therefore, rather than using a single threaded discussion as the unit of analysis, further research may be warranted to investigate the potential relationships between instructors' stated participation expectations and patterns of student participation outcomes exhibited throughout an entire course.

Chapter Summary

This chapter has provided a number of conclusions generated by the results of the current study that may have important implications for online education researchers and practitioners alike. Additionally, a number of important contributions of this study to the literature have been presented, with specific reference to their theoretical and practical implications. Finally, a number of potential directions for further research have been recommended.

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APPENDICES

APPENDIX A
THREADED DISCUSSION ANALYSIS WORKSHEET

Threaded Discussion Analysis Worksheet

Threaded Discussion Identifier:

Semester Code: _____ Course Code: _____ Unit Code: _____

I: Types of Student Participation Expectations**A. Expectations for Student Message Contributions**

- _____ 1) No expectation for student message contributions is explicitly stated
- _____ 2) Student message contributions are encouraged but not required
- _____ 3) Student message contributions are required

B. Expectations for Student Interactions with Other Participants

- _____ 1) No expectation for student interactions are explicitly stated
- _____ 2) Student interactions are encouraged but not required
- _____ 3) Student interactions are required

II: Levels of Student Participation Expectations**A. Expected Minimum Levels of Student Contributions**

- _____ 0) No minimum number of message contributions is explicitly stated
- _____ 1) Students are expected to contribute a minimum of one message
- _____ 2) Students are expected to contribute a minimum of two messages
- _____ 3) Students are expected to contribute a minimum of three messages
- _____ 4) etc.

B. Expected Minimum Levels of Student Interactions

- _____ 0) No minimum number of interactions are explicitly stated
- _____ 1) Students are expected to interact with a minimum of one person
- _____ 2) Students are expected to interact with a minimum of two people
- _____ 3) Students are expected to interact with a minimum of three people
- _____ 4) etc.

Semester Code: _____ Course Code: _____ Unit Code: _____

III: Participation Density of Overall Discussion

Density (D) = $2a / N(N-1)$, where "a" equals the actual number of participants engaging in the discussion and "N" equals the total number of possible discussion participants.

_____ A) Total Participation Density of the Overall Discussion

_____ Total Number of Possible Participants in the discussion

_____ Total Number of Actual Participants in the discussion

IV: Participation Intensity in Learner Interactions for the Overall Discussion

Average Level of Student Participation = Total Number of Interactions (Message Contributions) divided by the Total Number of Discussion Participants

_____ A) Average Level of Student Participation in Learner Interactions

_____ Total Number of Interactions (messages) in the Discussion

_____ Total Number of Actual Participants in the Discussion

_____ 1) Average Level of Participation in Learner-Content Interactions

_____ Total Number of LC Interactions in Discussion

_____ Total Number of Actual Participants in Discussion

_____ 2) Average Level of Participation in Learner-Instructor Interactions

_____ Total Number of LI Interactions in Discussion

_____ Total Number of Actual Participants in Discussion

_____ 3) Average Level of Participation in Learner-Learner Interactions

_____ Total Number of LL Interactions in Discussion

_____ Total Number of Actual Participants in Discussion

_____ B) Degree of Persistence (# of Levels Pursued in Overall Discussion)

Semester Code: _____ Course Code: _____ Unit Code: _____

The reviewer should use a separate assessment worksheet to analyze the density and intensity of each discussion level exhibited within the threaded discussion under review.

V: Participation Density of Discussion Level # (Circle One) 1 2 3 4 5 6 7 8 9 10

$$\text{Density (D)} = 2a / N (N-1)$$

[a=# of actual participants. N=# of possible participants]

_____ A) Total Participation Density of This Discussion Level

_____ Total Number of Possible Participants in Discussion

_____ Total Number of Actual Participants of this Discussion Level

VI: Participation Intensity of Discussion Level # (Circle One) 1 2 3 4 5 6 7 8 9 10

[Average = # of Message Contributions / # of Participants]

_____ A) Average Level of Student Participation in Learner Interactions

_____ Total Number of Interactions (Messages) in Discussion Level

_____ Total Number of Participants in Discussion Level

_____ 1) Avg. Level of Partic. in LC Interactions in this discussion level

_____ Total Number of LC Interactions in Discussion Level

_____ Total Number of Participants in Discussion Level

_____ 2) Avg. Level of Partic. in LI Interactions in this discussion level

_____ Total Number of LI Interactions in Discussion Level

_____ Total Number of Participants in Discussion Level

_____ 3) Avg. Level of Partic. in LL Interactions in this discussion level

_____ Total Number of LL Interactions in Discussion Level

_____ Total Number of Participants in Discussion Level

APPENDIX B

POST HOC TESTS FOR EXPECTATIONS FOR STUDENT INTERACTIONS
AND PERCENTAGE OF POSSIBLE DENSITY AT EACH DISCUSSION LEVEL

Post Hoc Tests for Expectations for Student Interactions and Percentage of Possible Density at Each Discussion Level

