INTERACTION AND INTERPERSONAL BEHAVIOR IN COMPUTER-
MEDIATED ACADEMIC FORUMS

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DEDICATION

To my wife, for her unending patience: without you, here and now, mine would be a mis-guided story.

To my daughter, for our very special bonds: may God shed his light upon you and show you the way.

To the memory of my late father, for his limitations: you searched, but could not find.

To the memory of my late grandmother, for your support all those years: you tried to understand me, but not hard enough.
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ABSTRACT

Computer-mediated communication (CMC) is rapidly emerging as a new modality of educational delivery, either as an alternative to face-to-face contact or as an additional resource to enhance and extend existing pedagogical processes. Computer-mediated technologies produce social environments that are different from traditional classrooms. As such, research is needed to review and redefine the character of online participation/interactivity, as well as to explore the nature of interpersonal aspects of online group learning. Interaction is considered a key issue in online knowledge building processes, while interpersonal issues tend to be regarded as disruptive. In this study, interactivity is viewed both as the degree of intermessage reference and as a personal attitude among participants. Thus, the type of interaction is considered as related to the degree of interpersonal or socioemotional content. The main purposes of this ex-post-facto, longitudinal case study study are to evaluate the amount and type of interaction and interpersonal content in messages posted among online postgraduate students, as well as to determine if there is an association between both variables. It focuses on a continuing interaction of a small group discussing on academic forums equally spaced throughout three semesters, on asynchronous, unstructured discussions based on reflection questions posed by a tutor. The study involves the same natural group working on multiple tasks of the same task type through an extended period of time and measured at three different points in its history. The online group relationship is considered as one homogeneous, holistic interaction. The results indicate that fostering appraisal, support, humor, and inquiry,
while stimulating healthy opposition based upon personal experiences and factual information ensures a greater dose of reactivity/interactivity. This may increase significant participation and expand the depth of discussion. Moreover, aiding effective tutoring, mentoring and coaching of online groups may help bringing about the full potential of the medium and contribute to the development and maintenance of effective group exchanges. Finally, regulating the complexity of interactions and fostering the development of a cohesive group of participants may render more controlled patterns of online behavior and improve collective learning.
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CHAPTER 1 - INTRODUCTION

Introduction

Computer-mediated communication (CMC) has become ubiquitous throughout the developed world (Spears, Lea, & Postmes, in press, p. 1). It is rapidly emerging as a new modality of educational delivery, either as an alternative to face-to-face contact or as an additional resource to enhance and extend existing pedagogical processes (Harasim, 1998; Dunham, 1997; Sargeant, 1997).

In open and distance education (DE), as well as in distributed learning (DL), CMC is being used increasingly to achieve their pedagogical outcomes. It is currently becoming the most dynamic medium of enabling pedagogical processes—both education and training—to reach people who are geographically and temporally dispersed and employed full-time (Eastmond, 1997; Hiltz, 1995; McDonald, 1997). At the same time, CMC may also be one of the fastest growing areas of educational

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1 The terms “distance education” or “distance learning” have been applied interchangeably by many different researchers to a great variety of programs, providers, audiences, and media. Its hallmarks are the separation of teacher and learner in space and/or time, the volitional control of learning by the student rather than the distant instructor, and noncontiguous communication between student and teacher, mediated by print or some form of technology (Sherry, 1996, p. 339).

2 A distributed learning environment is a learner-centered approach to education, which integrates a number of technologies to enable opportunities for activities and interaction in both asynchronous and real-time modes. The model is based on blending a choice of appropriate technologies with aspects of campus-based delivery, open learning systems and distance education. The approach gives instructors the flexibility to customize learning environments to meet the needs of diverse student populations, while providing both high quality and cost-effective learning (Institute of Academic Technology of the University of North Carolina, 1995).
technology research and development (Romiszowski, 1997).

Instructional paradigms in educational and training activities have driven much of the research done in education and training in the past thirty years, labeled as computer-assisted or computer–aided instruction (CAI), computer-based learning (CBL), and computer-assisted learning (CAL). Under a behaviorist approach, the emphasis was set on student-machine interaction as a means for automated instruction, focusing on the computer as a tool (Romiszowski, 1988). However, the increased capability of supporting complex interaction processes has recently shifted the emphasis to the cognitive-conversational paradigm (Dunham, 1997), which aims at collaborative learning and collective knowledge building under a more constructivist approach (Book & Putnam, 1992; Bullen, 1997; Christensen, 1991a, 1991b, 1991c, Gunawardena, 1995; Gunawardena, Lowe, & Anderson, 1997, 1998).

An increased interest in cooperative learning as an instructional strategy fosters the emergence of student-student interaction through CMC as an important area for research and practice in education (Higgins, 1998). “Deep learning is promoted by active learner participation” (Newman, Webb, & Cochrane, 1995, p. 60), and strongly associated to socioemotional involvement and feelings of empathy and belonging supported by interaction (Brandon & Hollingshead, 1999; Johnson, Johnson, & Smith, 1991; Biggs, 1987; Holmberg, 1996b). Interactivity thus describes and prescribes the manner in which conversational interaction as an iterative process leads to jointly produced meaning (Rafaeli & Sudweeks, 1997).
Two-way communication is thus considered by a growing number of researchers as a cornerstone of distance education (e.g., Holmberg, 1996b; Kaye, 1992; Kiesler, Siegel, & McGuire, 1984; Palloff & Pratt, 1999). While Palloff and Pratt (1999, p. 5) state that, “key to the learning process are the interactions among students themselves and the collaboration in learning that results from these interactions”, while McDonald (1997) demonstrated that positive social interaction creates group cohesion, while negative interaction disrupts the group constitution process, both directly impacting group performance, productivity and effectiveness.

Within CMC, computer conferencing is increasingly becoming a popular delivery mode for education at a distance, a common component of higher education courses, and the main form of all teaching/learning processes in complete degree programs (Bullen, 1997; Kearsley, Lynch, & Wizer, 1995). As a means of group interaction, computer conferencing is “the most common application of asynchronous educational CMC in distance and higher education” (Higgins, 1998, p. 42).

However, “conspicuously absent is an understanding of how computers are tools for connection and community” (Jones, 1995, p. 12). Although it is believed that computer mediation changes the nature of interaction in online academic groups, there is scarce research that examines either online group processes over time or the dynamics of online exchanges in natural learning environments (Haythornthwaite, 1998; McDonald, 1997). Mason (1992) states that “the published literature on educational computer conferencing consists, to a very large extent, of application-oriented descriptions…Very few researchers tackle the difficulties of analyzing the
educational quality of conference interactions” (p. 106), even when the type of language chosen to interact, either for action or for social maintenance, may help define the type of online relationship (Murray, 1991; Wellman & Gulia, 1999).

On the one hand, studies on collaborative computer-mediated groups tend to focus more on technology development (improving task performance, overcoming time and space constraints, and speed and volume of information processing) of hardware and software than on picturing computers as a meeting place for individuals (Jones, 1995; McGrath & Hollingshead, 1994). On the other hand, the abundant research on the structure of pedagogical discourse interactions, either as a control and differentiation instrument or as a process for democratization and community building in the classroom, is still concentrated on face-to-face oral exchanges (Bernstein, 1994; Book & Putnam, 1992; Cazden, 1991; Hertenstein, 1991; Sorensen & Christophel, 1992).

Course designers and online teachers, instructors, and moderators need to understand how students interact and how groups develop in computer-mediated environments. Research about interactive exchanges, the building and maintenance of online relationships, communication dynamics within natural and real-life academic electronic groups, and online relational patterns through time, especially in long term learning scenarios, may have important implications for educational practices. Research in these areas may contribute towards improving the efficiency and effectiveness of online asynchronous discussion forums (Brandon & Hollingshead, 1999; Eastmond, 1997; McGrath & Hollingshead, 1994; Rafaeli, Sudweeks, Konstan
& Mabry, 1994) and may be essential to understand the way both individual participants and groups behave over time in order to effectively design online group learning. Moreover, it may help build a theoretical background for better defining the constructs of interactivity and interpersonality in online communication.

Statement of the Problem and Purposes of the Study

As a new form of human communication, computer-mediated technologies “produce social environments that are different from traditional classrooms” (McDonald, 1997, p. 12). Attributes of computer conferencing as stated by Harasim (1990) (many-to-many communications, place-independent group communication, time-independent group communication, text-based communication and computer-mediated learning), foster the formation of groups among individuals who have never seen one another but nonetheless interact regularly and densely (McGrath & Hollingshead, 1994, p. 104). Some of the attributes of computer conferencing may also encourage a salient social climate that impacts online interactions and group dynamics (Gunawardena, 1995).

Educational computer conferencing must then be considered a “unique mode of education different from face-to-face and distance education” (Bullen, 1997, p. 39). As such, research is needed to review and redefine the character of online participation/interactivity, as well as explore the nature of interpersonal aspects of online group learning. Significant issues that have not been properly addressed are the assessment of the quality of online interactions and the quality of the online learning

It is still a common belief that CMC equates interaction (Kiesler et al. 1984; Hiltz & Turoff, 1978; Sproull & Kiesler, 1995) and diminishes transmission of affect among participants (Hiltz, Johnson, & Turoff, 1986; Sproull & Kiesler, 1986) when compared to face-to-face communication. That is, CMC reduces asymmetry or dominance among participants and promotes impersonal content exchange when compared to face-to-face interactions. However, recent findings may indicate this may not hold in long-term computer-mediated interactions (Herring, 1996a, 1996b, 1996c, 1996d; Walther, 1996), and may not be valid when knowledge of anticipated future lasting interaction is present (Walther, 1994, 1996).

On the one hand, interactivity—or intermessage referencing—may be the single most required feature of online communication aiming at the formation of knowledge building and the implementation of learning communities. Interactivity is not primarily a characteristic of the medium, but a quality of the communication relationship established by participants themselves. Interactivity is therefore a pivotal dimension of the social dynamics of group communication. It constitutes the pre-condition for online cooperative learning, critical thinking, and knowledge construction. Nonetheless, asymmetry in interactivity levels in CMC is a common issue. Only a small number of participants and messages get involved in exchange processes in academic group discussions (Rafaeli & Sudweeks, 1998).

On the other hand, interpersonality—or communication content which deals with socioaffective relationship among group members (Sudweeks & Allbritton, 1996),
has been repeatedly acknowledged as necessary for group cohesion (Lovaglia, 1997) and an issue that deeply affects the outcomes of a group (Galanes & Brilhart, 1997). However, its impact upon academic online exchanges remains unexplored. Most group theoretical and research studies assume that group relational processes are a fundamental basis by which group task performance is shaped. However, “the empirical evidence for such process/outcome relations are limited and mixed” (McGrath & Hollingshead, 1994, p. 99). Even when a number of studies have stressed the dynamics of group communication within the online learning process (Harasim, 1990; Hiltz, 1990; Hiltz, 1995), it is still a highly neglected issue in CMC.

In CMC environments, the issue is threefold: to determine to what extent are interactivity and interpersonality present in CMC academic forums, to explore how both theoretical and empirical issues regarding both constructs may relate to each other, and in what way recent research upon them may be furthered.

Thus, this study has four main purposes:

1. Describe the level and amount of participation in online academic discussion forums and determine the quantitative dimension of online participation through time.

2. Assess the relationship among messages (type of interaction) posted by participants in online academic forums over time, and identify and assess the type and amount of interpersonal content in messages posted to online academic forums over time.

3. Determine the level of association between interpersonal content and the type of interaction in discussion forums, as well as the behavior of the relationship
through time.

4. Determine the understandings of students about interactional and interpersonal issues in online postings.

Additionally, this study seeks to contribute to the design and development of both a coding instrument and a procedure to assess categories of interpersonal content and types of interaction in online CMC, and to expand pioneering efforts dedicated to explore the nature of online participation in computer-mediated groups (Barajas, 1996; Bullen, 1997; Higgins, 1998; McDonald, 1997; McElhearn, 1996; Rafaeli & Sudweeks, 1998; Rafaeli & Sudweeks, 1997; Sudweeks & Allbritton, 1996; Sudweeks and Rafaeli, 1996; Walther, 1996) by reframing the theoretical constructs of interactivity, interaction and participation.

This study therefore analyzes online interactions both in structure and content as a requisite for online cooperative learning, critical thinking, and knowledge construction (Henri, 1991, in Newman, Webb, & Cochrane, 1995). It also considers the social dimension of computer conferencing, acknowledging the importance it may have for participation and interactivity.

**Research Questions**

This study is guided by the following research questions and hypotheses derived from the research purposes that emerged from the literature review (Chapter 2):
Purpose 1

Describe the level and amount of participation in online academic discussion forums and determine the quantitative dimension of online participation through time.

Research Question 1 (Participation)

What are the basic quantitative features of that interaction both for each individual forum and for all forums combined?

a) How frequently and how much did students participate in online forums?

b) How is that participation grouped through time?

Purpose 2

Assess the relationship among messages (type of interaction) posted by participants in online academic forums over time, and identify and assess the type and amount of interpersonal content in messages posted to online academic forums over time.

Research Question 2 (Interaction)

To what degree are contributions in online academic discussion forums linked to each other and related among them? In other words, to what extent is online participation active, reactive or interactive? (semantic and operational definitions of these terms in Chapter 2 and Appendix C).

c) Over the duration of the course, to what degree do the students’ contributions appear to reflect interactive content? Does it represent a significant amount of overall message content?

d) Do levels of activity, reactivity and interactivity change over the duration of the study?

Research Question 3 (Interpersonality)

To what extent is interpersonal content present in online graduate students’ discussion forums? To what extent is online participation impersonal or interpersonal? (semantic and operational definitions of these terms in Chapter 2 and Appendix C).

e) Over the duration of the course, to what degree do the students’ contributions appear to reflect interpersonal content? Does it represent a significant amount
of overall message content?

f) Do levels of interpersonality and impersonality change over the duration of the study?

**Purpose 3**

Determine the level of association between interpersonal content and the type of interaction in discussion forums, as well as the behavior of the relationship through time.

**Research Question 4 (Interaction Related to Interpersonality)**

Is there an association between the amount of interpersonal content and the type of interaction in forums? To what extent do these relationships vary through time?

   g) Is there an association between the students’ amount of interpersonal content and the type of interaction in postings? Do these relationships vary through time?

**Purpose 4**

Determine the understandings of students about interactional and interpersonal issues in online postings.

**Research Question 5 (Participants’ Perceptions)**

What were the students’ perceptions of the issues that influenced the type of interaction in online discussion forums? Is there any apparent relationship between students’ perceptions and the results of the quantitative research?

   h) Which traits do students find most likely to respond to in others’ online messages in discussion forums? Which are the traits they find less likely to respond to?
   i) Which traits do students perceive in their own messages that could foster interaction? Which are the traits they find that discourage interaction?
   j) Is there a perceived relationship between interpersonality and the type of interaction in participants’ messages?
   k) To what extent are students’ perceptions related to the findings in purposes 1-3?

Data: Survey transcripts.
Significance of the Study

The potential of CMC in educational settings requires a better understanding of human communication processes, which help create or disrupt group balance and cohesion over time. The creation of learning communities and the building of collective knowledge through critical thinking rely strongly on the effectiveness and performance of each individual participant and of the group as a whole (Bullen, 1997). An in-depth study of the structure and content of online messages may reveal social issues about learners and their communicative process that may directly impact their educational outcomes.

As early as 1989, Moore established the importance of student-student interaction as a theoretical construct for distance education. More recently, Palloff and Pratt (1999) indicate that “it is the relationship and interactions among people through which knowledge is primarily generated” (p. 15). Even though computer conferencing has the potential to allow for more student-student interaction, and even if its features indicate that participation may be more equal than in face-to-face groups (Harasim, Hiltz, Teles, & Turoff, 1996; Rice, 1994), unbalanced, differentiated and asymmetric contributions to computer conferences are a common issue (Palloff & Pratt, 1999).

Several authors (e.g., Harasim, 1990; Harasim et al, 1996; Hiltz, 1995) were perhaps over-optimistic in describing the instructional advantages of CMC in the educational processes. Although they and others speak of collaboration, reflection and interactivity as inherent characteristics of the medium (Harasim, 1989; Kaye,
1989; Moore, 1991), its potential does not in itself determine collaborative online patterns for successful learning (Eastmond, 1997; Järvelä, 1997). Open access for a group of participants per se does not stimulate creative thinking, integration of ideas, or lasting educational change, nor does it automatically enable users to effectively and efficiently communicate ideas or discuss class content (Davies, 1989; Reil, 1993).

Extended inclusion of all participants, absence of turn-taking as a rhetorical device, concurrency (the capacity for all participants to exchange messages simultaneously without interfering with each others’ messages), non-linearity or sequentiality of online discourse, and reduced social and physical cues in computer conferences, all considered as computer conferencing advantages versus face-to-face teaching environments, have been reported to produce communication anxiety and diminished participation due to delayed responses, topic disruption and decay, message overlapping, perceived irrelevant content, and information overload (Graddol, 1989; Harasim et al, 1996; Herring, 1999; Rojas, 1995; Sproull & Kiesler, 1986; Valacich, Paranka, George, & Nunamaker, 1993; Voiskounsky, 1997). These effects may be reflected in both levels of interaction as well as in interpersonal content in postings.

Online success in academic asynchronous discussion forums depends on a variety of input factors, (such as students’ situational and dispositional factors, group attributes, task characteristics, subject matter, course design, instructor style, and context of implementation). However, technological issues have the least effect on
quantitative and qualitative characteristics of participation (Bullen, 1997). Moreover, many of the traits attributed to computer conferencing are brought about by inner process variables, such as the interpersonal content of messages (McDonald, 1997; McGrath & Hollingshead, 1994). Online interactive participation and collaboration through computer conferencing can be “increased or diminished entirely by the way the students…stay ahead or behind the discussion…and [by] how messages volume ebb and flow” (Eastmond, 1997, p. 96).

Thus, participants’ online behavior, much more than their personal and dispositional considerations or the technological attributes of the medium, may determine to a great extent whether computer conferencing is amplifying present social behaviors or qualitatively transforming them (Kiesler, 1997; Lawley, 1992). Therefore, although computer conferencing may facilitate or hinder interactivity for distant participants, it is not mainly a characteristic of the medium or even the nature of the task performed, but a quality of the communication relationship established by participants in the setting (Bullen, 1997; Rafaeli & Sudweeks, 1998), and the time span allowed for the group to consolidate (Walther, 1995).

However, as McGrath & Hollingshead (1994) state:

Research on technology and groups to date has focused almost exclusively on the production function of those groups. Relatively little attention has been paid to how, and how well, those groups socialize, train, and support their members, nor to how, and how well, those groups take care of their own system maintenance. (p. 71)

Better understanding interactions and socioemotional content in an electronic environment, and better interpreting their relationship within a computer-mediated
course, may allow designers and educators to improve the quality of interactivity towards building stronger, healthier online communities (O’Keefe, 1995; Sudweeks, 1998). It may also help to inform learners about what to expect, how to participate more effectively, and how to avoid potential pitfalls in computer conferencing.

Harasim, Hiltz, Teles, and Turoff (1996) state that “social communication is an essential component of educational activity…The forging of social bonds has important socioaffective and cognitive benefits for the learning activities” (p.137). Thus, insights into socioemotional and interpersonal content of postings may also help educators better structure and conduct online conferences to increase participation and expand depth of discussion (J. R. Llanes, personal communication, April 7, 1999).

The study may also aid in bringing about the full potential of the medium, contributing to the development of effective tutoring, mentoring and coaching of online groups in order to sustain effective group exchanges that support cooperative and interactive learning and knowledge building processes (Berge, 1996; Bullen, 1997; Green, 1998a; Holmberg, 1996a, 1996b; McDonald, 1997; McDonald & Gibson, 1998; Paulsen, 1995b; Rohfeld & Hiemstra, 1995, Tagg & Dickinson, 1995), thus increasing participant satisfaction and retention rates.

New, extended-bandwidth interfaces are being designed and new steps toward multimedia computing and desktop audio/video-conferencing constitute promising efforts towards improving online communication and thus enhancing distance education in the near future (Collis, 1996; Walther, Slovacek, & Tidwell, 2001).
Access issues and bandwidth problems still constrain their use to limited scenarios, although this is a transitional phase (Bates, 1995; Collis, 1996). However, research on the mechanics and dynamics of text-based asynchronous online interactions may also provide useful findings for better understanding communications for the design and operation of future pedagogical CMC applications, when interactive digital video combines textual with nonverbal codes (Lee, 1997).

**Setting and Scope of the Study**

It has been stated that CMC requires sustained dialogue over time for the knowledge building process to function effectively (Williams & Merideth, 1995). In order for the pedagogical possibilities of electronic systems to become realities, creative forms of conversation and dialogue must be developed, as well as the expertise and competence in creating and using new forms of social discourse through electronic devices must be attained (Graddol, 1989; Herring, 1996d).

This non-experimental, ex post facto study focused on patterns of interpersonal relationships on a small, restricted-access group of distant participants in a post-graduate educational setting through asynchronous conference forums, primarily used for information exchange and argument sharing. Quantity and quality of online participation were reviewed longitudinally, regarding amount and length of contributions, the level of interaction they reflect, and the degree of interpersonal content in postings. Content analysis was used to explore the type and degree of interactivity and the type and amount of interpersonal content of message exchange in
the group.

Most of educational CMC has been experimental and laboratory based, with small groups formed by researchers for a specific, structured task during a short period of time (atypically captive audience and uncommonly small groups) (Bordia, 1997; Garton & Wellman, 1993; Herring, 1996d; Walther, 1992). Only recently, several non-experimental studies have focused on the dynamics of online exchanges and the content of messages over an extended period of time (Bullen, 1997; McDonald, 1997; McDonald & Gibson, 1998; Rafaeli & Sudweeks, 1998), studying the way participants respond to naturally occurring conditions.

The size, the purpose, the task, the context-specific nature, and the restricted character of this single group study may limit the generalizability of the findings to other conferencing scenarios. Transfer of results may be done when the traits of new educational contexts resemble the ones portrayed in this study. Nonetheless, the results may be compared to other studies with similar populations and conditions. Thus the increasing usage of asynchronous communication devices in distance and open education for postgraduate programs may benefit from this research in restricted groups (McMillan & Schumacher, 1997).

**Definition of Terms**

The theoretical constructs of *asymmetry*, (Linell & Luckman, 1991), *participation* (Bullen, 1997), *interaction*: reactivity (Henri, 1992) and interactivity (Rafaeli, 1998; Rafaeli & Sudweeks, 1998), and *interpersonality* (Walther, 1996) in
electronic interactions encompass both posting behavior patterns and message properties of CMC groups over time.

**Asymmetry**

Individuals in social interaction produce communication, and patterns of asymmetry or systematic inequalities are generated in actual social intercourse (Cohen, 1994). Asymmetry is a term used in linguistic analysis that refers to various sorts of inequivalences in communication processes. Asymmetry is sometimes referred to indistinctively in the literature as “inequality”, “dominance”, or “imbalance.”

In this study, asymmetry as a linguistic construct is used as a theoretical support to frame online participation and interactivity. Two types of types of asymmetries were analyzed: **quantitative asymmetry** (number and length of postings) and **interactional or qualitative asymmetry** (interactivity or degree of intermessage referencing).

**Participation**

Participation is understood as the amount, length and frequency of postings each participant contributes to the conference forums, which reflects its level of involvement. Participation may be related in many ways to interactivity, but not necessarily. High participation rates with low levels of reactivity and interactivity may lead to poor sociability and diminished knowledge construction.
**Interaction**

Potential for interaction is the most salient and most influential characteristic of computer conferencing; it alters the nature of learning and increases its quality (Harasim, 1989). However, interaction and interactivity are not equivalent terms. The former refers to the action of relating among individuals through communication exchanges. Interaction may be reactive or interactive. Even when the number, extent and degree of “intermessage references” (Bullen, 1997, p. 80) characterize both, the former happens when participants simply react to other’s contributions, either explicitly or implicitly (Henri, 1992b).

True interactivity, however, refers to “the extent to which messages in a sequence relate to each other, and especially the extent to which later messages recount the relatedness of earlier messages” (Rafaeli & Sudweeks, 1998, p.175). Thus, interactive message segments are differentiated from active and reactive types of online interaction. While participation was likened to involvement, interactivity was associated to commitment. It is therefore a pivotal measure of the social dynamics of group communication.

**Interpersonality**

Interpersonality in postings is conceived as communication in which individuals relate on a personal level to others, either personally to them or to their audiences. The most helpful rule of thumb in categorizing this variable is one of
‘heart’ versus ‘head’ (McDonald, 1997, p. 35). Interpersonality is often referred to as social or personally oriented interaction or informal communication that addresses the creation of relationship norms among participants (Sudweeks & Allbritton, 1996; Sudweeks & Simoff, 1999). It is cited in opposition to information exchange, task-oriented, and formal or impersonal discourse (Rica & Love, 1987; Walther, 1996).

Interpersonality is categorized by valence (positive/negative) (Bales, 1970; Bochner, Kaminski, & Fitzpatrick, 1977), and related to issues such as friendliness/hostility (Smith, McLaughlin, & Osborne, 1997), disclosure/reserve, appraisal/chastisement (or flaming), (Herring, 1996d; 1998; Mabry, 1997), humor/sarcasm (Baym, 1995a; Baym, 1997; Rafaeli & Sudweeks, 1998), support/adversariality (or alignment/opposition), and other/self-orientedness.

Impersonality (Walther, 1996), traditionally considered as task-oriented style of interpersonal behavior, is related to an inform-offer/aski-request bipolar category.

**Research Assumptions and Biases**

Every research project is as much supported on literature review as it is based upon the researcher’s own ideas, points of view, and assumptions about the world in general and the studied problem in particular. It is therefore a healthy measure to state those assumptions clearly:

1. All pedagogical interactions are mediated by the human word, be it oral or textual. There is no such thing as a non-mediated pedagogical communication (Laurillard, 1996; Peraya, 1996).
2. Education is the practice of a type of communication (Tiffin & Rajasingham, 1995). Learning is built through conversational exchanges between persons or among groups, involving the creation and interpretation of communication. Communication exchange is required among students in order to build knowledge (Bullen, 1997; Harasim, 1990).

3. People collaboratively construct beliefs and meanings, as well as state their differences through conversations (Gay & Lentini, 1995). Learning is thus an interactive, dialogue-based process among participants involved in a pedagogical interaction. Its purpose is to provide a social context where students can communicate and converse. “Speaking and listening are the motor and motivation of learning...Students who take an active role in constructing meaning … learn more and better” (O’Keefe, 1995, p. 3-4). Learning is a result of interaction. “Learning is essentially a social process that requires interaction for the purpose of expression, validation, and the development of the self as a knowledgeable learner” (Jaffee, 1997, p. 265).

4. Collaborative learning promotes higher achievement, higher-level reasoning, more frequent generation of ideas and solutions, and greater transfer of learning than individualistic or competitive learning strategies (Johnson, Johnson, & Smith, 1991). “Collaborative development of shared meaning requires a substantial amount of communication, perhaps even more so in on-line than in face-to-face groups” (Brandon & Hollingshead, 1999).

5. Online education constitutes a new teaching and learning environment in
many ways different from traditional face-to-face environments (Ball-Rokeach & Reardon, 1988).

6. Small, online academic groups are autonomous, circular, and self-referenced systems of interaction whose properties are a consequence of its own organization. Change within those groups is reflected in the patterns of interaction among its members. “To discover the nature of a total system, it is necessary to interact with it and trace the circular pattern of interaction through which it is defined” (Morgan, 1997, p. 254). Although personality or situational factors may on their own explain some behavioral outcomes, most behavior is determined by the interaction of personality and situation (Magnusson & Endler, 1977). However, personality traits have low predictability in accounting for behavior across diverse social situations. Situational forces are much more influential than personality dispositions regarding behavioral outcomes in group processes (Mischel, 1968).

7. Asymmetries and systematic inequalities are essential properties of social interaction, of which communication processes are a special form. Differences between speakers regarding levels of participation, interactivity and interpersonal relations are displayed to some degree among participants in groups (Cohen, 1994). Those asymmetries may be imposed from outside (derived from social power and authority), but mostly they are dialogue produced or intrinsic, “as when derived from asymmetries between dialogue initiatives and responses as basic mechanisms of interaction” (Linell & Luckmann, 1991, p.10).

8. Socioaffective content marks human interactions. Emotions and affection are
constitutive of human beings. They are a ubiquitous presence of lived experience. They determine, to a great extent, communication and learning, and are key issues in defining success or failure in the learning process (Maturana, 1992). The division between task-oriented and relationship-oriented communication in human relationships is artificial and no longer represents a viable model for understanding human learning (Watzlawick, Bavelas, & Jackson, 1967).
CHAPTER 2 - LITERATURE REVIEW

Computer-mediated communication (CMC) is considered a sociotechnical system combining both technical and social elements (Feenberg & Bellman, 1990), in which participants not only transmit, receive, and store information from each other through messages, but also the emotional and motivational aspects contained in those same messages (McGrath & Hollingshead, 1994). As a particular technology or device within CMC, computer conferencing provides the potential for a two-way communication necessary for intellectually constructive interactions (McDonald, 1997). Its growing inclusion for educational purposes in online courses since 1982 (Bullen, 1997) provide increased opportunities for ongoing group interaction.

However, although theoretical attempts have been advanced in organizational, social, and academic settings, the literature reviewed indicates that there is at present no well established theory or substantial body of empirical research around the use of CMC and computer conferencing that can be of help to course designers, online tutors, and forum participants. Moreover, the existing body of literature seems to regard CMC and electronic academic forums as fundamentally impersonal and task-oriented, and thus especially well suited only for objective knowledge exchange.

This chapter has two main sections. In the first section, various issues and concepts pertaining to CMC and computer conferencing are covered. A working definition and a historical background are offered, and a typology of diverse devices in CMC is attempted. Technical and linguistic attributes of asynchronous computer-mediated communication (ACMC, mainly electronic mail and computer
conferencing) that potentially may affect group interaction are described. Some findings in social, organizational and educational environments that may have a direct impact upon the purposes of the study are also reviewed.

The second section is mainly a theoretical and empirical review of literature that has a direct bearing upon the notions of interactivity and interpersonality in computer conferencing and to the purposes of the study. From a group interaction perspective, various interpretations of these two constructs are described and classified. Borrowing from the linguistic field, a framing model for online participation, interaction and interactivity is developed. Next, the importance and relevance of interpersonality and socioemotional aspects in group development and relational processes is reviewed. Issues affecting both interactivity and interpersonality are then examined, and finally, a set of dimensions for analyzing online interpersonal behavior is developed.

**Computer-mediated Communication**

CMC is the interaction between humans using computers to connect with one another (Kiesler, 1997. p. ix). Broadly defined, composition, transfer, storage, and retrieval of electronically transmitted text are an integral part of CMC (Collins, 1/02/99; Lee, 1997). Narrowly defined, CMC refers to

The use of computers and computer networks as communication tools by people who are collaborating with each other to achieve a shared goal, which do not require the physical presence or co-location of participants, and which can provide a forum for continuous communication free of time constraints. (Kaye in Burgstahler & Swift, 1996, p.2)
For the purpose of this study, a more human point of view is adopted. CMC can thus be understood as the “communication between human beings via the instrumentality of computers” (Herring, 1996a, p. 1) through electronic mail, group conferencing systems and interactive chat systems. It is also conceived as “communication taking place between people through the computer” (Olaniran, 1996, p. 134), thus setting the stress on people more than on the technology. Jones (1995) states it clearly: “CMC, of course, is not just a tool: it is at once technology, medium, and engine of social relations. It not only structures social relations, it is the space within which the relations occur and the tool that the individuals use to enter that space” (p. 16).

Wellman et al. (1996) state that “when a computer network connects people, it is a social network...a set of people connected by a set of socially meaningful relationships” (p. 179). Computers are then conceived as a support for human communication (Santoro, 1995). CMC is thus here understood mainly as a social more than a technical phenomenon: it is about people communicating with other people (Chenault, 1998).

**Historical Background**

Originally devised for military and research resource sharing purposes (Donath, 1999; Quarterman, 1991), computer networks (ARPANET) transformed themselves into person-to-person social networks and communication forums in scarcely 25 years, with commerce and education dominating the host domains (King, Grinter &
Pickering, 1997). While the military network sought a highly distributed, asynchronous and autonomous communication system that could survive a massive nuclear attack, the researchers sought to capitalize on the efforts of dispersed members of their community. Presently, the uses of CMC range from transferring protocols to electronic commerce, from educational tutoring to political propaganda, from interpersonal support to conversation for action, from information exchange to maintenance of social cohesion.

The primary purpose of computers when they first appeared in the corporate environment was the manipulation of numbers, mainly bookkeeping and payroll tasks (Rapaport, 1991). During the 1960s, thanks to the development of direct access storage devices (DASD), file transfer protocols (FTP), and TELNET, text manipulation was possible. However, CMC consisted in the exchange of short, one-line instruction messages. Electronic mail (e-mail), not an original part of ARPANET in 1969 (Sproull & Kiesler, 1993), was first considered a ‘minor addition’ in the 1970s.

Computer conferencing, the antecedent of online education pioneered by Murray Turoff and others in the early 1970s, was to be a “collective intelligence environment, which would use the computer to structure human communication for information exchange and effective problem solving” (Harasim, 1990, p. 41). However, educational computer conferencing as such started only in the early 1980s. The American Open University first made use of computer conferencing in 1983 to supplement learner-tutor communication, while the Jutland Open University in
Denmark implemented computer conferencing the same year to deliver postgraduate courses (Harasim, et al. 1996; Nipper, 1989).

Random Access Storage (RAS) made it possible for researchers to start thinking of computers as facilitators of human communication. By 1975, e-mail was the most used device on the network, and by 1977, electronic mailing lists or distribution groups were formalized (Quarterman, 1991). However, it was not until 1989 that text-based interaction was first introduced in distance education, when the British Open University implemented computer conferencing as a supplement of a massive distance education course to over 1,300 students (Harasim, et al. 1996).

Presently, CMC includes, although in a limited fashion, a varied range of graphic, auditory, and/or tactile modalities either in combination or in substitution of mainly text-based activities performed through several technologies, and serves multiple purposes. However, the most important characteristic of CMC for educational purposes is interactive, linguistic exchange between individuals (Murray, 1991).

**Typology**

CMC is not a unified field, although literature has frequently considered it as a single block. A thorough classification of CMC varieties has not yet been achieved, both due to the still ambiguous terminology and to the ever-expanding range of new applications. Devices (Paulsen, 1995a), systems (Rapaport, 1991), services (Bates, 1995; Quarterman, 1991), sub-contexts (Metz, 1994), and systems (Holmberg, 1996a;
Kollock & Smith, 1999) are an example of this present lack of clarity. These terms are used to refer to both asynchronous (e-mail, bulletin boards, computer conferencing) and synchronous applications of CMC. For the purpose of this study, the term *devices* will be used.

Based on Harasim (1989), Paulsen (1995a, 1999), and Moore (1996a), a classification model for CMC is proposed:

![Figure 1. An interrelational typology among methods, environments and modes in CMC.](image)

Many-to-many social synchronous: IRCs, MOOs, MUDs
Many-to-many organizational synchronous: IRCs, CSCW, DSSs
Many-to-many educational synchronous: IRCs, CSCW, MOOs, MUDs, CSCL
Many-to-many social asynchronous: LISTSERVs, USENETs, conferencing
Many-to-many organizational asynchronous: Newsgroups, conferencing
Many-to-many educational asynchronous: Newsgroups,
One-to-many social synchronous: IRCs, MOOs, MUDs
One-to-many organizational synchronous: CSWS
One-to-many educational synchronous: IRCs, CSCW, MOOs, MUDs
One-to-many social asynchronous: BBs, Distribution lists, mailing lists
One-to-many organizational asynchronous: BBs, Distribution lists, mailing lists
One-to-many educational asynchronous: BBs, Distribution lists, mailing lists
One-to-one social synchronous: IRCs, Electronic mail
One-to-one organizational synchronous: IRC, Electronic mail
One-to-one educational synchronous: IRC, Electronic mail
One-to-one social asynchronous: Electronic mail
One-to-one organizational asynchronous: Electronic mail
One-to-one educational asynchronous: Electronic mail
One-to-web social synchronous: FTP, TelNet
One-to-web organizational synchronous: FTP, TelNet
One-to-web educational synchronous: FTP, TelNet

This model allows a classification of *devices* so that research efforts may be carefully situated within the spectrum of CMC. Three interaction *environments* are identified (organizational, educational and social), four *methods* of interaction (one-to-web, or learner/content interaction; one-to-one, one-to-many, and many-to-many, or learner/instructor and learner/learner interaction), and two *modes* of interaction.
(asynchronous and synchronous). One-to-web devices deal basically with information retrieval purposes through FTP, WWW search, and Telnet, allowing the user to get in touch with materials and content, not with other persons. They are therefore communicative but not conversational. One-to-one communication is promoted through electronic mail; one-to-many is mainly carried out through bulletin board systems (BBS) and mailing (MLS) and distribution lists (DLS); and many-to-many computer conferencing devices include decision support groups and collaborative forums, as well as Listservs and Usenet newsgroups. They are devices that allow communication plus conversation, the latter understood as “a series of electronic mail postings that involve two or more participants in open participation, putting forth alternative statements of variable duration or length, constituting a sequence that is continuous and developmental” (Topper, 1997, p. 1).

Asynchronous modes of interaction (e-mail, BBS, Listservs, newsgroups) are mostly used in organizational and educational settings, while synchronous modes on a one-to-one (IRCs), a one-to-many (IRCs, MOOs, MUDs) and many-to-many basis (IRCs, MOOs, MUDs) are used mainly for social purposes, although they are sometimes used for educational and organizational purposes. Additionally to this, asynchronous and synchronous devices may have an open (public) or restricted (private) character.

Although selection of the device and medium has been explained through Social Presence Model (SPM) and Media Richness Theory (MRT), as well as through the type of task to accomplish (McGrath & Hollingshead, 1994; Trevino, Daft, &
these theories have not taken into consideration the online socially constructed interactions through the actual use of a predetermined device and within the constraints and potentials of the medium itself. For this study, examining asynchronous CMC (ACMC) technical attributes and linguistic characteristics may help understand online interactions that take place through discussion forums.

**Attributes and Characteristics**

As Walther and Burgoon (1992) state, CMC “is no longer a novelty, but a communication channel through which much of our business and social interaction takes place, and this transformation is expected to continue” (p. 51). In little more than fifteen years, CMC has acquired legitimacy as a field of inquiry. Studies aiming at defining its distinctive features were and are being performed from different perspectives (linguistic, ethnographical, sociological, educational, psychological, communicational, and philosophical). The major part of CMC initial efforts focused on the technical issues of human-computer interactions-how people communicate *with* computers. Recently, scholars have begun to look at the human side of computer communication, basically how communication among individuals is carried *through* the computer.

A more recent emphasis was set on how people use different applications of electronic communication in different contexts and for different purposes (Kiesler, 1997, p. xiii), and what do they specifically do when they communicate on line: who
communicates what to whom, when, what for, and for how long (Haythornthwaite, Wellman, & Garton, 1998; Murray, 1991). Presently, there is growing interest in people interacting through electronic devices not just for information exchange, but also as individuals who seek affiliation, support, and affirmation (Sproull & Faraj, 1997a, p. 35).

However, the technical characteristics of CMC may determine, to some extent, the way it is used, the type of language employed and the pattern of interactions generated. In other words, the medium may still be the message. Gunawardena (1999) holds this view when she states that the effects of the interaction between learner and electronic devices (learner-interface interaction) are “increasingly overlooked” (p. 3) in distance education. “The interface in this case has become an independent force with which the learner must contend. The Web is a new medium for many adult learners and instructors” (p. 3).

Nevertheless, however important this issue may be, participation and interaction levels in CMC do not solely depend upon nor are they a direct effect of technical issues (Baym, 1995b). This is called the “media-deterministic approach” (Baym, 1995b, p. 141), or “cues filtered-out approach” (Culnan and Markus, 1987; Walther & Burgoon, 1992, p. 53). As an example of this approach, Lee (1997) states that the oral/textual hybrid nature of CMC has important effects upon the form and the content of postings, and consequently upon the relational patterns among participants in online communication.

In opposition to the media deterministic approach, Poole and De Sanctis (1990)
propose the Adaptive Structuration Theory (AST), which states the importance of
group interaction processes in both outcomes and in mediating the effects of
technology. This means that the group does not passively receive the technology, but
rather actively adapts it to its own ends. Thus, AST places human issues above
technological traits, stressing the importance of group interaction processes over
technological issues in determining group outcomes and in mediating the effects of
any support technology. Technical attributes of electronic devices may then condition
but not determine online interactions (Garton & Wellman, 1993). For example,
communication patterns are built upon a sense of identity and community which are
formed around the ongoing discursive exchanges that are shared by participants: “the
texts exchanged on the Internet are the artifacts that hold the Internet communities
together as well as indicators of the direction in which the community is headed”
(Mitra, p. 59).

Significant effects upon online communication patterns then appear to emanate
from the participants influence on the devices (frequency and type of use) as well as
from the attributes, constraints, and properties of the electronic devices
(Haythornthwaite et al. 1998; Lawley, 1992). Thus separating the characteristics of
the medium that may shape online interactions from those of human and
environmental origin is “an important prerequisite to further CMC analysis” (Herring,
1996d, p. 4).
**Computer Conferencing**

Computer conferencing is mainly a many-to-many device designed to facilitate and foster collaborative work and learning among participants in a group. In use for higher education since 1982 (Feenberg, 1987, in Bullen, 1997), it combines the functionality of electronic mail and bulletin boards. As Gunawardena, Lowe, & Anderson (1997) state, “the exchange of messages among a group of participants by means of networked computers, for the purpose of discussing a topic of mutual interest, is referred to as computer-mediated conferencing” (p. 397). Harasim et al. (1996) describe it as

A stored transcript of a discussion by a group in easily accessible format. Each conference has access privileges set by the person who opens (creates) the conference, specifying, for example, who can be a member of the conference. Each conference provides a membership list that allows participants to tell who has read what material, so one can know where everyone is in the discussion. (p. 19)

Computer conferencing, as an asynchronous subset of CMC, increasingly supports mediation between human interactivity for social, organizational and educational purposes. Although social interactions may be developed through it, its main objective is the association of ideas and experience of people, communicated in written words (Rapaport, 1991). Discussion groups allow and foster some type of interactions and discourage others (Wallace, 1999), although future enhancements may augment their respective potential. Being asynchronous, they allow participants to interact at their own individual pace, encouraging reflection and revision processes before sharing insight and information with others (Harasim et al. 1996; Mason,
It is thus “the computerized equivalent of a meeting” (Henri & Rigault, 1996, p. 11).