Dependent Variable		(I) Expected Student Interactions	(J) Expected Student Interactions	Mean Difference (I-J)	Std. Error	Sig.
L1 Percentage of Possible Density	Tukey HSD	No Expectations	Encouraged	-.03967	.064031	.810
			Required	-.15704(*)	.026112	.000
		Encouraged	No Expectations	.03967	.064031	.810
			Required	-.11737	.064947	.169
		Required	No Expectations	.15704(*)	.026112	.000
			Encouraged	.11737	.064947	.169
	Scheffe	No Expectations	Encouraged	-.03967	.064031	.825
			Required	-.15704(*)	.026112	.000
		Encouraged	No Expectations	.03967	.064031	.825
			Required	-.11737	.064947	.197
		Required	No Expectations	.15704(*)	.026112	.000
			Encouraged	.11737	.064947	.197
L2 Percentage of Possible Density	Tukey HSD	No Expectations	Encouraged	-.16426(*)	.049161	.003
			Required	-.47195(*)	.020048	.000
		Encouraged	No Expectations	.16426(*)	.049161	.003
			Required	-.30769(*)	.049864	.000
		Required	No Expectations	.47195(*)	.020048	.000
			Encouraged	.30769(*)	.049864	.000
	Scheffe	No Expectations	Encouraged	-.16426(*)	.049161	.004
			Required	-.47195(*)	.020048	.000
		Encouraged	No Expectations	.16426(*)	.049161	.004
			Required	-.30769(*)	.049864	.000
		Required	No Expectations	.47195(*)	.020048	.000
			Encouraged	.30769(*)	.049864	.000
L3 Percentage of Possible Density	Tukey HSD	No Expectations	Encouraged	-.02624	.043268	.817
			Required	-.24361(*)	.017645	.000
		Encouraged	No Expectations	.02624	.043268	.817
			Required	-.21737(*)	.043887	.000
		Required	No Expectations	.24361(*)	.017645	.000
			Encouraged	.21737(*)	.043887	.000
	Scheffe	No Expectations	Encouraged	-.02624	.043268	.832
			Required	-.24361(*)	.017645	.000
		Encouraged	No Expectations	.02624	.043268	.832
			Required	-.21737(*)	.043887	.000
		Required	No Expectations	.24361(*)	.017645	.000
			Encouraged	.21737(*)	.043887	.000

L4 Percentage of Possible Density	Tukey HSD	No Expectations	Encouraged	.00017	.030859	1.000
			Required	-.12370(*)	.012585	.000
		Encouraged	No Expectations	-.00017	.030859	1.000
			Required	-.12387(*)	.031300	.000
		Required	No Expectations	.12370(*)	.012585	.000
			Encouraged	.12387(*)	.031300	.000
	Scheffe	No Expectations	Encouraged	.00017	.030859	1.000
			Required	-.12370(*)	.012585	.000
		Encouraged	No Expectations	-.00017	.030859	1.000
			Required	-.12387(*)	.031300	.000
		Required	No Expectations	.12370(*)	.012585	.000
			Encouraged	.12387(*)	.031300	.000
L5 Percentage of Possible Density	Tukey HSD	No Expectations	Encouraged	-.00296	.019832	.988
			Required	-.05648(*)	.008088	.000
		Encouraged	No Expectations	.00296	.019832	.988
			Required	-.05351(*)	.020116	.022
		Required	No Expectations	.05648(*)	.008088	.000
			Encouraged	.05351(*)	.020116	.022
	Scheffe	No Expectations	Encouraged	-.00296	.019832	.989
			Required	-.05648(*)	.008088	.000
		Encouraged	No Expectations	.00296	.019832	.989
			Required	-.05351(*)	.020116	.030
		Required	No Expectations	.05648(*)	.008088	.000
			Encouraged	.05351(*)	.020116	.030
L6 Percentage of Possible Density	Tukey HSD	No Expectations	Encouraged	-.00121	.013154	.995
			Required	-.02794(*)	.005364	.000
		Encouraged	No Expectations	.00121	.013154	.995
			Required	-.02673	.013342	.113
		Required	No Expectations	.02794(*)	.005364	.000
			Encouraged	.02673	.013342	.113
	Scheffe	No Expectations	Encouraged	-.00121	.013154	.996
			Required	-.02794(*)	.005364	.000
		Encouraged	No Expectations	.00121	.013154	.996
			Required	-.02673	.013342	.136
		Required	No Expectations	.02794(*)	.005364	.000
			Encouraged	.02673	.013342	.136
L7 Percentage of Possible Density	Tukey HSD	No Expectations	Encouraged	.00	.008	.950
			Required	-.01(*)	.003	.000
		Encouraged	No Expectations	.00	.008	.950
			Required	-.01	.008	.277

		Required	No Expectations	.01(*)	.003	.000
			Encouraged	.01	.008	.277
L8 Percentage of Possible Density	Scheffe	No Expectations	Encouraged	.00	.008	.954
			Required	-.01(*)	.003	.000
		Encouraged	No Expectations	.00	.008	.954
			Required	-.01	.008	.310
		Required	No Expectations	.01(*)	.003	.000
			Encouraged	.01	.008	.310
	Tukey HSD	No Expectations	Encouraged	.00	.003	1.000
			Required	.00(*)	.001	.001
		Encouraged	No Expectations	.00	.003	1.000
			Required	.00	.003	.304
		Required	No Expectations	.00(*)	.001	.001
			Encouraged	.00	.003	.304
	Scheffe	No Expectations	Encouraged	.00	.003	1.000
			Required	.00(*)	.001	.001
		Encouraged	No Expectations	.00	.003	1.000
			Required	.00	.003	.338
		Required	No Expectations	.00(*)	.001	.001
			Encouraged	.00	.003	.338

* The mean difference is significant at the .05 level.