**Technical Attributes**

Harasim (1990) determines five attributes of computer conferencing that situate it apart from other devices and account for its potential to create new learning environments: many-to-many communication, place independent group communication, time independent group communication, text-based communication, and computer-mediated learning, which, as a whole, facilitate learning outcomes, increase interaction, expand access, facilitate self-pacing, promote active learning, and allow learner-centered education (Harasim et al. 1996).

In conferencing forums, workspaces or conference arenas can be tailored to specific learning needs and organized by topics or group membership. Messages are posted not to individual mailboxes or addresses, but to a file directory that enables them for public viewing and comment (Rapaport, 1991), and are automatically sorted into conference areas and followed as *threads* (chains of postings, responses and counter-responses on a particular topic strung together one after another which give the impression of an ordered, temporally unfolding discussion) (Burkhalter, 1999). However, posting to a forum *per se* does not guarantee a structured discussion. Conferencing software includes options on active participation history, allowing a moderator to see who has read certain postings (Collis, 1996).

While e-mail and distribution lists are catalogued as *push* or passive devices
(messages are sent to people without them doing anything), conferencing forums are
deemed as *pull* or active devices (people must select the group they want to
participate in and messages they want to interact with) (Hunt, 1997; Kollok &
Smith, 1999; Smith, 1998). New postings dealing with different issues can start new
conversational threads simultaneously, thus allowing each participant to decide when,
where, and if to post a message. However, discussion can be confusing when having
too many participants responding at different times to several threads, and the
discussion may move on to other issues before an individual has the opportunity to
participate (Eastmond, 1997).

The many-to-many pattern of conferencing promotes multi-voiced and multi-
threaded discussions, making them difficult to follow by novice participants
(Winniecki, 1999). Unlike face-to-face discussions, which are based on a one-to-one or
one-to-many serialized and turn-taking system, computer conferences are not serial
and do not occur in a turn-taking pattern. Herring (1999), states that, in online
exchanges, “responses are often separated from the turns they are regarding to [and]
topics tend to decay quickly…This [loosened coherence] creates potential confusion”
(p. 25). Following a thread of multiple discussions that carries on between many
participants concurrently is difficult to manage, and may fragment the discussion,
affecting the degree of interactivity. Thus, “the loss of conversational practice can
lead to breakdowns in the discursive instructional potential of computer conferencing.
If left unchecked, such breakdowns can lead to student disorientation, lack of
motivation, and decreased student participation” (Winiecki, 1999, p. 7). Lurking, or
the practice of reading but not posting, may also follow in open online discussion forums.

Moreover, putting ideas into written form in conferencing forums requires more intellectual efforts than posting in distribution lists. Comprehension, retention and elaboration of postings require time, and a certain amount of thinking and writing skills, making participation in conferencing forums longer, denser and more demanding than participation in distribution lists. Participants can go back and reflect on posted issues. They can change, reformulate and make adjustments on their own previous postings (self-reflection), making conferences and forums suitable for academic and educational purposes. This may be considered an advantage, but may put strain upon some participants, restricting the flow of ideas, affecting participation, and even determining the socioaffective tone of the conversation.

All postings are there to be seen and analyzed, thus preventing ideas from being recklessly discarded. This may also cause anxiety on some participants, withholding them from participation. The idea of being forced to contribute something when they do not have anything to contribute or when they do not want to contribute may be annoying, not allowing for threading of messages and fostering “disjointed soliloquies” (Eastmond, 1997, p. 73). On the other hand, these forums help prevent “productivity loss” due to the lack of opportunity to participate, as in face-to-face settings (Olaniran, 1996).

Discussion forums compensate lack of contextual information or substance when responding by quoting relevant portions of the message, or by copying the
entire message and responding in between the lines in a different font, thus mimicking and mocking oral prose and coming closer to a face-to-face conversation, helping visualize talk (Lee, 1997). Winiecki (1999) mentions the use of “strategic snipping” and “formulations” as means to make up for the absence of turn-taking, to avoid disruption, and to foster participation and interactivity. While snipping refers to the practice of including short sections of the message to which the participant is responding within the message being composed, thus recovering the thread of a message, formulating refers to the practice of beginning or ending messages providing a synopsis or summary of “who said what, to who, and when ...so as to repackage the history of the discussion up to a certain point and provide a logical ‘lead in’ to the point(s) being made in the current message” (pp. 8-9). In fact, both online strategies—snipping and formulating—may be considered as indicators of interaction.

However, Wallace (1999) argues that the ability to quote from a sender’s remarks (which is a technical feature she calls “framing”) may be a widely used tactic in argumentative and adversarial message content. A participant usually quotes parts of messages (“snippets”) out of the original context, and then “verbally tear the remark to shreds or poke fun at it” (p. 127). Mabry (1997), in over 3,000 messages to newsgroups, bulletin boards, and mailing lists, studied the way posters framed their messages and used quotations from other postings. He found that nearly 60% of postings were emotionally neutral, while over 25% expressed friendliness. The remainder showed disagreement, divergence, antagonism, or hostility. The more
antagonistic the messages, the more framing and quoting others’ words. So, snipping
due to the framing feature of computer conferencing may both help keep the
discussion going or may help in interrupting it. The technical features may thus
facilitate either supportive or disruptive conducts.

Although conferencing systems draw their models from bulletin boards
(Kollock & Smith, 1999), postings on discussion groups exhibit the “memo template”
(Lee, 1997, p. 279), specifying the to, from, and subject lines. Due to its revealing the
sender and receiver by default, conferencing eliminates the conventional letter
openings and closings. Sometimes subject lines may have nothing to do with the body
of the message. Long threads of conversation may be developed under the original
subject line. Experienced users, in order to get their messages read, tend to use catchy
and original subject lines if the software used allows it, thus enhancing the device
potential for interaction.

Time of response is an important issue in conferencing forums. As “intragroup
communication systems” (McGrath & Hollingshead, 1994, p. 8), the processes of
composition, edition, transmission, reception, and feedback (or acknowledgment of
receipt, and reply) are present, although the time to complete this communication
cycle varies. The almost immediate transmission of text situates online
communication in between the telephone and the letter. However, due to the textual
nature of messages in ACMC, messages have to be typed and transmitted via
electronic impulses, causing six types of delay (or lag) that makes the process slower
that face-to-face interaction:
1. Delay between the thoughts and message completion (Olaniran, 1996).

2. Delay between the sending of the message and its reception.

3. Delay between the reception and the reading.

4. Delay between the reading and the response.

5. Delay between the sending of the response and its reception.

6. Delay between the reception of the response and the reading of the response (Chen & Gaines, 1998).

Conferencing time delays tend to be longer than e-mail delays, due to the purpose and intent of messages posted. Discussion forums are used to develop, through an academic, scholarly language, a “methodically paced interaction between persons, emphasizing their demand for...thoughtfulness of response” (Rapaport, 1991, p. 34). Lag times vary dramatically depending upon geographic location, the location of the server, the bandwidth and traffic density (Wallace, 1999). Delays in response in computer conferences are mainly attributed to technical problems, participants’ lack of preparation, lack of interest, or mere online absence, although other factors such as the need for academic language, thoughtfulness of response, and building of knowledge, larger content of messages, and reduced number of postings compared to messages in mailing groups may also account for the longer delay in response. Delays are important inasmuch they are a source of frustration for online participants in asynchronous forums. As frustration triggers states of “negative affect” (Berkowitz, Cochran, & Embree, 1981), delays may influence the amount of hostile content in messages.
Online conferences usually develop around a topic. The lifetime of a non-restricted, non-evaluated conferencing forum may depend upon the interest of the topic (Sproull & Faraj, 1997b), whereas time span for valid postings may determine the lifetime of a restricted and evaluated forum. As flaming is closely associated to anonymous, synchronous and more automatic type of response, to unrestricted-access groups and to eventual interaction, it may be considerably reduced in non-anonymous, closed, ongoing forums. Siegel, Dubrovsky, Kiesler, & McGuire (1983, in Kiesler, Siegel, & McGuire, 1984) found that anonymous conferencing forums exhibited more than six times as many hostile remarks as the non-anonymous groups. However, more elaborate forms of disagreement may ensue in asynchronous forums, such as intentional communication disruption, unanswered postings, and lurking (Harasim, et al. 1996; Lee 1997).

The potential for messages to remain unanswered or unacknowledged is high (Berthold et al. 1998). The ability to know what, when and how to answer, is only acquired through time and interaction with and through the device. The induced stress from slow or missing feedback may reduce participation and group cohesion and influence interpersonal message content, threatening the group identity and affecting the communication pattern and dynamics (Eastmond, 1997).

E-mail one-to-many distribution lists come close to computer conferencing, while a two-member computer conference may strongly resemble e-mail exchanges. However, due to their inherently private character, e-mail systems lack user status reporting facilities, not allowing the user to know who has seen what message and
when a person was last present reading in a distribution list. Thus, e-mail systems can only simulate conferencing capabilities to some extent (Rapaport, 1991). A particular online conference may be linked from an e-mail message, while individual or distributed e-mail accounts may as well be established as links in a computer conference, thus allowing a conference member to communicate with another on a one-to-one basis. This inter-device flexibility facilitates communication processes at the same time it requires from researchers to start viewing e-mail and computer conferencing as a single, integrated mega-device, mutually influencing conversational and interactional patterns.

Nevertheless, e-mail and distribution lists discriminate poorly among messages, and the time spent in efficiently and effectively handling communications is considerable. Messages have to be read, one by one, in order to differentiate them (Collis, 1996). E-mail lists tend to be more focused, because of the lack of structure to handle multiple discussions simultaneously (Malinowski, 1997). Even when in e-mail based communication the messages are often posted chronologically, the context of comments is often unclear, there is a limited ability for transmitting/receiving graphics and pictures, joint editing is an awkward task, and there is a limited ability to create and archive an organized, evolving knowledge base (Klemm & Snell, 1995).

In the educational environment, e-mail tends to enable communication at the level of concerns, while conferencing devices do so at the level of ideas, mainly because conferences are structured around a well-defined agenda or specific task (Lohuis, 1996). Thus, conversation through restricted conferencing aims at sharing
perspectives for the creation of broader understanding among its members, while conversations through closed mailing lists are intended to express doubts, set forth questions, exchange information, offer and request support, and encourage participation. However, this does not exclude the exchange of interpersonal content in computer forums. Mailing lists, according to Newby (1993), “do not usually generate as strong a sense of community as is found in another forms of CMC” due to the fact that “people who read mailing lists tend to receive more than one, which diminishes the sense of community among members of a particular list” (p. 33-34).

Rapaport (1991, p. 39) mentions that some researchers (e.g., Turoff, Hiltz, and Johansen) have found that success in work-related computer conferences depends, to a great extent, on general conferences that serve no business or educational purposes (such as alternative forums created to ventilate socioaffective issues), although they do provide diversion from work and study, as well as motivation to work with technology. Thus, characteristics of discussion forums may have potential effects on participation, consensus, relation development, feedback and motivation (Olaniran, 1996). Nevertheless, the group interaction and performance as a whole may ultimately determine the communication outcome.

**Linguistic Characteristics**

Mainly a text-based form of communication, CMC in general and computer conferencing in particular have triggered linguistic research in two ways: the effects of CMC on language use and interpersonal relationships, and the influence of
language and relationships, both written and spoken, upon CMC.

In the former case, while McLuhan (1975) sustains that language changes when there is a shift in communication media, Ong (1977) states that “technology...transforms what can be said and what is said” (p. 1). Postman (1985) states that “a major new medium changes the structure of discourse” (p. 27), whereas Cathcart and Gumpert (1983, in Voiskounsky, 1998) propose that “each new technology not only extended the reach of human communication [but] also altered the ways in which humans related to information and to each other” (p. 29). In the latter sense, individuals are finding ways to adapt the essential features of interpersonal relationships (mainly interaction and communication) to the changing characteristics of available mediating technologies, thus shaping online devices through linguistic adaptation to carry on meaningful interactions (Palmer, 1995).

As Crane (1991, in Aycock & Buchignani, 1995, p. 184) states, “...in several critical ways computer discourses, at least superficially, appear to stand outside the conventions of everyday orality and literacy.” Studies tend to demonstrate that electronic language is a different modality of human language (especially in synchronous IRCs) (Baron, 1998; Collot & Bellmore, 1996; Thimbleby, 1996). Although it has traits that may identify it with written language (text-based; non-sequential; limiting of social and visual cues, such as gender, identity, personality, mood, and race; absence of paralanguage), it also exhibits characteristics that closely relate it to spoken language (sequentiality, spontaneity, ephemerality, use of metalanguage, repetition, and discourse markers) (Herring, 1996d).
Yates (1996) states that, regarding vocabulary use, CMC is closer to text (type/token ratio and lexical density), but more like spoken language concerning the use of personal pronouns and modal auxiliary use. Several authors (e.g., Yates, 1996; Collot & Belmore, 1996) consider CMC, as a whole, a new form of human communication and an emerging linguistic code, different from traditional textual and oral language. Rather than a middle ground between oral and textual exchanges, CMC “constitutes a junction in which orality and literacy, in their extreme or purest forms, meet” (Lee, 1997, p. 291). Synchronous modes of CMC have been more related to orality (IRCs, MOOs, and MUDs) (Werry, 1996; Reid, 1991), due to the rapid and informal type of register, while asynchronous modes are more closely linked to textual language characteristics. However, this is not a settled issue.

Interactive written discourse is thus emerging as a new rhetorical genre (Ferrara, Brunner, & Whittemore, 1991; Lee, 1997), with specific traits which characterize it (emoticons, such as smileys or faces composed of ASCII characters; the use of acronyms; truncated speech; specialized jargon such as lurking—reading online messages without active participation in the conversation; spoofing—unattributed communication; flaming—using derogatory language, negative comments, rude and insulting remarks, and emotionally offensive language directed toward someone on account of a position taken in a previous message; spamming—sending unsolicited messages to a large number of people, usually trying to sell or promote something; and lagging—a mechanical delay of communication; and specific online conventions, such as capital letters to imply shouting) (Marvin, 1995).
Three Environments

Although this study focuses on asynchronous interactions in an educational environment through computer conferencing, issues from social and organizational environments through asynchronous modes of interaction are here presented, as some of the findings shed light on the purposes and questions of this study.

Social Environments

Although information transmission and task oriented activities may be important issues when studying ACMC purposes, viewing it from a utilitarian standpoint may be a limited and reductionist move. Recreational and social exchanges account for a good deal of ACMC (Baym, 1995b). Under the influence of “cues filtered out” or “reduced cues” approach (bodily and environmental aspects are diminished or removed in online environments) (Culnan & Markus, 1987; Sproull & Kiesler, 1986), “social presence” (Short, Williams, & Christie, 1976) and “media richness” theories (Rice, 1984; Trevino, Daft, & Lengel, 1987, 1990), some studies have focused on the emotional side of ACMC. These theories generally deploy online interactions as emotionally poor (Trevino, Daft, & Lengel, 1990), cold and unsociable (Hiltz, Johnson, & Turoff, 1986), more task-oriented, exhibiting a greater level of equivocality and uncertainty (McGrath & Hollingshead, 1994), and rating emotions as a non-relevant issue on organizational and educational settings, where information exchange and action coordination rank higher in importance (Kling, 1996, Sherblom
Both Social Presence Model (SPM) and Media Richness Theory (MRT) are regarded as qualities of the medium. On the one hand, SPM evaluates the degree to which a device facilitates awareness of the other person as well as interpersonal relationships during an interaction. The term refers to “the degree of salience of the other person in the interaction, hence the salience of the interpersonal relationship involved in the interaction” (McGrath & Hollingshead, 1994, p. 54.). SPM argues that the greater number of cue systems users have in communication, the more social presence they will experience—a sense of the other—leading to interpersonal warmth, friendliness, and satisfaction with the interaction. Face-to-face communication has the greatest social presence, whereas print has the lesser.

On the other hand, MRT, or “message-medium fit”, arrays devices along a continuum based on speed of feedback, types of channels involved, and richness of information carried. “Rich media are those that convey many redundant cues and thus provide more social presence” (Haythorthwaite, Wellman, & Garton, 1998, p. 206). The theory suggests that a greater number of cue systems are beneficial when the topic is complex, whereas “leaner” media are adequate, and more efficient, for simple exchanges. Again, face-to-face is the richest form of communication due to its multichannel nature—tone of voice, facial expressions, physical contact—which in turn provides opportunities for high redundancy of meaning. Laurillard (1996), based upon these issues, developed a useful theoretical framework for the practical selection and use of educational technology.
Under these circumstances, electronic communication is rated as poor or lean, believed to limit interpersonal and social information (Palmer, 1995). Both SPM and MRT, deemed as rational models (Fulk, Schmitz, & Steinfeld, 1990, pp. 118-120), assume that communication devices have fixed and inherent properties, which may not be altered by the user. A device capacity of transmitting social presence and information richness is therefore invariant, regardless of the user, the context or the time spent in interaction. CMC, being text-based, both conveys low social presence and is information lean.

However, it is to be noted that both theories were developed for face-to-face, audioconferencing, and videoconferencing environments, not for CMC technology. Due to this, authors such as Tu (1999) and Walther (1992), state that social presence and media richness are dynamic variables that can be modified, taught, and cultured. In CMC, social presence is dependent upon social context, online communication, and degree of interactivity (Tu, 1999).

For that matter, concentrating on what CMC allegedly does not offer has lead to view it as a negative phenomenon when compared to face-to-face processes (Archer, 1990: Condon & Cech, 1996; Topper, 1997). Even though CMC may be lean in terms of social and visual cues, it extends, rather than replicates, face-to-face communication through some of its attributes: asynchronicity, communication at a distance, lack of turn taking, storage and retrieval of communication, and simultaneous transmission (Haythorthwaite, Wellman, & Garton, 1998), gaining control over the flow of communication.
Other authors (e.g., Rice & Love, 1987; Walther, Anderson, & Park, 1994) explore the emotional exchange and diverse synchronous and asynchronous modes of online relationships, and find that a very rich exchange of moods and feelings is achieved through the use of emoticons, text-based conventions, and other linguistic mechanisms. Emoticons (orthographic conventions), although presently a bit esoteric and thus not widely used, may be considered a sign system and a specialized code to represent attitudes and communicate absent facial expression as a response to a previous statement (Lee, 1997). Emoticons indicate a human adaptive move to express emotions in a text-based environment. Even without their use, recent studies (Walther, 1996) have suggested that “minimal, text-based CMC interaction is quite capable, and in some cases likely, to foster exceedingly intimate and affectionate communication, to levels greater than those common in face-to-face interaction” (Walther, 1999, n/p).

Further issues of online anonymity and disembodiment and its implications upon authenticity, legitimacy, sincerity, authority, resistance, persuasion, trust, sense of belonging, and reciprocity have a high impact on emotional manifestations in synchronous online exchanges in hobby and special interest groups (Sproull & Faraj, 1997a), support groups (Mickelson, 1997; Galegher, Sproull, & Kiesler, 1998), political action groups (Gurak, 1997), virtual teams (Jarvanpaa & Leidner, 1998), and knowledge construction groups (Cooper & Selfe, 1990).

Still another more recent issue is the formation and behavior of online communities. This line of research has mainly focused on the concept of cyberspace
and virtual communities (Benedikt, 1992; Rheingold, 1991, 1993; Whittle, 1997; Woolley, 1993). Defining norms of interaction (Collins, 1997; Stone, 1996), solving ethical dilemmas (Rawlings, 1996; Rawlings, 1998), group-domination (Gandy, 1995; Miller, 1995), online sexual exchanges (Adams, 1996; Deuel, 1996; Mehta & Plaza, 1997; Stone, 1996), flaming (Millard, 1997), the fabrication of multiple textual selves and identities (Gergen, 1992; Anderson, 1997; Stone, 1992), electronic surveillance and control (Lyon, 1994), cooperation, conflict resolution and negotiation strategies (Carnevale & Pobst, 1997; Kollock & Smith, 1996), and other sociopolitical issues as affiliation (Sproull & Faraj, 1997b), are mainly explored through the analysis of synchronous devices such as IRCs, MOOs and MUDs. Scarce attention has been given to socioemotional exchanges through asynchronous devices.

Organizational Environments

Most experimental work on ACMC has focused on its use in business and organizational processes (Baym, 1996), mainly on cooperative exchanges (Sudweeks & Allbriton, 1996; Sudweeks and Rafaeli, 1996), improvement of task performance (Hiltz & Turoff, 1978; Sproull & Kiesler, 1991), the extent to which electronic conversations coordinate actions (Flores & Winograd, 1986), the effect of network relationships upon the status quo (Rice, 1994; Rice, 1984; Ziv, 1996), the extent ACMC influences the capabilities of employees (Murray, 1991), and the set up and management of effective networks (Vallee, 1984). These research avenues further the pioneering studies on groups communicating via computers performed by Hiltz and
Networked employees speak more frankly and more equally, but increased participation and the reduction of higher-status influence associated to electronic interactions hinders decision making procedures, increases the expression of extreme opinions and thus increases conflict (Harasim, 1993). Online impersonality may foster participation for some type of persons (allowing shy persons cover and protection) (Berge & Collins, 1993), and in specific situations (when expressing one’s opinion upon a matter without the fear of retaliation). Thus, successful when used as information sharing, asynchronous communication can nevertheless negatively affect problem-solving processes due to the high rate of postings and the longer the interaction process takes (Harasim, 1989).

Some authors find that synchronous CMC is more efficient than asynchronous CMC for specific task-oriented activities, but that face-to-face communication is required for the production of more detailed plans (e.g., Archer, 1990; Condon & Cech, 1996). Although it allows everyone in a work group to have a voice (Olaniran, 1996; Sproull & Kiesler, 1995; Sproull & Kiesler, 1996), CMC makes it difficult to interact on complex topics and makes consensus difficult to reach (Baym, 1995b; Hiltz, Johnson, & Turoff, 1986) due to the text-based information overload and the diminishing of social context cues and nonverbal behavior, both traits of concurrent feedback in face-to-face communication (Carnevale & Probst, 1997). Others find that synchronous modes of CMC, due to its impersonality, frequent anonymity, and blurring of social boundaries, have deregulating effects (Metz, 1994), thus decreasing
inhibition in verbal behavior, (Reid, 1991), promoting self-disclosure, and facilitating hostile expression (flaming), both enhancing and deteriorating personal relationships (Kiesler, Siegel, & McGuire, 1984; Kim & Raja, 1991).

Social context cues (geographical, such as time and place; organizational, such as job and/or social position; and situational, such as age, gender, race, socioeconomic status, appearance, dress, accent, tone, moods and attitude), linguistic cues or paralanguage (voice quality, tone, volume, pitch, rate, inflection, enunciation, flatness, frequency, rhythm, speech speed, pauses) (Knapp & Hall, 1997), and physical cues (body posture, shape, color, movement, and image; trunk and arm position; gestures and facial expression; eye contact; laughter; olfactory cues) (Mehrabian, 1971), affect and influence face-to-face information exchange among individuals (Collins, 1992). Weak social, linguistic and physical online cues due to the limited bandwidth of CMC tend to produce more impulsive and less socially differentiated behavior (Sproull & Kiesler, 1986), as well as an increase in the rate of communication misinterpretation (Cathcart, Samovar, & Henman, 1996), erroneous judgments regarding the thinking dimensions of others’ personalities (Fuller, 1994), and delay in immediate repair of damages caused by both (Wellman & Gulia, 1999).

Several authors (e.g., Morahan-Martin, 1998; O’Brien, 1999) have also explored power issues in CMC groups, closely related to gender-related issues. Overall, in mixed male-female groups, men’s online messages tend to exhibit opposition (adversariality), a higher degree of impersonality, and are more factual and informative, while women’s messages express alignment (supportiveness), rapport
and empathy more explicitly than men (Ferris, 1996; Herring, 1996b; Herring, 1996c, Parks & Walther, 1996). Gender asymmetries in face-to-face interaction have thus manifested themselves in CMC (Tannen, 1990). However, other studies (Shelly & Munroe, 1999) analyzing all-female and all-male groups did not support these findings, reporting no significant differences in task-oriented and social-oriented behavior.

Even when CMC has the potential to “democratize” communication (Kiesler, Siegel, & McGuire, 1984) and to undermine social status and power differentials that may lead to more equalized and egalitarian participation (Dubrovsky, Kiesler, & Sethna; Kiesler, & Sproull, 1992), issues such as male predominating in number of postings, length of text, and frequency of discussions, tending to ignore topics introduced by women, competing instead of collaborating, dismissing women’s responses as irrelevant, ignoring their postings, and exhibiting and tolerating more aggressive behavior through language (insulting remarks, flaming, and sexual harassment) (Bernard, 1998; Herring, 1996b; Herring, 1996d; Hall, 1996, Graddol & Swan, 1989; Savicki, Lingenfelter, & Kelley, 1996), have proven consistent in CMC behavior in organizational settings. These findings may indicate that CMC does not really contribute to “flatten” organizational hierarchies as much as it both tends to interact with existing face-to-face hierarchies (Nelson, 2000; Ziv, 1996) and to reinforce face-to-face status and power relationships (Postmes, Spears, & Lea, 1998; MacDonald, 1994, in Watson, 1997; Saunders, Robey & Vaverek, 1994; Spears & Lea, 1994).
More recent studies, building upon the assumptions of social information processing theory (SIPT) instead of those sustained by MRT and SPM (Salancik & Pfeffer, 1978), have focused more closely on how organizations communicate and coordinate actions, basically through asynchronous modes of CMC, and on how online ties and relationships are created and evolve in time (Wellman, 1997), through establishing legitimacy and conveying authority as mechanisms of group identity building (Galegher, Sproull, & Kiesler, 1998). SIPT sustains that device perceptions are socially constructed, not a fixed trait of the device. Interaction through a particular device is therefore determined to a substantial degree by the attitudes, statements, and behaviors of participants. Participants, regardless of the medium, are driven to develop social relationships and will adapt and alter their behaviors in order to achieve them (McDonald, 1997: Walther, 1996).

**Educational Environments**

Whereas in social environments support and socioemotional exchanges may be the salient issues of CMC, and enhanced efficiency and action coordination may be decisive processes for CMC implementation in organizational settings, the ultimate purposes of using CMC in education are widespread access and enhanced learning (Witmer, 1998).

CMC in educational environments has focused mainly on six key areas: access to technology (Bates, 1995), training and induction of novice users (Geoghegan, 1998), user support (Moore & Kearlsey, 1996), staff training and development
A significant amount of research has been conducted comparing face-to-face with computer-mediated education (Archer, 1990; Bordia, 1997; Kilian, 1997; Olaniran, Savage, & Sorenson, 1996), showing different patterns of interaction between both processes. Greater equality of participation (Bordia, 1997), increased student support, connectedness, and interactivity (Moore, 1991) on the one hand, and more efficient discussion and problem solving processes (Henri & Rigault, 1996; Wells, 1992) on the other hand, are some alleged consequences of CMC. Advantages in CMC learning environments, such as defining a protected conversational space; allowing the students a visible record of their conversations for further reflection; allowing opportunities to research and support one’s assertions; providing a level of interaction between writing and speaking; and fostering a sense of immediacy, have also been reported (Anderson, 1996a; Colomb & Simutis, 1996).

Findings show that CMC may be particularly suited for implementing collaborative learning strategies through the promotion of interactive dialogue (Burge, 1995; Hiltz, 1990; Kaye, 1992a; Zimmer, 1995), extended participation (Berge & Collins, 1995; Grint, 1989), and the reduction of teacher-learner asymmetries (Gibson, 1997). In particular, computer conferencing stimulates a deeper reflection upon content, through the potential for fostering dialogue and interaction.
Although the importance of socioaffective dimensions in attention, reasoning, learning, memory and other cognitive functions have been registered (Picard, 1997), socioemotional and interpersonal issues in CMC learning environments have been largely ignored, except for some findings related to online mentoring, tutoring, and coaching, which recognize the importance of online interpersonality for successful pedagogical processes (Berge, 1996; Green, 1998b; Paulsen, 1995b; Rohfeld & Hiemstra, 1995). Tutoring support has proven essential in creating a suitable environment and optimizing group interaction (Bullen, 1997; Davie, 1989; Paulsen, 1995b; Moore, 1996b), fostering teamwork, avoiding unequal participation, and discouraging flaming (Harasim et al. 1996, Moore & Kearlsey, 1996), as well as reducing the amount of misinterpretation of online messages due to cue reduction (especially emotional cues), thus aiding the resolution of ideological and interest conflicts (Finholt, Sproull, & Kiesler, in Harasim, 1993, p. 27).

Cognitive processes towards collaborative learning and knowledge construction (Anderson & Kanuka, 1997; Bullen, 1997; Gunawardena, Lowe, Constance, & Anderson, 1997; Henri, 1992b) have recently received attention, although graduate, postgraduate, and adult continuing pedagogical interactions towards knowledge building remain neglected areas of inquiry (Brandon & Hollingshead, 1999; Kearsley, Lynch, & Wizer, 1995), underestimating interactive behavior, and student-teacher/student-student communication patterns. Moreover, as McDonald (1997) states, “little research has been conducted regarding group development in
educational settings...and even less has been done in distance education” (p. 4).

Additional Comments

Even though the spectrum of CMC devices is built around text, it is not a homogeneous form of communication. Different modes, environments, and methods of interaction may account for the diversity in research results (Culmer, 1997). Findings on one device do not necessarily extend to other devices (Savicki, Lingenfelter, & Kelley, 1996). In its asynchronous and synchronous forms, the level of interaction varies (Metz, 1994). It therefore manifests itself in different styles, determined either by the available technologies (e-mail, bulletin boards, chats, web-based group discussions, etc.), by communication purposes (information transmission, social support, virtual sex, knowledge building, identity interplay, and others), by human environments (organizational, educational, and social), by group membership, size and composition, and by individual traits (age, online experience).

The same person participating in a synchronous community group may be supportive, warm, and inspiring, while her participation in a MOO environment may be nasty and insulting. Her contributions to a distribution list or a conferencing forum at work may show cooperation, reflection and diverging but polite behavior. An individual who belongs to multiple online networks may keep a “dignified persona” in some of them, and be a “ferocious flamer” in others (Wellman, 1997, p. 195). Moreover, the same person may modify the behavior exhibited online through time.

IRCs have proven more suitable for developing social interactions through
socioemotional communication; conferencing systems for collaborative exchanges through conceptual communication (Reid, 1991), and electronic mail for coordinating actions in an organizational context through task communication, all of them as a supplement for face-to-face conversation and other media (Garton & Wellman, 1993; Sudweeks & Allbritton, 1996). However, this does not imply that each of these devices does not support communicational interactions other than the above mentioned.

This way, e-mail used for social purposes in a synchronous mode may well resemble IRC interactions. Socioemotional content, usually linked to IRCs, which in turn are related to social purposes, may also be present, although in a subtler and less frequent way, in conference forums (Rice & Love, 1987). CMC has sometimes amplified social practices (allowing people to do what they have been doing), and has sometimes transformed them (leading to qualitative changes in the way people interact with each other), thus supporting or expanding existing social behavior in groups (Kiesler, 1997, p xii-xiii).

**Group Interaction Processes in CMC**

The concept of group is a complex one, and a single definition is bound to distort and misinform the emphasis of the dynamic interrelationships that constitute it. A group may be deemed as independent units, which are in some sense together (aggregates or collections), or as a collection of units having common qualities or properties (classes). However, both conceptions exclude interrelation and interaction
among the constituents of the group. Attempts have been made to conceptualize groups according to interdependence, psychological relationship, and satisfaction of needs.

As early as 1939, Lewin stated that groups are sociological wholes whose unity is fundamentally defined by the interdependence of its parts. Therefore, relationships are the essence of a group: no relationships among its members, no group. Moreover, mutual influence is another important trait of groups. Shaw (1981, p. 8) defines a group as “...persons who are interacting with one another in such a manner that each person influences and is influenced by another person.” Following this line of thought, Gibb (1970), adds that

A group is characterized by the interaction of its members in such a way that each unit is changed by its membership and each would be likely to undergo a change as a result of changes in the group. In this case, there is a dependence of each member upon the entire group, and the relation between any two members is a function of the relation between other members. An aggregate of persons becomes a human group when interaction occurs among the units comprising it. (p. 25)

Groups are indigenous to both face-to-face and distance learning. The portrayal of the classroom as a group that has a task to accomplish, yet made up of differing individuals who need to come together to affect the outcome, focuses on participants as important contributors to their own and others’ learning. This brings forth the notion of “the classroom as a learning community” (Book & Putnam, 1992, p. 19). In constructivism, the concept of active learning in groups is emphasized. The learner is not just an active processor of information, but more importantly, the learner elaborates upon and interprets information furnished by himself and others (Fosnot,
Online groups are more than just a solitary collection of individuals who process information. They are “social beings...looking for affiliation, support, and information. Thinking of people on the net as social actors evokes a metaphor of a gathering” (Sproull & Faraj, 1997, p. 39). Computer conferencing and distribution lists then can be studied as social technologies, as they allow people with common interests and tasks to communicate over time. Therefore, the instructional paradigm that has led research in educational technology must make way for the conversational paradigm, which constitutes the basis for small-group and group dynamics studies (Romiszowski & Mason, 1996).

Cooper (1995) states that teacher and student, as well as students among them, “are linked in a system (italics in the original) of simultaneous communication transactions” (p. 7). O’Keefe (1995) mentions that “speaking and listening are the motor and motivation for learning” (p. 3). As these two functions of language are absent in online text-based pedagogical scenarios, writing and reading become the fundamental tools through which academic interaction is achieved. Academic interaction is here conceived as a learner/learner conversational process (Christensen, 1991b; Echeverría, Pizarro, De la Garma, & Beuchot, 1996; Elmore, 1991; O’Keefe, 1995) mainly dependent upon text, which “can be shown to lead to more cooperation” (Rafaeli & Sudweeks, 1997, p. 5). According to Sims (1996), interaction “is intrinsic to successful, effective instructional practice as well as individual discovery” (p. 1). Interaction through text in CMC is thus the essence of
learning.

As early as 1989, Moore established the importance of interaction as a theoretical construct for distance education, defining three types of interaction: learner-content interaction, which results in changes in the learner’s understanding; learner-instructor interaction, which allows the student to draw from the experience of the instructor through dialogue other than him/herself; and learner-learner interaction, which allows the learner to obtain information from other learners and build additional knowledge with and through them. This last type of interaction, as a relatively new dimension for distance education, has tended to be neglected (Bates, 1990). This has changed during the last years, where emphasis on community building stresses participation and interaction among students. It is now difficult to conceive an online learning group without interaction and interdependence of its members (Gunawardena, 1999; Palloff & Pratt, 1999).

Face-to-face groups are time and place dependent, while online groups are made possible due to independence of time and place (Harasim, 1990). Although an online group may be analyzed according to size, composition of membership (Schellenberg, 1970), prevailing psychological climate, and the purpose of gathering, there are other features to be taken into consideration. Group formation (voluntarily constituted or externally designated) (Baird & Weinberg, 1981), membership control (whether a group is private or public), editorial control (whether it is moderated or unmoderated) (Sproull & Faraj, 1997), character and purpose of participation (voluntary or mandatory) (Wallace, 1999), size (small or large), and permanence of
the group (short lived or constant through time) (Galanes & Brilhart, 1997), are issues in group constitution and operation which may also affect the quantity and quality of online interactions.

This study focuses on a continuing interaction of a small group of persons. On the one hand, small is a relative concept, and therefore was not defined in quantitative terms. It was used to describe a group “in which individual members perceive each other and are aware of each other as individuals when they interact” (Galanes & Brilhart, 1997, p. 12). Henri and Rigault (1996) mention that in computer conferences “that bring together large number of participants, the loss of a feeling of belonging and of commitment towards the group is felt” (p. 23). On the other hand, continuing was applied to a group whose members “...meet more or less regularly, who posses a common identity or shared purpose, and who share at least some standards governing their activity” (Galanes & Brilhart, 1997, p. 12).

**Asymmetry in CMC**

Online discussion forums constitute a type of social exchange among individuals within a task-oriented group. Individuals in social interaction produce communication, and patterns of asymmetry are generated in actual social intercourse. Asymmetries define several sorts of inequivalences and imbalances in the communication processes, specifically in dialogues. In this study, the term refers to global properties in entire social encounters, such as quantifiable relational patterns emergent over sequences and time (Linell & Luckman, 1991). It is sometimes in
literature referred to as “inequality”, “dominance”, or “imbalance”, and serves the purpose of providing a frame for the constructs of online interaction, participation and interactivity. Asymmetry may be a useful construct to evaluate communication differentials in online groups.

Berger and Conner (1974, p. 6) pose the following question: “Given the members of newly formed task-oriented groups, who are relatively alike with respect to major status characteristics (gender, educational background and position, age, workplace), how can we explain the emergence of a differentiated hierarchy?”

Even though there is a sharing of knowledge, language, or culture among people who engage with one another in communication (commonality), and even though there is a basic interdependence of assumptions between interlocutors (mutuality/reciprocity), asymmetry is an intrinsic feature of any communication process (Graumann, 1995; Linell & Luckmann, 1991). Davies (1994), states that

Whenever people are brought together in groups, a pattern of differential influence and participation quickly develops; group members talk more or less, receive more or less agreement and acceptance, and direct or lead the group with varying degrees of success... These inequalities (or interaction disabilities) are due to differences in ‘performance expectation states’ - beliefs about the likely task ability of each group member. Therefore, early on, group members make judgments about each other’s relative task abilities based on existing information, such that a picture of the performance expectations of each group member is built up. It is differences in performance expectations of states that lead to the observed pattern of unequal influence and participation; those who are judged to have high ability are encouraged to contribute more to the group process, whereas those of low perceived ability are discouraged. Some of the information about performance expectation states comes from initial group interaction, when impressions from each group member can be assessed. (p. 53)

Asymmetries often arise from the attempt of individuals to impose their
personal views upon other group members. However, far from diminishing, asymmetries are mutually constructed and maintained by participants. Asymmetries may be augmented either actively, by thrusting points of view upon others instead of establishing a joint perspective, or passively, by refusing to cooperate and participate. In both cases, individuals may intensify asymmetries and may even lead to a breakdown in the communication process (Marková, Graumann, & Foppa, 1995, p. xi-xii).

Expectations States Theory (EST), as developed by Berger, Cohen & Zelditch (1966) and Berger & Conner (1974), is concerned with the emergence of hierarchies in small, task-oriented groups. In face-to-face interactions, the effect of status characteristics (status orders) such as age, gender, race, and occupational class has marked effects in determining the initial behavior of individuals in a diverse variety of face-to-face, small-group situations. Marked inequalities seem to emerge in such groups in relatively short periods of time, and are made manifest in diverse interaction measures or components, such as rates of talking (or emitting messages) and rates of receiving messages. Moreover, such interaction measures were interrelated, and asymmetries were bound to surge.

However, online relationships are mostly text-based, with a high degree of media poorness or leanness and a considerable social cue reduction. Traditional face-to-face external status characteristics, such as gender, age, occupation, or status, are not as important issues as the message content itself in online communication, which reflects and gives direct evidence of the ability and intentions of group members for a
certain task. Existing asymmetries in online group relations may be therefore more dependent on text traits of postings (length, frequency, interpersonal content, emotional and cognitive tone) than on participants’ attributes (age, physical appearance, status) (Donnath, 1999, Henri & Rigault, 1996). However, this has not been well established in literature. Harasim et al. (1996) state this issue in the following terms:

A potential benefit of learning networks is that each student can participate equally in class discussions and activities; however, each student may not put in the same volume or quality of material. Differences based on student interest, ability, availability, or other considerations affect the upper and lower levels of participation. A relatively equitable distribution of communication can be encouraged, but some students may dominate or others refuse to participate. (p. 228).

A clue may be found in Fisher (1980) when she studies leaderless group discussions (LGD), where status symbols, which may account for a type of asymmetry, are not so clear. The status hierarchy in these groups is

An order based on the ability to influence other members. More specifically, high-status members in an LGD are perceived by other members as having provided the greatest assistance to the group’s task accomplishment. If the raison d’etre of the group is to accomplish some goal, whoever helps the group make progress toward that goal is rewarded with a high-status position. (p. 190)

In other words, in LGD (and this may be the case also for online groups where external cues are either absent or diminished) status is achieved through and during the interaction, and not brought early on to the group.

Karp and Yoels (1976) state that early in the life of a face-to-face college classroom, a hierarchy tends to form based on participation rates, with a few participants doing most of the talking. They term this phenomenon as “consolidation
of responsibility”-the fact that one or a few students carry the participation burden for the entire class. This hierarchy may be one, or more, and may undergo minor structural changes through the lifetime of the group. Leaders tend to talk more often (Reynolds, 1984) and more to the group as a whole (Goetsch & McFarland, 1980). While the former assertion may be reflected in the number of postings in computer conferences as well as in mailing lists, the latter may be present in quantity of messages posted to mailing lists.

In face-to-face groups, persons who have high participation rates generally produce longer speeches (Chell, 1979), and ignored individuals will tend to decrease their participation (Geller, Goodstein, Silver, & Sternberg, 1974). Core posters (individuals who are dedicated participants and contribute substantially and significantly, both in frequency and length of postings, to the value of a group) may acquire a high-status. They represent a small percentage of group members (Smith, 1999), but may account for the maintenance of the group structure and dynamics, as they “target their messages more finely and are more likely to be responded to” (Terveen et al. 1997, in Smith, 1999, p. 210).

Asymmetry is a term borrowed from the linguistic arena. Linell (1990) distinguishes four types of asymmetries in a conversational face-to-face dyad. *Quantitative asymmetry* concerns the relation between participants in terms of amount of participation in a conversation. Number, length and frequency of messages comprise this category. Number refers to the total amount of postings each participant contributes within a specified span of time, while frequency assesses the distribution
in time-or periodicity-of those postings. Messages can thus be either concentrated or evenly spread within the time span specified. The length of messages is usually measured in words, sentences (Rice & Love, 1987), number of lines transmitted (Hiltz, 1988), segments (Henri, 1992b; Henri & Rigault, 1996), and paragraphs. In 1987, Rice and Love demonstrated there is a high correlation between frequency and length in online messages.

The literature considers other quantitative imbalances and proposes measures for them (e.g., Smith, 1999). Smith considers the poster-to-post and thread-to-post ratios. On the one hand, a group with a high poster-to-post ratio is one in which many different people write most of the messages, while a group with a closer to zero poster-to-post ratio indicates very few active participants who contribute most of the messages. On the other hand, groups with a very high thread-to-post ratio are basically stand-alone messages, while a low thread-to-post ratio is likely to represent long threads, which may indicate disagreement or divergent opinions. An intermediate figure near 0.5 shows a straightforward pattern of questions and answers.

Interaction asymmetry or qualitative asymmetry has to do with the distribution of “weak” versus “strong”-or thread building-interactional moves, such as posting a non-responsive/non-responded message (activity or one-way posting), responding to a posting (reactivity) or intermessage referencing (interactivity). It is also related to “good” vs. “bad” messages (Berthold, et al. 1998), whether they are referenced or not, and whether they reference other messages as well. It also indicates the degree of
cohesiveness and involvement of a group. A group with high degree of interactivity in its postings is a cohesive group, while low interactivity (or high activity) may indicate a poor cohesion among its members. Similarly, high levels of active or reactive messages may indicate involvement versus commitment, which is present when interactivity predominates.

*Semantic asymmetry* would apply to a participant who generally determines and sets the topics sustained in a communication, and imposes influential interpretive perspectives upon issues conversed. It would indicate the imbalance existing among participants in terms of successful thread-initiating messages. *Strategic asymmetry* is present whenever a participant provides a new twist or turn in the conversational flow. This is reflected in those messages that generate the longest threads. Herring (1996d) states that what counts in CMC as “gaining the floor” (p. 208), is that the message a person posts draws a response and in some way affects the direction of the current thread. So, the aim of many participants is that their messages develop recognizable threads. This is sometimes made evident by requests from students so that their postings are answered.

*Structural asymmetry* (Paolillo, 1999) is a fifth category that refers to the relationship established among the different participants in terms of the number of messages exchanged, constituting an interaction network (Barajas, 1996). It shows who communicates with whom, either reactively or interactively, and with what frequency, allowing the identification of strength of ties among participants (Wellman, 1997).
When these five different aspects of asymmetry or imbalance are applied to an online group, a holistic pattern of communication behavior emerges both for the group as a whole and for each individual member. Due to the relevance literature ascribes to them (Moore, 1989; Rafaeli, 1988; Rafaeli & Sudweeks, 1998; Walther, 1996), this study focus is on quantitative and interaction asymmetries of an online academic group as a whole through time.

Figure 2. Dimensions for analyzing asymmetry in CMC.

The above categories of asymmetry and dominance in communication should not be confused with power, although dominance is associated to efforts to control, command, and persuade others. However, asymmetry implies a possession of communication resources by some participants at others’ expense, which may imply
certain degree of influence of one or more participants over the rest. This is a key issue regarding online participation and interactivity.

Differences between speakers regarding levels of participation, interactivity and interpersonal relations are displayed to some degree among participants in groups. Those asymmetries may be imposed from outside (derived from social power, organizational roles, social strata and authority). Due to the nature of CMC in academic environments (absence of social and visual cues, and the relative homogeneity of the group), asymmetries in participation and interactivity are mostly intrinsic, endogenous, and dialogue produced (Linell & Luckmann, 1991, p.10). Quantitative and interactional asymmetries are associated to verbal and linguistic behavior and are traced and related to one endogenous issue: the impersonal or interpersonal content of online exchanges, as they picture the presentation of self through text. Interactivity and participation are thus considered a function of the degree of interpersonal or socioemotional content.

Quantitative and interactional asymmetries represent important issues in CMC analysis. The former has been traditionally used as a stand-alone category, whereas the second has been hardly considered in empirical studies of CMC, notwithstanding its critical importance for learning process and outcomes (Bullen, 1997, p. 228). However, the notions of participation, interaction and interactivity are often used as synonyms in literature review. The following ideas may help clarify the issues at hand and better situate the construct of interactivity as a category of analysis for online communication.
Participation

Participation issues (or the capacity and extent of involvement of members in online forums through the mostly quantitative analysis of message number, length, and frequency) have been dealt with “fairly successfully” in the literature (Gunawardena, Lowe, & Anderson, 1998, p. 2). However, they may prove insufficient when trying to evaluate the quality of online communication towards knowledge construction.

It is a widely sustained tenet that CMC has the capacity and potential to encourage higher participation levels and more equally distributed than in face-to-face environments (Kiesler et al. 1984; Hiltz & Turoff, 1978; Sproull & Kiesler, 1995; Walther, 1992). Rice & Love (1987, p. 89) state that “the lack of nonverbal cues about physical appearance, authority, status, and turn taking allows users to participate more equally and with more extreme affect on CMC systems that in many face-to-face interactions.”

However, equal access to the “floor” does not ensure evenly distributed participation (Bullen, 1997). Mason (1998) mentions that in asynchronous, self-paced courses, about one third of participants remain inactive and rarely contribute messages to online discussions. To ensure equal participation rates, students may require the structure and imposed pacing of teacher-directed approaches “in order to maintain engagement with the course” (p. 62).

Disproportional participation in CMC has been found to occur less than in face-
to-face situations. When compared to face-to-face environments, McGrath and Hollingshead (1994) found that out of fourteen studies reviewed, ten found participation distribution to be more equal, while four studies found no difference. Nonetheless, Walther and Burgoon (1992) mention that “although the CMC experiments show greater equality in CMC as opposed to face-to-face conditions, it has been mostly a participation equality. The CMC messages themselves more frequently contained attempts to persuade others, suggesting a dominance-seeking pattern” (p. 61). However, their hypothesis that initial messages in a group of previously unacquainted interactants would show a higher dominance/inequality pattern than later messages did not hold.

Even when CMC offers the potential benefit of equal participation, computer conferencing and distribution lists by themselves do not simply increase participation rates of usually quiet or uninterested members of a group. Active participation appears to be unequally distributed across members in online support groups and hobby groups (Galegher, Sproull, & Kiesler, 1998), as well as in academic forums (Bullen, 1997). In CMC, the concepts of dominance and inequality have been traditionally analyzed through proportion of group participation, even when most studies in groups through CMC do not report on participation as a variable.

Participation is here understood as the number, length, and frequency of postings each participant contributes to the conference forums, which reflects his/her level of involvement. It may be related to interactivity, but not necessarily. High participation rates with low levels on interactivity may be an indicator of both poor
sociability and scarce contribution to knowledge construction. Logging-in is not considered as participation, due to the difficulty of measuring it, although it may not be discarded as unimportant: some students have manifested having learned substantially by “lurking.”

Henri (1990) states that most researchers “imply that to measure participation is to measure interaction” (in Mason, 1991, p. 169), thus using participation, interaction, and interactivity as synonyms.

Participation and interaction are not equivalent terms as the literature often indicates (see Figure 3). While the former refers to the action of relating among individuals by actively posting unrelated messages (action), the response to previous ones (reaction) and the number of “intermessage references” (Bullen, 1997, p. 80) or the attempts at discourse weaving measure the latter (McDonald, 1997). The former indicates the level of involvement in online forums, while the latter may help to assess commitment. Wallace (1999) equates involvement to posting quantity, although Sproull and Kiesler (1995) correlate participation or mail sending to commitment.

![Figure 3](image.png)

*Figure 3. Relational categories in CMC.*
Online participation, as defined above, is determined by several factors or “sources of influence” (Baym, 1995; McGrath & Hollingshead, 1994). While Baym (1995) mentions five factors: external context, temporal structure (synchronicity vs. asynchronicity), system infrastructure, group purposes, and participant characteristics, McGrath and Hollingshead (1994) cite four: context factors (equivalent to Baym’s first issue), technology (equivalent to Baym’s second and third issues), tasks/projects/purposes (equivalent to Baym’s fourth issue), and member attributes (equivalent to Baym’s fifth issue).

Bullen (1997) mentions that problematic issues regarding online participation (absence of non-verbal cues, information overload, asynchronicity, access problems, difficulty in following multiple discussions, fragmented or nonlinear nature of online communication, cognitive maturity of learners, technology problems, lack of time, and cost of access) are both related to individual problems/traits and to course design issues and instructor interventions. They are also strongly related to the five attributes of computer conferencing mentioned by Harasim (1990) in her seminal study: many-to-many communication, place-independent group communication, time-independent communication, text-based communication, and computer-mediated learning.

Grint (1989) adds to the above-mentioned issues the influences of status, gender, and technical expertise. Herring (1996d) and Hall (1996) stress gender as an imbalance issue in CMC: women participate significantly less than their numerical representation in discussion groups may indicate, while men tend to monopolize
online discussions contributing a higher percentage of postings and text produced (Ferris, 1996; Savicki, Lingenfelter & Kelley, 1996). Espinosa (1999) found that high online moderating activities constitute an important positive effect upon participation and threading levels, which may suggest a greater amount of interaction among participants. Vanderslice, Rice, and Julian (1987) mention there is a positive correlation between member satisfaction and participation in face-to-face groups. This correlation is also valid for online groups (Morahan-Martin, 1998). Moreover, increased levels of participation may also be significantly related to temporal factors, such as group development and technical expertise (Walther & Burgoon, 1992).

Even authors who tend to overemphasize the role of technology in communication processes (e.g., Harasim et al. 1996) recognize that there may be differences in students’ online participation and show that some dominate while other refuse to participate. However, they usually attribute this phenomenon basically to students’ personal traits. Student interest, ability, availability and other non-personality considerations affect what they term “the upper and lower levels of participation” (p. 228). However, personality in relation to behavior has lost validity and has shown low predictive utility in accounting for behavior since Mischel’s (1968) seminal publication. According to Mischel, situational factors and forces are more influential in determining behavior than personality predispositions. Recent developments indicate that behavior may be determined by the interaction of personality traits and situational factors (Magnusson & Endler, 1977), time and online moderating being important intervening issues (Bullen, 1997; Rojo, 1995,
What is low and high participation is not a predefined, universal notion. Determining the minimum required level of messaging or participation and the frequency of posting are issues that depend on the task, the size of the group, and the time the forum is open. Thus, low or high participation and frequency of posting should be set as expectations against standards at the beginning of any online interaction, and be assessed according to those standards.

Even though it is not possible for everyone to participate on an equal basis, due to the factors that condition and shape online interaction, the literature mentions that equitable distribution of participation through time should be encouraged to benefit the learning outcomes (e.g., Bullen, 1997; Green, 1998a). Nevertheless, equal participation is not always viewed as a desired outcome. McGrath and Hollingshead (1994) mention that

There are often situations in which equal participation by all group members may decrease the efficiency and effectiveness of the group task, and /or decrease satisfaction of many of the members with the group and its work, because group members have unequal expertise and knowledge to contribute to a given task, and there is not necessarily a high positive correlation between members’ willingness to contribute and the value of those contributions to the group. (p. 100)

Thus, asymmetry in participation-and asymmetry in general—should not be viewed solely as a negative issue, but as a condition of CMC that should be carefully analyzed. Forcing participation indiscriminately in online academic forums may turn out to be counterproductive, producing low-quality postings and thus discouraging interactivity.
Interaction and Interactivity

Potential for interaction is the most salient characteristic of computer conferencing, and the trait with the greatest influence on learning, which may alter its nature and increase its quality (Harasim, 1989; Henri, 1992a). Moore (1991) supports this when he states that

The areas of student interaction and creating knowledge promises to be [computer conferencing’s] main contribution to distance education...It is dialogue by teleconference between students that is making possible the creation of knowledge by students and high-level analysis, synthesis and critique of knowledge. (p. 6)

However, even when “in the rhetoric of computer-mediated communication visionaries, interactivity has a place of honor” (Rojo, 1995, p. 65), online communication is more often active and reactive than truly interactive, and again interaction is not interactivity. The former may be

More properly applied to the entire pattern of interconnected messages…It is the process through which negotiation of meaning and co-creation of knowledge occurs in a constructivist learning environment…[Interaction] is the essential process of assembling the contributions of participants into a coherent pattern in the co-creation of knowledge. (Gunawardena, Lowe, & Anderson, 1998, p. 4.)

Within this broader sense, interactivity is then a particular form of interaction (see Figure 3).

In his key theoretical paper on interactivity, Rafaeli (1988) proposes a working definition of the concept: “Formally stated, interactivity is an expression of the extent that in any given series of communication exchanges, any third (or later) transmission (or message) is related to the degree to which previous exchanges referred to even
earlier transmissions” (p. 111).

Interactivity is also conceived “as the extent to which messages in a sequence relate to each other, and especially the extent to which later messages recount the relatedness of earlier messages...It places shared interpretative contexts in the primary role” (Rafaeli & Sudweeks, 1998, p. 175). Interactivity thus requires a thread of messages, or a chain of interrelated messages, while reactivity can be assimilated to one-way feedback (Schultz, 1999).

In this same line of thought, Bretz (1983, in Henri, 1992b) defines interactivity as a three-step process:

Step 1: communication of information
Step 2: a first response to this information
Step 3: a second answer relating to the first (p. 128)

Thus, interactivity expresses the degree to which “interaction transcends mere reaction” (Berthold, Sudweeks, Newton, & Coyne, 1998, p. 191).

However, most studies reviewed do not consider interactivity as closely related to human-to-human relationships. They either consider interactivity as the possibility a medium offers to interact with others, or reduce true interactivity to mere reactivity. The former conceptions of interactivity are more conservative or technically-oriented conceptions (Thimbleby, 1996), which seem to focus on notions like connectivity, information manipulation, and interfaces. For Peraya (1996), functional interactivity designates the instrumental relationship between human and machines, or the human-to-machine interface.
Following this line of thought, Sherry (1996) states that interactivity “represents the connectivity (italics not in the original) the students feel with the distance teacher, the local teachers, aides, facilitators, and their peers” (p. 343), thus making interactivity and two-way communication equivalent terms. Gay (1997) expands this notion to have interactivity include “the extent to which students can manipulate the content of a Web site” (p. 10). While Sherry’s notion is more related to feelings of non-isolation, Peraya’s and Gay’s concepts refer to interface issues and the potential of participants to manipulate technological devices. These conceptions do not account for the level of reference among participants’ messages, which is the focus of this study. Mason (1998), adopting a different position more in agreement with interactivity as a personal construct, states that interactivity “at the most basic level...is simple electronic messaging with the tutor; at the most advanced level [it] is collaborative activity amongst students, particularly where it becomes a significant component of the course content” (p. 140).

As Henri and Rigault (1996) establish, “participants react more to the content of the message rather than to the attributes of the author of the message” (p. 12). Following this line of thought, Berthold et al. (1998), call a message ‘good’ if it participates in a thread; that is, if it is referenced at least by one other message. A ‘bad’ message, in contrast, is not referenced at all, or it does not participate in a thread. This point of view implies that the inner quality of a message is responsible for eliciting reference to it. If a message is referenced or not depends, ultimately, on the quantitative and qualitative features of a participant’s message. As such, the
authors analyze a message “typicality”, or the set of formal and content characteristics that evaluate a message degree of participation in a thread.

Whether a given property of CMC (Borsook & Higginbotham-Wheat, 1991), a by-product of instructional design (Fenrich, 1997), and a property of messages that reflect back on themselves, feed on and respond to the past (Newhagen & Rafaeli, 1996), interactivity is considered a pivotal measure of the social dynamics of group communication. It is associated to several factors such as activity itself (nature of task), type of list (voluntary vs. mandatory), list climate, group size, the emergence of leadership, and others. But even more important, and seldom conceived as such, interactivity is associated to “the attitudinal dimensions of acceptance and satisfaction, motivation, sense of fun, openness, frankness, and sociability” (Rafaeli & Sudweeks, 1998, pp. 173-176). In other words, it is strongly associated to interpersonal dimensions of messages. Therefore, interactivity is not an intrinsic trait of conference forums, neither it is “a succession of disconnected remarks, but a collaborative effort” (Ahern, 1994, p. 1). Interactivity “implies participants’ collaborative efforts in the communication process as well as communication skills” (Rojo, 1995, p. 65).

The threading features of computer conferencing and mailing lists do not substitute for interactivity. Interactivity is not a property of the medium. Quite the contrary, time-delayed exchanges in CMC “lead to disjointed transactions and poorly referenced communiqués” (Eastmond, 1997, p. 72). So interactivity is also understood in this study more as an ability and an attitude pertaining to the online
participant aiming at seeking socialization, and at the same time avoiding interactional incoherence, overlapping exchanges and topic decay (Herring, 1999).

Rafaeli and Sudweeks (1998) state that

Interactivity places shared interpretation contexts in the primary role. Interactivity describes and prescribes the manner in which conversational interaction as an iterative process leads to jointly produced meaning. Interactivity merges speaking with listening...Fully interactive communication requires that later messages in any sequence take into account not just messages that preceded them [reaction], but also the manner in which previous messages were reactive. In this manner, interactivity forms a social reality. (p. 175)

In the case of CMC, speaking stands for writing, while listening stands for reading.

Bretz (1983, in Bullen, 1997) and Bretz and Schmidbauer (1983, in Rafaeli, 1988) categorize messages into interactive (in two levels: true interactive and quasi-interactive) and non-interactive or independent. Rafaeli (1988) and Rafaeli and Sudweeks (1998) talk about interactive, reactive, and two-way communication. In his seminal paper, Rafaeli (1988), building upon Bretz and Schmidbauer (1983, in Rafaeli, 1988), developed a Responsiveness Model (RM) to categorize interactivity, quasi-interactivity (or reactivity) and non-interactivity (two-way communication or activity) in online messages:

This definition of interactivity recognizes three pertinent levels: two-way (non-interactive) communication, reactive (or quasi-interactive) communication, and fully interactive communication. Two-way communication is present as soon as messages flow bilaterally. Reactive settings require, in addition, that later messages refer to (or cohere with) earlier ones. Full interactivity (responsiveness) differs from reaction in the incorporation of references to the content, nature, form, or just presence of earlier reference. (p. 119)

He derives four principles from his RM. First, not all communication is interactive, even when non-interactive messages may contain coherent responses.
Second, interactivity is not a medium characteristic. Media may remove barriers and provide conditions for interactivity, but potential does not compel actuality. Third, much use of new technologies is non-interactive. Potential interactivity is a quality of the situation or setting. Fourth and last, interactivity is a subset of feedback.

“Interactivity is feedback that relates to previous messages and to the way previous messages related to those preceding them” (Rafaeli, 1988, p. 120).

Rafaeli also mentions that clear conceptualization of interactivity brings forth not only a theoretical understanding of the concept, but also the realization that high levels of interactivity are an ideal type, not a description of reality (‘ideal type’ is used here in the sense that settings can be judged against it, designs may be measured with it). Nor is it the case (as might be mistakenly construed) that the definition of interactive is a normative prescription. This point was brought home vividly when attempts were made to emulate interactivity in empirical settings (pp. 121-122)

Moreover, true interactivity is difficult to measure according to Rafaeli’s original model, which is communication-based.

Messages as units of analysis of interactivity according to this model may be misleading, due to their polysemic nature. Rafaeli himself asks “Is it possible to measure interactivity, or are we destined to approach measurement via classification [of messages]?” (p. 129). Echoing this concern, Henri (1992b) stated that “nowhere does the literature provide a full theoretical or operational definition of what we are to understand as ‘interactive process’” (p. 127). However, the problem may be in the conceptualization of interactivity. Most of the literature reviewed considers reactivity
as true interactivity.

For example, Henri (1992b) refers to one-way communication, non-interactive or independent messages as those which are neither an answer nor a commentary to previous messages, and which do not lead to any further statements, while interactive messages are those that elicit a response from one of the participants, either explicit or implicit. The same author (1992a) wrote, however, that true interactivity required three actions: a message from A to B, a message from B to A in response to the information transmitted by A, and a final message from A to B in response to B. She terms as quasi-interaction the first two steps.

Rafaeli (1988), terms these same three levels of interaction as two-way communication, reactive communication, and interactive communication. Thus, Henri’s (1992a) interactivity would be equivalent to his reactive communication. However, Rafaeli and Sudweeks (1998), in a latter modification of the original model, adopt the term one-way communication for stand-alone messages, fuse previously differentiated two-way communication and reactive communication, and keep interactive exchanges as such. At present, their theoretical and operational definition of interactivity accounts for independent, reactive and truly interactive content in messages (see Figure 4).
Bullen (1997) comments on a similar typology developed by Fafchamps et al. (1989):

Messages were analyzed for their degree of interactivity using the ‘islands, dialogues and webs’ structure suggested by Fafchamps et al (1989). According to this typology, islands are messages that do not receive a reply, dialogues are sets of two or more messages in which participants take turns, and a web develops when a message receives more than one reply and may respond to one or many messages. (pp. 54-55)

Later on, Herring (1996d) proposes a general scheme for evaluating just interactive
messages. Interactive texts, according to her, have a three-part structure: a link to previous discourse (either explicit or implicit), a contentful message, and a link to following discourse. According to Rafaeli and Sudweeks’ model (1998), she is referring to reactive messages. McDonald (1997), based on Henri (1992b), also makes a reference to interactivity in this sense. However, she adds an important consideration. She refers to references among messages not so much as volleys exchanged between participants, but as intentions and efforts to develop an online community. She includes the engaging move in a message segment so as to trigger others’ response as a fundamental trait to evaluate online interactivity. Interactivity thus understood may be related to the interpersonal style of messages. Her concept is a useful addition to Rafaeli and Sudweeks’ (1998) interactive communication.

Rafaeli and Sudweeks (1998) have found that true interactive messages are more opinion-oriented, significantly more humorous, and more likely to self-disclose. Interactive messages are also more likely to contain first-person plural pronouns, indicating other-orientation, involvement and belonging. However, they found no correlation between frequent participants and interactive messages: “frequent authors write significantly more reactive messages, but are just as likely as all others to write interactive messages” (p. 188).

However, Rojo (1995, 1996), in her analysis of academic mailing lists, mentions reciprocal interdependence as a key online issue, understood as an expectancy of a fair return for contribution of information. Without defining what she understands by “interaction” or “interactive”, she states that
It is online interaction itself that draws people in to contribute messages. Some researchers posit that each online message has the potential to accomplish two goals: to communicate content and to stimulate the responsiveness of interlocutors. A more interactive online communication setting is likely to increase participation. (1996, p. 3)

She thus seems to establish a causal relationship between interactivity and participation. Nonetheless, she further establishes an opposite thesis, suggesting participation as triggering interactivity. She states that

Regular contributions give a participant a ‘presence’ in the forums. Other participants can start perceiving some regularities in the style or content of the regular contributor’s messages. The particular perspective or form of his/her messages together with other regular contributors’ ‘presences’ can break the sense of uniformity and anonymity and bring into the list individuality as well as communality and help to stimulate arguments and bring more people into the discussion...active participants promote interactivity and reciprocity in the list exchange. (pp. 5-6)

Rafaeli (1988) mentions the positive effects of increased true interactivity in diverse media. Acceptance and satisfaction are the most salient attitudinal effects, while performance quality, increased cooperation, learning and mastery in the cognitive domain are positively affected by increased interactivity. Interactivity may also correlate with participation, interpersonality, group development, and interactional patterns, and thus become the key issue in online interaction. However, scarce interactivity or absence of it must not always be interpreted as a failure. Students have reported significant amounts of learning just by reading other participants postings (lurking) (Henri, 1992b).

Some theoretical studies have focused on establishing patterns of interactive messages. Levin, Kim and Riel (1990) developed the Intermessage Reference
Analysis (IRA), a system to map interactivity. By considering each reference of one message to another as a link, a graphical representation of messages and messengers can be drawn. The resulting message map shows the intermessage references as directed links between the messages. The graphic input and output of each message indicates to what extent it is referenced by others and in turn references others. Henri (1992) also developed a representation of online exchanges, which she termed ‘communicograms’, as an intent of illustrating the presence of links among messages.

However, these methods focus only on the references between messages, disregarding their content and producing largely complicated graphical structures of message records. Berthold et al. (1999), further analyzed the thread structure to explore interactive threads. Based on Autoassociative Neural Networks (ANN), their reference tree assesses the degree of interactivity of a message through three categories of analysis: reference-height (how many references are found in a sequence before a particular message); reference width (how many references were found that referred to this message); and reference depth (how many references were found in a sequence after a particular message). To this framework, Sudweeks and Simoff (1999) added time as another variable. The resulting graph structure is also complicated for long threads. Moreover, as Galegher, Sproull and Kiesler (1998) state, the perfect sequencing of online messages is complicated because sometimes topics develop across multiple threads.

However useful they may be in determining interactivity patterns, both IRA and ANN focus on message interaction more than the people behind them, thus limiting
the threading feature in electronic devices to viewing the interrelationship pattern of messages (Kanuka & Anderson, 1998). Moreover, they consider messages as a unit of analysis, when messages are almost never a homogeneous unit of meaning.

Messages tend to be polysemic: segments of a message may be interactive, but other may be reactive or even stand-alone segments (Henri, 1992b). Thus, when the unit of content analysis is smaller than the message, mapping intermessage content becomes complicated and unclear. Nonetheless, both may prove a valuable tool for analyzing network patterns among participants or identifying key of influential posters in online groups (structural and strategic categories of online asymmetry).

As recent literature indicates, the notions of activity, reactivity and interactivity as properties of the medium are being displaced, and more frequently considered as indicators of human commitment in online processes. Moreover, reactivity is also expanding from being a simple reference among messages to a construct that includes references to previous intent of engaging others into conversation, and interactivity is being differentiated from reactivity. However, in spite of the efforts to assess it, online interactivity is still a buzz word. Interactivity is for some authors (e.g., Henri, 1992b; McDonald, 1997) what reactivity is for others (e.g., Rafaeli, 1988; Rafaeli & Sudweeks, 1998), while some of them (e.g., Henri, 1992b) consider speech segments as interactive as others support interactivity as describing the whole message (e.g., Rafaeli & Sudweeks, 1998).

Taken on their own, the categories proposed by the literature reviewed do not fully account for the complexity of the construct. As a whole, these theoretical and
empirical propositions allow the researcher to focus on the construct as less a property of CMC or a trait in messages than as an attitude, a particular way participants have of relating to one another.

Table 1

*Summary of Research on Interaction and Interactivity in CMC*

<table>
<thead>
<tr>
<th>Study</th>
<th>Scheme</th>
<th>Context</th>
<th>Findings/propositions</th>
</tr>
</thead>
</table>
| Bretz and Schmidbauer (1983, in Rafaeli, 1988) | • Interactive  
• True interactive  
• Quasi-interactive  
• Non-interactive or independent | No data      | No data                                                                             |
| Ellis and McCreary (1985, in Henri, 1992b) | • Unlinked messages  
• Apparently linked  
• Actually linked | No data      | No data                                                                             |
| Rafaeli (1988)             | Responsiveness Model      | Theoretical  | Interactivity is associated to:  
- attitudinal dimensions of acceptance and satisfaction  
- performance quality, cognition, learning  
- motivation, sense of fun, openness, frankness and sociability |
| Fafchamps et al. (in Mason, 1991) | • Islands  
• Dialogues  
• Webs | No data      | No data                                                                             |
| Mason (1991)                | • Independent  
• Interactive | Empirical (Undergradu | Independent messages account for only 15% of |
<table>
<thead>
<tr>
<th>Source</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Henri (1992a)</td>
<td>Empirical</td>
<td>Distance students from the Open University)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the total number of postings, while the remaining 85% may be considered interactive.</td>
</tr>
<tr>
<td></td>
<td>Monologue</td>
<td>-Interactivity is mainly related to the initiative of online moderators and tutors</td>
</tr>
<tr>
<td></td>
<td>Quasi-interactivity</td>
<td>-Learners adopt a more individual than collective process in computer conferencing</td>
</tr>
<tr>
<td></td>
<td>Interactivity</td>
<td>-Interactive postings (25%), quasi-interactive (25%) and independent or monologues (50%).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Henri (1992b)</td>
</tr>
<tr>
<td></td>
<td>Theoretical</td>
<td>-Interactivity may be related to levels of collaboration, active participation in the accumulation of knowledge, and structuring information skills.</td>
</tr>
<tr>
<td>Levin, Kim, and Riel (1990)</td>
<td>Empirical</td>
<td>Intercultural Learning Network: students and faculty from elementary to graduate levels)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-a majority of messages (54%) were never referenced</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-24% of messages were referenced one time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-messages from students are referenced slightly more often than those from adults</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-people in a given role or level tend to reference messages of those in the same role.</td>
</tr>
<tr>
<td>Galegher, Sproull, and</td>
<td>Empirical</td>
<td>Self-help</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-questions are the most frequent form of seed</td>
</tr>
<tr>
<td>Kiesler (1998)</td>
<td>• Reply (a message referencing another message) and support groups</td>
<td>messages. reply messages represented 48% -solo messages represented 31% -solo messages represented 20% of total postings.</td>
</tr>
<tr>
<td>Berthold, Sudweeks, Newton, and Coyne (1998)</td>
<td>Autoassociative Neural Network</td>
<td>• Good messages (referenced)</td>
</tr>
<tr>
<td>Rafaeli and Sudweeks (1998)</td>
<td>Modified Responsiveness Model</td>
<td>• One-way communication</td>
</tr>
</tbody>
</table>
**Dimensions of Interaction Analysis**

Based on Henri (1992a, 1992b) and Rafaeli and Sudweeks (1998), enriched with Herring’s (1996b) notion of links to following discourse and McDonald (1997) engaging intent of reactivity, this study considers active, reactive, and interactive categories to evaluate the construct of interaction in online messages in discussion forums.

Online messages do not have a single meaning and may thus confer and convey different intentions within the same message (Henri, 1992b). Active segments within a particular message are those chunks of information that do not reference others, even when they may or may not be referenced by others. Reactive segments are those that address a segment in an immediately previous posted message. Reactivity is further analyzed as either *explicit* or *implicit*. Interactivity is here understood as *engaging* when the message segment intent is to induce other participants to interact, and as *true interactivity* when it directly refers to how previous segments relate to even earlier segments (Rafaeli Sudweeks, 1998). That is, when they are reactive to reactivity (see Appendix C for operational definitions of these terms).

![Diagram](image)

*Figure 5. Dimensions for analyzing interactions in CMC.*

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There has been a strong debate over the extent to which CMC allows socioaffective and interpersonal discourse. Ever since the pioneering and influential work of Hiltz and Turoff (1978), literature is basically inclined towards considering that CMC in general, and task-oriented, academic discussion forums in particular, is impersonal: CMC does not allow the effective transmission of social and emotional information, or interpersonal content.

MRT (see Trevino, Daft & Lengel, 1987), SPM (Rice & Love, 1987), and reduced social cues model (RSCM) (Kiesler & Sproull, 1992; Sproull & Kiesler, 1995) generally predict that positive interpersonal relationships should occur infrequently, whether negative interpersonal communication is more frequent—both behaviors having face-to-face interactions as a parameter. CMC is thus generally characterized in literature as impersonal, unfriendly, and non-social. However, recent theories such as information-processing perspective (IPP) (Walther, 1992), and the move of research away from the laboratory to the field, challenge the above claims.

Even though many authors use the term “interpersonal”, few give a definition. Moreover, related terms are used interchangeably: “relational dimensions” (Burgoon & Hale, 1987; Parker, 1995), “affective patterns” (Walther & Burgoon, 1992), “socioaffective relations” (Sudweeks & Allbritton, 1996), “affiliative communication” (Jaffe, Lee, Huang, & Oshagan, 1995), “socioemotional areas” (Bales, 1950, in D’Andrade & Wish, 1985; Rice & Love, 1987), and even “promotive
interaction” (Johnson et al. 1991). However, interpersonality is a more suited
terminology that has been developed to evaluate and name the diverse dimensions
present in group communication (D’Andrade & Wish, 1985; Wish, D’Andrade, &

Although recognized as a key issue in face-to-face learning (Johnson et al.
1991), the importance of socioaffective and interpersonal issues in online
environments has been recently emphasized (Brandon & Hollingshead, 1999). Some
authors (e.g., Galanes & Brilhart, 1997) establish that group communication is
situated between public communication and interpersonal communication, the latter
usually representing a unique relation in a dyad for social purposes. Group
communication is complex, informal, and spontaneous. While primary groups are
usually formed to meet needs of inclusion and affection, secondary groups exist
mainly for control needs or problem-solving tasks. However, no group can be solely
defined as primary or secondary. Sometimes productive and satisfying secondary
groups may have strong primary components, where members feel included,
appreciated, and even cared for.

Interpersonality is often referred to as social or personally oriented interaction
or informal communication that addresses the creation of relationship norms among
participants (Sudweeks & Allbritton, 1996; Sudweeks & Simoff, 1999), and often
defined as social or personally oriented interaction or informal communication,
mentioned in opposition to information exchange, and to task-oriented, formal
discourse. However, there is not a single, coherent criterion on which to recognize
interpersonality in CMC. McDonald (1997) refers to interpersonality in postings as “communication in which individuals were relating on a personal level to others...The most helpful rule of thumb in categorizing this variable is one of ‘heart’ versus ‘head’” (p. 32).

In some studies, interpersonality is referred to as “task irrelevant communication” (McGrath & Hollingshead, 1994, p. 90). When analyzing group interaction, Berger and Conner (1974) leave socioemotional exchanges out of the scope of their studies. They assume that “task completion takes precedence over such things as maintaining friendly relations, reducing tension and antagonism, and producing personal satisfaction. That is, we assume that the group is ‘task focused’” (p. 86).

In face-to-face groups, research has confirmed Bales’ task-group interaction using his interaction process analysis (IPA) coding scheme. Most interactions in task-oriented groups consist of task behaviors (giving and asking for instructions, asking for opinion, giving orientation), which appear to be the major source of status and influence in a group. Positive socioemotional behaviors (showing solidarity, satisfaction, agreement, humor) follow, and are about twice as common as negative socioemotional behavior (showing disagreement, passive rejection, tension, and antagonism) (D’Andrade & Wish, 1985; Ridgeway & Johnson, 1990). Bales’ IPA has also been the most widely used theoretical model and coding scheme in research on interpersonal issues in CMC (Hiltz, Johnson, & Turoff, 1986; Rice & Love, 1987; Walther, 1992).
However, CMC is not merely an extension of existing social forms of interpersonal communication (Ball-Rokeach & Reardon, 1988). CMC removes time and distance barriers to the formation of groups (Hiltz & Turoff, 1978), thus allowing interaction of physically dispersed people (Sproull & Kiesler, 1995). Text-based, CMC constitutes a new speech pattern, a new language code (Lee, 1997) that place it somewhere between written and spoken language. Therefore, the dynamics of interaction, communication, and coordination of electronic communities differ from face-to-face interactions. Communication mediated by technology filters out communicative and social cues, which led to the notion that computer conferencing is less interpersonal or prone to socioemotional traits than face-to-face interactions. Nevertheless, Boshier’s (1988) research on computer conferences on Listservs found that friendly relationships do develop in spite of social cues reduction, and that participants become more casual and more humorous over time. Supporting this issue, Walther and Burgoon (1992) found that CMC groups Develop and evolve in relationally positive directions. Participants’ ratings of one another composure/relaxation, informality, receptivity/trust, and social (versus task) orientation became higher during their progression; dominance became lower. The current study suggests that filtered-out theories and the associate effects of greater task orientation, self-absorption, arousal, and impersonality do not occur in extended-time asynchronous interactions in CMC. (pp. 76-77)

This finding opposes empirical studies portraying CMC interactions as less personal (depersonalized) and socioemotional than face-to-face exchanges (Hiltz, Johnson, & Turoff, 1986; Sproull & Kiesler, 1986). Interpersonal relationships appear to evolve naturally as a function of time and online experience, and may even be
considered a ubiquitous property of online exchanges (Walther, 1992): “an impulse that seems to be inherently human” (Walther, 1996, p. 33).

Henri (1992b) developed an analytical framework for analyzing academic CMC. She stated that quantitative studies that focused on number of messages were of little use as a measure of student participation. She proposed to add to this participative dimension (compilation of the number of messages or statements) other four dimensions: social (statements not related to formal content), interactive (chain of connected messages), cognitive (statements that exhibit knowledge and skills related to the learning processes), and metacognitive (statements showing awareness, self-control, and self-regulation of learning). The first three dimensions are particularly important for this study as they deal directly with participation, interactivity, and social issues in online relationships.

Walther and Burgoon (1992), based on Burgoon and Hale (1987), who in turn based their approach on Bales’ IPA, developed a coding scheme for assessing social content in online messages around six dimensions: immediacy/affection (incorporating inclusion and involvement), receptivity/trust (rapport, openness, and the desire to be trusted), composure/relaxation-arousal (the degree of relaxation, calm or tension, discomfort and nervous arousal), formality/informality, dominance/inequality-submissiveness/equality (efforts to control, command, persuade, and dominate others), and similarity/depth. These dimensions account for the traditional variables of interpersonal behavior.

More recently, as part of a long-term collaborative effort to study CMC
communications (ProjectH), Rafaeli and Sudweeks (1993) developed a quantitative, 46-variable codebook specifically designed for CMC large-scale content analysis. Over one hundred researchers which analyzed over 3,000 messages in 30 online discussion groups found that interpersonal issues are also present, either assessing use of emotional icons and emotional devices, or evaluating the argumentative tone of the message. In seeking to evaluate the emotional tone of postings, they classify messages as friendly, neutral, or hostile, allowing intermediate categories such as divergence, disagreement, tension, and antagonism.

Interpersonality is a term closely related to affinity. In face-to-face learning environments, the issue of teacher-student affinity has been closely studied (Daly & Kreiser, 1992). Affinity is understood as “the active social-communicative process by which individuals attempt to get others to like and feel positive about them” (p. 122). Affinity is, therefore, a communication construct, and an active rather than passive activity, such as can be physical attraction. A series of affinity strategies have been identified, which include openness, inclusion of others, eliciting other’s disclosure, optimism, self-inclusion and supportiveness (Daly & Kreiser, 1992). Close to the concept of affinity, McDonald (1997) speaks about “intention” as a distinctive trait between online interpersonal and “non-interpersonal” message segments. Intention would then define interpersonality, whereas non-interpersonal segments would be devoid of intention. Even though this distinction is a step beyond considering messages as either interpersonal or task-oriented, senders should not consider non-interpersonal messages as emotionally neutral, as they may trigger interpersonal
reactions in messages receivers. Even if intent may not be clear, non-interpersonal messages also have a socioaffective communicative purpose.

According to McDonald’s (1997) findings, interpersonal speech segments in messages began at an extremely high level (75%), only to decrease sharply to (43%) at the middle of her study, with a slight increase (52%) near the closing period, with an overall significant downward trend, although still prominent. Parks and Floyd (1996), analyzing both newsgroups and experienced individual posters, found out that personal relationships were a common issue: nearly 61% reported development of interpersonal behavior with another, whereas Mabry (1997) found out that over 25% of messages in newsgroups, bulletin boards, and mailing lists were emotionally laden.

Rafaeli and Sudweeks (1998), using messages as the coding unit in online research, found that worldwide messages collected from Bitnet lists, Usenet groups and CompuServe SIGs are predominantly impersonal and factual in group CMC. However, out of 4,322 messages, more than a third of postings contained “personalizing content, in the form of a verbal self-disclosure” (p. 185). Chesebro (1985) and Meyers (1985, both in Jaffe et al., 1995), analyzing computer bulletin boards, found that personal-related information was respectively present in 32% and 39% of the messages reviewed.

These figures are consistent with the one reported later by Rice and Love (1987) after studying transcripts from a nationwide public computer conference Medsig/Compuserve, sampling eighteen months of online exchanges. In this study, socioemotional issues constituted around 30% of the total amount of message
content, using the sentence as coding unit. This finding seems to contradict the issue that CMC is a lean medium (Trevino, Daft, & Lengel, 1990) with low social presence (Short, Williams, & Christie, 1976). Rice and Love (1987) also found a high positive correlation between participation (length and frequency of messages) and between the amount of socioemotional content and participation: “the more one sends messages, the more one sends a larger number of socioemotional sentences” (Rice & Love, 1987, p. 98). Wallace (1999) supports this when she states that people who have established online interpersonal relationships with others were “more heavily involved and visible to the group participants in the sense that they posted more messages” (p. 135).

Although literature review shows a varying degree of interpersonal content in online messages in task-oriented groups due to theoretical and methodological differences in the studies, there is an agreement that the amount is much more considerable than SPM and MRT would predict. Moreover, the presence of interpersonal content and its importance in group dynamics is acknowledged as unavoidable and indispensable (Walther, 1996).
## Table 2

**Summary of Research on Interpersonality in CMC**

<table>
<thead>
<tr>
<th>Study</th>
<th>Scheme</th>
<th>Context</th>
<th>Findings/propositions</th>
</tr>
</thead>
</table>
| Rice and Love (1987)   | Socioemotional content (solidarity/antagonism, tension relief/tension, agreement/disagreement). Bales’ categories. | Empirical (publicly available computer conferencing system Medsig/Compuserv) | positive correlation between length and frequency of messages  
- positive correlation between frequency of messages and number of socioemotional sentences.  
- nearly 30% of message content was socioemotional  
- CMC is less suitable for complex human processes |
| Boshier (1988)         | No data                                     | Empirical (Listservs)           | - friendly relationships do develop in spite of social cues reduction  
- participants become more casual and more humorous over time. |
| Henri (1992b)          | Social dimension defined as communication issues not related to formal | Theoretical (the expression of social issues) | Social issues as important for:  
- group social |
content or subject matter

Walther (1992)  Social information processing theory  Theoretical

Compared to face-to-face interactions, in CMC
- interpersonal content requires more time
- personalized communication takes longer to emerge
- relational communication changes as the number of exchanges increases
- changes in relational communication will take longer
given enough time and amount of message exchange, relational communication will parallel face-to-face interactions

Walther and Burgoon (1992)  Relational communication coded as: immediacy/affection; receptivity/trust; composure/relaxation-arousal; formality/informality; Dominance/inequality-

Empirical (experimental study of sixteen groups through computer conferencing and face-to-face interactions)

CMC groups evolve in relationally positive directions
dominance became lower and receptivity and trust higher
submissiveness/equality: similarity/depth

Walther, Anderson, and Park (1994)  
Socially-oriented vs. task-oriented studies and negative/uninhibited communication  
Theoretical/empirical (Articles and book chapters of empirical/quantitative studies: 21 for socioemotional tone and 14 for uninhibited negative content)

Parks and Floyd (1996)  
No data  
Empirical (e-mail surveys to 176 individuals from 24 different public newsgroups)

-extended time has a positive effect on positive social communication  
-extended time has a positive effect on positive social communication  
-the difference between CMC and face-to-face interaction on socially-oriented communication is greater in time-limited than in time-unlimited interaction.