APPENDIX C

POST HOC TESTS FOR EXPECTATIONS FOR MINIMUM LEVELS
OF MESSAGE CONTRIBUTIONS AND PERCENTAGE OF POSSIBLE DENSITY
AT EACH DISCUSSION LEVEL

Post Hoc Tests for Expectations for Minimum Levels of Message Contributions and Percentage of Possible Density at Each Discussion Level

Dependent Variable		(I) Minimum Message Contributions	(J) Minimum Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
L1 Percentage of Possible Density	Tukey HSD	0 Messages Required	1 Message Required	-.23741(*)	.031352	.000
			2 Messages Required	-.27502(*)	.032679	.000
			3 Messages Required	-.35160(*)	.040975	.000
		1 Message Required	0 Messages Required	.23741(*)	.031352	.000
			2 Messages Required	-.03761	.028137	.540
			3 Messages Required	-.11419(*)	.037453	.013
		2 Messages Required	0 Messages Required	.27502(*)	.032679	.000
			1 Message Required	.03761	.028137	.540
			3 Messages Required	-.07658	.038571	.196
		3 Messages Required	0 Messages Required	.35160(*)	.040975	.000
			1 Message Required	.11419(*)	.037453	.013
			2 Messages Required	.07658	.038571	.196
	Scheffe	0 Messages Required	1 Message Required	-.23741(*)	.031352	.000
			2 Messages Required	-.27502(*)	.032679	.000
			3 Messages Required	-.35160(*)	.040975	.000
		1 Message Required	0 Messages Required	.23741(*)	.031352	.000
			2 Messages Required	-.03761	.028137	.618
			3 Messages Required	-.11419(*)	.037453	.027
		2 Messages Required	0 Messages Required	.27502(*)	.032679	.000
			1 Message Required	.03761	.028137	.618

			3 Messages Required	-.07658	.038571	.270
		3 Messages Required	0 Messages Required	.35160(*)	.040975	.000
			1 Message Required	.11419(*)	.037453	.027
			2 Messages Required	.07658	.038571	.270
L2 Percentage of Possible Density	Tukey HSD	0 Messages Required	1 Message Required	-.10630(*)	.027264	.001
			2 Messages Required	-.47798(*)	.028418	.000
			3 Messages Required	-.59029(*)	.035632	.000
		1 Message Required	0 Messages Required	.10630(*)	.027264	.001
			2 Messages Required	-.37168(*)	.024468	.000
			3 Messages Required	-.48399(*)	.032569	.000
		2 Messages Required	0 Messages Required	.47798(*)	.028418	.000
			1 Message Required	.37168(*)	.024468	.000
			3 Messages Required	-.11231(*)	.033541	.005
		3 Messages Required	0 Messages Required	.59029(*)	.035632	.000
			1 Message Required	.48399(*)	.032569	.000
			2 Messages Required	.11231(*)	.033541	.005
	Scheffe	0 Messages Required	1 Message Required	-.10630(*)	.027264	.002
			2 Messages Required	-.47798(*)	.028418	.000
			3 Messages Required	-.59029(*)	.035632	.000
		1 Message Required	0 Messages Required	.10630(*)	.027264	.002
			2 Messages Required	-.37168(*)	.024468	.000
			3 Messages Required	-.48399(*)	.032569	.000
		2 Messages Required	0 Messages Required	.47798(*)	.028418	.000
			1 Message	.37168(*)	.024468	.000

			Required 3 Messages Required	-.11231(*)	.033541	.012
		3 Messages Required	0 Messages Required	.59029(*)	.035632	.000
			1 Message Required	.48399(*)	.032569	.000
			2 Messages Required	.11231(*)	.033541	.012
L3	Tukey	0 Messages Required	1 Message Required	-.04943	.022849	.136
Percentage	HSD		2 Messages Required	-.22450(*)	.023816	.000
of Possible			3 Messages Required	-.35475(*)	.029862	.000
Density						
		1 Message Required	0 Messages Required	.04943	.022849	.136
			2 Messages Required	-.17508(*)	.020505	.000
			3 Messages Required	-.30533(*)	.027295	.000
		2 Messages Required	0 Messages Required	.22450(*)	.023816	.000
			1 Message Required	.17508(*)	.020505	.000
			3 Messages Required	-.13025(*)	.028109	.000
		3 Messages Required	0 Messages Required	.35475(*)	.029862	.000
			1 Message Required	.30533(*)	.027295	.000
			2 Messages Required	.13025(*)	.028109	.000
	Scheffe	0 Messages Required	1 Message Required	-.04943	.022849	.200
			2 Messages Required	-.22450(*)	.023816	.000
			3 Messages Required	-.35475(*)	.029862	.000
		1 Message Required	0 Messages Required	.04943	.022849	.200
			2 Messages Required	-.17508(*)	.020505	.000
			3 Messages Required	-.30533(*)	.027295	.000
		2 Messages Required	0 Messages Required	.22450(*)	.023816	.000