-60.7% of participants reported personal relationships  
-72.2% of women reported personal relationships vs. 54.5% of men  
-personal relationships highly correlated with frequency and duration of participation  
-as relationships develop, the breadth (variety of topics and communication channels) and
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Concept/Application</th>
<th>Methodology</th>
<th>Findings/Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mabry (1997)</td>
<td>Flaming and antisocial behavior</td>
<td>Empirical (over 3,000 messages posted to newsgroups, bulletin boards, and mailing lists)</td>
<td>Depth (intimacy and self-disclosure) of interaction increases</td>
</tr>
<tr>
<td>McDonald, (1997); McDonald and Gibson (1998)</td>
<td>Based on Schutz’ (1994) theoretical approach of group development and Lundgren (1977) typology of interpersonal needs (involvement, control, openness, solidarity, and conflict)</td>
<td>Empirical (speech segments from real-life academic computer conferences in a course)</td>
<td>-60% of postings emotionally neutral -over 25% showed expressions of friendliness</td>
</tr>
<tr>
<td>Rafaeli and Sudweeks (1998)</td>
<td></td>
<td>Empirical (publicly available communication selected from Bitnet, Usenet and)</td>
<td>Messages on average: -predominantly factual, conversational,</td>
</tr>
</tbody>
</table>
Dimensions of Interpersonal Analysis

The analysis of interpersonal dimensions is closely linked to group development theories and small group research. Development is associated to time, and with terms such as “movement”, “change”, and “dynamics”, terms that indicate how a group operates to develop and maintain its “groupness.” Group development implies that “two or more people are working together on some need or problem toward some recognized end, by some form of interpersonal relations, with some covert or overt effect on each other” (Hopkins, 1970, p. 93).

Literature deals mainly within group development in organizational, task-specific settings. Little research has been done regarding group development in face-
to-face academic settings (Lundgren, 1977), and less in distance education environments. Recent exceptions are McDonald (1997) and McDonald and Gibson (1998). While a number of studies report on well defined phases of group development and growth (progressive models, cyclical models and nonsequential models), others focus on “a continued growth related to some type of interpersonal behavior as the group becomes more cohesive and better able to handle the task” (Hare & Davies, 1994, p. 192). Such is the case in Sudweeks and Allbritton’s (1996) study, in which they used a five-stage combinational model of sequential and cyclical phases as proposed by Robbins (1993): forming and norming; low performing, storming, high performing, and adjourning.

Progressive or linear models state that groups displace from one stage to another due to increasing maturity and communication (Bales & Cohen, 1979; Tuckman & Jensen, 1977); cyclical models propose a recurring cycle of birth, growth, maturation, and death of groups (Schutz, 1958; Schutz, 1994); and nonsequential models state that group processes are contingent on a variety of issues that can alter the sequence of development (Baym, 1995b; McGrath, 1991; Sudweeks & Allbritton, 1996), understanding group phases not as a fixed sequence of well-defined phases, but as “potential forms of activity” (McGrath, 1994, p. 63). All of these group stages revolve around interpersonal dimensions.

Interpersonality favored a focus on group development theories that dealt to a large extent with interpersonal or socioemotional issues. Bales (1950, in D’Andrade & Wish, 1985) developed the best-known and more frequently used system for
interpersonal behavior analysis (IPA) in both face-to-face and CMC environments, based on four dimensions (twelve categories): positive reactions, negative reactions (both within the socioemotional area), problem solving attempts, and questions (both within the task-oriented area).

While Bales and Cohen (1979) proposed three bipolar behavioral dimensions as core of their theory (SYMLOG: System for the Multiple Level Observation of Groups): upward/downward (dominant vs. submissive), positive/negative (friendly vs. unfriendly) and forward/backward or task-oriented/expressive (conforming vs. nonconforming), groups according to Schutz (1958, 1994) (FIRO: Fundamental Interpersonal Relations Orientation) evolve through stages along the dimensions of inclusion, control and openness. McGrath (1991, 1994) (TIP: Time, Interaction, and Performance) states that groups are engaged in three major functions: production, member support, and group well-being. Interpersonality and time are central issues in all theoretical constructs regarding group interaction and development.
Table 3

*Summary of Research on Interpersonal Analysis*

<table>
<thead>
<tr>
<th>Author</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lundgren (1977)</td>
<td>Involvement, control, openness, solidarity and conflict</td>
</tr>
<tr>
<td>Bales and Cohen (1979)</td>
<td>System for the Multiple Level Observation of Groups (SYMLOG)</td>
</tr>
<tr>
<td>Wish, D’Andrade, and Goodenow (1980)</td>
<td>Speech Act Factors (SAF)</td>
</tr>
</tbody>
</table>

McDonald (1997) and McDonald and Gibson (1998), based on Schutz’s theoretical approach, performed a qualitative study in online group dynamics and found a strong parallel to face-to-face group dynamics in terms of the dominant concerns of the group over time. A strong concern about control and inclusion showed up early in the group, while the growth of trust and intimacy ensued over time. However, the analysis was conducted on a three-week sample (weeks 3, 8 and 13) with four online small groups (nineteen students) during one semester. A longer time span may be required for ongoing, long-term work groups to identify variations
in the relationship among participants and their impact on the evolution of interpersonality.

Sudweeks & Allbritton (1996), using a combination of cyclical and linear group development models, studied academic interactions along a time-span of twenty-three months. They identify five types of group communication: informal, formal, socioemotional, conceptual and task oriented. They found that informal communication is closely related to the stages of forming, reflection and adjourning in group development, while socioemotional content is related to the storming, reflecting, high performing, and adjourning stages. But most important, they found that task and socioemotional processes are not separated issues in group exchanges.

Lundgren (1977), referring to interpersonal relationship in groups, states that the current typology distinguishes between content themes involving five major classes of interpersonal issues or problem areas. These are termed: involvement, control, openness, solidarity, and conflict. Involvement issues have to do with concerns about levels of participation, emotional involvement, and member commitment. Control issues concern influence, power, authority, and status relationships. Openness issues involve dilemmas about expression of feelings, self-disclosure, and exchange of feedback. Solidarity issues concern affection, liking, closeness, and cohesiveness between individuals and within the group as a whole. Conflict issues concern anger, hostility, divisiveness, and, in general, negative social-emotional relationships between members. (p. 181)

Recent research focuses on fewer dimensions than the twelve proposed originally by Bales (1950, in D’Andrade & Wish, 1985) or the five mentioned by Lundgren (1977) as a result of factor analysis of many variables (Hare & Davies, 1994). Wish, D’Andrade, and Goodnow (1980) mention that multidimensional scaling of data has revealed four stable dimensions of interpersonal communication:
cooperative-friendly/competitive-hostile, dominance/equality, task-oriented-formal/socioemotional-informal, and intense/superficial.

A similar set of three dimensions was defined within a field theory of interpersonal behavior, which assumes that “every act of behavior as taking place in a larger context that is part of an interactive field of influence” (Hare, 1994). These dimensions are represented by a three bipolar system of behavioral characteristics: dominance/submissiveness, friendliness/unfriendliness, and acceptance/non-acceptance of authority. The correlation among those dimensions has been established. Within a group, dominant members may participate more, and may probably be extroverts who tend to impose their views upon the group. Friendly participants tend to be associated to more cooperative behavior, agreement and submissiveness.

This study focuses upon the friendly vs. unfriendly dimension of analysis. The categories that were analyzed represent a continuum, from the positive-reflecting an acceptance of communicative behavior we like-to the negative-reflecting our avoidance of what we do not like. They have been studied either as constituents of diverse bipolar coding systems in group development theories in face-to-face scenarios or as specific, stand-alone categories or relational dimensions.

Feeding on face-to-face theoretical constructs of interpersonal behavior by Bales (1950, in D’Andrade & Wish, 1985), Bales and Cohen (1979), Lundgren (1977), and Schutz (1994), and deriving from Henri’s (1992b), Rafaeli and Sudweeks’ (1993), Walther and Burgoon’s (1992), Higgins’ (1998), and Mabry’s
(1997) coding frameworks for analyzing CMC, a broad, two-category taxonomy for evaluating online interpersonal content was used: friendliness or hostility in postings as an overall measure. Interpersonality is thus initially categorized by valence (positive and negative) (Bales, 1970; Berschield & Hatfield, 1978; Bochner, Kaminski, & Fitzpatrick, 1977), as in most interpersonality bipolar coding schemes.

This categorization is closely related to issues such as friendliness/hostility (McLaughlin, Osborne, & Smith, 1995; Smith, McLaughlin, & Osborne, 1998), disclosure/guard, withholding (Davis & Brewer, 1997; Hare & Davies, 1994; Hargie, 1986; openness (Schutz, 1994; Walther & Burgoon, 1992), appraising/chastising (flaming) (Herring, 1996d; Mabry, 1997), humor/sarcasm (Baym, 1995a; Foot, 1986; Herring, 1996d; Rafaeli & Sudweeks, 1998), supportive/adversarial, (or alignment/opposition, as in Herring, 1996b), informing-offer/asking-request (Constant, Sproull, & Kiesler, 1997; Higgins, 1998), and other/self-orientation, or inquiry/advocacy (Echeverría, Pizarro, De la Garma, Beuchot, 1996; Senge, 1990; Senge, Ross, Smith, Roberts, & Kleiner, 1994; Sproull & Kiesler, 1986). Friendliness is thus associated to humor, support, openness, and inclusion of others, while hostility is related to sarcasm, adversariality, seclusion or control, ignorance of others, and self-centeredness.

Berschield and Hatfield (1978) classify interpersonal attraction as either a positive or a negative attitude towards another person. Interpersonal attraction or rejection is defined as “an individual tendency or predisposition to evaluate another person or symbol of that person in a positive (or negative) way” (p. 2). Broadly
labeling interpersonal dimensions as negative or positive is less a participant’s moral attitude towards others than a communication behavior that either fosters or hinders interactive online content in group performance. Smith, McLaughlin, and Osborne (1998) categorize friendly online behavior when there is a cordial or congenial manner towards a poster, while hostile behavior is said to be present when there is obvious belligerence towards a poster, with or without the use of profanity (p. 101).

In CMC literature, several pairs of oppositions have been proposed to evaluate online content, pertaining to the socioemotional and to the cognitive domains: warmth/coldness, agreement/disagreement; pacifying/conflict raising; tension relief/tension; solidarity/antagonism; pushing/condescending; diverging/converging; legitimacy/authority; offering/requesting; refusal/acceptance; welcoming/challenging; apologizing/complaining; competing/cooperating; collaborating/disrupting; providing-offering/seeking-requesting information; and self-absorption/other-orientedness. The dimensions for analysis proposed below comprise these issues, which must not be taken as fixed, isolated properties of a person’s online discourse (see Appendix C for operational definitions of these terms).
Figure 6. Dimensions for analyzing interpersonality in CMC.

**Support-alignment/adversariality-opposition**

Herring (1996b) defines two broad variants when classifying online messages: the aligned and the opposed variants. Although she applies these variants to basically characterize gender differences in online discourse, they may be applied without direct reference to gender issues, as they are more related to styles or modes of communication. On the one hand, an aligned message is characterized as such when it expresses: 1) agreement, appreciation, and support by a poster to a previous message, 2) a non-critical expression of the previous writer’s views, 3) suggestions, questions, answers, offerings, or expressions of support, and 4) appeal to other participants to engage further in the discussion (pp. 92-94). McDonald (1997) refers to this last
condition as fundamental for the conceptualization of interactivity: the intentionality of interactivity (or attempted interactivity) is to be considered as important as interactivity itself.

On the other hand, an opposed message is defined in opposition to alignment, when it manifests 1) a direct opposition, conflict or disagreement with the views of a previous poster, 2) an expression of a critical view or an objection, 3) an appeal to end the discussion or no attempt to further pursuing it.

In other works (1994; 1996d), Herring terms “adversarial rhetoric” as mostly pertaining to male language, containing strong assertions, self-promotion, loaded with presuppositions and rhetorical questions, with an authoritative orientation, challenging others and with a generous dose of humor, sarcasm, and complaints. Women’s language, on the contrary, is more supportive, with attenuated assertions and expressions of appreciation, apologies, thanking, explicit justifications, questions, other-orientedness and supportive content.

However, males and females may use adversarial and supportive discourse. More than associating gender with a type of discourse, she refers to “manners of participation” (1996d, p. 484). Therefore, support-alignment may be related to Bales and Cohen (1979) forward or accepting behavior, while adversariality-opposition is close to backward or opposing behavior towards authority. Support-alignment is also close to Lundgren’s (1977) concept of involvement and to Schutz’s (1994) notion of inclusion.
**Self disclosure/reserve**

Self-disclosure is here understood as the written behavior “through which individuals truthfully, sincerely, and intentionally communicate novel, ordinary private information about themselves to one or more addressees” (Fisher, 1984, in Hare & Davies, 1994, p. 185). Self-disclosure thus involves the transmission to others of a subjective dimension, of personal information about us. Sharing information about personal background, interests, views, feelings, and opinions constitute attempts at self-disclosure. Stewart (1977, in Hargie, p. 223) defines the concept as “the act of verbally and nonverbally sharing with another some aspects of what makes us a person, aspects the other individual would not be likely to recognize or understand without our help.”

In other works (e.g., Schutz, 1994), self-disclosure is deemed as high openness, or the truthful communication of personal experience, while low openness is regarded as impersonal and business-like behavior. In their study, Walther and Burgoon (1992) manifest that a communication behavior denoting openness and trust may be the tendency to freely state overt judgments. They hypothesized that initial messages among previously unacquainted participants in CMC would be lower in receptivity/trust than in later messages, which was not supported.

In face-to-face interactions, deep levels of disclosure may be made to complete strangers providing the discloser is sure s/he will never meet the person again. That is, the expectation of ongoing relationships may discourage self-disclosure (Hargie, 1986). However, online interactions may be different. In Ma’s (1996) study, both
East Asian and U.S. students perceived themselves as engaging in higher levels of self-disclosure when compared to face-to-face interactions. Kim and Raja (1991) further found that the reduced cues of CMC fostered both self-disclosure and hostile behavior from the beginning, either enhancing or deteriorating online relationships—or what Spears, Lea, and Postmes (in press) call “social gain” and “social pain.”

Hare and Davies (1994) review critical issues regarding self-disclosure in face-to-face environments. Self disclosure, as alignment, has been strongly associated to gender issues—females are more likely to engage in self-disclosive behavior than males, especially to other females (Savicki, Lingenfelter, & Kelley, 1996), and to group size issues (Baym, 1998)—members of smaller groups self-disclose more than members of larger groups. Self-disclosure is higher among friends than among strangers in face-to-face communication, suggesting that time may play an important role in aiding self-disclosure in human interactions. Self-disclosure is contagious: it generates disclosure from other participants (reciprocity) (pp. 186-187). Lastly, Won-Doornink (1979) documented changes in rates of self-disclosure over time and discovered (although from couples in a long-term relationship) that intimacy is low at first, becomes higher and then falls again later in the relationship.

Hargie (1986) mentions four features of self-disclosive content: 1) The use of personal pronouns “I” or related self-reference words such as “me”, “mine”, and “my”. 2) Self-disclosure can either be about facts or feelings. Both types can be regarded as a sign of commitment to a relationship. 3) Self-disclosure can be about one’s own personal experience or about one’s personal reaction to the experiences
communicated by another person. The latter is deeper than the former, and can enhance the development of interpersonal relationships. 4) Self-disclosure can be about the past, the present or the future.

Regarding the first issue mentioned by Hargie (1986), Yates (1996), after linguistically analyzing academic interactions through computer conferences from the Open University, found out that CMC has a lower presence of third person references than writing or speaking, but a higher presence of second person pronouns that writing, although less than in speaking. CMC also makes a greater use of first and second person pronouns (64%) than either speech (58%) or writing (27%). She also found that in CMC, the use of first person pronouns is paramount, followed by third person pronouns and lastly, second person pronouns. Davies and Brewer (1997) in a three-semester, academic longitudinal study, found out that the use of first person pronouns was overwhelming. The use of first person pronouns denotes a degree of involvement of the poster with the text and task, while the use of second person pronouns indicates a high degree of involvement of the poster with the addressee.

However, the simple word count approach to self-disclosure may be misleading, because it decontextualizes the use of pronouns in a segment. For example, the pronoun “I” may indicate either self-disclosure or may represent a symbol of authority and self-centeredness. Thus, as in interactivity, intentionality and content in context is also important in determining online self-disclosure.
Appraisal/chastisement

Chenault (1998) humorously refers to this dichotomy as “please or prick” (p. 1), while Wallace (1999) talks about “liking and loving” versus “flaming and fighting” (p. 110-156). However, the distinction is not that clear in online discussion forums. It is important to distinguish between online adversariality and chastisement. Adversariality is “a conventionalized and accepted (indeed rewarded) pattern of behavior in academic discourse, and characterizes postings that otherwise show evidence of careful planning and preparation” (Herring, 1996d, p. 487). Mabry (1997) supports this when he states that specialized discussion groups (affinity groups) are permissive environments in which “tacitly, if not actively, encourage the airing of controversies and usually evidence substantial tolerance in supporting ongoing arguments and disputes” (p. 2).

According to this idea, confrontation is valued and “should be encouraged as a means of arriving at deeper understandings of issues and sharpening one’s intellectual skills” (Herring, 1996c, p. 129). However in practice, this “constructive denunciation” is not easily distinguished from hostile adversariality. Women, more than men, tend to group all adversariality under flaming, rudeness or provocation. The problem is, however, not one of misunderstanding, but one of values. For example, when women try to have equal treatment on male-dominated discussions, they are trivialized, threatened, or criticized by men (Hall, 1996; Herring, 1994). Other forms of chastisement include males directing more postings to men, ignoring women’s postings or dismissing them as irrelevant (Hall, 1996). Their postings on
discussion groups are respondent to about half as frequently as men’s messages (Herring, Johnson, & DiBenedetto, 1992, in Morahan-Martin, 1998).

In literature, chastisement is more openly associated to decreased inhibition and “spontaneously venting one’s emotion” (Herring, 1996d, p. 487), thus associated to openly disqualifying, insulting, deprecating, reproaching, complaining, and invalidating behavior, thus close to Schutz’s (1994) exclusion dimension of interpersonal behavior. While adversariality may be tolerated and encouraged, chastisement and its highest manifestation-flaming-is frequently sanctioned. Flaming is conceived as “messages that are precipitate, often personally derogatory, ad hominem attacks directed towards someone, due to a position taken in a message posted to the group” (Mabry, 1997, p. 2).

McCormick and McCormick (1992, in Herring, 1996d, p. 487) define flaming as “excessive informality, insensitivity, the expression of extreme opinionated views, and vulgar behavior” (including blunt disclosure, swearing, insults, name calling, and hostile comments). However, flaming is not always related to chastisement. In a recent study by Postmes, Spears, and Lea (in press), flaming has also been found to occur unrelated to genuine insults and closer to playful irony, more as an expression of social intimacy than as a sign of social distance (T. Postmes, personal communication, November 8, 2000).

Chastising content tends to create either negative, emotional spirals (retaliation) in online communication (Mabry, 1997, p. 11) or communication disruption. Mabry (1997) found that the amount of intermessage references (what he calls ‘message
dependency’ and in this study is considered interactivity), was lower for messages showing emotionally neutral content, and it increased, subsequently, for messages showing friendliness, diverging content, disagreement, and tension. Message dependency thus increased as the emotional tone of messages became increasingly negative, reaching its peak in antagonistic messages, only to diminish (to levels between emotionally neutral and friendly messages) when messages were coded as hostile. Hostile messages turned out to be complex messages, containing a dose of agreements, capitulations, and compromises that ended the emotional escalade. While friendly messages maintained a sustained intermessage referencing, emotionally negative peaked out only to drop down after a short period.

Negative uninhibited exchange, or “flame wars” most often occur among strangers. “Newcomers to Internet discussion groups (newbies), and new members of a particular group are often the source of, or the target of, inflammatory messages” (King, 1995, p. 2). Therefore, in asynchronous, mediated, long-term relationships, and in absence of anonymity, chastisement is bound to either be absent or considerably diminished. It is important to note that the lack of social and visual cues in CMC is linked to desinhibition (Joinson, 1998). In turn, desinhibition may be related to the presence of seemingly contradictory behaviors: chastisement (negative) and self-disclosure (positive). Both, however, are more strongly related to anonymity, synchronicity, short-term interaction, and unmediation in online environments (Kiesler, Siegel, & McGuire, 1984), situations not usually present in online academic conferencing forums.
Appraising, close to Lundgren’s (1977) solidarity notion and to Schutz’s (1994) inclusion dimension, is associated to motivating actions, with celebrating and reinforcing others’ contributions, and with congratulating and encouraging behavior. Appraising implies consideration, recognition, compliment and acknowledgement of others’ contributions. While supportive behavior is close to inclusion (“I include you”) and disclosure is close to openness (“I am open with you”), appraising is basically related to significance—when in the interpersonal area— (“I feel you are significant”) and competence—when in the task-oriented area— (“I feel you are competent”) (Schutz, 1994).

According to Schutz (1994), high inclusion is related to interactive behavior, whereas in an atmosphere of low inclusion (or exclusion) communication is seldom achieved. Just as aggressive behavior encourages retaliation, appraisal fosters the “you like me, I like you, you like me more” spiraling behavior (Wallace, 1999, p. 144). Therefore, appraising behavior may also be related to interactivity in online communication.

**Humor/sarcasm**

Literature that supports the view that CMC is basically task-oriented implies that the medium is “inhospitable to humor” (Baym, 1995a, p. 1). Bullen (1997) states that, due to the lack of context and social cues, CMC makes it difficult to use the subtle traits of face-to-face communication, such as humor and irony. However, humor is possible in asynchronous discussion groups, and it should not be
discouraged, as it contributes to creating social meaning, group solidarity, and a caring group atmosphere (Baym, 1995a). She states that “humor helps create a friendly and open environment that encourages participants to leap in and voice their own opinions” (Baym, 1997, p. 113). Thus, humor may be related both to increased participation, disclosure, and interactivity (Rafaeli & Sudweeks, 1998).

Morreall (1983) argues that “sharing humor with others, then, is a friendly social gesture. It shows our acceptance of them and our desire to please them...[humor] set[s] up the mood of acceptance and make[s] the other person relax” (p. 115). Humor, as a positive aspect of communication, aids in disclosing information and in self-disclosing to others. It is often used as a vehicle for conveying to others personal motives and intentions, unmasking hypocrisy, expressing liking and friendship, managing anxiety, achieving status and individuality, controlling social interaction, and accomplishing inter and intra-group control.

Foot (1986) supports this when he states that “exercised judiciously, humor is a valued social asset, which confers upon the participant the welcoming approval of others” (p. 361). He also mentions that humor signals three key affective ingredients about the person that uses it: 1) as a jovial person who is rewarding and fun to be with, 2) as a sensitive person who has a friendly interest and willingness to enter relationships with others, and 3) as one who seeks, and probably wins, the social approval of others (or “likes to be liked”) (p. 361).

Following this line of thought, Baym (1997), includes humor, together with insight, politeness, and distinctive personality, as one of the criteria to measure online
skilled performance, and as an effective means for achieving online individuality. This issue may be strongly linked to the formation of online relational patterns and the attainment of status in a group. Baym (1995a) has also demonstrated that thoughtful, original, and humorous postings exert strong attraction among participants, and are traits of quality postings.

Baym (1995a, 1997) provides an extensive empirical study of online humor in common interest electronic discussion groups through USENET, which discussed daytime soap operas. She found that out of the 128 participants, 41% used humor at least once, while 60% of the humor occurred in messages that responded to other messages (reactive). However, Rafaeli and Sudweeks (1998) found that in an academic environment, more than 20% of messages contained at least one humorous attempt. This difference between both findings may be attributed to the nature of the context: common interest groups for the first scenario and academic groups for the second. This is, the former may produce more humorous content due to the fact that there was an external issue (soap operas) to trigger it.

Baym (1995a) states:

Humor is thus somewhat more independent than most discourse, but is still primarily stimulated by others, especially by others’ humor…Two tentative conclusions can be drawn from this finding in this computer-mediated context. The fact that humor is slightly less responsive than posts in general could mean that humor is more individualizing than many other messages. That so much of it is responsive, however, could mean that humor is an important way in which participants connect to one another and create the group’s social environment. By using an earlier post as a launching pad for fun, a poster engages the other in a game, enhancing the group’s sociable and playful nature. Humor more often than not occurs in explicit reactions to others’ messages, and humor often invokes past group discussions. Humor is thus one of the ways in which
participants blend the group’s discourse into a unified whole. What could be an ongoing stream of messages with little coherence are transformed into group history and interpersonal contacts. This does not happen in all Usenet groups...The humor is a joint production, which the audience not only understands but also helps create. This joint authorship enhances group identity and solidarity...despite the impersonal elements of the medium. Future analyses of computer-mediated groups should consider the extent to which they use humor and the ways humor operates. Rich comparative analyses of humor (or the lack of humor) across a range of computer-mediated groups can provide unique insights into the dynamics of CMC social formation. (pp. 5-7)

Although online humor can be “a powerful force in interpersonal attraction” (Wallace, 1999, p. 148), it also has its dark side. Too much humor may be viewed as a denial of serious intent, or “de-commitment” (Kane, Suls, & Tedeschi, 1977), that is, as a sign of non-involvement and lack of respect for a group activity. Sarcasm, derision, satire, and humor targeted at others may be considered as cruel forms of humor, “obtaining amusement from incompetencies and deformity, and from the oddities and incongruities of others’ behavior” (Foot, 1986, p. 361). Hostile wit within a group may hinder the social interaction or the flow of conversation because it threatens the cohesiveness of the group (Foot, 1986).

Nevertheless, the line that divides humor from sarcasm may not be so clear or distinct to an outside observer. Humor and sarcasm, as Baym (1995a) and Foot (1986) state, have to be viewed in relation to the context in which they are produced. They are context dependent. Among equals and friends, sarcasm may constitute a regular feature of their communicative style. According to this view, across time, humor may tend to increase in frequency and may show a tendency to change into sarcasm at least among certain members of the group. Interactivity may then be
linked both to humor and sarcasm. Moreover, both humor and sarcasm are communication traits in CMC associated to male language (Herring, 1996d).

Although several studies focus on the use and abuse of emotional icons and their effects upon online interactions (Lee, 1997; Marvin, 1995), in this study, humor is evaluated exclusively through content in postings. The use of emotional icons-or “emoticons”-and paralanguage, as well as other graphical conventions reviewed above, was considered as an esthetical resource pertaining to either the heading or the signature of the poster, not always reflecting the message interpersonal tone. Moreover, as an emerging register in language, it is not yet a widely known and used form of communication, especially in academic forums.

*Other-orientedness-inquiry/self-absorption-advocacy*

Advocacy refers to the action of stating personal views; forwarding personal beliefs with the intention of letting others know what issues we consider important and what paths should be followed. It is related to taking a position and holding it, usually excluding the other (Echeverría et al. 1996). D’Andrade and Wish (1985) found out that “opinions are given for purposes other than providing information” (p. 7), linking advocating to the advancement of personal beliefs. In this case, the use of the first person pronouns is the opposite of self-disclosure: it is more related to issues of dominance, authority, forwardness and control, or “gaining the floor.”

Inquiry, on the other hand, is associated to a linguistic move aiming at allowing the other to express her/his point of view. Palloff and Pratt call it “expansive
questioning” (1999, p. 119), with no right or wrong answers, aiming at increasing the level of discussion and the amount of participation. As a dimension of interpersonal behavior, it is thus related to the inclusion of others. However, in task-oriented environments, inquiry is often associated to submissive and backward behavior (Bales & Cohen, 1979).

High advocacy, high inquiry, and low advocacy may all lead to communication disruption (Senge, 1990; Senge et al. 1994; Senge et al. 1999). The former is associated to behaviors like challenging the other, dictating, asserting and pontificating, and to what Bales (1950, in D’Andrade and Wish, 1985, p. 242) terms as ‘problem solving attempts’ while the latter relates to submission, bystanding and withdrawing from the conversation. High inquiry is associated to interrogating, clarifying and interviewing. A balance in conversation-high inquiry and high advocacy allows for the expression of personal points of view and the knowledge of others’ stances, and may also constitute an indicator of a skilled discussion (Echeverría et al. 1996).

Advocacy and inquiry are also gender-related issues. Men are usually rewarded more for advocacy, while women are more rewarded for inquiry (Senge et al. 1994). However, in this study these terms are not be gender-laden, as a focus on group behavior is pursued. Interactivity may call for a balance between inquiry and advocacy, between speaking one’s mind and inviting others to do so.
Informing-offer/asking-request

Asking for information and giving information has been traditionally considered a task-oriented activity, and therefore, neutral, impersonal or factual (Rice & Love, 1987; Rafaeli & Sudweeks, 1998). The main distinction here is between requesting information or asking any type of question as opposed to giving information spontaneously or in answer to a question (D’Andrade & Wish, 1985). The difference between asking and inquiring, as well as between informing and advocating, has to do with the intent of the speaker.

In both asking and advocating, the person that performs the action is taking care of her/his own interests. However, when inquiring and informing, the speaker is taking care of the others’ concerns. More precisely, someone asks for information to satisfy her/his needs, but inquires so as the other person can express her/himself. Both can be seen as questions, but with different purposes. Similarly, a person can offer information either to satisfy other person’s request or to share with others, but advocates so as advancing her/his points of view (Echeverría et al. 1996). Offering and giving other than factual or technical information or reporting an event is considered as advocacy in this study. In a similar fashion, asking for anything besides factual information or requesting the report of an event is considered as inquiry.

However, Bales (1950, in D’Andrade & Wish, 1985, p. 242) does not make these distinctions. He categorizes the actions of giving (suggestion, direction, opinion, evaluation, analysis, expressing feeling, wish, orientation, information, repeating, clarifying, confirming) as problem solving moves, more on the active side
of communication. He also categorizes diverse actions of asking (for orientation, information, repetition, confirmation, opinion, evaluation, analysis, expression of feeling, for suggestion direction, and for possible ways of action) as simply ‘questions’, more on the passive side of communication.

There may be a difference between an active seeker and a passive provider of information. Constant, Sproull & Kiesler (1997) report on an organizational study with employees from all levels, that information seekers asked fundamentally technical questions. Information providers, when answering a question posed by others, they did so to help them and the organization. Reasons of personal benefit—mainly to earn others’ respect—followed. This position seems to be held by Galegher, Sproull, and Kiesler (1998), inasmuch they suggest that, in electronic support groups, asking questions may be closely related to participants’ legitimating claim for attention, while offering answers may be related to establishing authority.

However, constantly requesting factual information may also be perceived either as a sign of cognitive immaturity or as a trait of helplessness. On the other hand, permanently offering non-requested information may be perceived either as being overtly presumptuous, or as a characteristic of an altruistic and helpful behavior. As in any rhetorical exchange, the nature of the question and answer and the relationship between the questioner and answerer must be considered to fully assess the nature of the communication. Anyway, both categories may thus have an important effect upon online interactivity. So, even when considered by Bales (1950, in D’Andrade & Wish, 1985, p. 242) as independent dimensions of impersonal
content in messages, offering/requesting (as informing/asking) is also regarded as a bipolar category (Wish, D’Andrade & Goodenow, 1980), correlated to issues of dominance/submission in interpersonal relations (Burgoon & Hale, 1987; Hare & Davies, 1994; Lundgren, 1977; Schutz, 1994).

**Additional Issues Influencing Interaction and Interpersonality**

Diverse issues influence both interaction and interpersonality. The most salient present in online CMC literature are time, anticipated interaction, type of task, and gender.

**Time**

Communication technology develops at a higher speed than the social skills required to operate in groups with distant partners, so new communication technologies require that users learn new ways of behaving towards information and towards each other (Kiesler, Siegel, & McGuire, 1984) in order to fully exploit the potential the electronic devices have to offer. “Changes in relational communication should be expected to occur when such communications continue over time” (Rice & Love, 1987; Walther & Burgoon, 1992). Group computer interactions take longer than face-to-face communications, so they both may operate at different levels of social information exchange, which makes relational development slower for the former than for the latter. Baron (1998) seems to support this when he reflects upon the high rate of misunderstandings and hurt feelings in CMC inexperienced users.
The influence of time of interaction in CMC has produced contradictory findings. Several authors (e.g., McDonald, 1997; McDonald & Gibson, 1998; Rice & Love, 1987) found that the proportion of socioemotional content in messages does not increase over time. “This result implies that users do not ‘warm up’ to a CMC system to display their propensity toward sending messages, at least when using the simpler messaging capabilities, but rather display their communication style early on” (p. 98). In opposition to this conclusion, Walther and Tidwell (1995) refer to the time factor as a key variable that affects interpersonality. To explain this, Walther (1992) developed a relational perspective based on social information processing theory. He states that relational (or interpersonal) communication in groups varies through the group’s evolution through time. First exchanges in group development are more oriented to task, followed by conflict and then solidarity, as demonstrated in McDonald and Gibson (1998), thus contradicting Rice and Love (1987) who state that socioemotional content in message appears early on in online interactions.

Few of the studies reviewed were conducted over a long enough time period for the socioemotional stages to emerge, thus time-limited experiments appear impersonal. Walther’s (1992) social information processing theory thus predicts temporarily retarded interpersonal development in CMC. Walther and Burgoon (1992) state that CMC interactions tend to become more personal over time.

Extended interactions…should provide sufficient information exchange to enable communicators to develop interpersonal knowledge and stable relations. Because CMC groups take longer to communicate than face-to-face groups…the progression of relational development should therefore be slower in CMC that face-to-face. (p. 55)
Expressing and deciphering online interpersonal cues is slower than in face-to-face communication. Walther and Burgoon (1992), in a face-to-face vs. CMC study conducted with ninety-six undergraduate students representing several majors and class levels participating for course credit, state that interpersonality as a whole in a group may be dependent on a temporal perspective, and the impersonal content of CMC may be “limited exclusively to initial interactions” (p. 55). Increased interpersonality, or socioemotional communication, is positively related to increased time for interaction (Walther, Anderson, & Park, 1994). They also found that when time is not restricted, negative interpersonal communication is less than when time is limited. Time, more than medium characteristics, is “a strong discriminator in explaining the amount of socially oriented versus task-oriented communication” (p. 477).

Moreover, impression formation is much slower in online forums than in face-to-face settings. Early research on this theme involved short-term interactions in so-called zero-history groups, in which strangers worked together for short periods of time. According to Walther (1993), the participants may not have had enough time to form more than just an amorphous impression of their invisible partners. With time, he states, a well-developed impression of the other may eventually emerge, thus fostering interpersonality. Jaffe et al. (1995) state the following:

A major, axiomatic assumption of social information processing is that actors in CMC are affected by the same internal drive of “affiliation,” i.e., interaction with other humans, as actors in other communicative contexts. Affiliative communication uses, and its constituent messages, constitute relational communication. A second assumption is that the development of an
interpersonal impression of another person is based on the information one gets via nonverbal or verbal-textual channels over the course of several interactions. A third assumption of this perspective is that in CMC, messages take longer to process than do those sent FTF. One conclusion of these assumptions, and of the research which challenged their pertinent hypotheses, is that CMC can be just as deeply relational as FTF communication if sufficient time and message exchange is allowed for message volume to generate a relationship. (p. 6)


Walther (1996) states that interaction is impersonal on rare occasions. He mentions five issues that may force online relationships to become impersonal:

1. Natural or experimental settings with restricted time frames for interaction.
2. Purposes of interaction do not include interpersonal goals.
3. Online encounters with no expectation of future interaction.
4. Impersonality as a desired effect.
5. Anonymity and software-imposed interaction structures (p. 32).

Although early research on CMC led to the notion that it supported and fostered impersonality—and that sociality was somehow undermined (Spears, Lea, Postmes, in press)—because of its intrinsic task-orientedness, impersonal exchanges in computer conferences may be exclusively limited to initial interactions, especially among unacquainted interactants. Walther and Burgoon (1992) study with undergraduate
students on a five-week time span supported the hypothesis that initial messages among previously unacquainted participants in CMC are higher in task orientation and lower in composure/relaxation (or more tense and aroused) than later messages. However, in a meta-analysis of empirical research, Walther, Anderson, & Park (1994) found out that time makes a difference between studies on general socioemotional communication, but no difference on the negative interpersonal dimension. They state that “it is reasonable to interpret that it is the positive end of social CMC that changes over time” (p. 481).

Some authors (e.g., Longacre, 1992; Swales, 1990, in Herring, 1996d) have reported that online informational texts tend to be organized as expository reports with little interactivity, while interactive postings, both between teachers/students and students/students, tend to be more interpersonal, thus suggesting a dependency relationship between interpersonality and interactivity. If interactivity was conceived as an attitude demonstrated by participants’ online postings, interpersonality in online exchanges may be considered as an active, purposeful behavior: an attitude also.

However, the issue of interactivity in messages being positively related to an increase in interpersonality is scarcely dealt with in the literature. Interpersonality in long-term interaction through conference forums in academic settings is a relatively untouched issue, although Parks and Floyd (1996) found that both duration (length) and frequency of participation in newsgroups were the best predictors of the development of personal online relationships. A strong correlation between level of participation and interpersonality was established.
Thus, time is the determining factor in online group flow and development. It is mentioned in literature as strongly related to interpersonality, participation and interactivity (Baym, 1995b; McGrath & Hollingshead, 1994; Rice & Love, 1987; Walther & Burgoon, 1992). Socioemotional and interpersonal content in group exchanges may change, strengthen, or attenuate as interaction continues over time (Driskell & Webster, 1997). However, most studies (see review in Bordia, 1997) have been conducted on a short time span. Studies that imply a longer time span are lacking.

**Anticipated interaction**

As important as time affecting interpersonal content in CMC is the expectation of a long-term association or anticipated future interaction. McGrath and Hollingshead (1994) state that

Groups should be considered as continuing, intact social systems engaged in one or more relatively macroprojects, any one of which is likely to extend beyond the temporal boundaries of a single meeting. There may be some natural groups that do exist only for a single meeting and work on only a single topic, but by far the majority of natural groups have a life that extends beyond a single meeting on a single topic…(p. 76)

Walther (1994, 1996) found out later on that anticipation of future interaction in longitudinal groups accounted for the presence of interpersonality since some of groups’ first meetings and throughout the study. This is, “although the zero-history group members…knew nothing about their partners as they undertook their meetings, partners knew they would be communicating with and interdependent upon their
partners over time” (p. 478).

Building upon Uncertainty Reduction Theory (URT) by Berger and Calabrese (1975), Walther states that the mere knowledge of a long-term versus short-term encounter positively affects the initial amount of friendly interpersonal content. More positive interpersonal content appears to be present when users think their association will have some longevity. People who anticipated working with the same partners for a continued time showed a more open, friendlier, more affectionate, and warmer content in their postings, compared to people who thought work with others would be ephemeral. He states that “when online encounters do not include anticipated future interactions, they are less personal than comparable face-to-face encounters…when users even so much as expect to have a long-term association, CMC is no less personal than face-to-face” (1995, pp. 32-33).

Kollock and Smith (1996) make reference to a possible relationship between interpersonality and expectation, when they state that “knowing that one will be interacting with others on a continual basis can lead to the creation of reputations, and serve as a powerful deterrent to short-run, selfish behavior” (p. 119). Reinforcing this notion, McDonald and Gibson (1998), based on group development theory (GDT), also noted that interpersonal interactions were paramount at the beginning of online exchange, just as they had predicted. They found that interpersonal content was more intense at the beginning of graduate group activity, and diminished with time over a sixteen-week period. Communication among graduate students during one semester indicated that
Interpersonal issues were very important at the beginning of the course. However, tests for linear trend of proportion of interpersonal segments over time indicated a significant downward trend. Although interpersonal issues became less important over time, it is important to note that they still remained prominent with a 45% (of the total segments) throughout the course. (p. 14)

**Type of task**

The type of task a group of persons performs may also influence online socioemotional behavior as well as group interaction (McGrath & Hollingshead, 1994). McElhearn (1996) comments that restrictions placed on an electronic forum “have a very strong influence on the type of message that is permitted, and therefore on the type of discourse that the list generates” (p. 10). The task to perform is a highly restrictive issue in fostering or discouraging socioemotional content in online exchanges.

McGrath (1984) developed the Group Task Circumplex (p. 61) to categorize task types into four quadrants: generating (creativity and planning tasks), intellective (problem solving and decision-making tasks), negotiating (conflict resolving tasks), and executing (performance executing tasks). These tasks differ in the degree of media richness required to be accomplished, or in the amount of emotional information needed to effectively address different situations (Trevino, Daft, & Lengel, 1987). They require either more information transmission or more interpersonal commitment. Information generating tasks thus require less degree of interpersonality than conflict solving tasks. Thus, the type of task has a direct impact
upon interpersonality (Trevino, Daft, & Lengel, 1987; Laurillard, 1996; McGrath & Hollingshead, 1994).

Tasks also vary in their degree of ambiguity (McGrath & Hollingshead, 1994). Tasks such as idea generation, information exchange, or argument sharing have a low degree of ambiguity because they require the submission of little or no additional information except the needed for the acquisition of more information, while high ambiguity tasks, such as decision making and conflict resolution require the open exchange of subjective views (Valacich, et al. 1993). Laurillard (1996) adheres to this view by stating that computer conferencing does not support any task “other than the description and redescription of the student’s view” (p. 170). Generating ideas is a task that may only require the transmission of specific information, which may imply that

- Evaluative and emotional connotations about message and source are not required and are often considered to be a hindrance...[whereas] tasks requiring groups to negotiate and resolve conflicts of views or conflicts of interests may require the transmission of maximally rich information. (McGrath & Hollingshead, 1993, in Valacich et al, 1993, p. 253)

Therefore, according to the authors, the presence or absence of socioemotional content may sometimes be welcomed and required, and sometimes be a hindrance. Henri (1992b, p. 127) states that, “high levels of socially oriented messages may sometimes be a disruptive element, distracting learners from the purpose of the communication; in other cases, these messages can be supportive of the learning process.”

Walther (1994) supports this by stating that early studies in CMC believed that
“what is most interpersonally satisfying is not always most productive” (p. 495), and further (1996) comments that it was also believed that reduced socioemotional communication and increased task orientation can enhance group work, leaving a greater proportion of time to fulfill the instrumental task at hand. Emotionally laden content takes time away from task resolution.

Mabry (1997) also mentions that emotionally intense messages, especially negative or perceived as negative, are not well suited (even irrelevant) for cognitive processes. Following this line of thought, and backing up the idea that CMC is more task-oriented than interpersonally oriented, much of the research on technology and groups has been done under the assumption that all activity that does not contribute directly to the performance of the assigned task is evidence of the inefficiency of the group. Therefore, as mentioned above when addressing equality of participation, interpersonality is also ubiquitous in CMC, even though it may not always be welcomed or encouraged.

**Gender**

Gender composition of groups affects the content of language in CMC. Parks and Floyd (1996) found that women are significantly more likely than men to establish online interpersonal relationships. Only 54.5% of men in newsgroups had formed a personal relationship, against 72.2% of women. Support/alignment, disclosure, praise, offer-inform, and inquiry are traits strongly associated to female rhetoric, while the presence of adversariality/opposition, reserve, chastisement,
humor/sarcasm, request-ask-demand, and high levels of advocacy are indicative of male discourse (Herring, 1996c; Herring, 1996d).

In a more recent study analyzing online behavior of adult professionals studying bachelor and master’s degrees, Blum (1999) found out that females communicate in a more personal manner while males do so using a more impersonal style of communication. Female discourse disclosed more, contained words of a more elegant nature, the overall tone of their messages was less rough, arrogant, and assertive, contained fewer insults, less slang, fewer jokes, and fewer derogatory words, showed a stronger tendency to collaborate, to ask for and respond to pleas for help than male discourse. Female discourse was also characterized by placing more attention on relationships, being more empathetic in nature, and stressing more cooperation than competition. The use of polite words, the acknowledgement of the original sender, and the use of polite conventions also marked female discourse.

Men, on the contrary, posted more messages and answered to more posted messages than women, attempting to control the online environment. They also showed a tendency to avoid asking questions, to show certainty, to use slang, to be arrogant, and to post more jokes-most of sexual nature-particularly after a pattern of many female messages. Their postings did not contain personal references, and overall lacked a mention of self, personal experience, and family issues, thus exhibiting a more impersonal style of communication. Age/maturity may also be an influencing factor. However, Bullen (personal communication, July 17, 2000) states that his experience when moderating and tutoring online academic groups does not
support such a huge difference between male and female styles of communicating.

Although gender differences in communication style is not the specific focus of this study, it is expected that female predominance in online discussion forums will increase the interpersonality content in group discussions.

**Culture and language of interaction**

The online environment allows for the connection of individuals and groups all over the world, and this exposure to other cultures and languages may provide deeper understanding of one’s own and others’ cultures, develop useful connections, and promote collaboration (Palloff & Pratt, 1999). However, the literature that deals with factors affecting online interaction (Bullen, 1997; Baym, 1995a, 1995b, 1996, 1997, 1998; McGrath & Hollingshead, 1994) does not consider cultural issues as influencing participation, interaction or interpersonality. Nonetheless, asymmetries in online relational patterns, participation, interactivity, and interpersonality have been reported in bicultural or multicultural discussion forums when non-Americans and non-native speakers of English interact (Ma, 1996; Colomb & Simutis, 1996). Among the cultural issues affecting interaction, language and nationality are the most relevant.

On the one hand, non-proficiency in the language of interaction-usually English-is a key issue in face-to-face exchanges. Non-proficiency may deter and inhibit participation and involvement in conversation. However, asynchronicity, the absence of turn taking, and the reduction, and even absence, of physical cues in
online interactions may encourage participation in non-proficient interactants. The absence of physical cues and turn-taking moves may have a reductive effect on the inhibition caused by language difficulties, while the time delay offered by asynchronicity may benefit participation.

Even when people whose mother tongue is not the interaction language may be capable of performing low cognitive activities (as conceived by Bullen, 1997; Henri, 1992b; Gunawardena et al. 1997; Kanuka & Anderson, 1998), they may not be able to engage in deeper and higher-order phases within the cognitive process which lead to critical thinking and shared knowledge construction. Difficulties with the use of the language of interaction may thus impact negatively on participation and interactivity levels, but may have little bearing on the amount of interpersonal exchange. The expression of socioemotional content may not require interactional language proficiency.

On the other hand, cultural issues may also impact asymmetry and interpersonal outcomes. In a cross-cultural study between North American and East Asian junior-level online students, Ma (1996) found that while East Asian students thought they were more direct online than in face-to-face interactions, some U. S. students still perceived them to be polite but reserved and indirect. Intercultural interaction patterns are similar in many ways to gender-related patterns: unanswered messages, shorter interactions, stronger disagreement, impersonality, and even open hostility towards “strangers” (Gudykunst & Kim, 1984, in Ma, 1996). “Strangers represent both the idea of nearness in that they are physically close and the idea of remoteness in that
they have different values and ways of doing things” (p. 177). The problem is that in cyberspace either everyone or no one is a stranger, because the notion of host/guest is non-existent. Both online language proficiency and intercultural issues are still a neglected field in online research.

**Emerging Traits in Group CMC**

After analyzing social, educational, organizational, linguistic, technical, interactional and interpersonal issues of CMC, some traits and tendencies appear to be emerging more clearly. Any generalization from the above-mentioned findings is risky and unsound, due to the fact that literature concentrates on one or two variables and ignores the complexity of online communication. Thus, findings are not consistent. As McGrath and Hollingshead (1994, p. 92) state, “the problem is not that…sets of facts disagree; rather, it is that they cannot be compared, because they deal with different parts of the domain (communication media, tasks, dependent variables) and do so in different research languages.”

However, a summary of findings may be useful.

1. CMC is yet another mediated type of interaction among human beings (as the telegraph, the telephone and sign language), and not merely an extension of existing social forms of interpersonal communication (Ball-Rokeach & Reardon, 1988). CMC removes time and distance barriers to the formation of groups (Hiltz & Turoff, 1978), thus allowing interaction of physically dispersed people (Sproull & Kiesler, 1995).
2. Primarily and fundamentally text-based, CMC constitutes a new speech pattern, a new language code (Lee, 1997), a hybrid form of register (Veselinova & Dry, 1995, in McHelhearn, 1996) that shares some traits of written and spoken language, and thus may be termed as “a model of a different form of conversation…a written quasi discussion” (Shank & Cunningham, 1996, p. 30) and a new semiotic system (Voiskounsky, 1998). CMC has been called “multiloguing” (Shank, in Shank & Cunningham, 1996, p. 30) and “teleloguing” (or telematic polylogue) (Ball-Rokeach & Reardon, 1988) as a step beyond monologue and dialogue. Whereas print can be considered digital, discursive, and communicative (versus analogic, presentational, and expressive forms of visual media) (Goffman, 1969; Meyrowitz, 1985; Watzlawick, Bavelas, & Jackson, 1967), CMC, although presently dependent upon a set of typed characters, can be labeled as a form of interactive print, creating a “word world”, “text talk”, “digital rhetoric”, or “electronic discourse” with processes and structures as real as face-to-face or other mediated forms of communication (McLaughlin, Osborne, & Smith, 1995). Thus, although CMC “derives from both writing and speech, it does not homogenize traits from each into a synthetic mixture or blend. Rather…it has some traits from…one and from the other, and the combination has a life of its own.” (Lee, 1997, p. 294).

3. “By virtue of being carried out exclusively via language, text-based CMC makes transparent as never before the role of language in the presentation of self, and in the genesis and organization of social practices” (Herring, 1996e, n/p). The phenomenon of CMC interest allows the exploration of persistent human-to-human
interactions through the transposition of ordinarily ephemeral conversation into the potentially persistent digital medium. “The persistence of such conversations gives them the potential to be searched, browsed, replayed, annotated, visualized, restructured, and recontextualized, thus opening the door to a variety of new uses and practices.” (G. Haifa, personal communication, February 9, 2000)

4. As McGrath and Hollingshead (1994) state

On one hand, technology extends the range of possible communicators beyond the time and space barriers imposed on face-to-face groups. At the same time, it restricts the modalities through which those individuals can communicate with one another…This restriction of modalities can have both favorable and adverse effects on the work of groups. (p. 53)

The dynamics of interaction, communication, and coordination of electronic communities differ from face-to-face interactions (Henri & Rigault, 1996). CMC is commonly and erroneously defined in opposition to face-to-face communication. The “reduced cues” approach is “ill-prepared” to account for the development of personal relationships currently occurring through CMC, as it relies too heavily on the “physical and spatial aspects of interaction” (Lea & Spears, 1995, p. 220). “Electronic groups are not just traditional groups whose members use computers” (Sproull & Kiesler, 1993, p. 112). They are “nontraditional social formations” (Jones, 1995, p. 11), “alternate spaces” (Slouka, 1995, p. 43), that “are not a pale, artificial substitute for more traditional forms of community” (Kollock & Smith, 1999, p. 17). Their members develop their own behavior norms and structures, establish their operating rules and evolve through time, both through the creation and the disruption of individual bonds within the group, exclusively upon the use of textual language
CMC offers the possibility of increasing relationships and the range of social networks (Haythornthwaite et al. 1998; Wellman & Gulia, 1999), moving away from dependency on “physical co-presence of individuals” (Lea & Spears, 1995, p. 220).

Due to this, the practice of CMC has influenced how we interact and form relationships, thus reshaping organizational and educational structures and redefining the nature of managerial and teaching/learning practices. However, existing communication or sociological theories do not often address the complex online phenomena adequately (Kiesler, 1997). Many previous analyses of CMC have examined “artificial, experimental situations, rather than a vital community of interacting individuals” (Murray, 1997, n/p) over a short period of time, focusing more on connectivity computer issues than upon computer-mediated people-to-people networks and social relations (Jones, 1995; Sudweeks & Simoff, 1999). Rafaeli and Sudweeks (1998), state that

Laboratory based, experimental work has uncovered a series of dysfunctional or problematic attribute of CMC. Among the topics studied in the laboratory were flaming behaviors, desinhibition, and deindividuation…Important as they may be, these concepts neither disprove nor explain either growth or the glue that keeps CMC together. (p. 177)

As a relatively new field of study, more descriptive research in natural settings is required to explain the ecology of online interactivity. Since the way participants behave in an artificial setting may not be the same as in naturally occurring conditions, the degree of possible generalization is restricted (McMillan & Schumacher, 1997, p. 191).
6. Although it was thought that CMC conveyed a low sense of physical and social presence (Culnan & Markus, 1987; Sproull & Kiesler, 1986) due to cue deficiencies and low media richness of its narrow bandwidth, and although a certain degree of message misinterpretation (Cathcart, Samover, & Henman, 1996) and erroneous personality judgments appear to be present (Fuller, 1994), a high degree of desinhibition (Joinson, 1998), emotional involvement, intimacy and immediacy (Lombard & Ditton, 1997) may be achieved in asynchronous modes when used as the only or primary means of human interaction. Alleged predominantly impersonal, serious, hostile, task-oriented, businesslike content as reported by Hiemstra (1982) and Rice and Love (1987) may not be inherent to CMC, but strictly bounded to certain specifiable conditions (restricted time frames for interactions, purpose for interaction, task requirements, imposed specific technological devices, type of partnership) (Walther, 1996; Walther & Burgoon, 1992), and the theoretical framework and the category system used to evaluate interactions (Hare & Davies, 1994). Thus, CMC is not a “linguistically unidimensional or impoverished media” (Spears, Lea, & Postmes, in press, p. 21).

7. Three types of online environments seem to emerge. Academic, in discussion groups in educational settings; administrative, through e-mail in organizational settings; and community building (Herrmann, 1998), through synchronous devices in social settings. However, although it means that they are functionally different (community-building discourse is basically continuous, aimed at creating cohesive ties, while academic and administrative discourse is primarily
discrete and punctual, aimed at knowledge sharing and action coordination), the three forms of discourse may share traits among themselves. Socioaffective issues and interpersonal exchanges may be found in academic discourse (McDonald, 1997), as well as action coordination may be present in social groups. Impersonal exchanges are not the norm even in educational, task-oriented group communication (McDonald, 1997). Interpersonal and hyperpersonal communication (CMC that exceeds face-to-face interpersonal communication) take place not only in recreational synchronous interactions, but also in asynchronous decision-making and task-oriented groups in academic and social settings (Ord, 1989; Rice & Love, 1987; Walther, 1996). Even in groups where interaction is mainly for information exchange purposes, companionship, social support, and a sense of belonging is abundant (Wellman & Gulia, 1999).

8. With time, and with the anticipation of future interaction, users find ways of conveying socioemotional contents even in task-oriented environments. For interpersonal interaction to occur, and because the progression of relational development through CMC is slower than in face-to-face settings (Walther & Burgoon, 1992), users must be allowed time to get to know their fellow partners, to exchange more messages and develop an affinity for the device (Olaniran, 1996). There is a learning curve, so people need time to become “adept at using and interpreting textual signs and paralinguistic codes” (Lea & Spears, 1995, p. 217). Training previous to working electronically can foster this latter issue, especially for people with a low ability to communicate through writing and with low typing skills.
Studies over time must be conducted to account for CMC inherent time delays in interaction (Arrow et al., 1995).

9. Some asynchronous CMC users tend to develop communities of “consistently presented personae” (McLaughlin, Osborne, & Smith, 1995, p. 93) through compensation and self-regulatory mechanisms in text-based online interactions among individuals and within a group. Online identities are constructed largely (and sometimes solely) through textual interchange and interaction, when bodily and environmental aspects are reduced (Mason, 1992; McDonald, 1997; Perrole, 1996; Postmes, Spears, & Lea, 2000), making the postings themselves as sole assessment signals for a salient trait (Donath, 1999; Henri & Rigault, 1996). These computer-mediated “communities of interlocutors” (Gergen, 1994, p. ix) jointly structure and shape a meeting place as they generate and maintain meaning through conversational rituals of relationship (Gergen, 1994; Goffman, 1967; Shotter, 1993). “Discourse processes generate social structures, which in turn affect discourse processes” (Berger & Luckmann in McLaughlin, Osborne, & Smith, 1995, p. 94).

Participants in electronic relationships get personally involved and live important parts of their lives in those contexts. They consider electronic life as real life, with its “own set of advantages, limitations, and challenges” (Eastmond, 1997, p. 97; Rheingold, 1993). Computer personalities are psychologically real to users (Moon & Nass, 1996), and as such, a rich addition to its existence as it allows them a new and sometimes the sole way to connect with each other (Anderson, 1997).

10. CMC relationships are therefore neither casual, temporary, false or
emotionally shallow (Chenault, 1998), and interaction with participants in CMC is “really interacting with people” (Stoll in Hart, 1996, in Chenault, 1998). The absence or reduction of social and personal cues should not be taken as to mean that CMC is impersonal, as some authors have demonstrated (e.g., McDonald, 1997; Palmer, 1995; Walther 1992). The subtlety of online cues, such as chronemics (time-related issues in postings) (Walther & Tidwell, 1995) and language content of messages (Lea & Spears, 1995) take on greater value instead. Research must move away from the notion that face-to-face communication is the only real, paradigmatic, prototypical, desired, and ideal form of relationship among individuals (Palmer, 1995). This has caused interactional patterns and relational development of online “nontraditional social formations” (Jones, 1995, p. 11)-whether communities, groups, or one-to-one interactions-to be understudied (Duck & Wood, 1995; Parks & Floyd, 1996).

11. Although “there has been no evidence, other then anecdotal, stating that groups can, and do, develop online” (McDonald & Gibson, 1998, p. 1), there is recent research that shows some long-term, successful online small groups of interactants. Restricted in participation, their members share a common interest, have known, stable identities (Donath, 1999), are socially homogeneous, and have clearly defined boundaries. These characteristics reduce conflict (Kollock & Smith, 1999) and foster repeated interaction, which in turn encourages cooperation. If individuals are not likely to interact in the future, there is huge temptation to behave selfishly. On the other hand, “knowing that one will be interacting with others on a continual basis can lead to the creation of reputations, and serve as a powerful deterrent to short-run,
selfish behavior” (Kollock & Smith, 1996, p. 119).

12. “Dynamic group structures emerge when people converse electronically” (Sproull & Kiesler, 1993, p. 113). Nevertheless, a working group is not necessarily a community. The question about what constitutes a virtual community “remains unexplored territory” (McLaughlin, Osborne, & Smith, 1995, p. 93). Most of the published works on virtual communities are either theoretical or philosophical (Liu, 1999). Utopian and dystopian (“panacea and threat”, according to McGrath & Hollingshead, 1994, p. 2) views of electronic communities and work groups in the popular press by enthusiasts and critics, based upon speculative opinion and anecdotal experiences, need to be properly sustained (Chenault, 1998; Jones, 1995; Kollock & Smith, 1999; McGrath & Hollingshead, 1994; Wellman & Gulia, 1999). So called “virtual communities” have been studied mostly through the patterns of postings in special common interest newsgroups in Usenet (Baym, 1995b; McLaughlin, Osborne, & Smith, 1995; Parks & Floyd, 1996; Smith, 1999). However, the few empirical ethnographical studies reported (Gunawardena, 1995) provide little information because they are static and are marked by differences in their variables (McGrath & Hollingshead, 1994). It may be clear that not all online exchanges and interactions between people, although highly interpersonal, can and should be considered community-constituting efforts. Beniger (1987) uses the term “pseudo-community”, one in which interpersonal relations constitute simulated personalized communication, “a hybrid of interpersonal and mass communication” (p. 369). Talking about online groups (instead of communities) may be more adequate in some
task-oriented situations. Online communities may still be a buzzword, something that “we seem to want or need to be true” (Jones, 1995, p. 15).

13. Even if CMC has not proven suitable for interaction upon complex subjects (reach decisions and consensus, or completing a task) (Baym, 1995b; Hiltz, Johnson, & Turoff, 1986), it does allow the constitution and operation of online discussion groups which require a certain dose of rapport (Holmberg, 1996a), empathy (Holmberg, 1996b), closeness, mutual respect and affinity (Henri & Rigault, 1996), support and intimacy (Wellman & Julia, 1995), cooperation and trust (Lauzon, 1992), personal fulfillment, and presence. Text-based discussion groups are working social units where a certain level of regulation has had to be accomplished (Carnevale & Probst, 1997) and a high degree of interactivity is exhibited (Rafaeli & Sudweeks, 1997).

14. Although the possibility for online interaction increases through growing access to computers, the notion that democracy, cooperation and support should inevitably follow is misleading. Intolerance, imbalance, punishment, and humiliation are present (Reid, 1999) in CMC, especially in non-restricted synchronous virtual environments. Even when many non-moderated and moderated communities are a model example of collaboration, empowerment, organization, and productivity (Mele, 1999), asynchronous, moderated, restricted-access, work-oriented small groups may exhibit either highly hierarchical and dictatorial structures, with some people dominating and imposing their views upon others (Walther, 1992), or wild and unordered exchanges, thus reproducing and even amplifying face-to-face relationship
stereotypes (Kollock & Smith, 1999).

15. CMC is not a unitary or a homogeneous field. There are a variety of devices, each with a particular set of capabilities and limitations, which help structure interactions in a specific way (Ahern, 1994; Culmers, 1997; Kollock & Smith, 1999). Their structural qualities may influence their selection and may shape types of discourse that emerge (Herring, 1996d; Smith, 1998). Therefore, studies that focus on two or more devices through holistic analysis may prove more useful for uncovering mutual influences upon conversational patterns, thus better explaining the complex ecology of interactivity. However, a comprehensive analysis of CMC is not currently possible, limited by the “paucity of available data” (Lea & Spears, 1995, p. 199).

Together with the technological aspects of CMC, both the content and form messages take are highly dependent upon the role of participants (Lawley, 1992), upon the structured relations among people (Haraway, 1991), and upon participation frequency, timely contributions, and nature of posted messages (Eastmond, 1997).

16. Online interactivity patterns and group dynamics (amount, frequency, and directionality of postings through time) as CMC variables depend upon diverse input factors such as technical (device richness, device attributes, compatibility, friendliness, features, mode), human (gender, age, maturity, previous technological and CMC experience, communication skills, knowledge of course content, degree of motivation, learning style, personality, time working together, role of participants), environmental (design and planning), and task related issues (purposes and nature of educational, organizational or social tasks), as well as upon the quality of postings
(content and emotional overtone, or what is communicated and how it is done).

Therefore, CMC should not be conceived as an isolated or simple social phenomenon (Haythornthwaite et al. 1998). The diverse factors that shape online group interaction are difficult to separate in controlled studies, which may account for the fact that findings of experimental research often do not hold true when applied under real settings and in blind studies (McDonald, 1997). McGrath and Hollingshead (1994) state that

There are a plethora of potentially relevant factors; far too many to incorporate in any given study as design variables, or as factors to control statistically or experimentally…The most important effects in this domain are likely to be interactive consequences of the joint operation of a number of variables, rather than main effects in one. (p. 94)

17. CMC expands access to others and offers the possibility of increased participation (Harasim, 1993, 1990, 1989; Harasim et al. 1996). However, this does not necessarily imply higher interactivity, egalitarianism, or more evenly distributed participation among group members (Baym, 1995b), or that “online cooperation is inevitable and expanding” (Kollock, 1999, p. 235). Group-oriented responses for pedagogical decision-making tasks frequently turn out to be, at best, a collection of monologues (Hewes, 1986). Communication anxiety in relation to delayed responses, fear, information overload (infoglut) (Harasim et al. 1996; Johnson & Huff, 2000; Rojas, 1995), loss of control and sense of structure, (Romiszowski & Jost, 1989), confusion and inhibition due to multiple threads of simultaneous topics (Ruberg, Moore, & Taylor, 1996), unequal participation (under and over posting), spamming, lurking, perceived awkwardness of asynchronous exchanges, trivialization and
perceived irrelevance of conversation in forums (Grint, 1989; Rojas, 1995), overwhelming initial greetings followed by scarce or null participation (Hunt, 1997), miscommunication, textual ambiguity, technical problems, difficulty in sustaining discussions (Eastmond, 1997), and excessive time demand for “online listening”—reading and responding to others (Anderson, 1996b; Kindler, 2000)—have been reported as common problems in educational online communication (Harasim et al. 1996; Reid, 1997). Thus, the impact and effectiveness of interactivity and relational development in learning groups upon cognitive processes, collaborative work, idea sharing, and knowledge building are a growing concern among scholars in a variety of fields (Berthold et al. 1998; Brandon & Hollingshead, 1999; Bullen, 1997; Eastmond, 1997; Haythornthwaite et al. 1998; McDonald, 1997; Palmer, 1995; Rafaeli & Sudweeks, 1998; Riel, 1996; Sudweeks & Rafaeli, 1996; Walther, 1996, 1995, 1996; Walther & Burgoon, 1992; Wellman, & Gulia, 1999).

18. Both asymmetry in interactions and interpersonality in messages, contradictory as they may seem, may be both inherent and ubiquitous properties of human communication and thus, of CMC. Asymmetry is related to interactional dominance, and would seem closer to impersonality in postings. Interpersonality would seem more related to a symmetrical or more even interactional environment. However, this is not so. The issue is how are they related and why. As Chenault (1998, p. 18) puts it, “In the end, the argument should not be whether or not if CMC can properly foster interpersonal relationships. Instead, scholarship can move into the ‘how’ and ‘why’, and beyond the mere ‘if.’”
Conclusions

Asymmetries in participation and interaction, as well as differences in interpersonal style, may be due to a myriad factors and issues: members’ characteristics (cognitive, affective, volitive, and demographic); properties of the group (compositional and structural); task characteristics; properties of technological systems (both hardware and software); and context characteristics (physical, sociocultural, and temporal). Specific issues of access, information overload, gender, language of interaction, culture, status, cognitive maturity, subject matter, course design, moderator/instructor intervention and style, technology issues, time of interaction, group size and composition, ongoing expectation/first impressions, and task related issues all seem to bear upon the amount and type of online interaction and interpersonal content.

Interaction is particularly critical for learning process and outcomes (critical thinking and knowledge building) (Bullen, 1997, p. 228). As explored above, it is not so much a characteristic of the medium as it is a crucial process-related theoretical construct to assess online academic communication (Rafaeli & Sudweeks, 1998, p. 175). More than an issue related to the medium itself, it refers to the way participants in conference forums relate to each other, and thus may be considered as an indicator of group cohesiveness and as a parameter to evaluate participants’ commitment. Interaction then is more than message exchange between participants. It reflects the degree to which they listen to each other and build upon other’s contributions. Interaction is thus to be considered as a seminal property of online discussions that
aim at building knowledge and developing high-order cognitive skills.

However, interaction is still not a clear construct, and therefore not easy to evaluate in online communication. On the one hand, reactivity to others’ messages is often mistaken for interactivity. On the other hand, interaction is more than just a count of volleys among participants’ messages. It is also related to the intentionality of participants in involving others. Interaction is, therefore, a construct that seeks to incorporate both past contributions as well as engaging future postings in online threads. It both depends on prior context and defines the conditions for possible continuations (Linell & Luckmann, 1991, p. 7).

Interaction has both a quantitative and a qualitative dimension. The former is reflected in the number of direct and indirect intermessage references; the latter is reflected in the intent of invitation to participate. It is, and this is the new theoretical twist, less a property of CMC or a trait in messages than an attitude, a particular way participants have of relating to one another. In other words, messages are not reactive or interactive: people are. Identifying the issues that impact upon interaction, fostering it when present and developing it when absent may be an important task of online tutoring towards the building of learning communities.

Historically, studies of relational and interactional patterns in face-to-face groups have focused either on task behavior or upon the relationships between their members. This traditional opposition may be considered as a continuous dimension, which measures the extent to which messages range from work-related to personal issues (Walther & Burgoon, 1992). This notion has also been applied in CMC
research (e.g., McDonald, 1997, McDonald & Gibson, 1998; Rice & Love, 1987; Walther & Burgoon, 1992). Since Bales (1950, in D’Andrade & Wish, 1985) developed his twelve-category system for interpersonal process analysis based upon the distinction between socioemotional and task areas-six for the former and six for the latter, there has been a search to limit the number of dimensions of analysis that would integrate the major variance. Nonetheless, the dichotomy between social and task oriented content in those attempts has remained. Social oriented messages have been defined as interactions that show solidarity, tension relief, agreement, antagonism, tension, and disagreement, while task oriented messages are defined as interactions that ask for or give information or opinion (Rice & Love, 1987).

Following this social/task bipolarity, most online courses offer alternative forums for the students to express their socializing needs and their emotional requirements. Thus, it is expected that content-related forums remain strictly impersonal, or assignment focused. This is a sane pedagogical strategy, inasmuch it seeks to separate socioemotional from cognitive postings and avoids academic forums from becoming too interpersonal, endangering knowledge construction. Morris, Mitchell, and Bell (1999) have found, not surprisingly, that most course-related conference postings were “assignment focused” (p. 1) in an analysis of postings from 4,500 students for a single course during an academic year. Nonetheless, this does not exclude the presence of interpersonal issues in strictly academic forums.

However, the interpretation of messages as either task or socially oriented is a
notion that fails to account for other dimensional qualities of online communication and contradicts the simultaneous content and relational functions of messages, (Watzlawick, Bavelas, & Jackson, 1967). It does not acknowledge “the variety of relational themes interactants typically address and interpret…Consequently, in assessing a person’s relational communication, different criteria may be applied to the judgment of task involvement versus social orientation” (Walther, 1992, p. 64). The election of a more holistic approach implies taking distance from the very notion of task vs. social related content in human communication, derived from the strict Cartesian mind/body dichotomy. “Conversation types do not occur in any discrete fashion; there is a constant interweaving of [action and social maintenance] in most interactions” (Murray, 1991, p. 84). Impersonality is thus redefined as the dimension of factual information, though nevertheless a part of human relations.

The reductionism and ambiguity shown in traditional interaction analysis theories and coding dimensions both in face-to-face and CMC environments since Bales’ IPA (see Table 3), is not present when analyzing messages as either impersonal or interpersonal (Walther, 1994). Task-related comments may vary in regard to the presence of interpersonal dimensions. As Burgoon and Hale (1987) stated, “A person who is very task oriented may still demonstrate sociable tendencies” (p. 40). Traditionally task-oriented content was thus further analyzed, on the one hand, under the general categories proposed by Lundgren (1977), McDonald (1997) and Schutz (1958, 1994), and on the other, by specific categories derived from CMC analysis. Thus, original task-oriented content is reduced to factual information

In this study, a nonsequential approach in group development was followed. No definite, fixed phases were conscientiously sought after, and thus no intentional emphasis was put in following a theoretical sequence of presence or absence of interpersonal dimensions, which emerge at different periods in the life span of groups (Schutz, 1994). This approach assumes a “meaningful and orderly sequence in terms of the emergence and salience of various interpersonal issues…and that these temporal changes will be reflected on the overt content of interaction among group members” (Lundgren, 1977). The focus was set instead on the dynamic process related to interpersonal behavior and types of interaction through time. Emphasis was put on the flow of negative vs. positive message content and the relationship of these issues to the presence or absence of interaction types. Thus, the notion that groups develop in a single, quasi-universal set of stages is not as important in this study as the presence of interpersonal issues and their relation to interaction as the group proceeds in time.

If asymmetries in participation and interaction may be related to a vast array of factors, differences found in the literature reviewed which deals with these constructs may be due to diverse definitions of concepts, selection of theoretical background, variations in study design and population samples, as well as authors’ assumptions and biases related to both dependent and independent variables. Hare and Davies (1994) state that the type of results revealed by research depends both upon the theory
selected by the researcher and the category system (units of analysis included) employed to assess the problem and the hypotheses.

In this study, the theoretical approaches selected to evaluate interpersonality and interaction in message content may also determine the results obtained. Thus, on the one hand and compared to studies reviewed, interactivity may show a decrease, as reactivity is differentiated from true interactivity. However, the latter may also show an increase as the notion of intentionality or engagement is incorporated to the construct. On the other hand, interpersonality may also show an increase when compared to literature reviewed, as some dimensions previously considered as task-oriented are now labeled as interpersonal. Anyhow, the interpersonal dimensions in online discussions are believed to increase student participation, interaction and involvement and thus create a productive and comfortable social environment for collaborative work.

As a summary, Figure 7 indicates both explanatory (interpersonality) and response (interaction) variables (after Sanders, 1995, p. 493) and their categories of analysis as developed from the literature review.
Figure 7. Dimensions for analyzing interpersonality and interaction in CMC.
CHAPTER 3 - STATEMENT OF THE PROBLEM/RESEARCH DESIGN

This study identified the type of interpersonal content among members of an online group, and assessed the quality of interaction as the group evolved over time (Berthold, Sudweeks, Newton, & Coyne, 1998; Henri, 1992b; Smith, 1999; Walther, 1995) to determine if there was a relationship between both variables in participants’ message contents as they relate to each other in online academic groups. As literature has established the relevance for both improved socioemotional relations in terms of the betterment of learning environments, and the importance of interactivity as a condition for critical thinking and knowledge building, this study focused on the nature of the relationship between both constructs.

Research Purposes, Research Questions, Hypotheses, and Data Sources

This study was guided by the following research questions and hypotheses derived from the research purposes that emerged from the literature review:
Table 4

Relationship of Purposes, Research Questions, Hypotheses, Intentions, Research Methods, and Types of Statistics

<table>
<thead>
<tr>
<th>Purpose#</th>
<th>R.Q.#</th>
<th>H#</th>
<th>Intention</th>
<th>Method</th>
<th>Type of Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose 1</td>
<td>R.Q.1.1</td>
<td>Ha1</td>
<td>Analyze level and amount of participation through time</td>
<td>ex post facto longitudinal (quantitative)</td>
<td>inferential continuous data (Pearson r, one-way ANOVA)</td>
</tr>
<tr>
<td>Purpose 1</td>
<td>R.Q.1.2</td>
<td>Ha2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose 1</td>
<td></td>
<td>Ha3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose 2</td>
<td>R.Q.2.1</td>
<td></td>
<td>Assess type and amount of interaction through time</td>
<td>ex post facto longitudinal (quantitative)</td>
<td>descriptive nominal data (Chi-square for homogeneity and trend)</td>
</tr>
<tr>
<td>Purpose 2</td>
<td>R.Q.2.2</td>
<td>Ha4₁</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose 2</td>
<td></td>
<td>Ha4₂</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose 2</td>
<td></td>
<td>Ha4₃</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose 3</td>
<td>R.Q.3.1</td>
<td></td>
<td>Assess type and amount of interpersonality though time</td>
<td>ex post facto longitudinal (quantitative)</td>
<td>descriptive nominal data (Chi-square for homogeneity and trend)</td>
</tr>
<tr>
<td>Purpose 3</td>
<td>R.Q.3.2</td>
<td>Ha5₁</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose 3</td>
<td></td>
<td>Ha5₂</td>
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<tr>
<td>Purpose 3</td>
<td></td>
<td>Ha5₃</td>
<td></td>
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</tr>
</tbody>
</table>

Table 4 continued

1 The test for homogeneity is a type of chi-square statistic that tests the null hypothesis to see if the distribution of proportions within the rows is the same for all rows (Johnson, 1992, p. 576). It is useful to determine if a proportion of a category in a variable is significantly different from other categories in that variable (unlikeness of samples).

2 The chi-square test for trend is literally a linear regression of an $r \times 2$ contingency table (Steele & Torrie, 1981, p. 515). It is useful to determine apparent tendencies in separate variables. It is to be used only when the classification categories arranged in the columns fall into a natural order (as time), and if they are equally spaced. Testing for trend requires appropriate grouping of data (Daniel, 1978, p. 186-187; McDonald, 1997, p. 75).
Table 4 continues

<table>
<thead>
<tr>
<th>Purpose#</th>
<th>R.Q.#</th>
<th>H#</th>
<th>Intention</th>
<th>Method</th>
<th>Type of Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose 3</td>
<td>R.Q.4</td>
<td>Ha6</td>
<td>Establish the relationship of interpersonality and interaction through time</td>
<td>ex post facto</td>
<td>inferential nominal data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ha6</td>
<td></td>
<td>longitudinal</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>relational</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(quantitative)</td>
<td></td>
</tr>
<tr>
<td>Purpose 4</td>
<td>R.Q.5</td>
<td></td>
<td>Collect participants perceptions about interaction and interpersonality</td>
<td>close and open</td>
<td>verbatim quotes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ended survey</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(quantitative)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(and qualitative)</td>
<td></td>
</tr>
</tbody>
</table>

Note. The null hypotheses are not stated in this study.

Purpose 1

Describe the level and amount of participation in online academic discussion forums and determine the quantitative dimension of online participation through time.

Research Question 1 (Participation)

What are the basic quantitative features of interaction for each forum and for all forums combined?

1.1 How frequently and how much did students participate in online forums?

Ha1: Number and length of messages (measured in number of sentences) will show a positive correlation (.05 level) over the span of the study.

1.2 How is that participation grouped through time?

Note. The chi-square for independence is used to test the null hypothesis of two variables being independent. It is useful to determine the association of two distinct variables.
Ha2: Number and length of threads (measured in number of messages) will show a negative correlation (.05 level) through time.

Ha3: Participation will be unevenly distributed (.05 level) among days of the week over the duration of the study.

Data: Absolute number of total sentences per message, messages per sentence, and mean of both were correlated for all forums combined over time and for each forum separately. Additional quantitative indicators of participation (number of messages per forum, number of threads per forum, sentences per message and per day, messages per day, sentences per thread and thread-to-message ratio) were graphed for each individual forum.

These first three hypotheses focus on the structural analysis of online interaction. As Lichtenberg and Knox-Harbour (1988, p. 5) state, “in contrast to analysis of content of a group’s social interaction and/or the qualifications of that content, structural analysis of the interaction within a group focuses on the organization of the interaction among group participants.” However, as discussed above, analysis of participation, although necessary, may not be enough in this stage of CMC research. Quantitative data on form (as opposed to function or content) may render a useful picture of how the group as a whole behaves through time and how the words exchanged weave into sentences, these into messages and the latter into threads.

The more messages posted, the longer the messages, while the fewer number of threads opened, the longer those threads will be. Moreover, common sense tells us that participants will not post equal number of messages per day. Each of the above mentioned quantitative indicators may not mean much by themselves, but analyzed as a whole, together with more qualitative content aspects, may provide a
comprehensive picture of online participation/interaction processes. The recent emphasis in the content must not exclude the analysis of the form.

**Purpose 2**

Assess the relationship among messages (type of interaction) posted by participants in online academic forums over time; and identify and assess the type and amount of interpersonal content in messages posted to online academic forums over time.

**Research Question 2 (Interaction)**

To what degree are contributions in online academic discussion forums linked to each other and related among them? In other words, to what extent is online participation active, reactive or interactive?

2.1 Over the duration of the course, to what degree do the students’ contributions appear to reflect interactive content? Does it represent a significant amount of overall message content?

2.2 Do levels of activity, reactivity, and interactivity change over the duration of the study?

Ha4\(_1\): Initial levels of active content will tend to decrease (.05 level) during the interaction.

Ha4\(_2\): Initial levels of reactive content will tend to increase (.05 level) during the same period of time.

Ha4\(_3\): Overall interactive content in graduate students online forums will increase (.05 level), from initial levels, over the duration of the study.

Data: Number and percentage of active/reactive/interactive sentences per forum and for the set of forums analyzed. Time-series graphs.

There is no information in literature regarding the evolution and behavior of interactive content over time. Rafaeli and Sudweeks (1998) found out that while interactivity ranged from 0% to 40% in the online forums they analyzed, on average under 10% of the messages were coded as interactive. Henri (1992a), analyzing the
online interactions of a six-week training program, and categorizing messages as either independent or interactive, found that 53% of participants input were independent or active statements.

Types of interaction among participants may be an indicator of online quality of exchanges. Recent emphasis on interactivity is closely related to the notion of constructivism, so interactivity is preferred to reactivity, and the latter to mere active traits in online exchanges. Throughout time, and as the group consolidates and its members develop coherence, active content should diminish, while reactive and interactive content increases. This should indicate increasing levels of commitment (interactivity) and decreasing levels of involvement (activity). However, this must not indicate that reactivity and activity should be discouraged. The weight of each must be assessed and a desired balance should be defined for each specific learning task. Nevertheless, it must be stated that growing interactivity, as it transcends mere reaction, may indicate a tendency towards collective knowledge construction.

**Research Question 3 (Interpersonality)**

To what extent is interpersonal content present in online graduate students’ discussion forums? To what extent is online participation impersonal or interpersonal?

3.1 Over the duration of the course, to what degree do the students’ contributions appear to reflect interpersonal content? Does it represent a significant amount of overall message content?

3.2 Do levels of interpersonality and impersonality change over the duration of the study?

Ha51: Initial levels of negative interpersonal content and initial levels of positive interpersonal content will vary significantly (.05 level) through
time.

Ha5: Initial levels of positive impersonal content and initial levels of positive interpersonal content will vary significantly (.05 level) through time.

Ha5: Initial levels of overall interpersonal content and initial levels of overall impersonal content will vary significantly (.05 level) through time.

Data: Number and percentage of interpersonal/impersonal sentences and frequency distribution of categories of interpersonal content per forum. Time-series graphs.

Interaction is a step forward in CMC analysis. However, it is only a part of content analysis. Studying types of interaction does not indicate what is exchanged among participants. Even interactive content may indicate an escalade of flaming or deprecating behavior. Therefore, content analysis should also include the type of interpersonality behind the type of interaction. Impersonality (both negative and positive) and negative interpersonality should not be readily discouraged. Both the former (informing and requesting) and the latter (mainly due to advocating) are required in academic online exchanges.

Nonetheless, not all categories of interpersonality may be expected in academic online forums. Due to their information exchange nature and to the asynchronous mode of interaction, little negative interpersonal content, other than advocating, is bound to show up. At the same time, positive impersonal content (informing) may be expected to surpass negative impersonal content (requesting), also due to the purpose of the forums. The situation may be totally different for synchronous, socially-oriented help forums, where the frequencies of negative interpersonality and
impersonality would be expected to surge.

**Purpose 3**

Determine the association between interpersonal content and the type of interaction in discussion forums, as well as the behavior of the relationship through time.

**Research Question 4 (Interaction Related to Interpersonality)**

Is there an association between the students’ amount of interpersonal content and the type of interaction in postings? Do these relationships vary through time?

- **Hₐ₁**: Overall interpersonal content will be significantly related (.05 level) to the amount of reactive and interactive content in graduate students’ online messages, both for each forum and for the set of forums analyzed.

- **Hₐ₂**: Overall impersonal content will be significantly related (.05 level) to active content in graduate students online messages for the set of forums analyzed.

Data: Number and percentage of active/reactive/interactive sentences per forum and for the set of forums analyzed. Number and percentage of interpersonal/impersonal sentences and frequency distribution of categories of interpersonal content per forum. Time-series graphs.

Once the presence and evolution of both interaction and interpersonality (and their respective categories) have been established, a possible relationship between them may then be pursued. The notion that certain types of interaction may be linked to some categories of interpersonal content, as such, has not been explored in the literature, although some authors have dealt with related issues (e.g., Rafaeli & Sudweeks, 1998). However, a higher interactivity and reactivity in response to interpersonal content should be expected, while activity should be linked to impersonality in online messages.
Purpose 4

Determine the understandings of students about interactional and interpersonal issues in online postings.