			1 Message Required	.17508(*)	.020505	.000
			3 Messages Required	-.13025(*)	.028109	.000
		3 Messages Required	0 Messages Required	.35475(*)	.029862	.000
			1 Message Required	.30533(*)	.027295	.000
			2 Messages Required	.13025(*)	.028109	.000
L4 Percentage of Possible Density	Tukey HSD	0 Messages Required	1 Message Required	-.01598	.016552	.769
			2 Messages Required	-.10217(*)	.017252	.000
			3 Messages Required	-.18048(*)	.021632	.000
		1 Message Required	0 Messages Required	.01598	.016552	.769
			2 Messages Required	-.08619(*)	.014854	.000
			3 Messages Required	-.16449(*)	.019772	.000
		2 Messages Required	0 Messages Required	.10217(*)	.017252	.000
			1 Message Required	.08619(*)	.014854	.000
			3 Messages Required	-.07830(*)	.020362	.001
		3 Messages Required	0 Messages Required	.18048(*)	.021632	.000
			1 Message Required	.16449(*)	.019772	.000
			2 Messages Required	.07830(*)	.020362	.001
	Scheffe	0 Messages Required	1 Message Required	-.01598	.016552	.818
			2 Messages Required	-.10217(*)	.017252	.000
			3 Messages Required	-.18048(*)	.021632	.000
		1 Message Required	0 Messages Required	-.01598	.016552	.818
			2 Messages Required	-.08619(*)	.014854	.000
			3 Messages Required	-.16449(*)	.019772	.000

		2 Messages Required	0 Messages Required	.10217(*)	.017252	.000
			1 Message Required	.08619(*)	.014854	.000
			3 Messages Required	-.07830(*)	.020362	.002
		3 Messages Required	0 Messages Required	.18048(*)	.021632	.000
			1 Message Required	.16449(*)	.019772	.000
			2 Messages Required	.07830(*)	.020362	.002
L5 Percentage of Possible Density	Tukey HSD	0 Messages Required	1 Message Required	-.00702	.010361	.906
			2 Messages Required	-.03797(*)	.010800	.003
			3 Messages Required	-.10099(*)	.013541	.000
		1 Message Required	0 Messages Required	.00702	.010361	.906
			2 Messages Required	-.03095(*)	.009299	.005
			3 Messages Required	-.09397(*)	.012377	.000
		2 Messages Required	0 Messages Required	.03797(*)	.010800	.003
			1 Message Required	.03095(*)	.009299	.005
			3 Messages Required	-.06302(*)	.012747	.000
		3 Messages Required	0 Messages Required	.10099(*)	.013541	.000
			1 Message Required	.09397(*)	.012377	.000
			2 Messages Required	.06302(*)	.012747	.000
	Scheffe	0 Messages Required	1 Message Required	-.00702	.010361	.928
			2 Messages Required	-.03797(*)	.010800	.007
			3 Messages Required	-.10099(*)	.013541	.000
		1 Message Required	0 Messages Required	.00702	.010361	.928
			2 Messages Required	-.03095(*)	.009299	.012

			3 Messages Required	-.09397(*)	.012377	.000
		2 Messages Required	0 Messages Required	.03797(*)	.010800	.007
			1 Message Required	.03095(*)	.009299	.012
			3 Messages Required	-.06302(*)	.012747	.000
		3 Messages Required	0 Messages Required	.10099(*)	.013541	.000
			1 Message Required	.09397(*)	.012377	.000
			2 Messages Required	.06302(*)	.012747	.000
L6 Percentage of Possible Density	Tukey HSD	0 Messages Required	1 Message Required	-.00196	.006795	.992
			2 Messages Required	-.01425	.007082	.186
			3 Messages Required	-.05834(*)	.008880	.000
		1 Message Required	0 Messages Required	.00196	.006795	.992
			2 Messages Required	-.01229	.006098	.185
			3 Messages Required	-.05638(*)	.008117	.000
		2 Messages Required	0 Messages Required	.01425	.007082	.186
			1 Message Required	.01229	.006098	.185
			3 Messages Required	-.04409(*)	.008359	.000
		3 Messages Required	0 Messages Required	.05834(*)	.008880	.000
			1 Message Required	.05638(*)	.008117	.000
			2 Messages Required	.04409(*)	.008359	.000
	Scheffe	0 Messages Required	1 Message Required	-.00196	.006795	.994
			2 Messages Required	-.01425	.007082	.259
			3 Messages Required	-.05834(*)	.008880	.000
		1 Message Required	0 Messages Required	.00196	.006795	.994