Research Question 5 (Participants’ Perceptions)

What were the students’ perceptions of the issues that influenced the type of interaction in online discussion forums? Is there any apparent relationship between students’ perceptions and the results of the quantitative research?

5.1 Which traits do students find most likely to respond to in others’ online messages in discussion forums? Which are the traits they find less likely to respond to?

5.2 Which traits do students perceive in their own messages that could foster interaction? Which are the traits they find that discourage interaction?

5.3 Is there a perceived relationship between interpersonality and the type of interaction in participants’ messages?

5.4 To what extent are students’ perceptions related to the findings in purposes 1-3?

Data: Survey transcripts

Participants’ perceptions were assessed as a means to throw light and to illustrate quantitative data. Students’ attraction to specified types of interpersonal message content may indicate their inclination to respond to them more often, thus generating reactivity and interactivity in online forums. On the other hand, students’ perception of their writing style may indicate if their messages are prone to generate reactive or interactive responses.

For this survey, three sample messages from different participants were taken from forum 9 (see Appendix B) for participants to select from. Message A exhibits a balanced mixture of positive and negative interpersonal issues, and practically no
impersonal content. Message B content balances impersonality with negative interpersonal traits (no positive ones), while message C balances positive and negative interpersonal issues with positive impersonal content. (Specific coding of these messages by categories in both variables can be found in Appendix I. A summary of content may be found in Table I). 

Method Overview

The nature of the research purposes, the stated questions and hypotheses, and the characteristics of the samples selected to test those hypotheses were tackled through a combination and variety of research methods and data gathering techniques. An ex-post-facto and longitudinal case study on a natural setting was conducted, together with a qualitative, information gathering survey. Content analysis was used as a technique to collect data from the samples. The explanatory (interpersonality) and response (interaction) variables were observed and measured within an already existing condition and therefore not manipulated; an association between them and their particular dimensions of analysis was sought; and this association was assessed over a period of three semesters, where successive measures were taken, for trend controlling purposes, at three different, fixed-interval points in time from the same group of participants (forum 1, forum 9, and forum 14). Lastly, students’ perceptions and impressions about positive and negative message traits were collected through an electronic open-ended survey so as to illustrate quantitative findings.
Bullen (1997) states that

There has been considerable discussion in the literature about qualitative versus quantitative research methods and the compatibility of the two approaches. Some suggest that the two are epistemologically incompatible and that it is inappropriate to mix quantitative and qualitative research methodologies. However, many contend that qualitative and quantitative research methods are complementary and when appropriately used can strengthen research in education and the social sciences. (p. 90)

Sudweeks (1998) seems to support this point of view when she mentions that

The majority of theoretical and research work is conducted within the bounds of a narrow set of assumptions, beyond which the researcher rarely deviates. It is useful, therefore, to explore alternative perspectives…The positivists vary in their methodological approach, ranging from verifying to falsifying hypotheses, but the intent in both instances is based on a belief that there are immutable structures to be discovered, explored and analyzed. The anti-positivist (or interpretivist) methodological approach is to be immersed in situations and allow insights to emerge during the process of investigation. In general, the research questions of interest guide the choice of methodological tools. If the unit of analysis is the individual, applying statistical analysis of data obtained from sample of subjects within a population is a rigorous method of testing predefined hypotheses and determining generalizability of results. Research questions of social and organizational theories, on the other hand, seem best suited to inductive analysis…the weakness of any single method-qualitative or quantitative-is balanced by the strengths of other methods. Because new media are at an early stage development, scholars need to use multiple methods, including more qualitative methods of data gathering and analysis, and interpretive approaches to researchers. (pp. 8-10)

Research purposes, questions, and hypotheses determined a complementary approach. Ex-post-facto research, as an exploratory tool in non-artificial settings, yields valuable information regarding the nature of a phenomenon. However, the problem of not being able to randomize participants, especially in communication studies, may pose a problem to external validity (Cohen & Manion, 1994). Longitudinal studies consider that certain aspects of a phenomenon may be better
revealed over time, especially trends in social and educational realities (Williams, Rice, & Rogers, 1988). The control or measurement effect, when used in combination with the ex-post-facto research, is eliminated. Relational and/or correlational studies are particularly recommended at the early stages of a discipline in order to discover relationships among a large number of factors and issues presumed to have some bearing in the phenomenon researched. This method also allows the measurement of those factors at different points in time (Gall, Borg, & Gall, 1996).

Finally, surveys are a useful way of assessing participants’ attitudes, beliefs, and opinions, both through descriptive and explanatory questions (McMillan & Schumacher, 1997). This variety of research methods are embedded under an overall “quantitative case study research” (Cohen & Manion, 1980, p. 107) or what Gay (1996, p. 231) terms a “more-structured” (e.g., quantitative) approach to the case method. The primary sources of data for the study were computer transcripts from three computer forums from three online courses. In addition to the transcripts from each sampled discussion forums, verbatim replies from an online survey were used.

**Case Study Approach**

Bullen (1997, p. 90) mentions that “regardless of the approach taken to data collection and analysis, case studies seek to understand a phenomenon in its natural setting without separating the phenomenon from the context and without manipulating either the context or the phenomenon.” An overarching case study is especially appropriate for this research because:
1. It focused on one particular observed phenomenon through both a convenience and purposeful sampling (students of the first class of the doctoral program).

2. It sought context-bound generalizations, or extrapolations related to broader populations. The process of quantifying results was not driven by statistical generalization. Even when numerical data were used to collect and interpret findings and test local hypotheses, results can only be extrapolated to similar populations in similar conditions.

3. It was conducted on a real-life, natural scenario. There was no manipulation of variables and no control of them by artificial means.

4. The researcher was a participant in the discussion groups being analyzed.

5. There was direct production from participants (what they actually said) that has been recorded, both from online forums and from online surveys. The use of qualitative data shed light into the meaning of quantitative results. Participants were the main sources of data.

6. There was an observation process of recorded information (online postings) together with a survey to obtain participants’ demographic and personal verbatim information (beliefs and perceptions), presented as direct quotations. Testimonials and quotes were used in conjunction with descriptive data (Gay, 1996, p. 232)

7. The population for the study was small.

8. Data was obtained not from a standardized instrument, but from coding
units of analysis using categories derived from the literature review, adjusted and refined through a pilot study.

An overall case study approach was then used to examine both quantitative data (number and length of messages, frequencies of interpersonal content, and frequencies of types of online interaction) and qualitative data (perceptions of students about valued interpersonal traits in theirs’ and others’ messages). The former component was numerical data from content analysis, analyzed with statistical procedures. This was considered as the “true” data, which “accurately measure the behavioral component of CMC” (Rice, 1994, p. 176). The latter was unstructured textual data from open-ended surveys to illustrate quantitative findings. Self-reported data often disagree with comparable measures of observed CMC behavior, “even when respondents are surveyed online within minutes of the actual system use” (Rice, 1994, p. 176). Nonetheless,

Computer-monitored usage…data are potentially more accurate than corresponding self-report data. However, monitored system usage…data may represent a different aspect of human communication that does perceived usage, so they are not necessarily more valid. (Rice, 1994, p. 176)

Although interpretation of the communication content was essentially a qualitative assessment, it did involve counting and categorizing of items, which then took the form of numeric values assigned to both explanatory and response variables. Similarly, the responses to the surveys were quantified.

The result was an integrated case study approach that narrowly focused on a particular social phenomenon (Sudweeks & Simoff, 1999, p. 34). The case selection
and description follows.

**Context Description, Subjects, and Sampling Procedures**

Describing context, characterizing participants, and defining sampling steps are issues that need to be carefully considered.

**Context Description**

Context description is important inasmuch as it allows the researcher to frame the particular research purposes, questions, and hypotheses. Pewsner (1999) states that

From the moment we place ourselves in the perspective of meaning, there is the need to limit and determine, as precisely as possible, the particular context that grants the meaning that individuals refer to. In sum, the analysis of context guarantees the validity of the interpretation: it allows the avoidance of the dogmatic risk inherent to the systematic recurring to a general formula that pretends to be universal. The discovery of meaning of all human conduct...is only possible through the analysis of the real environment-itself product of history-in which the activity of the subjects is displayed (p. 41).

In 1996, the Monterrey Institute of Technology (ITESM in Spanish abbreviation) and the University of British Columbia (UBC) formed a strategic alliance. Early in 1997, they signed a collaborative agreement to design, develop, and deliver a set of five courses in the area of technology-based distributed learning, driven by the need to address the increasing use of technology in the teaching-learning process in both institutions. These courses were the following: Designing, Developing, and Delivering Technology-based Distributed Learning (Des&Dev);
Selecting and Using Technology for Distributed Learning (Sel&Use); Planning and Managing Technology-based Distributed Learning (Plan&Man); Social Issues in Technology-based Distributed Learning (Soc&Tech); and Research and Evaluation Issues in Technology-based Distributed Learning (Res&Eval) (Bates & Escamilla de los Santos, 1997, p. 54).

That same year, the ITESM launched the Doctoral Program in Educational Innovation and Technology (DITE in Spanish) for the period 1997-2001. Out of the thirteen required courses for this program, eight required participation in discussion forums as part of their graded activities. Four out of those eight were developed by ITESM/UBC. During the first three semesters of the program, three of these four courses were offered consecutively, one during each sixteen-week semester, as part of the core courses of the doctoral program: Des&Dev (August 1997), Sel&Use (January 1998), and Plan&Man (August 1998). Soc&Tech was not required for the doctoral program, and Res&Eval was offered in August 1999. Those first three courses were also available as graduate-level credits for two Master’s programs at the ITESM (Educational Technology and Management of Educational Technology) and for diverse educational purposes at UBC; (as single non-credit courses and as part of a post-graduate on-line certificate program.

The courses followed exactly the same curricular requirements, regarding elaboration of assignments and participation in discussion groups. Overall, participants from nineteen countries all over the world enrolled in the courses for different purposes. ITESM was responsible for recruiting, assessing, and accrediting
students from Latin America (Bartolic-Zlomislic & Bates, 1999). Twenty students were the maximum allowed per tutor per discussion group, considering adaptability to local needs.

**Subjects**

This is not a study that deals with technology, information processing, or about a group or about human participants in a group, but about the character of the written exchanges and communication processes within a sampled group in a long-term, continuous, context-embedded, academic environment. The majority of the quantitative data was obtained from the messages posted to conference forums by participants in a doctoral program. However, in this study six levels of entities were sampled: participants, semesters/courses they took, online group discussions, message threads, messages, and individual sentences (see Table 6 below). The literature virtually ignores both group and member traits. Relevant input factors (McGrath & Hollingshead, 1994, pp. 95-105) such as member and group characteristics, task characteristics, technology characteristics, and context characteristics were not considered relevant for sampling selection, and were only mentioned as issues that hinder generalization of findings to other settings.
Participants

A group of sixteen students of the doctoral program were selected through convenience sampling, mainly for three reasons. First, this group inaugurated the Doctoral Program at the ITESM. Second, the group was kept almost intact during the online interactions throughout the first three semesters, using the same technology throughout that time, keeping its natural academic boundaries and establishing recurrent online interactions. As McGrath and Hollingshead (1994, p. 116) state, “the purpose of holding group membership constant in research is to increase rigor…A group’s reactions to early and later events are likewise more comparable.” Immediately after the first semester, two students dropped out, so their messages were not considered in the final sampling and coding process.

Third, the group was homogeneous in several aspects. All of the students were required to have a Master’s degree in Education and a score of over 550 on the TOEFL for admission to the Program. All except one of the students has Spanish as mother tongue, and all of them lived in Mexico. Even though some of them knew each other, they had not interacted academically before, either face-to-face or electronically. However, there were marked gender differences in group composition, as eleven of the students were female and only five male.

No significant differences due to hierarchical status were detected among group members even when fifteen out of sixteen worked full-time at the ITESM in eight

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4 Consent from participants was required to obtain the database of the online forums from UBC in 1998. Consent for a pilot study was granted by participants in 1999. Additional consent was required for the real study (see Appendix A).
different campuses. Despite working for the same institution, group members have not worked together before and the majority of group interaction occurred electronically (through e-mail, computer conferencing, and three times a semester, through videoconference), with little or no face-to-face contact. All of them teach at least one course. The author was a member of the studied group, although when the online interactions took place the proposal for this study was not yet made. Moreover, the researcher was not surveyed so as to avoid biased information.

As a whole, and using Gunawardena, Lowe, and Anderson’s (1998) words, the participants may be described as “a group of professionals of roughly equal stature coming together to contribute their knowledge, negotiate meaning, and come to an understanding about important issues in the theory and practice of distance education” (p. 6).

**Semester/courses**

All of the stated hypotheses and research questions consider a time span. The three courses taken by the selected group (Des&Dev, Sel&Use, and Plan&Man) were all offered for the first time by ITESM/UBC in consecutive sixteen-week semesters under basically the same pedagogical criteria: print material (textbooks and selected readings) to read and analyze as basis for group discussions, and a Web site (containing a study guide, teaching materials, online resources, student and tutor biographies, and online conferences). Since this was the first time the courses were offered, students were just behind the course design and development team, which
introduced an additional “pioneering” emotional tone to the newly created doctoral program.

Computer conferences

Doctorate students’ online, asynchronous discussion forums were kept restricted and homogeneous. Bullen and Janes (1998) state three reasons for this: keeping extremely ‘grade conscious’ students separate from students less concerned about grades; grouping certificate students together, more interested in theoretical discussions than those students concerned about more practical issues; and finally, the ITESM requirements in keeping the discussion groups administered by their tutors as intact, which did not allow for group discussion at an international level other than unmoderated, informal forums with no specific topic for discussion.

Even though they were tutored by the ITESM, the discussions for doctoral students were carried out in English. Participation in the forums was mandatory and graded (15% of the total course grade), restricted (password protected) to program students living in Mexico and fundamentally un-moderated: tutors posted only 0.62% of the total amount of messages in three consecutive semesters (due to this, their postings were eliminated from the samples).

All online discussions were strongly academic-oriented, mainly structured around set discussion topics guided by questions based on mandatory course readings. Those predetermined questions triggered “intellective tasks” and idea-generation processes, with a low degree of ambiguity (McGrath & Hollingshead,
(Roberts, 1994, p. 108; Rice & Love, 1987, p. 90) centered upon individual participations, thus showing a relative task-homogeneity during the three sampled forums.

However, even when all three semesters analyzed presented homogeneous task characteristics (question type triggering sentences, the need for participants to support their views with evidence, and the disposition to respond to and comment on other participants’ contributions), the second semester requirements were unique in several ways due to additional demands for participants. An initial contribution was required from appointed students, which should follow specific taxonomical objectives (select, compare/contrast, analyze, explain advantages and disadvantages). A final synthesis by pairs of “rapporteurs” appointed by e-mail was expected. These summarizing postings, due to their intrinsic reactive and interactive nature, and their wrapping-up factual content, were not considered for coding purposes. Forums belonging to the first and third semesters required the students to explain their position upon certain issues, expecting them to support those views with evidence from their own personal experience as teachers and students, while second semester forums specifically required support from the readings. So, in a sense, second semester forums were more specific, less opinion-based, and more task-oriented than the rest.

No online collaborative work was required during these three semesters from the doctoral students. Postings were restricted to 300 words, but a substantial amount of messages (44%) surpassed this figure in the sampled forums.

Besides the graded, topic-specific, academic discussion groups, other non-academic forums were provided in each course for the students to interact upon social
and administrative issues. The introductions conference, the international café, and
the general questions conference were left out of the sampling procedure, mainly
because they were not task-oriented and involved both UBC and ITESM students
(introductions forums allowed UBC students to meet other UBC students, while the
international café allowed contact between UBC and ITESM students. The general
questions forum dealt mainly with administrative aspects of the course). Thus, most
of the interaction for learning took place in the restricted, academic forums. Only
members were allowed to freely post messages in their respective groups.
### Table 5

**Types of UBC Courses Discussion Forums**

<table>
<thead>
<tr>
<th>Type of forum</th>
<th>Purposes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Academic</strong></td>
<td></td>
</tr>
<tr>
<td>Block-specific</td>
<td>Discussion and exchange of readings-related issues and content of the course.</td>
</tr>
<tr>
<td>Guest tutors</td>
<td>Discussion ideas upon specific subjects for each forum with invited experts.</td>
</tr>
<tr>
<td><strong>Social</strong></td>
<td></td>
</tr>
<tr>
<td>Introductions</td>
<td>Introductions between UBC and ITESM students. Posting bios and hobbies for students to know each other.</td>
</tr>
<tr>
<td>International student cafe</td>
<td>Social area to introduce any non course-related topics, and requests for partners for collaborative tasks.</td>
</tr>
<tr>
<td><strong>Administrative</strong></td>
<td></td>
</tr>
<tr>
<td>Course feedback</td>
<td>Comments on the quality of the course, complaints of general nature and suggestions of specific changes to the course.</td>
</tr>
<tr>
<td>General questions</td>
<td>Expression of doubts and questions regarding course schedule, assignments, and both hardware and software. An administrative online space.</td>
</tr>
</tbody>
</table>

Most of the literature deals with groups whose members relate to each other for the first time in a single meeting extended during a semester. From the literature reviewed, this seems to be a fairly common design (Bullen, 1997; Harasim, 1990; Harasim, Hiltz, Teles, & Turoff, 1996; Gunawardena, 1995; Lauzon, 1992; McDonald 1997). McGrath and Hollingshead (1994) state that
The majority of studies of computer-mediated groups deal with single meetings of those groups. Often they deal with groups that exist only for a single meeting; a considerable portion of that literature deals with groups whose members are using that computer-mediated system for the first (and only) time. (p. 76)

In this study, the group’s life extended beyond a single online meeting to discuss a single topic. The relationship among group members was based on “multiple meetings at specified periods of time with distinct non-meeting intervals between them” (McGrath & Hollingshead, 1994, p. 76). Throughout each sampled course/semester, several discussion forums that support different study units or blocks were opened and closed by the tutors.

The forums population was thus purposefully sampled: the first conference of the first semester (forum 1), the third conference of the second semester (forum 9), and the third conference (and last) of the third semester (forum 14) (see Table 6 below), so as to assess the beginning (zero-history forum), the middle, and the final stages of the whole online group interaction throughout the three consecutive semesters, at equivalent fixed-time intervals (seven months between forum 1 and forum 9, and between forum 9 and forum 14). Sampling discussion forums through this criterion is possible because discussion groups were designed as context independent: several discussion forums were set during a course, each unrelated to the one before and to the next one. Valid posting dates for forum 1 spanned for one week (eight days), two weeks (twelve days) for forum 9, and three weeks (twenty-two days), for forum 14.

Thus, this CMC study involves the same natural group (existing prior to and
independent from the purposes of the researcher) working on multiple tasks of the same task type (basically information exchange) not assigned by the researcher, working through an extended period of time, and measured at three different points in its history as a group. The online group relationship may be considered as one homogeneous, holistic interaction through eleven different forums during a sixteen-month span, more than an interaction divided into three semesters, the first two comprising four forums each while the last one had three (see Table 6 below).

According to Walther (1994), anticipated future interaction, which affects interpersonal content in online exchanges, is more greatly influenced by a long-term term than by a short-term assignment. Online groups develop over time, and one-shot CMC experiments fail to capture online dynamics. Taking three shots in time of a zero-history group, from its inception to its demise (instead of three equivalent forums, one for each semester), rendered more useful information to the purposes of the study and the requirements of the hypotheses.

**Threads**

All conferences used HyperNews as support software. Through HyperNews Discussion takes shape through the list of messages or ‘replies’ sent in and which physically follow the base article…Replies may be directed to the base article or they may be replies to another reply…HyperNews creates a hierarchical structure with the base article considered the 0\textsuperscript{th} level of the hierarchy. The messages, which respond directly to the base article, form the 1\textsuperscript{st} level; replies to those messages form the 2\textsuperscript{nd} level and so on. The replies are displayed through an indented tree format that shows how they are related.…[The ‘outline’ format] uses indentation to represent the tree of messages, displaying which messages are replies to other messages…allowing
users to enter the dialogue at any point in its past as well as its present.  
(Bartolic-Zlomislic & Bates, 1999, pp. 105-108)

Other HyperNews features are the optional use of icons to tag the emotional 
tone of messages and the mandatory use of message titles. These features were not 
taken into consideration when coding sentences, due to the uncertainty of the 
adequate use of the former and to the sometimes one-word reference for the latter.

Sampling threads may be misleading. It must not be assumed that students are 
technology wise from the start, and they will competently use the software threading 
potential, posting each message within the limits of the desired thread and not 
creating first-level threads constantly. To assess this, first level threads were 
identified for each discussion forum and thread/message ratio calculated (see Figure 
14 below). This ratio was low during the first semester, increased during the second 
and lowered in the third. This inconsistency makes threads context dependent: 
sampling through first level threads will be highly inconsistent.

Moreover, not all students participate in all threads. Even when a student 
participates with a considerable amount of messages, those messages may be 
concentrated in a small number of threads. Participation in threads may be determined 
by motivation and interest in the particular thread issue. Random sampling threads 
may leave several students under-represented, and may also render confusing data. 
Therefore, the thread population for each sampled discussion group was entirely 
sampled.
Messages

Messages, as the basic unit of online exchange, are also context dependent. In order to assess the types of interaction (especially implicit reaction), messages must not be isolated from each other. Random sampling in messages may be misleading and erroneous due to the nature of human online communication. Random sampled messages, even within a same discussion forum, are removed from their location in the communication process, and thus decontextualized. Therefore, the population of messages within a discussion group was also entirely sampled. Messages of the students that dropped out after the first semester were left out of the first conference forum (13.8% of the messages for that forum), as well as messages that were mandatory summaries of previous ones in forum 9 (7.14% of the total messages for that forum).

Sentences

The sentence was the coding unit for content analysis. Each message has an average number of thirteen sentences ($M = 13.11, SD = 0.79$). Like threads and messages, sentences are context dependent: they cannot be understood in isolation. Even when sentences are self-contained grammatical units, they are imbedded in discourse. One logically follows the previous one, and sets the tone for the following. Thus, as with threads and messages, sentences were entirely sampled.

The total number of sentences for the three-semester time span of the study nearly reaches 9,000. To make the volume of coding more manageable, a sample of
three entire forums (1, 9, 14) of 2,096 sentences in 160 messages in 28 first-level threads, (over 23% of the total number of sentences) produced by 14 students in the early, middle, and late stages of their three semester relationship, were coded from computer transcripts through content analysis.

Table 6

Relationship Among Sampling Levels

<table>
<thead>
<tr>
<th>Semester # (Course Code)</th>
<th>Discussion groups (Month/Year)</th>
<th>Threads</th>
<th>Messages</th>
<th>Sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Des&amp;Dev)</td>
<td>1&lt;sup&gt;a&lt;/sup&gt; (September 97)</td>
<td>14</td>
<td>29</td>
<td>(13) 357</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>16</td>
<td>22</td>
<td>286</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>21</td>
<td>83</td>
<td>1,079</td>
</tr>
<tr>
<td></td>
<td>4 (5)</td>
<td>17</td>
<td>39</td>
<td>507</td>
</tr>
<tr>
<td></td>
<td>Sum</td>
<td>4</td>
<td>68</td>
<td>173 2,229</td>
</tr>
<tr>
<td>2 (Sel&amp;Use)</td>
<td>6</td>
<td>6</td>
<td>75</td>
<td>(13) 975</td>
</tr>
<tr>
<td></td>
<td>7 (8)</td>
<td>10</td>
<td>61</td>
<td>793</td>
</tr>
<tr>
<td></td>
<td>9&lt;sup&gt;b&lt;/sup&gt; (March 98)</td>
<td>7</td>
<td>56</td>
<td>792</td>
</tr>
<tr>
<td></td>
<td>10 (10)</td>
<td>9</td>
<td>55</td>
<td>715</td>
</tr>
<tr>
<td></td>
<td>Sum</td>
<td>4</td>
<td>32</td>
<td>247 3,275</td>
</tr>
<tr>
<td>3 (Plan&amp;Man)</td>
<td>12</td>
<td>19</td>
<td>93</td>
<td>(13) 1,209</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>19</td>
<td>107</td>
<td>1,391</td>
</tr>
<tr>
<td></td>
<td>14&lt;sup&gt;c&lt;/sup&gt; (October 98)</td>
<td>17</td>
<td>75</td>
<td>947</td>
</tr>
<tr>
<td></td>
<td>Sum</td>
<td>3</td>
<td>55</td>
<td>275 3,367</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>155</td>
<td>695</td>
<td>8,871</td>
</tr>
</tbody>
</table>

Note. Letters a, b, c indicate the forums sampled in this study, while (13) indicates sentence mean per message for all forums.
Computer conferencing transcripts, as Henri and Rigault (1996) mention, may be the most obvious source of data available. Ironically, as reported by Mason (1992), it is the one that is least used. So far, only a few analyses have been made of these “precious artifacts” (p. 15). McDonald and Gibson (1998) comment that transcripts provide an ideal situation for content analysis usage. Besides providing the opportunity “to follow the interaction between participants in the give-and-take of a conference” (Gunawardena, Lowe, & Anderson, 1998, p. 3), they provide data for examining the social and cognitive processes at work in online natural environments that do not allow manipulation of variables, which is an issue that increases external validity in the analysis of computer communication data. Computer transcripts analysis also allows for unobtrusive, immediate access to real data, simplifying the data collection process. Herring (1996e) states that

Where the tape recorder expanded the limits of human memory by enabling verbatim accounts of continuous speech to be recorded and transcribed, text-based computer mediation systems take us beyond the physical limitations of transcription by generating pre-transcribed data, which are easily downloaded for analysis. The lack of visual cues in most CMC means that the presence of an observer need not be known to the people whose communication is being studied, thereby allowing for the collection of more authentic, un-selfconscious data. (n/p)

However, this may be a mixed blessing (McDonald, 1997). The text-only format, with its reduced cues, takes focus off the messenger and places additional strain upon the message itself, leading to the need of a more comprehensive and
exhaustive analysis of communicative exchanges. Analysis of content is thus more comprehensive, although more tiresome and time-consuming if oriented more to qualitative dimensions than to mere word count.

**Content Analysis**

Several authors (e.g., Bullen, 1997; Henri, 1992b; & Mason, 1991) have stated the futility of restricting CMC analysis to the mere recording of participation rates, length of messages, and frequency of postings:

Researchers have usually restricted their analysis of computer conferencing to the quantitative dimensions of participation. There have not been many attempts to probe the qualitative nature of student communication…Researchers need to look more closely at the content of computer conferencing participation. (Bullen, 1997, p. 57)

The text exchanged between users is the glue that holds CMC together (Mitra, 1997). Therefore, in-depth analysis of message content seems the most appropriate approach to understand not only what is being said, but also the way it is said (Henri, 1992b). Rice, in an empirical study as early as 1987, highlighted the importance of analyzing both communication structure and content. He states that “a few studies have combined these two emphases. One approach is to complement the study of the changing structure with archival measures of content” (p. 87). Later on, Mason (1991) stated that

The published literature on educational computer conferencing consists, to a great extent, of application-oriented descriptions…The taint of subjectivity is so threatening, that most computer conferencing research stops with quantitative analyses of messages sent and by whom, number and time of logons, and message chains. Conclusions as to the revolutionary potential of computer
conferencing are, therefore, often drawn with scarcely a mention of the actual content, much less the value, of the interactions. (p. 161)

In a more recent paper, she mentions that content analysis is the key methodology for establishing the educational values of computer conferencing (Mason, 1992, p. 105). Even though this was expressed nearly eight years ago, only a few studies since (e.g., Bullen, 1997; Mabry, 1997; McDonald, 1997, McDonald & Gibson, 1998; Sudweeks & Allbritton, 1996) have turned to content analysis as a means for evaluating the quality of online participation and the nature of message exchanges.

Other authors (e.g., Rice, 1994; Sharf, 1999; & Sudweeks & Simoff, 1999) have called attention to the need to focus on the content of messages to assess the quality of online interactions, and even support a combination of quantitative-qualitative analysis to study online communications as a new social domain. Volume of messages, number and length of postings and frequency of participation do not render full comprehension of the learning process in computer conferencing. Rice (1994), states that

Analyses of full-text message content and network flows…may be combined in a variety of ways to illuminate how users’ social structure both provides a context for meaning and is affected by the content exchanged within that structure. (p. 175)

As Hare and Davies (1994) indicate,

A complete analysis of social interaction includes a consideration of the form of communication (the communication network and the frequency of interaction), the process (directed toward the task), and the content (in terms of the function being performed). (p. 169)
The persistent availability of electronic data (Herring, 1999; McDonald & Gibson, 1998) allows for the comprehensive and simultaneous observation of structure/content and pattern/features of postings. Sudweeks and Simoff (1999) point out that “traditional methodologies need to be adapted to these new research environments in which communication technologies and sociocultural norms challenge existing research assumptions and premises” (p. 30).

Content analysis, as a method of “assessing what people say or write about in speech and texts” (Gottschalk, 1995, p. 1) has experienced considerable growth in the past two decades. Content analysis has two apparently different orientations: a more quantitative and a more qualitative approach. Content analysis, understood as “the systematic and reliable coding of communication content into a theoretically meaningful set of mutually exclusive and exhaustive categories” (Williams, Rice & Rogers, 1988, p. 37), uses a set of procedures to make valid inferences from text, and among other purposes, it is used for describing attitudinal and behavioral intentions in communication and for assessing trends in communication content (Weber, 1990).

However, traditional content analysis tends to reduce text to relevant and manageable bits of data by focusing on short units of analysis (single words or parts of speech, or short phrases) as a means of text manipulation, and fitting them into units of text or classification categories, which may lose the holistic quality of textual interactions. Simply stated, content analysis in the social sciences is, therefore, a way of transforming textual data into numeric data (H. Klein, personal communication, March 13, 2000). Content analysis studies that range from simple counts of words,
parts of speech, and classes of words or categories of subject matters may fail to evaluate the socioemotional behavior among individuals (Gottschalk, 1995).

Focusing on the frequency of appearance of a specific word or phrase within a body of text or transcript of human communication, traditional content analysis strips words from context and the development of meaning, as well as loses sight of the polysemic nature of human communication. Although useful, this traditional approach may seem too reductionist, as it focuses only on the content and not on the way it is presented and on its significance. Moreover, traditional content analysis usually deals with informational texts, which

Tend to be organized as expository essays or reports, while interactive (conversational texts such as computer registers) texts tend to be organized as conversational turns (in speaking) or personal notes (in writing)...Each of these text types has a distinctive schematic organization, or conventional sequence of functional ‘moves’ into which the text can be chunked. (Herring, 1996d, p. 83)

Thus, when analyzing text-based conversation as in CMC, it may not be useful or accurate to restrict language exchanges “to the description of linguistic forms independent of the purposes or functions which these forms are designed to serve in human affairs” (Brown & Yule, 1983, p. 1).

Williams, Rice, and Rogers (1988) comment upon these two avenues of content analysis: “the content can be analyzed qualitatively (to develop an understanding of the use and form of various contents) or quantitatively (as frequencies or percentages of one category compared to another, or to determine the reliability of coding)” (p. 37). Thus, traditional/structural (or quantitative) content analysis must move towards a more functional and symbolic “critical textual analysis”, in which the effectiveness
of a certain part of the text depends on the larger discourse it is part of (Mitra & Cohen, 1999). Krippendorf (1980), in his classical work on content analysis, states that content analysis is more than just extracting meaning out of data, as if meaning was a constituting part of texts. Messages do not have a unique meaning or intention that has to be discovered. Multiple meanings may coexist and be simultaneously valid. Even one single message is capable of transmitting a variety of meanings to the same receptor. Therefore, consensus over meaning of messages is not only unnecessary, but also utterly impossible.

Thus, this more elaborate form of content analysis approaches discourse analysis in many ways. According to Stubbs (1983), discourse analysis consists of “attempts to study the organization of language above the sentence or above the clause, and therefore to study larger linguistic units, such as conversational exchanges or written texts” (p. 1). Discourse analysis, contrary to content analysis, is focused on language in use in particular interactions (Schiffrin, 1996). It is concerned more with the function of language than with the form. In this study, the emphasis was placed upon the qualitative aspect of the former, providing data for both independent (interactivity) and dependent (interpersonal content) variables. However, although interpretation of the communication content was essentially a qualitative assessment, it involved counting and categorizing of units of analysis which took the form of numeric values assigned to both explanatory and response variables (Higgins, 1998).
Unit of Measure

The problem of selecting the unit of measurement becomes a key issue in content analysis of online postings, due to the dual nature (text-discourse) of CMC—“a written quasi discussion” (Shank & Cunningham, 1996, p. 30). According to Muchielli (1984, in Henri, 1992b), the choice of the unit of analysis in CMC proceeds from the objective of the content analysis: the analysis must break up the content into units of meaning according to the analytical objectives.

Several units of analysis, both syntactic and semantic, have been proposed in literature to tackle content analysis. Isolated words (modal verbs and personal pronouns) (Collot & Belmore, 1996; Davis & Brewer, 1997; Higgins, 1998; Yates, 1996), sentences (Rice & Love, 1987), paragraphs, speech acts (D’Andrade & Wish, 1985), idea units (Walther & Burgoon, 1992), macrosegments (Herring, 1996d), clauses (including complements and subordinate clauses) (Condon & Cech, 1996), speech segments (Henri & Rigault, 1996; McDonald, 1997), statements or units of meaning (Henri, 1992b), messages (Bullen, 1997; Gunawardena, Lowe, & Anderson, 1998; Henri & Rigault, 1996), and genres (Svensson, 1999) have been proposed, all attempting to break down online exchange into manageable-and meaningful-chunks of information.

Understanding and interpreting content in computer messages is thus an acute problem, as it is a demanding and time-consuming task. CMC software does provide a way of analyzing isolated words, phrases and even sentences. However, it is difficult and misleading to match socioemotional content, and even interactivity, to
syntactical or grammatical units. Moreover, the coding process of qualitative information is not easily done solely through computer software. Henri (1992b) states that CMC messages are polysemic: they entail more than one unit of meaning.

The message as a unit of measure is a highly variable [measure]: some messages contain very little information; others contain several paragraphs dealing with numerous ideas, and set out complex arguments, which may be broken up into several messages…What are we then to count? What is the significant measure? (p. 126)

Davis and Brewer (1997) refer to CMC as “electronic discourse” (p. 2), focusing on how individuals use language to exchange ideas more than on the medium that delivers the message. They define electronic discourse as “writing that very often reads as if it were being spoken-that is, as if the sender were writing talking” (p. 2). Doing this, they emphasize their focus on analyzing language at “above the sentence” (Schiffrin, 1995, p. 39) level. In CMC, messages often follow one another as in a textual conversation, so conventional quantitative-oriented content analysis may be hard to adapt to this new mode of communication. Therefore, neither whole messages nor isolated words convey the semantic and holistic meaning and complexity that conversational exchanges posses. The former may be too large and complex, while the latter may turn out to be too small and simple. Both may be misleading to the approach in this study.

Krippendorf (1980) states that the smaller the unit of analysis, the easier the cognitive operations performed to identify them, making them more reliable. In other words, shorter coding units yield higher reliability than longer units. However, he also states that the simpler units may not be “analytically productive” (p. 91). For
more complex analysis, he suggests what he calls “propositional units” (p. 92), which although may present only a moderate degree of reliability, may be more appropriate for analyzing discourse exchanges.

More suitable approaches to CMC analysis seem to borrow from pragmatic linguistics and discourse analysis. Schiffrin (1995), proposes utterances as the units of discourse for face-to-face interactions, and defines them as “the units of language production (whether spoken or written) that are inherently contextualized” (p. 41), which may or may not conform to grammatical units such as the sentence. Condon and Cech (1996) adopt these units to analyze online discourse, defined as “a single clause with all components and adjuncts, including sentential complements and subordinate clauses” (Condon & Cech, 1996, p. 68). Svensson (1999, after Orlikowsky & Yates, 1994) proposes genre, or a “typified communicative act having a socially defined and recognized communicative purpose with regard to it audience” (p. 2), as the unit of analysis. In a similar fashion, Henri and Rigault (1996), propose the speech segment, or “the smallest unit of delivery that is linked to a single theme directed at the same interlocutor (singular, plural, or indefinite), identified by a single type (linguistic), and having a single function” (p.32), expanding Henri’s (1992b) units of meaning.

In the end, the selection of units of analysis is a subjective procedure, driven both by personal preferences, conceptual frameworks, and cultural inclinations, and is therefore not objectively or previously defined with independence of a particular and specific analytical case. Krippendorf (1980) states that, regarding the process of
determining units of analysis, the researcher “must aim at selecting the more productive and more empirically significant, which may be identified with efficiency and reliability, and which satisfy the demands of available techniques” (p. 92). For this study, the sentence as a grammatical unit was used as unit of measurement to assess the type of interaction and the level of interpersonality in online messages, as it is efficient and empirically significant; it represents a middle unit of content/discourse analysis (not too detailed or to vague); it stands for close semantic/syntactic agreement; and it presents a higher degree of reliability for coding purposes than speech segments.

When Schiffrin (1996, p. 32) states that sentences “are not the unit most germane to understand language use and social interaction”, and “interactionally situated language use is sensitive to constraints quite independent of syntax”, she is making reference to spoken discourse, in which sentences are difficult to identify. However, this study analyzed written records, made up of strings of sentences. The sentence approach is reasonable as online conversation may be viewed as having a written expression and presented in sentence format.

A sentence was considered as “a section of the message that contains one item of information and that is comprehensible even if read outside the context in which it is embedded” (Gall, Borg, & Gall, 1997, p. 563). It was limited, on a first stage, according to the following grammatical/visual criteria:

1. from period to period (without considering capital letters because some online writers may not use them at all)
However, these initial parameters may not be enough. The use of connectives such as “and”, “or”, “but”, “however”, or “moreover” may just as well indicate a change of sense in a sentence that may allow for two different coding categories within the same sentence. In that case, two clauses may be considered as two different sentences. These connectives (called “discourse markers” in spoken language) are independent of sentence structure and usually precede sentences. Therefore, removal of a marker from its initial position in a sentence leaves the sentence structure intact. However, markers may occur within sentences, in which case they indicate either a reinforcement of the original idea or a change of sense. Anyhow, markers or connectives indicate sentence boundaries, subordinating some sentences to others as clauses (Schiffrin, 1996).

There is an additional problem in CMC. Non-native English speakers (and sometimes even native speakers) online postings are not collections of perfectly structured, clear-cut sentences. Grammatical rules are not always followed. Moreover, CMC, especially synchronous modes, tend to eliminate the use of capital
letters and punctuation marks, further approaching text to discourse, thus making sentence identification difficult. Sentences must be then be further delimited attending to both the sense and function of the written segment in each particular context, according to the operational definition of each category in the coding instrument specified below.

**Dimensions of Analysis for Interpersonality and Interaction Constructs**

Derived both from theoretical and empirical literature review, relational categories for each variable were clustered as indicated in Figure 7 above. Besides the evaluation and description of quantitative aspects of online participation as the number and length of messages, the notions of interpersonality and interactivity, although quantifiable *per se*, may be considered to move into a qualitative dimension. The presence or absence of intermessage references may point the way to evaluating educational quality in issues such as level of involvement, engagement, and commitment. A similar consideration or interpersonal issues may strongly indicate quality aspects of online exchange, even when they may be expressed in quantitative terms.

Following this line of thought, descriptive/quantitative analysis of complete messages were used to determine quantitative aspects needed for the stated hypotheses (the number and length of postings). Qualitative analysis of messages—salutation, introduction, body, closing, and signature (Herring, 1996d)—were used to evaluate interaction content (active, reactive and interactive sentences), to
discriminate between impersonal and interpersonal issues, and to further categorize the former (offer/request) and the latter (support/opposition, disclosure/reserve, appraisal/chastisement, humor/sarcasm, inquiry/advocacy).

Gunawardena, Lowe, and Anderson (1998) consider that the selection of any categorical system for evaluating online communication may be subject to more or fewer categories than the ones proposed. Objections may be raised against any categorization of online exchange. Moreover, all categories may not always be present in the transcripts analyzed. Different online communication devices (e-mail, chats, computer conferences) may show predominance of some of the categories above others. As Bullen (1998) states, the process of analyzing conference transcripts is “a subjective process” (p. 6).

**Coding Scheme**

The essence of a content analysis is the coding of messages into categories (Gall, Borg, & Gall, 1996). In the following coding scheme, the two variables are not exclusive. Thus, a sentence was coded twice, once for the type (or category) of interaction and again to assess its dimension (or category) of interpersonality. However, categories within each variable (five discreet categories for interactivity and six bipolar categories for interpersonality) are *mutually exclusive* and *collectively exhaustive*. The former notion refers to the capacity of data language to establish clear-cut distinctions among the observed phenomena (specificity), while the latter refers to the capacity of data language to represent or fit all the units of measure in a

Based on Figure 7, the following coding scheme depicts the categories of analysis for each of the two main variables in the study:

**Figure 8.** Response and explanatory variables and their coding categories.
Table 7 depicts the identification codes used in subsequent tables and figures.

Table 7

**Identification Codes for Interpersonality and Interaction Categories**

<table>
<thead>
<tr>
<th>Categories</th>
<th>Identification code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interpersonality</td>
<td></td>
</tr>
<tr>
<td>Support-alignment/adversariality-opposition</td>
<td>(SPRT/OPPTN)</td>
</tr>
<tr>
<td>Disclosure/reserve</td>
<td>(DSRE/RSVE)</td>
</tr>
<tr>
<td>Appraisal/chastisement</td>
<td>(APRL/CHMT)</td>
</tr>
<tr>
<td>Humor/sarcasm</td>
<td>(HMR/SRSM)</td>
</tr>
<tr>
<td>Inquiry/advocacy</td>
<td>(INQR/ADVC)</td>
</tr>
<tr>
<td>Inform-offer/ask-request (impersonality)</td>
<td>(INFM/RQST)</td>
</tr>
<tr>
<td>Other</td>
<td>(OTHR)</td>
</tr>
<tr>
<td>Interaction</td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>(ACTV)</td>
</tr>
<tr>
<td>Explicit reactive</td>
<td>(EXRTV)</td>
</tr>
<tr>
<td>Implicit reactive</td>
<td>(IMRTV)</td>
</tr>
<tr>
<td>Engaging interactive</td>
<td>(EGINTV)</td>
</tr>
<tr>
<td>Interactive</td>
<td>(INTV)</td>
</tr>
</tbody>
</table>

**Definition, Explanation, and Indicators of Categories**

As indicated in Chapter 2, both the coding model and the operationalization and explanation of coding categories for interpersonality and interaction adopt, adapt, and develop general theoretical issues, coding frameworks, and specific coding explanations for analyzing CMC proposed by authors from diverse backgrounds.5

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The definition and explanation of interpersonality and interaction categories, the coding criteria to assess them, and examples to illustrate them, as substantial parts of the codebook, may be found in Appendix C and D.

**Coding Procedure**

The researcher first conducted a pilot study for different purposes. One, to live the coding process through. Two, to set the first stage for inter-coder reliability. Three, to further refine the established hypotheses. The pilot study worked with the same data as the real study. Reliability among coders was then assessed to determine if the pilot study could be used as the definitive study.

Before the coding process was carried out, the messages on each sample group selected for the study were taken individually to identify the sentences to be coded. They were assigned a classification code (sentence number/message number/forum number). Message number refers to the ordinal position of the message in a message hierarchy. So each message now had a code that looked like this: 17/4/9. Then, the messages in each forum were read once as an entire conversation to grasp the general meaning and tone of the online exchange, and assess, intuitively, the overall level of interpersonality and interaction. Once this was done, each message was read a second
time and coded for interaction categories for each sentence. A third reading was
performed to code for interpersonality categories. Coders could now identify each
sentence by a classification code and a pair of identification codes (17/4/9;
ACTV/DSRE).

According to Krippendorf (1990), coding is such an important process in
content analysis that in the past the former and the latter were considered as
equivalent terms. Today, although the coding procedure is no more considered a
synonym of the method, it is a fundamental stage of it. For that matter, explicit
information must contain everything that is required to be able to reproduce both the
coding process and the data collection procedure when different coders participate. A
codebook was prepared before the coding process began (see Appendixes C through
F). The codebook is a document that describes the coding variables, the coding
categories, and the coding definitions assigned to the latter (Babbie, 1997). Moreover,
the codebook has two main functions: it constitutes the guide for the coding
procedure, and it is the guide for collecting, organizing and classifying data during
and after analysis (Babbie, 1997). Overall, the codebook must provide the following
information, both for coders and for coder trainers:

*Characteristics of the coders*

As Miller and Riechert (1994, p. 2) state, “for researchers who wish to examine
more than simple frequency counts, content analysis remains a laborious process of
devising reliable coding schemes and applying human judgments.” Thus, just as
important as the coding scheme are the persons who collect the data. Skill and preparation were fundamental issues to be considered when recruiting content coders. For this study, two independent coders were hired. Sophomore students working under a scholarship program, with a TOEFL score of at least 550, were selected. However, they were not individuals familiar with the social sciences or with the phenomena under study. No peer coding among experts in CMC was performed due to the difficulties inherent in this process (time and cost).

Training and preparation of coders

Cone and Foster (1998, p. 163) recommend that “it is wise to train (the coders) so their agreement (on practice stimuli) is 10 to 15% higher than the lowest (the researcher) would accept in the study, because agreement frequently drops when (coders) begin working on ‘real’ data.” Thus training and preparation of coders was a key element in assuring that data was scored reliably. Preliminary training was furnished for the coders during two four-hour sessions on two consecutive days, explaining the meaning and relevance of the study, the operational definitions of the variables, and examining examples for each crossing of categories for each variable.

Additionally, a four-week practice was done on the transcripts used to extract the coding examples. Information they submitted further refined the coding categories. Individual coders were familiar with the category definitions and the coding procedure, as well as with the problems the researcher faced when pilot coding. The purposes and the hypotheses of the study were not mentioned to the
coders so as to not introduce bias in the coding procedure.

**Definitions and meaning of coding categories**

This information is specified in the long definitions of the coding scheme (see Appendix C). Once a preliminary coding scheme was determined and tested in the pilot study, transcripts from semester 1, discussion group 2 were analyzed (not included in the study) A total of 440 sentences in 22 messages were coded for three main purposes. First, to assess the exhaustibility and exclusivity of the coding categories proposed for the explanatory and response variables and identify points of ambiguity. As Weber, (1990) states, “the best test of clarity of category definitions is to code a small sample of text. Testing not only reveals ambiguities in the rules, but also often leads to insights suggesting revisions of the classification scheme (p. 23).” A set of categories that initially thought of as exhaustive may turn out not to be so after a coding a sample, thus developing new categories or splitting original categories may ensue (constant comparison). Thus, original categories may be modified or another one added to account for those segments labeled as “others” or “not applicable” (Krippendorf, 1990, p. 110).

The second purpose was to extract examples for each coding category so as to illustrate each one, and thus contribute to augment intra and intercoder reliability when supplied to external coders. The third purpose is to test the scoring rules of the coding scheme. As it turned out, the coding criteria and definitions were adjusted, adding extra evaluating characteristics for three categories (two in interpersonality
and one in interaction). The OTHR category was also added.

**Instructions for the coding procedure**

Ideally, independent researchers should be able to work based solely on the coding directions and the coding definitions of each category. In this particular study, measurement consisted in counting the occurrence of sentences within each dimension within the variables. However, to be able to make this a holistic approach to communication processes required that the coders read all the messages in each of the sampled discussion groups before reading again each message separately, in order to grasp the flow of the online discussion and avoid miscoding the response variable.

After this was done, each message was analyzed sentence by sentence, coding each of them twice: once to determine the type of interpersonality, and a second time to assess the type of interaction. Thus, each sentence had two codes in the data entry form. For this study, the researcher identified the sentences and clauses to be coded by the independent coders in order to avoid discrepancies in the identification of units of analysis that may have affected internal validity. Sentences supplied to the coders were previously identified by a code of three numbers (sentence number/message number/forum number). This allowed the performance of reliability tests. Providing the sentences to the coders, however, does not exclude training them in sentence identification.
Information in the coding sheet

The coding sheet (or data entry form) contains primary and explicit information, as they may be the only source of data. For this study, the coding sheet includes administrative information (coder’s name, participant’s information, date of data collection, number of message, etc.), simplified coding directions, and coded data. The coding sheet provided in this study was useful when coding by hand in the pilot study (see Appendix F). Independent coders used a computer program—a database spreadsheet developed in Access—for their coding process (not included in this study).

Thus, coder characteristics, coders training and preparation, operational definitions of variables, examples of coding categories, instructions and coding procedures, and data entry forms are key issues that were carefully addressed in the codebook before the data collection process took place.

Reliability and Validity

However sophisticated a measurement technique, instrument, or procedure may be, and despite how much experience the researcher may have, error may exist in the assessment of any complex construct that pretends to represent human traits (Udinsky, Osterlind, & Lynch, 1981), as may be the case when assessing interpersonality and interaction processes. Reliability and validity are two criteria that help determine the quality of the measurements (or, if preferred, the estimate of measurement error) in the research (McMillan & Schumacher, 1997). Even when validity may be the most important, reliability is a necessary precondition for overall
validity.

**Reliability**

The term refers to the degree to which a measurement process remains unchanged over time (McDonald, 1997). More specifically, it addresses the consistency and stability of different measurements or ratings of the same thing, object, or situation (Gravetter & Wallnau, 1996; McMillan & Schumacher, 1997), either by different persons at the same time or by the same person in different times. The former is known as reproducibility, inter-coder or inter-rater reliability, while the latter is termed stability, consistency or intra-coder reliability.

Two independent coders—in addition to the author-coded identical messages (all sentences in forum 1, which account for 17% of the total number of sentences). In this study, reproducibility for the coding process in the form of agreement or consistency of ratings (McMillan & Schumacher, 1997)—as opposed to reliability of the instrument—was assessed. This type of reliability is expressed as a coefficient of agreement. This is established by determining the extent to which two or more persons agree about what they have seen, heard, or rated. That is, when two or more observers or raters independently observe or rate something…[to determine] if there is some consistency in measurement…It will be reported as inter-rater reliability or scorer agreement and will be expressed either as a correlation coefficient or as a percentage of agreement. (McMillan & Schumacher, 1997, p. 242)

Intercoder reliability is not determined by number of coders, but by the extent of agreement between coders. As stated above, some research studies report percentage of agreement. However, some agreement will occur by chance, which should
artificially inflate the amount of real agreement in a percentage of simple agreement (B. Benoit, personal communication, December 5, 2000). Kappa techniques are ways to correct for agreement by chance (Cohen, 1960).

Independent coders worked on sentences previously identified and labeled by the researcher, so reliability related to coding units was not necessary for this study (further studies will require additional work with coders upon this issue). Specific agreement between pairs of coders for both variables, as well as the overall agreement per variable and per independent category (Appendix G, Tables G1-G7), were analyzed through consolidated contingency tables (chi square for independence) and kappa for independent units. Futrell (1995), mentions that

Chi-square can, in fact, be computed along with Kappa for any contingency table. The statistics, however, have different purposes: Chi-square determines whether a relationship exists between categorical variables, while Kappa assesses the degree of the relationship. (p. 82)

For this study, an overall kappa value for each variable and individual kappa values for each independent category were calculated. The latter revealed those categories in which raters had trouble agreeing, thus indicating either a need to refine the operational definitions for those categories, a deficiency in coder training, or a combination of both. When there was substantial agreement among raters, “there is the possibility, although no guarantee, that the ratings are accurate” (Futrell, 1995, p. 81).

Regarding kappa values, McMillan and Schumacher (1997) state that studies of groups can tolerate a reliability index “sometimes as low as 0.50 in exploratory
research” (p. 244), although Orwin’s (1994) figures just above 0.50 are considered as fair. Futrell (1995) states that “0.70 should be regarded as a lower bound of acceptability, and anything higher than 0.90 is quite good. If values below 0.70 are obtained, the measurement system needs to be evaluated” (p. 84). His figures, however, refer to industrial processes and not to social sciences, where different-and lower-ranges are accepted. For example, Martin, Meek, and Willeberg (1987, p 74) indicate that kappa values of 0.4 to 0.7 show fair to very good agreement, while values above 0.7 show excellent agreement. This study follows the more strict-and more recent-kappa ranges specified by Li and Lautenschlager (1997) for educational and psychological measurements:

For practical or clinical uses, an index value smaller than 0.40 is unacceptable. An index value falling between 0.40 and 0.59 is borderline. An index value between 0.60 and 0.75 is good, and values exceeding 0.75 are deemed excellent. (p. 818)

Caution is required when attempting generalized reliability of satisfactory coefficients involving several raters to scores generated by a single rater, as if more than one rater had coded the entire sample. As Fan and Chen (2000) state:

It is erroneous to generalize the interrater reliability coefficient estimated from two or more raters rating only a (small) portion of the sample to the rest of the sample data for which only one rater is used for scoring, although such generalization is often made implicitly in practice. (p. 532)

In this study, a G score was obtained to evaluate the possibility of generalizing the figures for reliability obtained for forum 1-coded by the three raters-to forums 9 and 14.
Values and Discussion of Results

Kappa values were obtained through sentence/sample-by-category data matrixes (see Appendix G, Tables G3-G4). The obtained kappa values for the three raters in Table G1 and Table G2 (both category-by-rater contingency tables) in Appendix G show differing levels of agreement for specific categories for the explanatory and the response variables. Out of the thirteen interpersonality categories, five (38.4%) rate as excellent, three (23%) as good, three more as borderline (23%), and only two (15.4%) as unacceptable. Out of the overall number of sentences evaluated by the three coders (1,071), only 18 (less than 2%) are included in this rating category, while 751 (70%) rank as good (see Appendix G, Table G1). The coders seem to have trouble differentiating humor from sarcasm, as well as in clearly identifying disclosive content in online messages. Humor and sarcasm may be difficult to distinguish as it much depends on the context of the forum. However, disclosure as a category may require a revision of its operational definition.

Regarding the response variable, out of the five interaction categories, none rated as excellent, three as good (60%), one as borderline (20%), and one more as unacceptable (20%). Of the overall number of sentences evaluated by the three coders in these categories (1,071), 53 (less than 5%) are included in this rating category (IMRTV), while 992 (over 92%) rank as good (see Appendix G, Table G2). Apparently, coders have difficulty in clearly identifying whenever a sentence implicitly refers to a previous one, whether in the same message or in a different one. As in humor/sarcasm, this may require a more careful reading of messages in the
discussion forum, its improvement depending more on the training process of the
coders than on reviewing the operational definition.

Overall for both variables, four categories (22%) were rated as excellent,
comprising only 29 sentences (4% of the total amount of sentences in both
categories), six categories (33%) were rated as good, comprising 587 sentences (over
80%), and 73 sentences (10%) were rated either as borderline or unacceptable. This is
reflected in the overall kappa for interpersonality (0.64) and for interaction (0.65),
both considered as good (see Appendix G, Tables G1-G4). These figures were
obtained through conventional kappa techniques, and crosschecked through Fleiss
(1971) multiple-rater kappa statistic, derived through the ANOVA approach (see
Appendix G, Tables G3 and G4).

As reliability may also be defined as the estimate of the amount of error usually
attached to an individual’s obtained test score, the extent of raters’ bias in assigning a
sentence into a category within each variable was assessed through the percentage of
total variance for raters, using Tables G5 and G6. In each of the variables, the
percentage obtained does not indicate a systematic bias (0.17 for interpersonality and
0.25 for interaction). If bias were large (10% or more), it would indicate that raters
used different criteria to evaluate sentences. The $G$ (generalizability) coefficient was
obtained from variance applied to categorical data (see Appendix G, Tables G5 and
G6). Because it considers raters’ systematic variation, this coefficient indicates a
more accurate overall agreement than the kappa coefficient. For both variables, $G =
0.83$, which is deemed as excellent (Li & Lautenschlager, 1997).
Lundgren (1977), when using $X^2$ coefficient to determine the goodness of fit between pairs of coders’ scores across different categories as a limited-but valid-reliability check, cites Bales (1950) as suggesting a probability criterion level of $p = .50$ as indicating “a satisfactory level of interobserver agreement” (p. 186). No agreement beyond chance would yield a $p = 0$, while a $p = 1$ would indicate perfect agreement. In other words, and contrary to the testing of correlation among variables, the lower the value of $X^2$, the higher the agreement.

The overall level of agreement between any two coders established through various chi-square tests for independence (see Appendix G, Table G7) was, according to Bales (1950, in Lundgren, 1997), not satisfactory for coders 2 vs 3. However, results for agreement between coders 1 vs 2 and coders 1 vs 3 were satisfactory. When analyzing separate variables, agreement in overall interpersonality categories was high only for coders 1 vs 3, while agreement in overall interaction categories was satisfactory only for coders 2 vs 3. Thus, coder 1 exhibited a higher level of agreement with coder 3 regarding interpersonality, and with coder 2 regarding interaction. Overall, coder 3 was closer to agreement with coder 1 than coder 2. Coders 1 and 2, as independent coders, exhibited a low level of agreement.

Based on the overall results of inter-coder agreement for interpersonality and interaction both among and between them (through three reliability statistics-chi-square, kappa and $G$ coefficients), it was determined to use the data obtained from the pilot study (coding of transcripts for forums 1, 9, and 14) for the testing of hypotheses $Ha_{51}$, $Ha_{52}$, $Ha_{53}$, $Ha_{61}$, and $Ha_{61}$ of this study (Titscher, Meyer, Wodak, & Vetter,
Validity

In general terms, validity refers to the degree in which an instrument measures the variable it intends to measure (Sampieri, Collado, & Lucio, 1998, p. 236), or, in other words, that the analytical results represent what they claim to represent (Krippendorf, 1980). When it comes to complex constructs that cannot be measured directly, validity becomes an important issue to consider. Validity does not reside in the instrument itself as it depends on the population, the environmental characteristics and the purpose in which a specific measurement takes place (McMillan & Schumacher, 1997).

Content, construct, and criterion validity are the most commonly used types of evidence to assess the validity of an instrument in classical procedures. However, most of them cannot be used in interpretative types of research as this one (Titscher et al. 2000). The absence of a panel of experts and of a gold standard with which to compare the results (McDonald, 1997), together with the principle of content analysis which states that coding categories must be exhaustive and mutually exclusive, imply that a clear operational definition of variables, based upon coding schemes and established methods and theories taken from the literature, sufficiently account for both content and construct validity. Regarding these issues, Krippendorf (1980) mentions that the situation of the content analyst is different than that one in which the experimental psychologist is immersed. Henri (1992b) seems to agree as she
states that

Content analysis of computer-mediated conferencing aims to derive meaningful objects from a corpus of teleconferencing messages. It is a tool, which educators need if they are to decode and understand the mental processes involved in this kind of learning…Given the pragmatic approach of our research, efficiency must be a prime concern. We are equally concerned that the analytical procedure be scientific-i.e. that the methodology is equipped to resist the subjective manipulations of the encoder and of the educator/analyst….A key element in this protection is to define rigorously the aims of the analysis, the theoretical framework, and the analytical criteria. (p. 134)

While the latter are clearly defined in Appendix C, the two former were specified in Chapter 2.
CHAPTER 4 – DATA ANALYSIS

This chapter summarizes the results of the study. Data from forums 1, 9, and 14 is depicted in raw and processed data tables (Appendix H, Tables H1-H14) for statistical hypotheses testing.

Purpose 1

*Describe the level and amount of participation in online academic discussion forums and determine the quantitative dimension of online participation through time.*

Participation constitutes the form (versus the content) of exchanges among group members in online forums. It was termed “quantitative asymmetry” in Chapter 2, and was evaluated through number, length, and frequency of sentences, messages, and threads. Other indicators (such as valid posting dates) were also considered for each individual forum and for the three forums analyzed (Appendix H, Table H1). The main data are graphically displayed in Figure 9.

*Figure 9.* Percentages of total amount of threads, messages, and sentences for each individual forum over time.
Overall, 2,096 sentences in 160 messages arranged in 38 threads during the three forums were analyzed (see Table 8). Figure 10 depicts other participation indicators from Table H1 that adjust these absolute figures to valid posting dates.

*Figure 10.* Mean registers for participation indicators for each individual forum over time.
Research Question 1.1

How frequently and how much did students participate in online forums?

Ha1: Number and length of messages (measured in number of sentences) will show a positive correlation (.05 level) over the span of the study.

A double procedure was followed to test this hypothesis. Pearson correlation and an ANOVA were used as complementary testing procedures. A correlation for the data on Appendix H (Table H4) revealed that the number and length of messages (measured in number of sentences) for all forums were significantly correlated, \( r = +.97, n = 38, p < .01, r^2 = 0.94 \). Thus, 94% of the variability in the number of sentences can be explained from the relationship with the number of messages.

Independent correlation coefficients for each individual forum showed a high correlation. Forum 1, \( r = +.91, n = 14, p < .01, r^2 = 0.82 \); forum 9, \( r = +.94, n = 7, p < .01, r^2 = 0.88 \); forum 14, \( r = +.99, n = 17, p < .01, r^2 = 0.98 \). Thus, the null can be rejected.

Figure 11 indicates this graphically for threads in the three separate forums.
Figure 11. Absolute number of messages per thread and sentences per thread in forums 1, 9, and 14.
The following scattergram pictures data for the three forums:

![Scattergram](image)

*Figure 12. Correlation of sentences and messages in forums 1, 9, and 14.*

The findings using the Pearson correlation were corroborated through a one-way ANOVA for the three forums analyzed, as reported in Table 8.

### Table 8

*Analysis of Variance for Messages and Sentences*

<table>
<thead>
<tr>
<th>Sources</th>
<th>n (messages)</th>
<th>T (sentences)</th>
<th>M</th>
<th>SD</th>
<th>F(2, 157)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forum 1</td>
<td>29</td>
<td>357</td>
<td>12.31</td>
<td>8.71</td>
<td>0.75</td>
</tr>
<tr>
<td>Forum 9</td>
<td>56</td>
<td>792</td>
<td>14.14</td>
<td>9.97</td>
<td></td>
</tr>
<tr>
<td>Forum 14</td>
<td>75</td>
<td>947</td>
<td>13.10</td>
<td>5.62</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>N = 160</td>
<td>G = 2,096</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Although the ANOVA is more accurate when the sample sizes are equal, this happens almost always in experimental designs. As this is an ex-post-facto study, the sample sizes are unequal, both for the different valid posting dates for each forum and the variable nature of online participation. In these situations, ANOVA still provides a valid test, even when the discrepancy among sample sizes is relatively great, as samples are relatively large, as in this study (Gravetter & Wallnau, 1996). $F$ indicates that there is no significant difference among the sentence means in all forums, which is equivalent to stating that $n$ and $T$ are related. In other words, the variability of samples is so small that we may conclude they come from the same population. This value of $F$ supports the rejection of the null hypothesis.

**Research Question 1.2**

How is that participation grouped through time?

Ha2: Number and length of threads (measured in number of messages) will show a negative correlation (.05 level) through time.

A double procedure was again used for hypothesis testing. A correlation for the data on Appendix H (Table H5) revealed that the number and length of threads (measured in number of messages) for all eleven forums during the three semesters (so as to assure a sufficiently large sample size) were not significantly correlated, $r = +.28$, $n = 11$. The null may not be rejected.

The following figure illustrates this overall lack of correlation in a logarithmic
scale for all forums analyzed. It shows the number of threads and messages per forum through all the online group interaction. The inclusion of polynomic trendlines confirms the Pearson correlation test performed for these data.

![Graph showing number of threads and messages over semesters](image)

**Figure 13.** Absolute number of threads and messages for all forums.

Figure 13 shows that the number of threads and messages are not likely to show any relationship through time. Moreover, the pattern depicted shows divergent behavior between them. The findings using the Pearson correlation were corroborated through a one-way ANOVA only for the three forums analyzed, as reported in Table 9.
Table 9

Analysis of Variance for Threads and Messages

<table>
<thead>
<tr>
<th>Sources</th>
<th>$n$ (threads)</th>
<th>$T$ (messages)</th>
<th>$M$</th>
<th>$SD$</th>
<th>$F(2, 35)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forum 1</td>
<td>14</td>
<td>29</td>
<td>2.07</td>
<td>1.44</td>
<td>4.16*</td>
</tr>
<tr>
<td>Forum 9</td>
<td>7</td>
<td>56</td>
<td>8.00</td>
<td>6.87</td>
<td></td>
</tr>
<tr>
<td>Forum 14</td>
<td>17</td>
<td>75</td>
<td>4.40</td>
<td>4.89</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$N = 38$ $G = 160$

$p < .05$

$F$ indicates that there is a significant difference among the message means in all forums, which is equivalent to stating that $n$ and $T$ are not related. This value of $F$ supports the acceptance of the null hypothesis using the Pearson test. The following figure depicts the thread-to-message ratio for all 11 forums, together with its polynomic trendline.

Figure 14. Thread-to-message ratio for all forums.
Ha3: Participation will be unevenly distributed (.05 level) among days of the week over the duration of the study.

A chi-square test for goodness of fit was performed for the frequencies of messages per day of the week for all forums to evaluate message distribution. According to the calculations from data (column $f$) in Table 10 (see also Tables H2 and H3 in Appendix H), the distribution of messages over the week does not have equal proportions, $X^2(6, n = 160) = 25.04, p < .001$. That is, there are some days for posting that are preferred to others. The null is rejected.

Table 10

*Mean Levels of Messages and Sentences per Day of the Week for all Forums*

<table>
<thead>
<tr>
<th>Day of the week</th>
<th>Frequency of messages ($f$)</th>
<th>Number of sentences ($n$)</th>
<th>Sentences per message ($M$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday</td>
<td>14</td>
<td>239</td>
<td>17.07</td>
</tr>
<tr>
<td>Monday</td>
<td>32</td>
<td>341</td>
<td>10.66</td>
</tr>
<tr>
<td>Tuesday</td>
<td>38</td>
<td>555</td>
<td>14.61</td>
</tr>
<tr>
<td>Wednesday</td>
<td>20</td>
<td>227</td>
<td>11.35</td>
</tr>
<tr>
<td>Thursday</td>
<td>25</td>
<td>278</td>
<td>11.12</td>
</tr>
<tr>
<td>Friday</td>
<td>21</td>
<td>289</td>
<td>13.76</td>
</tr>
<tr>
<td>Saturday</td>
<td>10</td>
<td>167</td>
<td>16.70</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>160</strong></td>
<td><strong>2,096</strong></td>
<td><strong>13.10</strong></td>
</tr>
</tbody>
</table>

While Figure 15 shows the absolute number of messages and sentences per day
of the week, including linear trends, Figure 16 shows the logarithmic scaling of those figures to enhance the posting tendency throughout the days of the week for all 14 forums in the online interaction.

![Figure 15. Number of messages and sentences per day of the week for all forums.](image)

![Figure 16. Number of messages and sentences per day of the week for all forums (logarithmic scale).](image)

Frequency of messages for the three forums analyzed in this study are depicted
in Figure 17, both separately and in a composite manner, while Figure 18 shows the composite number of messages against the average sentences per message.

Figure 17. Number of messages per day of the week per forum and for all forums.

Figure 18. Number of messages and sentences per message per day of the week for all forums.
Purpose 2

Assess the relationship among messages (type of interaction) posted by participants in online academic forums over time; and identify and assess the type and amount of interpersonal content in messages posted to online academic forums over time.

Research Question 2.1

Over the duration of the course, to what degree do the students’ contributions appear to reflect interactive content? Does it represent a significant amount of overall message content?

Raw data for the following figures is depicted in Appendix H (Tables H6 and H7). Figure 19 shows the absolute number of sentences for each interaction category for each forum. Active content represents the largest amount of sentences in all forums, while interactive content the smallest.

![Figure 19. Number of sentences per interaction categories per forum.](image-url)
Figure 20 shows the overall presence of active, reactive and interactive content, from data in Appendix H, Table H6.

Active content in online forums, as measured in percentages of total contributions per forum, tends to diminish its weight, while the sum of both reactive (EXRTV and IMRTV) categories of interaction and both interactive categories of interaction (EGINTV and INTV) show a clear tendency to augment its presence. However, interactive content represents, overall, less than 5% (4.87%) of the overall message content in all forums.

A complementary scenery emerges analyzing active, reactive, and interactive content as percentages of the total number of sentences per forum (data in Table H7, Figure 20. Percentage of sentences per interaction categories per forum. Statistically significant linear trends are indicated in the legend for each category (*p < .005), as shown in Table 11.
Appendix H, column \( \% \)), All interaction categories increase, although reactive and interactive content do so in a more linear fashion. Reactivity and interactivity show a four-fold increase in Forum 14 when compared to Forum 1, while active content doubles its presence, as shown in Figure 21.

![Graph showing the percentage of total number of sentences per interaction categories per forum](image)

**Figure 21.** Percentage of the total number of sentences per composite interaction categories per forum.

**Research Question 2.2**

Do levels of activity, reactivity, and interactivity change over the duration of the study?

Ha4$_1$: Initial levels of active content will tend to decrease (.05 level) during the interaction.

Ha4$_2$: Initial levels of reactive content will tend to increase (.05 level) during the same period of time.

Ha4$_3$: Overall interactive content in graduate students online forums will increase (.05 level), from initial levels, over the duration of the study.
A chi-square test for homogeneity is used to assess if two population proportions are equally distributed through time. Null hypotheses are rejected if the proportions differ significantly between each other (Daniel, 1978). Thus, a series of tests for homogeneity were performed both for composite comparison among forums (sub-table 1) and for each interaction category within each forum (sub-tables 2-4) to assess if the distribution of proportions of the categories was statistically different from forum to forum. Additionally, chi-square tests for trend were performed testing each interaction category against all other categories. Data for the tests are recorded in Table 11.
Table 11

Frequency of Sentences and Statistical Analyses for Interaction Categories for Each Forum and for All Forums

<table>
<thead>
<tr>
<th>Sub-table</th>
<th>Category</th>
<th>Forum 1 (8 days)</th>
<th>Forum 9 (12 days)</th>
<th>Forum 14 (22 dys)</th>
<th>X² Homogeneity</th>
<th>X² Trend&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ACTV</td>
<td>263 (73.7%)</td>
<td>537 (67.8%)</td>
<td>580 (61.2%)</td>
<td>20.88&lt;sup&gt;*&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RCTV</td>
<td>80 (22.4%)</td>
<td>223 (28.2%)</td>
<td>311 (32.8%)</td>
<td></td>
<td>19.97&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>INTCTV</td>
<td>14 (3.9%)</td>
<td>32 (4.1%)</td>
<td>56 (5.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ACTV</td>
<td>263 (73.7%)</td>
<td>537 (67.8%)</td>
<td>580 (61.2%)</td>
<td>19.97&lt;sup&gt;*&lt;/sup&gt;</td>
<td>19.95&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>RCTV +</td>
<td>94 (26.3%)</td>
<td>255 (32.2%)</td>
<td>367 (38.8%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>INTCTV</td>
<td>14 (3.9%)</td>
<td>32 (4.1%)</td>
<td>56 (5.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>RCTV</td>
<td>80 (22.4%)</td>
<td>223 (28.2%)</td>
<td>311 (32.8%)</td>
<td>14.42&lt;sup&gt;*&lt;/sup&gt;</td>
<td>14.35&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>ACTV +</td>
<td>277 (77.6%)</td>
<td>569 (71.8%)</td>
<td>636 (67.2%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>INTCTV</td>
<td>14 (3.9%)</td>
<td>32 (4.1%)</td>
<td>56 (5.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>INTCTV</td>
<td>14 (3.9%)</td>
<td>32 (4.1%)</td>
<td>56 (5.9%)</td>
<td>4.10</td>
<td>40.67&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>ACTV +</td>
<td>343 (96.1%)</td>
<td>760 (95.9%)</td>
<td>891 (94.1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RCTV</td>
<td>14 (3.9%)</td>
<td>32 (4.1%)</td>
<td>56 (5.9%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. All sub-tables for homogeneity have a df = 2 (except sub-table 1, df = 4) and N = 2,096.
<sup>a</sup> Trend refers to long-term increase or decrease in the magnitude of a variable. Variables that increase or decrease randomly and non-significantly fit the definition of trendless (Monge, 1995). All sub-tables for trend have a df = 1.
<sup>*</sup> p < .005

1 Interpretations of 2 x 2 contingency tables are “straightforward and unambiguous” (Daniel, 1978, p. 185). For contingency tables with df > 1 (as in sub-table 1), interpretations are not clear-cut. A technique known as partitioning of chi-square was used in sub-tables 2-4 to break down sub-table 1 into smaller tables.
According to data in sub-table 1, all forums were found to be significantly different from each other, $X^2(4, n = 2,096) = 20.88, p < .005$. Each independent interaction category differences are reported as follows: in contingency table 2, active content showed a significant difference from composite reactive and interactive content in the three forums, $X^2(2, N = 2,096) = 19.97, p < .005$, as well as reactive content when compared to the composite of active and interactive content in the contingency sub-table 3, $X^2(2, N = 2,096) = 14.42, p < .005$. However, interactivity is not significantly present, $X^2(2, n = 2,096) = 4.10$, for data in contingency sub-table 4. Interactivity is homogeneously distributed through time. Trend analysis reveals significant descending tendencies for active content, while disclosing significant ascending tendencies both for reactive and interactive content through time. Therefore, the null for Ha4₁, Ha4₂, and Ha4₃ may be rejected.

**Research Question 3.1**

Over the duration of the course, to what degree do the students’ contributions appear to reflect interpersonal content? Does it represent a significant amount of overall message content?

Raw data for the following figures is depicted in Appendix H (Tables H8 and H9). Figure 22 shows the absolute number of sentences for each interpersonal category for each forum. Negative interpersonality represents the largest amount of sentences in forums 1 and 14, while positive impersonality predominates in forum 9. Every category increases, except negative impersonality. Positive impersonality
remains practically stable in forums 9 and 14. OTHR ("others") category represents a minimum amount of sentences in each forum, as in all forums as a whole.

![Graph showing number of sentences per interpersonal categories per forum.](image)

**Figure 22.** Number of sentences per interpersonal categories per forum.

Figure 23 shows the overall presence of interpersonal categories in percentages of sentences per forum (the category OTHR was suppressed due to its low presence in each forum).
Research Question 3.2

Do levels of interpersonality and impersonality change over the duration of the study?

Except for positive interpersonality, which tends to remain fairly stable through the group interaction, the other categories vary in forum 9. While negative interpersonality decreases, both positive interpersonality and negative impersonality increase their presence. Again forum 9 seems to behave somewhat different. An opposite behavior is depicted between negative interpersonal and positive impersonal content, or basically between informing and advocating (the heaviest category in that area, with an overall presence of 93.57%). Both informing and advocating account for over 70% of overall interpersonal content. The former accounts for 33.21% and the latter for 38.22% of overall interpersonal content.
The composite categories of both positive and negative interpersonality and impersonality are shown in Figure 24, from data in Appendix H, Table H9.

![Graph showing percentage of sentences per interpersonal composite categories per forum.](image)

*Figure 24. Percentage of sentences per interpersonal composite categories per forum.*

Individual categories of interpersonality and impersonality are shown in Figure 25 as bipolar categories, as analyzed in Chapter 2, from data in Table H9, Appendix H.
Figure 25. Percentage of interpersonal sentences per bipolar categories per forum. Statistically significant linear trends are indicated in the legend for each category
\* \( p < .10 \) \** \( p < .025 \) \*** \( p < .005 \), as shown in Table 12.
Based upon frequencies in Appendix H (Table H8), a chi-square test for homogeneity for the composite of all bipolar categories over time was performed, to find out if the proportions of each category were statistically different. Trend tests for each independent category were performed against all the other categories to find out evidence of a significant linear trend in the proportions of each category.

Table 12

*Relationship of Sentences for Interpersonality Specific Categories for Each Forum and for All Forums*

<table>
<thead>
<tr>
<th>Sub-table</th>
<th>Category</th>
<th>Forum 1 (8 days)</th>
<th>Forum 9 (12 days)</th>
<th>Forum 14 (22 days)</th>
<th>X² Homogeneity</th>
<th>X² Trenda</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>All</td>
<td></td>
<td></td>
<td></td>
<td>26.75b df = 22</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.57</td>
</tr>
<tr>
<td>2</td>
<td>a SPRT(+)</td>
<td>27</td>
<td>89</td>
<td>94</td>
<td></td>
<td>0.57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(7.56%)</td>
<td>(11.24%)</td>
<td>(9.93%)</td>
<td></td>
<td>0.20</td>
</tr>
<tr>
<td>2</td>
<td>b OPPTN(-)</td>
<td>2</td>
<td>13</td>
<td>11</td>
<td></td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.56%)</td>
<td>(1.64%)</td>
<td>(1.16%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>a DSRE(+)</td>
<td>42</td>
<td>47</td>
<td>42</td>
<td></td>
<td>20.62***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(11.76%)</td>
<td>(5.93%)</td>
<td>(4.44%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>b RSVE(-)</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
<td>0.15b</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.00%)</td>
<td>(0.13%)</td>
<td>(0.00%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>a APRL(+)</td>
<td>3</td>
<td>17</td>
<td>20</td>
<td></td>
<td>1.52</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.84%)</td>
<td>(2.15%)</td>
<td>(2.11%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>b CHMT(-)</td>
<td>0</td>
<td>5</td>
<td>2</td>
<td></td>
<td>0.00c</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.00%)</td>
<td>(0.63%)</td>
<td>(0.21%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>a HMR(+)</td>
<td>8</td>
<td>8</td>
<td>18</td>
<td></td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.24%)</td>
<td>(1.01%)</td>
<td>(1.90%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>b SRSM(-)</td>
<td>8</td>
<td>6</td>
<td>7</td>
<td></td>
<td>4.27*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.24%)</td>
<td>(0.76%)</td>
<td>(0.74%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 12 continues*
<table>
<thead>
<tr>
<th>Sub-table</th>
<th>Category</th>
<th>Forum 1 (8 days)</th>
<th>Forum 9 (12 days)</th>
<th>Forum 14 (22 days)</th>
<th>X² Homogeneity</th>
<th>X² Trend&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>a INQR(+)</td>
<td>6 (1.68%)</td>
<td>18 (2.27%)</td>
<td>36</td>
<td>5.38**&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b ADVC(-)</td>
<td>148 (41.46%)</td>
<td>252 (31.82%)</td>
<td>401</td>
<td>2.65</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>a INFM(+)</td>
<td>105 (29.41%)</td>
<td>295 (37.25%)</td>
<td>296</td>
<td>0.13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b RQST(-)</td>
<td>1 (0.28)</td>
<td>28 (3.54)</td>
<td>6</td>
<td>1.28</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* All sub-tables for homogeneity have a df = 2 and N = 2,026. The category OTHR was ignored.

<sup>a</sup> All sub-tables for trend have a df = 1.

<sup>b</sup> Chi-square test admits this figure as cells with low expected values represent less than 20% of the total number of cells when df > 1.

<sup>c</sup> Due to values too low for a chi-square test, these X² approximations are considered poor.

<sup>p < .10</sup> **<sup>p < .025</sup> ***<sup>p < .005</sup>

The chi-square test for homogeneity comparing all categories for all forums combined over time, apparently indicates a significant difference in the proportional distribution of the categories over time. However, this figure must be taken cautiously due to two expected frequencies lower than 1².

Although at different levels of significance, trend figures indicate a significant increase for INQR, and a significant decrease for DSRE and SRSM. Trend patterns

<sup>²</sup> Cochran (in Daniel, 1978) recommends that “for a contingency table with more than one degree of freedom, a minimum expected cell frequency as low as 1 should be allowed if 20% or fewer of the cells have expected frequencies less than 5.” (p. 167).
for other categories are not significant. However, negative interpersonal content exhibits low frequencies, as expected, except for ADVC, which accounts for 41.46% of total number of sentences in forum 1, 31.82% in forum 9, and 42.34% in forum 14, for an overall presence of 38.22%. Regarding bipolar categories, this is the only case in which negative interpersonality outweighs its positive counterpart (INQR).

Ha5₁: Initial levels of negative interpersonal content and initial levels of positive interpersonal content will vary significantly (.05 level) through time.

Ha5₂: Initial levels of positive impersonal content and initial levels of positive interpersonal content will vary significantly (.05 level) through time.

Ha5₃: Initial levels of overall interpersonal content and initial levels of overall impersonal content will vary significantly (.05 level) through time.

Chi-square tests for independence were performed, both for composite comparison among forums and for positive and negative broad categories within each forums to assess if the distribution of proportions of the interpersonality categories was statistically different from forum to forum (Table 13). Trend tests were also performed for each composite category against all other categories over time.
Table 13

*Frequency of Sentences and Statistical Analyses for Interpersonality Categories for Each Forum and for All Forums*

<table>
<thead>
<tr>
<th>Sub-table</th>
<th>Category</th>
<th>Forum 1 (8 days)</th>
<th>Forum 9 (12 days)</th>
<th>Forum 14 (22 days)</th>
<th>X² Homogeneity</th>
<th>X² Trenda</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>INTPRL(+)</td>
<td>86 (24.1%)</td>
<td>179 (22.2%)</td>
<td>210</td>
<td>17.67*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>INTPRL(-)</td>
<td>158 (44.3%)</td>
<td>277 (34.9%)</td>
<td>421</td>
<td>21.7</td>
<td>(0.03)</td>
</tr>
<tr>
<td></td>
<td>IMPRL(+)</td>
<td>105 (29.4%)</td>
<td>295 (37.2%)</td>
<td>296</td>
<td>20.63***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IMPRL(-)</td>
<td>1 (0.3%)</td>
<td>28 (3.5%)</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OTHR</td>
<td>7 (1.9%)</td>
<td>13 (1.6%)</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>INTPRL(+/ -)</td>
<td>244 (68.3%)</td>
<td>456 (57.6%)</td>
<td>631</td>
<td>20.63***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IMPRL(+/ -)</td>
<td>106 (29.7%)</td>
<td>323 (40.7%)</td>
<td>302</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OTHR</td>
<td>7 (1.9%)</td>
<td>13 (1.6%)</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>INTPRL(+)</td>
<td>86 (24.1%)</td>
<td>179 (22.2%)</td>
<td>210</td>
<td>0.54</td>
<td>0.47</td>
</tr>
<tr>
<td></td>
<td>INTPRL(-)</td>
<td>271 (75.9%)</td>
<td>613 (77.8%)</td>
<td>737</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IMPRL(+/ -)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OTHR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 13 continues*
<table>
<thead>
<tr>
<th>Sub-table</th>
<th>Category</th>
<th>Forum 1 (8 days)</th>
<th>Forum 9 (12 days)</th>
<th>Forum 14 (22 days)</th>
<th>X² Homogeneity</th>
<th>X² Trend⁹</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>INTPRL (-)</td>
<td>158 (44.3%)</td>
<td>277 (34.9%)</td>
<td>421 (44.4%)</td>
<td>18.13***</td>
<td>1.77</td>
</tr>
<tr>
<td></td>
<td>INTPRL (+) / IMPRL (+/-) / OTHR</td>
<td>199 (55.7%)</td>
<td>515 (65.1%)</td>
<td>526 (55.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>IMPRL (+)</td>
<td>105 (29.4%)</td>
<td>295 (37.2%)</td>
<td>296 (31.3%)</td>
<td>9.77**</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>IMPRL (-) / INTPRL (+/-) / OTHR</td>
<td>252 (70.6%)</td>
<td>497 (62.8%)</td>
<td>651 (68.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>IMPRL (-)</td>
<td>1 (0.3%)</td>
<td>28 (3.5%)</td>
<td>6 (0.6%)</td>
<td>27.18***</td>
<td>1.26</td>
</tr>
<tr>
<td></td>
<td>IMPRL (+)/ INTPRL (+/-) / OTHR</td>
<td>356 (99.7%)</td>
<td>764 (96.5%)</td>
<td>941 (99.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>INTPRL (+/-)</td>
<td>244 (68.3%)</td>
<td>456 (57.6%)</td>
<td>631 (66.6%)</td>
<td>20.24***</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>IMPRL (+/-)⁹</td>
<td>106 (29.7%)</td>
<td>323 (40.7%)</td>
<td>302 (31.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>INTPRL (+)</td>
<td>86 (24.1%)</td>
<td>179 (22.2%)</td>
<td>210 (22.7%)</td>
<td>4.14</td>
<td>1.14</td>
</tr>
<tr>
<td></td>
<td>INTPRL (-)</td>
<td>158 (44.3%)</td>
<td>277 (34.9%)</td>
<td>421 (44.4%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 13 continues
According to the contingency sub-table 1, all forums were found to be significantly different from each other through time, $X^2(8, N = 2,096) = 17.67, p < .025$. For $H_{a5}$, the calculations for chi-square for homogeneity in sub-table 8 indicate that there is no significant difference in the proportions of positive and negative interpersonality, $X^2(2, N = 1,331) = 4.14$. This is, both categories are homogeneous. This does not mean that their presence in online forums is the same. In fact, relationship between proportions for both categories (83% for forum 1, 54% for forum 9, and 100% for forum 14, for an overall difference of 80%) indicate a constant greater presence of positive interpersonal content. The calculations indicate, however, that the initial differences in proportions do not vary significantly over time. Thus,
the null is accepted.