			2 Messages Required	-.01229	.006098	.257
			3 Messages Required	-.05638(*)	.008117	.000
		2 Messages Required	0 Messages Required	.01425	.007082	.259
			1 Message Required	.01229	.006098	.257
			3 Messages Required	-.04409(*)	.008359	.000
		3 Messages Required	0 Messages Required	.05834(*)	.008880	.000
			1 Message Required	.05638(*)	.008117	.000
			2 Messages Required	.04409(*)	.008359	.000
L7 Percentage of Possible Density	Tukey HSD	0 Messages Required	1 Message Required	.00	.004	1.000
			2 Messages Required	-.01	.004	.506
			3 Messages Required	-.03(*)	.005	.000
		1 Message Required	0 Messages Required	.00	.004	1.000
			2 Messages Required	-.01	.004	.417
			3 Messages Required	-.03(*)	.005	.000
		2 Messages Required	0 Messages Required	.01	.004	.506
			1 Message Required	.01	.004	.417
			3 Messages Required	-.03(*)	.005	.000
		3 Messages Required	0 Messages Required	.03(*)	.005	.000
			1 Message Required	.03(*)	.005	.000
			2 Messages Required	.03(*)	.005	.000
	Scheffe	0 Messages Required	1 Message Required	.00	.004	1.000
			2 Messages Required	-.01	.004	.587
			3 Messages Required	-.03(*)	.005	.000

		1 Message Required	0 Messages Required	.00	.004	1.000
			2 Messages Required	-.01	.004	.502
			3 Messages Required	-.03(*)	.005	.000
		2 Messages Required	0 Messages Required	.01	.004	.587
			1 Message Required	.01	.004	.502
			3 Messages Required	-.03(*)	.005	.000
		3 Messages Required	0 Messages Required	.03(*)	.005	.000
			1 Message Required	.03(*)	.005	.000
			2 Messages Required	.03(*)	.005	.000
L8 Percentage of Possible Density	Tukey HSD	0 Messages Required	1 Message Required	.00	.002	1.000
			2 Messages Required	.00	.002	.706
			3 Messages Required	-.01(*)	.002	.000
		1 Message Required	0 Messages Required	.00	.002	1.000
			2 Messages Required	.00	.002	.597
			3 Messages Required	-.01(*)	.002	.000
		2 Messages Required	0 Messages Required	.00	.002	.706
			1 Message Required	.00	.002	.597
			3 Messages Required	-.01(*)	.002	.000
		3 Messages Required	0 Messages Required	.01(*)	.002	.000
			1 Message Required	.01(*)	.002	.000
			2 Messages Required	.01(*)	.002	.000
	Scheffe	0 Messages Required	1 Message Required	.00	.002	1.000
			2 Messages Required	.00	.002	.764

			3 Messages Required	-.01(*)	.002	.000
		1 Message Required	0 Messages Required	.00	.002	1.000
			2 Messages Required	.00	.002	.670
			3 Messages Required	-.01(*)	.002	.000
		2 Messages Required	0 Messages Required	.00	.002	.764
			1 Message Required	.00	.002	.670
			3 Messages Required	-.01(*)	.002	.000
		3 Messages Required	0 Messages Required	.01(*)	.002	.000
			1 Message Required	.01(*)	.002	.000
			2 Messages Required	.01(*)	.002	.000
L9	Tukey	0 Messages Required	1 Message Required	.00	.001	1.000
Percentage	HSD		2 Messages Required	.00	.001	.986
of Possible			3 Messages Required	.00(*)	.001	.003
Density		1 Message Required	0 Messages Required	.00	.001	1.000
			2 Messages Required	.00	.001	.978
			3 Messages Required	.00(*)	.001	.001
		2 Messages Required	0 Messages Required	.00	.001	.986
			1 Message Required	.00	.001	.978
			3 Messages Required	.00(*)	.001	.004
		3 Messages Required	0 Messages Required	.00(*)	.001	.003
			1 Message Required	.00(*)	.001	.001
			2 Messages Required	.00(*)	.001	.004
	Scheffe	0 Messages Required	1 Message Required	.00	.001	1.000

	2 Messages Required	.00	.001	.989
	3 Messages Required	.00(*)	.001	.008
1 Message Required	0 Messages Required	.00	.001	1.000
	2 Messages Required	.00	.001	.983
	3 Messages Required	.00(*)	.001	.003
2 Messages Required	0 Messages Required	.00	.001	.989
	1 Message Required	.00	.001	.983
	3 Messages Required	.00(*)	.001	.010
3 Messages Required	0 Messages Required	.00(*)	.001	.008
	1 Message Required	.00(*)	.001	.003
	2 Messages Required	.00(*)	.001	.010

* The mean difference is significant at the .05 level.

APPENDIX D

POST HOC TESTS FOR EXPECTATIONS FOR MINIMUM LEVELS
OF STUDENT INTERACTIONS AND PERCENTAGE OF POSSIBLE DENSITY
AT EACH DISCUSSION LEVEL

Post Hoc Tests for Expectations for Minimum Levels of Student Interactions and Percentage of Possible Density at Each Discussion Level

Dependent Variable		(I) Minimum Student Interactions	(J) Minimum Student Interactions	Mean Difference (I-J)	Std. Error	Sig.
L1 Percentage of Possible Density	Tukey HSD	0 Student Interactions Required	1 Student Interaction Required	-.12506(*)	.027697	.000
			2 Student Interactions Required	-.23475(*)	.043802	.000
		1 Student Interaction Required	0 Student Interactions Required	.12506(*)	.027697	.000
			2 Student Interactions Required	-.10969(*)	.046493	.050
		2 Student Interactions Required	0 Student Interactions Required	.23475(*)	.043802	.000
			1 Student Interaction Required	.10969(*)	.046493	.050
	Scheffe	0 Student Interactions Required	1 Student Interaction Required	-.12506(*)	.027697	.000
			2 Student Interactions Required	-.23475(*)	.043802	.000
		1 Student Interaction Required	0 Student Interactions Required	.12506(*)	.027697	.000
			2 Student Interactions Required	-.10969	.046493	.064
		2 Student Interactions Required	0 Student Interactions Required	.23475(*)	.043802	.000
			1 Student Interaction Required	.10969	.046493	.064
L2 Percentage of Possible Density	Tukey HSD	0 Student Interactions Required	1 Student Interaction Required	-.42247(*)	.021619	.000

		1 Student Interaction Required	O Student Interactions Required	.42247(*)	.021619	.000	
			2 Student Interactions Required	-.14063(*)	.036289	.000	
		2 Student Interactions Required	O Student Interactions Required	.56310(*)	.034189	.000	
			1 Student Interaction Required	.14063(*)	.036289	.000	
Scheffe	O Student Interactions Required	1 Student Interaction Required		-.42247(*)	.021619	.000	
		2 Student Interactions Required		-.56310(*)	.034189	.000	
	1 Student Interaction Required	O Student Interactions Required		.42247(*)	.021619	.000	
		2 Student Interactions Required		-.14063(*)	.036289	.001	
	2 Student Interactions Required	O Student Interactions Required		.56310(*)	.034189	.000	
		1 Student Interaction Required		.14063(*)	.036289	.001	
	L3 Percentage of Possible Density	Tukey HSD	O Student Interactions Required	1 Student Interaction Required	-.20670(*)	.018169	.000
				2 Student Interactions Required	-.34966(*)	.028733	.000
1 Student Interaction Required			O Student Interactions Required	.20670(*)	.018169	.000	
			2 Student Interactions Required	-.14296(*)	.030498	.000	
2 Student Interactions Required			O Student Interactions Required	.34966(*)	.028733	.000	

		Scheffe	O Student Interactions Required	1 Student Interaction Required	-.20670(*)	.018169	.000
				2 Student Interactions Required	-.34966(*)	.028733	.000
			1 Student Interaction Required	O Student Interactions Required	.20670(*)	.018169	.000
				2 Student Interactions Required	-.14296(*)	.030498	.000
			2 Student Interactions Required	O Student Interactions Required	.34966(*)	.028733	.000
				1 Student Interaction Required	.14296(*)	.030498	.000
L4 Percentage of Possible Density	Tukey HSD		O Student Interactions Required	1 Student Interaction Required	-.09747(*)	.012934	.000
				2 Student Interactions Required	-.20236(*)	.020454	.000
			1 Student Interaction Required	O Student Interactions Required	.09747(*)	.012934	.000
				2 Student Interactions Required	-.10489(*)	.021710	.000
			2 Student Interactions Required	O Student Interactions Required	.20236(*)	.020454	.000
				1 Student Interaction Required	.10489(*)	.021710	.000
		Scheffe	O Student Interactions Required	1 Student Interaction Required	-.09747(*)	.012934	.000
				2 Student Interactions Required	-.20236(*)	.020454	.000
			1 Student Interaction Required	O Student Interactions Required	.09747(*)	.012934	.000

		2 Student Interactions Required	O Student Interactions Required	.20236(*)	.020454	.000
			1 Student Interaction Required	.10489(*)	.021710	.000
L5 Percentage of Possible Density	Tukey HSD	O Student Interactions Required	1 Student Interaction Required	-.03421(*)	.008028	.000
			2 Student Interactions Required	-.12324(*)	.012696	.000
		1 Student Interaction Required	O Student Interactions Required	.03421(*)	.008028	.000
			2 Student Interactions Required	-.08902(*)	.013476	.000
		2 Student Interactions Required	O Student Interactions Required	.12324(*)	.012696	.000
			1 Student Interaction Required	.08902(*)	.013476	.000
	Scheffe	O Student Interactions Required	1 Student Interaction Required	-.03421(*)	.008028	.000
			2 Student Interactions Required	-.12324(*)	.012696	.000
		1 Student Interaction Required	O Student Interactions Required	.03421(*)	.008028	.000
			2 Student Interactions Required	-.08902(*)	.013476	.000
		2 Student Interactions Required	O Student Interactions Required	.12324(*)	.012696	.000
			1 Student Interaction Required	.08902(*)	.013476	.000
L6 Percentage of Possible Density	Tukey HSD	O Student Interactions Required	1 Student Interaction Required	-.01297(*)	.005277	.039

		1 Student Interaction Required	O Student Interactions Required	.01297(*)	.005277	.039	
			2 Student Interactions Required	-.06135(*)	.008859	.000	
		2 Student Interactions Required	O Student Interactions Required	.07432(*)	.008346	.000	
			1 Student Interaction Required	.06135(*)	.008859	.000	
Scheffe	O Student Interactions Required	1 Student Interaction Required		-.01297	.005277	.051	
		2 Student Interactions Required		-.07432(*)	.008346	.000	
	1 Student Interaction Required	O Student Interactions Required		.01297	.005277	.051	
		2 Student Interactions Required		-.06135(*)	.008859	.000	
	2 Student Interactions Required	O Student Interactions Required		.07432(*)	.008346	.000	
		1 Student Interaction Required		.06135(*)	.008859	.000	
	L7 Percentage of Possible Density	Tukey HSD	O Student Interactions Required	1 Student Interaction Required	-.01	.003	.191
				2 Student Interactions Required	-.04(*)	.005	.000
			1 Student Interaction Required	O Student Interactions Required	.01	.003	.191
				2 Student Interactions Required	-.04(*)	.005	.000
			2 Student Interactions Required	O Student Interactions Required	.04(*)	.005	.000

L8 Percentage of Possible Density	Scheffe	O Student Interactions Required	1 Student Interaction Required	-.01	.003	.220
			2 Student Interactions Required	-.04(*)	.005	.000
		1 Student Interaction Required	O Student Interactions Required	.01	.003	.220
			2 Student Interactions Required	-.04(*)	.005	.000
		2 Student Interactions Required	O Student Interactions Required	.04(*)	.005	.000
			1 Student Interaction Required	.04(*)	.005	.000
	Tukey HSD	O Student Interactions Required	1 Student Interaction Required	.00	.001	.358
			2 Student Interactions Required	-.01(*)	.002	.000
		1 Student Interaction Required	O Student Interactions Required	.00	.001	.358
			2 Student Interactions Required	-.01(*)	.002	.000
		2 Student Interactions Required	O Student Interactions Required	.01(*)	.002	.000
			1 Student Interaction Required	.01(*)	.002	.000
	Scheffe	O Student Interactions Required	1 Student Interaction Required	.00	.001	.393
			2 Student Interactions Required	-.01(*)	.002	.000
		1 Student Interaction Required	O Student Interactions Required	.00	.001	.393

L9 Percentage of Possible Density	Tukey HSD	2 Student Interactions Required	O Student Interactions Required 1 Student Interaction Required	.01(*)	.002	.000
				.01(*)	.002	.000
		O Student Interactions Required	1 Student Interaction Required 2 Student Interactions Required	.00	.001	.900
				.00(*)	.001	.000
		1 Student Interaction Required	O Student Interactions Required 2 Student Interactions Required	.00	.001	.900
				.00(*)	.001	.000
	Scheffe	2 Student Interactions Required	O Student Interactions Required 1 Student Interaction Required	.00(*)	.001	.000
				.00(*)	.001	.000
		O Student Interactions Required	1 Student Interaction Required 2 Student Interactions Required	.00	.001	.908
				.00(*)	.001	.000
		1 Student Interaction Required	O Student Interactions Required 2 Student Interactions Required	.00	.001	.908
				.00(*)	.001	.000
L10 Percentage of Possible Density	Tukey HSD	2 Student Interactions Required	O Student Interactions Required 1 Student Interaction Required	.00(*)	.001	.000
				.00(*)	.001	.000
		O Student Interactions Required	1 Student Interaction Required	.00	.001	1.000

		1 Student Interaction Required	O Student Interactions Required	.00	.001	1.000
			2 Student Interactions Required	.00(*)	.001	.012
		2 Student Interactions Required	O Student Interactions Required	.00(*)	.001	.007
			1 Student Interaction Required	.00(*)	.001	.012
	Scheffe	O Student Interactions Required	1 Student Interaction Required	.00	.001	1.000
			2 Student Interactions Required	.00(*)	.001	.010
		1 Student Interaction Required	O Student Interactions Required	.00	.001	1.000
			2 Student Interactions Required	.00(*)	.001	.016
		2 Student Interactions Required	O Student Interactions Required	.00(*)	.001	.010
			1 Student Interaction Required	.00(*)	.001	.016
L11 Percentage of Possible Density	Tukey HSD	O Student Interactions Required	1 Student Interaction Required	.00	.000	1.000
			2 Student Interactions Required	.00(*)	.000	.007
		1 Student Interaction Required	O Student Interactions Required	.00	.000	1.000
			2 Student Interactions Required	.00(*)	.000	.012
		2 Student Interactions Required	O Student Interactions Required	.00(*)	.000	.007

Scheffe	O Student Interactions Required	1 Student Interaction Required	.00	.000	1.000
		2 Student Interactions Required	.00(*)	.000	.010
	1 Student Interaction Required	O Student Interactions Required	.00	.000	1.000
		2 Student Interactions Required	.00(*)	.000	.016
	2 Student Interactions Required	O Student Interactions Required	.00(*)	.000	.010
		1 Student Interaction Required	.00(*)	.000	.016

* The mean difference is significant at the .05 level.

APPENDIX E

POST HOC TESTS FOR EXPECTATIONS FOR MINIMUM LEVELS
OF MESSAGE CONTRIBUTIONS AND AVERAGE LEVEL OF PARTICIPATION
IN LEARNER INTERACTIONS

Post Hoc Tests for Expectations for Minimum Levels of Message Contributions and Average Level of Participation in Learner Interactions

Dependent Variable		(I) Minimum Message Contributions	(J) Minimum Message Contributions	Mean Difference (I-J)	Std. Error	Sig.
Average Learner-Content Interactions	Tukey HSD	0 Messages Required	1 Message Required	-.05645	.030115	.242
			2 Messages Required	-.02582	.031375	.844
			3 Messages Required	-.10653(*)	.039262	.036
		1 Message Required	0 Messages Required	.05645	.030115	.242
			2 Messages Required	.03063	.026868	.665
			3 Messages Required	-.05008	.035763	.500
		2 Messages Required	0 Messages Required	.02582	.031375	.844
			1 Message Required	-.03063	.026868	.665
			3 Messages Required	-.08072	.036830	.128
		3 Messages Required	0 Messages Required	.10653(*)	.039262	.036
			1 Message Required	.05008	.035763	.500
			2 Messages Required	.08072	.036830	.128
	Scheffe	0 Messages Required	1 Message Required	-.05645	.030115	.321
			2 Messages Required	-.02582	.031375	.878
			3 Messages Required	-.10653	.039262	.064
		1 Message Required	0 Messages Required	.05645	.030115	.321
			2 Messages Required	.03063	.026868	.729
			3 Messages Required	-.05008	.035763	.581
		2 Messages Required	0 Messages Required	.02582	.031375	.878
			1 Message Required	-.03063	.026868	.729
			3 Messages Required	-.08072	.036830	.190
		3 Messages Required	0 Messages Required	.10653	.039262	.064
			1 Message Required	.05008	.035763	.581
			2 Messages Required	.08072	.036830	.190
Average Learner-Instructor Interactions	Tukey HSD	0 Messages Required	1 Message Required	-.00314	.047625	1.000
			2 Messages Required	-.00329	.049618	1.000
			3 Messages Required	.02042	.062091	.988
		1 Message Required	0 Messages Required	.00314	.047625	1.000

			2 Messages Required	-.00016	.042489	1.000
			3 Messages Required	.02356	.056557	.976
	2 Messages Required		0 Messages Required	.00329	.049618	1.000
			1 Message Required	.00016	.042489	1.000
			3 Messages Required	.02371	.058245	.977
	3 Messages Required		0 Messages Required	-.02042	.062091	.988
			1 Message Required	-.02356	.056557	.976
			2 Messages Required	-.02371	.058245	.977
Scheffe	0 Messages Required		1 Message Required	-.00314	.047625	1.000
			2 Messages Required	-.00329	.049618	1.000
			3 Messages Required	.02042	.062091	.991
	1 Message Required		0 Messages Required	.00314	.047625	1.000
			2 Messages Required	-.00016	.042489	1.000
			3 Messages Required	.02356	.056557	.982
	2 Messages Required		0 Messages Required	.00329	.049618	1.000
			1 Message Required	.00016	.042489	1.000
			3 Messages Required	.02371	.058245	.983
	3 Messages Required		0 Messages Required	-.02042	.062091	.991
			1 Message Required	-.02356	.056557	.982
			2 Messages Required	-.02371	.058245	.983
Average Learner-Learner Interactions	Tukey HSD	0 Messages Required	1 Message Required	-.20912	.102348	.175
			2 Messages Required	1.30377(*)	.106631	.000
			3 Messages Required	2.30021(*)	.133436	.000
		1 Message Required	0 Messages Required	.20912	.102348	.175
			2 Messages Required	1.09465(*)	.091312	.000
			3 Messages Required	2.09110(*)	.121544	.000
	2 Messages Required		0 Messages Required	1.30377(*)	.106631	.000
			1 Message Required	1.09465(*)	.091312	.000
			3 Messages Required	-.99645(*)	.125172	.000
	3 Messages Required		0 Messages Required	2.30021(*)	.133436	.000
			1 Message Required	2.09110(*)	.121544	.000
			2 Messages Required	.99645(*)	.125172	.000
Scheffe	0 Messages Required		1 Message Required	-.20912	.102348	.246
			2 Messages Required	1.30377(*)	.106631	.000

	3 Messages Required	2.30021(*)	.133436	.000
1 Message Required	0 Messages Required	.20912	.102348	.246
	2 Messages Required	1.09465(*)	.091312	.000
	3 Messages Required	2.09110(*)	.121544	.000
2 Messages Required	0 Messages Required	1.30377(*)	.106631	.000
	1 Message Required	1.09465(*)	.091312	.000
	3 Messages Required	-.99645(*)	.125172	.000
3 Messages Required	0 Messages Required	2.30021(*)	.133436	.000
	1 Message Required	2.09110(*)	.121544	.000
	2 Messages Required	.99645(*)	.125172	.000

* The mean difference is significant at the .05 level.

MONTANA STATE UNIVERSITY - BOZEMAN



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