For Ha$_{52}$, calculations in sub-table 9 indicate that there is no significant difference in the proportions of positive impersonal and positive interpersonal content, $X^2(2, N = 1,171) = 3.28$. Both categories do not vary significantly over time. Relationship between proportions for both categories (22% for forum 1, 64% for forum 9, and 70% for forum 14, for an overall difference of 46%) indicate a constant greater presence of positive impersonal content. The calculations indicate, however, that the initial differences in proportions do not vary significantly over time. Thus, the null is accepted.

As for Ha$_{53}$, calculations in sub-table 7 indicate that overall interpersonal content (both positive and negative) differs significantly, $X^2(4, N = 2,096) = 20.24$, $p < .005$, from overall impersonal content. This is a significant difference between-category variation, which indicates no homogeneity between distributions of categories, or a significant greater presence of overall interpersonal content over impersonal content. This also indicates that categories are strongly associated. Thus, Ha$_{53}$ null is rejected.

Other calculations for the rest of the sub-tables in Table 14 indicate interesting distributions in proportions of interpersonality categories. Both interpersonal positive content and OTHR categories show no significant differences with the rest of the composite categories. However, interpersonal negative content in sub-table 4, $X^2(2, N = 2,096) = 18.13$, $p < .005$, and impersonal positive content in sub-table 5, $X^2(2, N = 2,096) = 9.77$, $p < .01$, differ significantly from their respective composite
interpersonality categories. Impersonal negative content in sub-table 6, also shows a significant variation, $X^2(2, N = 2,096) = 27.18, p < .005$.

Although the overall frequency of interpersonal content, both positive and negative, increases throughout the interaction, this increase is not significant. However, within its own specific categories (see Appendix H, Table H9, column %c), overall interpersonal content, both negative and positive, show a substantial increase, through time, as shown in Figure 26.

![Figure 26. Percentage of sentences per composite interpersonal categories per forum.](image)

Although no hypotheses was stated regarding the relationship between negative interpersonal and positive impersonal content (Table 14, sub-table 10), they were found to be significantly different, $X^2(2, N = 1,552) = 16.71, p < .005$, as shown in Figure 27 (Appendix H, Table H9, column labeled %a). The difference is basically...
determined by ADVC and INFM. A chi-square for homogeneity between advocacy and information [Table 13, rows = ADVC(sub-table 5b), INFM (sub-table 6a); columns = Forum 1, Forum 9, Forum 14] indicates that there is a significant difference between both through time, \(X^2(2, N = 1,497) = 19.20, p < .005\), which is equivalent to stating that the two variables are significantly related negatively (Gravetter & Wallnau, 1996). Once again, forum 9 seems to exhibit a different behavior when compared to forums 1 and 14.

![Graph](image)

*Figure 27. Percentage of negative interpersonal and positive impersonal content per forum.*

**Purpose 3**

*Determine the association between interpersonal content and the type of interaction in discussion forums, as well as the behavior of that relationship through time.*

**Research Question 4**

Is there an association between the students’ amount of interpersonal content and the type of interaction in postings? Do these relationships vary through time?
Table 14

*Frequency of Sentences for Interpersonality and Interaction Categories for Each Forum and for All Forums*

<table>
<thead>
<tr>
<th>Sub-tables</th>
<th>Interpersonality</th>
<th>Interaction</th>
<th>ACTV</th>
<th>RCTV</th>
<th>INTCTV</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forum 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>INTPRL (+)</td>
<td>46</td>
<td>28</td>
<td>12</td>
<td>86</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>INTPRL (-)</td>
<td>135</td>
<td>22</td>
<td>1</td>
<td>158</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>IMPRL (+)</td>
<td>77</td>
<td>28</td>
<td>0</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>IMPRL (-)</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>Total</td>
<td>258</td>
<td>79</td>
<td>13</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Forum 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>INTPRL (+)</td>
<td>86</td>
<td>71</td>
<td>22</td>
<td>179</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>INTPRL (-)</td>
<td>239</td>
<td>37</td>
<td>1</td>
<td>277</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>IMPRL (+)</td>
<td>184</td>
<td>104</td>
<td>7</td>
<td>295</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>IMPRL (-)</td>
<td>15</td>
<td>11</td>
<td>2</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>Total</td>
<td>524</td>
<td>223</td>
<td>32</td>
<td>779</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Forum 14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>INTPRL (+)</td>
<td>84</td>
<td>86</td>
<td>40</td>
<td>210</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>INTPRL (-)</td>
<td>300</td>
<td>116</td>
<td>5</td>
<td>421</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>IMPRL (+)</td>
<td>183</td>
<td>102</td>
<td>11</td>
<td>296</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>IMPRL (-)</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>Total</td>
<td>570</td>
<td>307</td>
<td>101</td>
<td>933</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>All forums</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>INTPRL (+)</td>
<td>216</td>
<td>185</td>
<td>74</td>
<td>475</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>INTPRL (-)</td>
<td>674</td>
<td>175</td>
<td>7</td>
<td>856</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>IMPRL (+)</td>
<td>444</td>
<td>234</td>
<td>18</td>
<td>696</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>IMPRL (-)</td>
<td>18</td>
<td>15</td>
<td>2*</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>Total</td>
<td>1,352</td>
<td>609</td>
<td>101</td>
<td>2,062</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OTHR</td>
<td>28</td>
<td>5</td>
<td>1</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grand Total</td>
<td>1,380</td>
<td>614</td>
<td>102</td>
<td>2,096</td>
<td></td>
</tr>
</tbody>
</table>

*a Even when this cell has low expected value, chi-square test admits this as the cell represents less than 20% of the total number of cells in this sub-table.*
Based on Table 14, an overall chi-square for independence was performed with data from sub-table 4 (rows = 4a, 4b, 4c, 4d; columns = ACTV, RCTV, INTCTV, for all forums). Results indicate a large discrepancy between observed and expected values. This difference in frequency proportions suggests a relationship or dependency among variables, \(X^2(6, N = 2,062) = 244.84, p < .005\). Or, in other words, some interaction categories depend on some categories of interpersonality.

Isolating categories is now required to further specify the nature of the overall relationship between both variables. Another general chi-square test for independence was performed [rows = INTPRL(+/-) + IMPRL(+/-)(sub-tables 1a + b, 2a + b, 3a + b); columns = ACTV, RCTV, INTCTV, for forums 1, 9, 14] for the same population. Results also indicate a large discrepancy between observed and expected values, \(X^2(4, N = 2,062) = 21.77, p < .005\).

\(H_{a61}\): Overall interpersonal content will be significantly related (.05 level) to the amount of reactive and interactive content in graduate students online messages, both for each particular forum and for the set of forums analyzed.

A chi-square test for independence between forums over time was performed [rows = INTPRL(+) (sub-tables 1a, 2a, 3a), INTPRL(-) (sub-tables 1b, 2b, 3b); columns = RCTV + INTCTV, for forums 1, 9, 14]. Interpersonal content was found to be significantly related to the sum of reactive and interactive content for the set of forums, \(X^2(2, N = 441) = 14.79, p < .005\).

Both explanatory and response variables were analyzed for each individual forum and for all forums through a series of chi-square tests for independence now
dealing with reactivity and interactivity as separate categories. For all forums [rows = INTPRL(+) (sub-table 4a), INTPRL(-) (sub-table 4b); columns = RCTV, INTCTV, for all forums], chi-square calculations reveal a significant relation between variables, $X^2(1, N = 441) = 43.55, p < .005$.

Due to low expected values in all four cells, $X^2$ calculations for forum 1 [rows = INTPRL(+) (sub-table 1a), INTPRL(-) (sub-table 1b); columns = RCTV, INTCTV, for forum 1] are considered poor, $X^2(1, N = 63) = 5.85, p < .025$. Figures for forum 9 [rows = INTPRL(+) (sub-table 2a), INTPRL(-) (sub-table 2b); columns = RCTV, INTCTV, for forum 9], $X^2(1, N = 131) = 8.23, p < .005$, and forum 14 [rows = INTPRL(+) (sub-table 3a), INTPRL(-) (sub-table 3b); columns = RCTV, INTCTV, for forum 14], $X^2(1, N = 247) = 31.66, p < .005$, are valid. With the data obtained, the null may be rejected.

$Ha_{62}$: Overall impersonal content will be significantly related (.05 level) to active content in graduate students online messages for the set of forums analyzed.

A chi-square test for independence between forums over time was performed [rows = IMPRL(+) (sub-tables 1c, 2c, 3c), IMPRL(-) (sub-tables 1d, 2d, 3d); columns = ACTV, for forums 1, 9, 14]. Impersonal content was found to be significantly related to active content, $X^2(2, N = 462) = 12.73, p < .005$. The null is thus rejected.

Based on Table 14, a series of chi-square tests for independence were performed to analyze relationships among data not stated in the hypotheses.

According to the coded frequencies [rows = INTPRL(+) (sub-tables 1a, 2a, 3a), INTPRL(-) (sub-tables 1b, 2b, 3b); columns = ACTV, for forums 1, 9, 14], overall
interpersonal content was found significantly independent (.05 level) from active content, $X^2(1, N = 890) = 2.15$.

Moreover, a non-significant relationship (.05 level) between overall impersonal content and the sum of reactive and interactive content [rows = IMPRL(+) (sub-tables 1c, 2c, 3c), IMPRL(-) (sub-tables 1d, 2d, 3d); columns = RCTV + INTCTV, for forums 1, 9, 14] was found, $X^2(2, N = 269) = 5.69, p < .10$.

Thus, even when the sum of reactive and interactive content is significantly related to both overall interpersonal and overall impersonal content, the relationship with the latter is weaker and established at a lower level of significance than the relationship with the former.

**Purpose 4**

*Determine the understandings of students about interactional and interpersonal issues in online postings.*

**Research Question 5**

What were the students’ perceptions of the issues that influence the type of interaction in online discussion forums? Is there any apparent relationship between students’ perceptions and the results of the quantitative research?

5.1 Which traits do students find most appealing in others’ online messages in discussion forums? Which are the traits they find least appealing?

5.2 Which traits do students perceive their own messages show the most and which the least in discussion forums?

5.3 Is there a perceived relationship between interpersonality and the type of interaction in participants’ messages?

5.4 To what extent are students’ perceptions related to the findings in purposes 1-3?

Eleven out of the thirteen students answered the online survey (the author did
not participate), which represents roughly 85% of participants. Nearly 75% selected message C (see Table 15) as the one they found more inclined to respond to. Almost 65% of participants marked message B as the least likely to respond to. Both figures are statistically significant at $p < .025$ and $p < .05$, respectively. A little over 54% of the participants agreed both in rating message C as the most likely to be answered, and message B as the least likely (see Appendix I, Table I2). Message A was the second best choice for 54.5% of the participants, and the third best choice for a little over 35% of the participants.

Table 15

*Frequency and Percentage of Messages Evaluated by Participants*

<table>
<thead>
<tr>
<th>Sub-tables</th>
<th>Messages</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>$X^2$</td>
</tr>
<tr>
<td>Sub-table 1-First choice-frequency(/%)</td>
<td>1 (9.1)</td>
<td>2 (18.2)</td>
<td>8 (72.7)</td>
<td>8.46 ***</td>
</tr>
<tr>
<td>Sub-table 2-Second choice-frequency(/%)</td>
<td>6 (54.5)</td>
<td>2 (18.2)</td>
<td>3 (27.3)</td>
<td>2.36</td>
</tr>
<tr>
<td>Sub-table 3-Third choice-frequency(/%)</td>
<td>4 (36.4)</td>
<td>7 (63.6)</td>
<td>0 (0.0)</td>
<td>6.73 **</td>
</tr>
<tr>
<td>$X^2$</td>
<td>3.64</td>
<td>5.00 *</td>
<td>8.92 ***</td>
<td>17.56 ****</td>
</tr>
</tbody>
</table>

*Note.* Due to expected values lower than 5, the above approximations for $X^2$ are considered relatively poor. All sub-tables have a $df = 2$, as well as the columns for messages A, B, and C. The total chi-square figure was calculated using sub-tables 1, 2, and 3, with a $df = 4$.

- $p < .10$
- $p < .05$
- $p < .025$
- $p < .005$
Summary

Table 16 summarizes the acceptance or rejection of null hypotheses for this study:

Table 16

Acceptance or Rejection of the Null Hypotheses

<table>
<thead>
<tr>
<th>Null Hypotheses</th>
<th>Accepted</th>
<th>Rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₀1</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>H₀2</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>H₀3</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>H₀4₁</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>H₀4₂</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>H₀4₃</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>H₀₅₁</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>H₀₅₂</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>H₀₅₃</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>H₀₆₁</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>H₀₆₂</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Total (11 hypotheses)</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>
CHAPTER 5 – DISCUSSION OF THE RESULTS

This chapter summarizes the results of the study, analyzing the structure of participant’s postings and searching for patterns and relationship between interpersonal content and type of interaction in academic online forums. The findings suggest that interaction among participants becomes more reactive and interactive as time goes by, and that these types of interaction are related to personal involvement in message content. That is, as messages become more interpersonal, reactivity and interactivity increase.

However, even when the testing of specific hypotheses was involved in this study and inferential statistical procedures were used to determine significant differences or whether variation was due to chance alone, little knowledge is derived from pure numbers.

Higgins (1998) states that

The significance and importance of research is not a function of the degree of statistical significance reported in the findings (as in quantitative studies), nor the clarity and insightfulness of ethnography (as in qualitative studies). Rather, they are a function of contextual and theoretical factors that guide the research and project its relevance. (p. 80)

In education, results of research must be put in context and interpreted in the light of the literature if practical information is to be derived from them. Nonetheless, it is worth remembering that this study is focused neither on establishing causation among variables, nor on determining triggering events for the phenomena hypothesized. However, possible explanations that may account both for
the presence of variables and their relationship must be sought in literature and, when
not possible, alternative explanations should be offered, understanding that future
studies may be required to support or dismiss such explanations.

Findings Related to Study Purposes

Purpose 1

Describe the level and amount of participation in online academic discussion forums
and determine the quantitative dimension of online participation through time.

Research Question 1 (Participation)

What are the basic quantitative features of interaction for each forum and for all
forums combined?

1.1 How frequently and how much did students participate in online forums?

As Lichtenberg and Knox-Harbour (1988, p. 5) state, “in contrast to analysis of
the content of a group’s social interaction and/or the qualifications of that content,
structural analysis of the interaction within a group focuses on the organization of the
interaction among group participants.”

Student participation, measured in total number of messages per forum (see
Figure 9) appears to increase systematically, in response to the valid posting dates for
each forum (8, 12, and 22 days for forums 1, 9, and 14, respectively). More messages
and sentences are posted when there is more time available to do so. This is hardly
surprising. Moreover, the amount of messages posted is related to the length of those
messages: more messages mean longer messages, or in other words, increased
frequency of messaging is associated to increased duration of messaging. That is, “the
highly reliable and correlated personality traits of response duration and response latency, insofar as they are indicated by length and frequency of messages, are reflected in users’ CMC behavior.” (Rice & Love, 1987, p. 101)

Group participation, as measured in messages per day, started at 3.63, peaking in forum 9 to 4.67 (nearly a message more per day), only to drop again in forum 14 to lower levels (3.41) than those shown in forum 1, thus supporting Bullen’s (1997) reported participation behavior. Both Bullen (1997) and McDonald (1997) report on student participation in online forums, both of them analyze student interaction during one semester (12 weeks and 15 weeks respectively), and both sample equal time spans (three one-week forums).

While the former reports a diminished participation (as measured in messages) towards the end of the course, starting immediately after a peak in mid-semester, the latter reports exactly the opposite: an acute dip in participation (as measured in speech segments) was experienced in the middle of the course in all of the nine groups she analyzed, and experienced a rise again, without reaching initial levels. She attributes this to the combination of participants’ involvement in mid-term exams and to the waning of the CMC novelty effect. She also mentions that this participation diminishment has not been reported elsewhere.

However, Bullen (1997) also reports students having mid-term and final examinations. Thus, at first sight, it may seem that participation in online forums is more related to internal group dynamics than to external issues. Nonetheless, in this study the absence of tutor directions regulating posting frequency may also contribute
to observed peaks in participation.

This study focuses on a longer time span (a three semester interaction) than the above mentioned, and in forums with uneven time-spans, contrary to most studies in the field, which span one semester, a fairly common practice in online communication research. Therefore, other indicators (see Figure 10) beyond simple message or sentence count point at the type of task as the issue that can explain variations in participation.

For instance, the percentage of first-level threads follows an erratic behavior, experiencing a dip in forum 9 and peaking again in forum 14. Contrary to the amount of messages and sentences, the number of threads is not directly related to the time span of the forum. Threads per day and messages per day (see Figure 10) may thus be a more accurate indicator of participation for longitudinal studies.

This indicator shows that its members initiate more threads at the beginning of the group history, and that these threads contain few messages. As time goes by, messages appear to be more focused on the discussed issues. Forum 9 exhibits longer threads (as measured in both messages and sentences per thread). This sticking to fewer discussion themes is also reflected in the threads-per-day ratio: fewer threads are initiated in this forum, as compared especially to forum 1, where almost two new threads were started every day. In the beginning of a zero-history group dealing with a new technology, a greater number of threads may be due to the lack of experience of the group when managing the specific requirements of a particular software as a communication tool (in this case, HyperNews), and the desire to establish the ground
by opening more threads at a time. It is expected that participants weave longer threads as both their expertise on the device used to communicate increases, and that their personal identity has been established. Fewer first-level threads with more messages per thread are expected as the interaction in the group advances, as is the case in forums 6 to 11), and will tend to stabilize as the interaction matures (forum 14).

Smith (1999) mentions the thread-to-message ratio. Forum 1 shows a ratio of 0.48, while forum 9 ratio is 0.12 and forum 14 ratio is 0.22 (see Table H1). According to him, figures near 0.5 may indicate a dominant form of interaction, which shows “a fairly straightforward pattern of questions asked and answered” (p. 210). So, a ratio of 0.5 is a desired figure. Lower figures characterize longer threads. However, longer threads “may be an indicator of discussion characterized by disagreement, divergent opinions, or ambiguous subjects that cannot be neatly characterized.” (p. 210). This assertion cannot be supported by quantitative data alone: longer threads may also indicate smooth, straightforward, and supportive interaction. Thus, thread-to-message ratio is only useful in combination with content analysis. We shall return to these measures later on. In any case, high thread-to-message ratio are present in the first stage of the interaction (forum 1), which may both indicate a first approach to technology and a need of participants in zero-history groups to, in initial messages, establish a personal identity (Walther & Burgoon, 1992).

A low ratio between threads and messages (from 0.3 to 0.5) should be fostered,
as it may indicate that participants are opening fewer threads, are keeping the online interaction close to few issues, and the conversation is less dispersed. This may contribute to collective knowledge building, as participants listen to and respond to few issues more deeply. Moreover, groups with a high thread-to-post ratio indicate, basically, stand-alone messages. When this is confronted with the thread-to-message ratio for forum 9, again the behavior of the group, as shown in diverse quantitative data, is different from forums 1 and 14.

Out of the 14 forums of the group continued online exchange, forum 9 exhibited the second fewer number of threads for all forums (the first being forum 6, also during the second semester), as well as the second lower thread-to-message ratio. This is particularly important, as the valid dates for postings were on the rise for forum 1, 9, and 14, each with 8, 12, and 22 days. This indicates, for group 9, that participants tend to stick to fewer issues as a group and do so for longer periods of time. However, the number of threads increases again together with the number of messages, although slightly, for the third semester as a whole.

Five forums (45.45%) show a ratio below 0.20, and out of that percentage, 80% (4 forums) are located in the second semester (see Figure 14). The tendency for the thread-to-message ratio, after an erratic behavior during the first semester (forums 1, 2, 3, and 4), is to stabilize around 0.16 (both mean and mode in forums 6 through 14). Apparently, the most adequate span of time for valid participation in online forums, is 12 days. If more days are allowed, more threads tend to be started by participants. In other words, the focus of learning tends to get lost. Another influencing issue is the
more guided nature of all forums in the second semester, which may have also helped in focusing. While all forums had a low degree of ambiguity on their directions for discussion and neither of them required mandatory, open exchange of subjective views, forum 9 exhibited a more argument-sharing approach than the other two forums (McGrath & Hollingshead, 1994). This may inhibit participants to initiate more first-level threads and may foster the postings of more messages under the same topic, and thus focus more on the task at hand. On the other hand, triggering questions requiring information from participants, without further demands on their postings, may tend to foster, at the beginning of an interaction in a zero-history group, a high thread-to-message ratio (as in forum 1). Moreover, it may also account for the increasing ratio tendency in forum 14.

This issue may also affect the presence of interpersonal content in online messages: more focused, low-ambiguity tasks may tend to reduce interpersonal content and increase impersonality. Thus, differences in participation may be affected by the time span of the different forums, the type of task required form participants, the expertise with handling communication technology, and the inner dynamics of the group interaction.

1.2 How is that participation grouped through time?

Another indicator, although minor, and not present in literature, is posting dates. In this study, posting-date patterns are disparate, showing an unstable daily behavior. Forum 1 favored Fridays, while Tuesdays peak in forum 9. Forum 14 most frequent
posting dates were Mondays and Thursdays. A sharp contrast is shown in Tuesdays.
It is forums 1 and 14 lowest posting day (including Saturday and Sunday), but the
highest posting date for forum 9. As opposite to this behavior, forum 9 lowest posting
day (as low as Sunday) is Thursday.

However, overall participation in all 14 forums concentrated at the beginning of
the week, on Mondays and Tuesdays, only to decline from Wednesday on, with a
small peak on Thursdays. As could be expected, Saturdays and Sundays registered
less postings in each specific forum and in all forums combined.

However, fewer although longer messages were posted in Saturdays and
Sundays. This may be due to the fact that during the weekend, participants have more
time to think more deeply in the issues at hand, read more, and explore them more
profoundly. Starting the week, however, more and shorter messages are posted when
compared to weekends. Overall, more, and longer messages tend to be posted on
Tuesdays, while less and shortest messages were posted on Wednesdays and Fridays.

This may lead to consider that valid posting dates may have to include two
weeks (from Monday to Friday) with one weekend in between for valid posting dates.
The weekend in the middle would be beneficial for participants so as to read, go over,
and reflect upon what was posted during the first week, so as to have them write
summaries and wrapping-ups of their classmates’ postings, or open new threads. The
second week would again leave them time to exchange postings within the threads
opened during the first week and feed new threads opened during the weekend.
**Purpose 2**

Assess the relationship among messages (type of interaction) posted by participants in online academic forums over time; and identify and assess the type and amount of interpersonal content in messages posted to online academic forums over time.

**Research Question 2 (Interaction)**

To what degree are contributions in online academic discussion forums linked to each other and related among them? In other words, to what extent is online participation active, reactive or interactive?

2.1 *Over the duration of the course, to what degree do the students’ contributions appear to reflect interactive content? Does it represent a significant amount of overall message content?*

Active content represents, in all three forums, 66% of message content, whereas interactive (both engaging and true interactive) content accounts for only over 4.5% of the overall online exchanges. Reactive content (explicit and implicit) represents 29% of the total amount of sentences posted. Active content is by far the most common type of interaction modality. These figures are consistent with some literature reports (e.g., Bullen, 1997; Henri, 1992a; Mason, 1991; Rafaeli & Sudweeks, 1998).

Rafaeli and Sudweeks (1998) found out that while interactivity ranged from 0% to 40% in the online forums they analyzed, an average under 10% of the messages were coded as interactive. As this study was basically based on their notion of interactivity, the figures are consistent with their findings. Henri (1992a), analyzing the online interactions of a six-week training program, and categorizing messages as either independent or interactive, found that 53% of participants’ input were
independent or active statements. These findings are also consistent with this study, as over 50% of message content was found to be active. Her findings regarding reactive and interactive messages differ, due mainly to the way these categories of the variable were defined. However, her quasi-interactive amount of content is around 25%, compared to the 29% reported in this study.

Studies report different figures, mainly for two reasons: divergence in conceptualizing reactivity and interactivity, and differences in units of analysis. However, even under these circumstances, participants’ postings are commonly and systematically reported as “overwhelmingly independent in nature” (Bullen, 1997, p. 135).

2.2  Do levels of activity, reactivity and interactivity change over the duration of the study?

There is little information in the literature regarding the evolution and behavior of interactive content over long periods of time. Focus seems to be on the broader picture. However, Bullen (1997) examines the change in levels of interactivity, and reports erratic behavior over a sixteen-week time span. No clear increasing or decreasing tendency is here reported, although the time span in this study may be too short to detect the influence of time upon relational communication.

In this study, active content in online forums, as measured in percentages of total contributions per forum (see Figure 20), tends to diminish its weight, while the sum of both reactive (explicit and implicit) categories of interaction and both
interactive categories of interaction (engaging and true interactive) increase as the term progresses.

Additional information of this behavior may be obtained when evaluating the specific behavior of each interaction category in forums 1, 9, and 14 (see Figure 22). Although in this case all interaction categories increase, their initial levels are reversed in the last forum. Both reactivity and interactivity surpass activity in the increase of their specific weight through time. In other words, reactivity and interactivity presence is quantitatively more important through time than the presence of activity, as expressed by the trend figures. Interactivity shows the most dramatic and constant increase, surpassing both active and reactive content when compared to itself through time. Time, in this study, seems to play an important role in the way the types of interaction behave, while the variation in the type of task in forum 9 does not seem to have a discernible effect upon the behavior of any of its categories.

Reactivity and interactivity are cited in literature as key issues in online exchanges, although their importance has not been clearly stated. We believe, with Harasim (1989) and Moore (1991), that the foundations of social construction of knowledge rest upon these desirable types of online discourse. Moreover, as Schultz (1999) states, “the formal characteristics of fully interactive communication can imply more equality of the participants and a greater symmetry of communicative power than two-way and reactive communication, and clearly more so than one-way communication” (p. 4). Thus, reactivity and interactivity must be encouraged and fostered in zero-history groups from the very beginning, and not just be left to the
passage of time.

This does not mean that active content should be discouraged. It was theoretically determined that involvement was to be associated to active content in messages, while commitment was to be linked to reactive and interactive moves in online discourse. Involvement and commitment are both important issues in online communication in pursuing knowledge building. However, their presence has been associated to the technology itself, leaving little room and no advice to educators as to how to increase their presence. Fostering interpersonal content in online messages may be the answer, approaching interactivity and reactivity more as an attitude of participants than as a trait of discourse.

Research Question 3 (Interpersonality)

To what extent is interpersonal content present in online graduate students’ discussion forums? To what extent is online participation impersonal or interpersonal?

3.1 Over the duration of the course, to what degree do the students’ contributions appear to reflect interpersonal content? Does it represent a significant amount of overall message content?

Whereas Hiltz and Turoff (1978, 1993) found an average of 14% of what they termed socioemotional content in eight CMC forums, Meyers (1985) raised that figure to 39% (both in Jaffee, et al. 1995), and Rice and Love (1987) found that 31% of the total message content was socioemotional. Rafaeli and Sudweeks (1998) found that over one third of messages from Usenet, Bitnet, and Compuserve discussion forums contained personalizing content. Differences in these figures are due to
differences in conceptualization and ways of evaluating interpersonality. However, figures regarding interpersonal content may be said to be on the rise, contrary to early findings on the field (Hiltz, Johnson, & Turoff, 1986; Sproull and Kiesler, 1986) and supporting the notion that interpersonal relationships may be a ubiquitous property of online exchanges and an inherently human impulse (Walther, 1992; Walther & Burgoon, 1992).

Because this study conceptualizes and assesses interpersonal/impersonal content in online forums under a different typology, interpersonality (both positive and negative), accounts for an overall 64% of the total message content, a figure that certainly is higher than literature establishes, and certainly remarkable, considering the alleged low “social presence” of CMC These findings are contrary to early experimental design, in artificial environments, in short–term scenarios, and taking messages as a coding unit. However, findings in this study could be argued to be similar to McDonald’s (1997). She reports an average of 57% of interpersonal speech segments in her one-semester online forums study. Both figures, 64% and 57%, indicate that interpersonal exchange accounts for over half of online content even in task-oriented academic groups, and contrary to literature findings, online academic forums may be more the source of opinion than the arena of factual exchange.

3.2 Do levels of interpersonality and impersonality change over the duration of the study?

Overall, levels of interpersonality (positive and negative) and impersonality
Interpersonal content began at a very high level (over 68%) and then decreased in forum 9 to a little over 57%, only to rise again to almost initial levels (nearly 67%) in forum 14. This behavior in interpersonal content is similar to the one reported by McDonald (1997), in her one-semester study. She reports high percentage of interpersonality during the third week of interaction (75%), followed by a sharp decrease to an average low of 43% by week 8 and a moderate rise to 52% by week 13.

Both studies suggest that the limited bandwidth of text-based CMC has apparently small effects (if any) upon the amount of social communication and relational development, as the social presence model and the media richness theory sustain. Moreover, neither of the studies supports the notions that interpersonal content in online messages develops slowly and evolves in positive directions through time (Walther & Tidwell, 1995). Online content does not appear to be more task-oriented in the beginning and become more personal over time. As in interaction, time is not the an issue that affects either the presence or the evolution of interpersonal behavior (Walther & Burgoon, 1992), as it is present early on even in zero-history groups, and its amount stays fairly constant-no “warming up” is required to send socioemotional content (McDonald & Gibson, 1998; Rice & Love, 1987). Nonetheless, the early presence of interpersonal content seems to support Kollock and Smith’s (1996) and Walther’s (1994, 1996) notion that participants who anticipate working with the same partners for a continued period of time may show a
more personally-oriented behavior since the first group meeting and throughout its history.

In this study, interpersonal issues as a whole remained very important throughout the whole interaction, becoming less important (although still very much so) as participants became more focused on ideas and in fulfilling task requirements for forum 9. This modality in task requirements may also account for the rise in impersonal content in forum 9 (40%) from fewer than 39% in forum 1, and its decrease again in forum 14 to a little over 30%, thus supporting the literature findings (Laurillard, 1996; McElhearn, 1996; McGrath & Hollingshead, 1994).

Thus, for forum 9, the balanced combination of the high proportion of interpersonal content with the increased proportion of impersonal content presents a strong picture of constructivist behavior, with participants showing solidarity, tension relief, agreement, antagonism, and humor together with information requesting and offering (Henri, 1992b; Mabry, 1997; Walther, 1996). These figures may also indicate that when the type of task is less specific, roughly two thirds of online content in academic forums has an interpersonal nature, while the remainder third may be strictly labeled as impersonal.

However, the different categories of interpersonality exhibit diverse behaviors at different points in time. There is a lack of data within computer conferencing literature with which to compare the results of the analysis of interpersonality categories, except maybe for McDonald (1997) and McDonald and Gibson (1998), (although employing different categories for analysis). Lundgren (1977), however,
provides a comprehensive study of interpersonal issues in face-to-face group
development in non-academic settings. In absence of data, his study may also be
useful in this case. It should be noted that Lundgren’s study spanned over only
periods of seventeen days, while McDonald’s research sampled three groups in a
fifteen-week time span. Moreover, issues dealing with interpersonal behavior may be
strongly affected by cultural issues (Colomb & Simutis, 1996; Ma, 1996). Therefore,
comparisons should be carefully assessed.

Positive interpersonality categories, (support, disclosure, appraisal, and humor),
are far more common than their negative counterparts (opposition, reserve,
chastisement, and sarcasm). Reserve, chastisement, and sarcasm were expected to be
low in asynchronous, mediated, long-term relationships in an academic setting with
absence of anonymity (Kiesler, Siegel, & McGuire, 1984; King, 1995), while
opposition was expected to be much higher because of the same reasons. However,
opposition did increase from initial levels in forum 9, again in direct response to the
task type, only to descend again at the end when the task type was the same as in
forum1.

Advocacy (catalogued as negative interpersonality) far surpasses inquiry
(positive interpersonality) in this study. This is, forwarding opinions and establishing
one’s own point of view is far more common than the manifest interest in others’ way
of seeing things. In fact, the advocacy content is fifteen times greater than inquiry.

Advocating (a “This is what I think”, “This is the way things are”, or “Let me
interest you in my ideas” overtone, with 38.5%), together with informing (a neutral
overtone, with 32.5%), deemed as positive impersonality, constitute the two most common interpersonal traits in the three forums, and account for over 71% of interpersonal content, supporting Herring’s (1996b) assertion that expression of views appears to be the most important function in extended discussions, albeit through mailing lists. This is hardly surprising: stating one’s opinions and sustaining them with factual information is a natural behavior in academic settings, and an expected response to an information generating type of task, thus confirming literature findings (Herring, 1996b; Laurillard, 1996; McGrath & Hollingshead, 1994; Valacich, et al. 1993). However, according to Walther and Burgoon (1992), at the same time this may indicate a dominance-seeking pattern, with participants more interested in acquiring status than in building knowledge together.

Both advocating and informing start at a high level in forum 1 (over 40% for the former and a little under 30% for the latter) and end up in forum 14 at nearly those same levels. However, while advocating dips in forum 9, informing peaks almost in the same proportion, thus responding to the specific direction indicating participants to support their views with evidence from the readings, while forums 1 and 14 indicate participants to support their views with experiences as teachers or students.

Support accounts for fewer than 10% of this percentage, while appraisal merely stand for under 2%. Support is therefore the first most important positive interpersonal category. Both support and appraisal categories (or the “I acknowledge and care about you” and “I feel you are significant and competent” overtone) exhibit the same behavior, both starting as a lesser issue, peaking in forum 9, and declining
slightly in forum 14. This seems to support McDonald’s (1997) and Lundgren’s (1977) findings for solidarity, a rough equivalent for both appraisal and support. This is, for both online and face-to-face interactions, behavior for these categories seems to follow similar patterns.

Incidentally, both opposition and chastisement (or the “I acknowledge you and do not agree” and “I feel you are not significant nor competent” overtone) although sensibly lower than support and appraisal, showed a similar behavior, peaking in forum 9 and declining again in forum 14, although not to the initial levels of forum 1. However, the peaking behavior for support/opposition and appraisal/chastisement may also be explained by the specific requirement in forum 9 for participants to specifically be ready to comment on other students’ responses, which was absent in forums 1 and 14.

Self-disclosure (an “I am open to you”, “talking about me”, or “this is how I am” overtone) and inquiry (a “what do you think?”, “tell me more” or “I am interested in your ideas” overtone) exhibit contradictory patterns through time. The former represents the second most frequent positive interpersonal category (with 7.5%). It starts with a fairly high 11.7%, only to dip dramatically to a 5.9%, and then continuing to decline, although less drastically, to a 4.4% in forum 14. This seems to support Walther and Burgoon’s (1992) study, in which they hypothesized that high receptivity and trust would grow with time, and it did not hold. However, this study opposes face-to-face findings stating that self-disclosure is discouraged by the expectation of ongoing interaction (Hargie, 1986), and that it is higher among friends
than among strangers (Hare & Davies, 1994).

The answer may be found in Kim and Raja (1991), when they found that reduced cues in CMC may foster both self-disclosive (as well as hostile) behavior from the very beginning. In this study, chastisement (an “I feel you are not significant nor competent” overtone) and sarcasm (an “I am having a good time at your expense” overtone), which may be considered hostile, are practically absent, the former representing an overall 0.3% of total message content, while the latter accounts for 1.25%. This seems to support the notion that both categories are considerably reduced in non-anonymous, closed, ongoing forums (Siegel, Dubrovsky, Kiesler, & McGuire (1983, in Kiesler, Siegel, & McGuire, 1984).

It is worth noting, however, that sarcasm, as well as humor (with 1.7% of total message content and an “I am having a good time together with you” overtone), is present early on at the same level (2.24%). While the former dips strongly in forum 9 only to keep at the same level until it almost disappears, humor also dips drastically in forum 9, only to rise again in forum 14 to almost the level it had in forum 1. There is no reference in CMC literature that deals with humor dynamics. However, Rafaeli and Sudweeks (1998) do account for humor in academic forums (20% of messages with at least a humorous attempt), while Baym (1995a) mentions that 41% of participants in common interest groups exhibited humor at least once. In this study, behavior of humor, although low in its presence in comparison to the above-mentioned studies, may be attributed to the specific directions for students in forum 9, less specific in nature and different from forums 1 and 14.
Inquiry (a “what do you think?” or “tell me more” or “I am interested in your ideas” overtone), an essential move towards inviting interactivity, is under-represented in this study, with a mere overall 2.5%. However, its behavior through time is constantly and steadily on the rise, starting in a low 1.68% and more than doubling at the end with a 3.80%. When compared to self-disclosure, it is apparent that interest in oneself declines as time goes by while interest in the other increases. Both descending and ascending trends are statistically significant (see Table 13). Both behaviors do not seem to be affected by the particular directions in the task in forum 9. They seem to behave as a natural pattern of group dynamics over time.

Impersonality categories (inform as positive and request as negative) follow similar behaviors, although the former is twenty-two times more common, as a whole, than the latter, which is scarcely present (an overall 1.48%).

Informing and requesting, both emotionally neutral, again peak in forum 9, only to return again to almost their initial levels. This may indicate that informing, in this study, is most commonly used not as an answer to somebody’s request, but as a factual support for opinions (advocacy). It does not seem to be due to issues of earning others’ respect and establishing authority (Constant, Sproull, & Kiesler, 1997; Galegher, Sproull, & Kiesler, 1998). Again, the specific instructions in forum 9 seem to make the difference in the tendency. This high levels of advocating and informing, together with low levels of interactivity, may be an indicator of poor attempts towards collective knowledge building.
Purpose 3

Determine the association between interpersonal content and the type of interaction in discussion forums, as well as the behavior of the relationship through time.

Research Question 4 (Interaction Related to Interpersonality)

Is there an association between the students’ amount of interpersonal content and the type of interaction in postings? Do these relationships vary through time?

This issue may be the most important in this study. The literature makes no reference to the association of interpersonality and types of online interaction as such, although some authors (e.g., Baym, 1995a; Longacre, 1992; Swales, 1990, in Herring, 1996d; Schutz, 1994) hint a relationship between certain categories of interpersonality and interactivity.

Rafaeli and Sudweeks (1998) offer the most extensive account of the relationship between these variables in mailing lists up to date. They found that among messages coded as interactive, there is a tendency to express opinion (advocating in this study) and to express agreement (twice as much as other messages). As well, interactive and reactive messages are more humorous and tend to contain fewer requests for information (coded as impersonality in this study). Overall, interactive messages exhibit a propensity to agreement and are more likely to contain self-disclosure, thus indicating that interactivity may be associated “with a sense of involvement and belonging.” (p. 187).

This study supports all of the above in a longer time span for specific academic discussion forums. Reactive and interactive messages were found to be more
humorous, self-disclosive, supportive, praising, and inquiring than active messages, which were found to be more fact oriented. For example, there is a significant relationship (at \( p < .01 \)) between interactivity (engaging and true) and inquiry, which supports Rafaeli and Sudweeks’ finding relating interactivity with captivating/engaging communication.

However, there is a key difference between this study and Rafaeli and Sudweeks’: they state that interactivity is, perhaps, the cause of social dynamics of group communication. They also state that interactivity can lead to sociability. However, although this study was not intended to seek causation, it tends to reverse the equation: increased sociability can lead to increased reactivity and interactivity in academic online forums. We do sustain that there is a relationship between reactivity/interactivity and socioemotional content. Reactivity/interactivity are related to sociability (Rafaeli, 1988) and therefore, stimulating the latter may have important effects in augmenting the levels of the former.

This becomes crucial when recognizing that “deep learning is promoted by active learner participation” (Newman, Webb, & Cochrane, 1995, p. 60), and strongly associated to socioemotional involvement and feelings of empathy and belonging supported by interaction (Brandon & Hollingshead, 1999; Johnson, Johnson, & Smith, 1991; Biggs, 1987; Holmberg, 1996b).

Palmer (1995), when talking about the relational functions of communication, summarizes the relationship between interpersonality and interaction as follows:

Of all the possible functions accomplished through the transmission of
messages between people, the interpersonal functions concern themselves with the creation, modification and dissolution of affective and cognitive bonds. Appearing on nearly every list of fundamental human activities are seeking or giving affection, creating intimacy or inclusion, and developing a sense of belonging to another person…. These activities and others are relational in nature and define emotional and cognitive associations that create the phenomenological sense of being bonded to another. I will further claim that in every (italics in the original) human interaction, the participants cannot fail to communicate some sense of how they feel about themselves, about their partners, and about the relationship between them. This claim suggests that in every interaction there are relational patterns taking place, even if the relational transaction is not the explicit or consciously held purpose of the interaction… This perspective assumes the back-and-forth exchange of relational messages between interaction partners constitutes a process by which an interpersonal relationship is defined and redefined… Thus, interpersonal communication is interactive and transactional in nature, and the exchange of messages is interdependent. (pp. 279-280)

**Purpose 4**

Determine the understandings of students about interactional and interpersonal issues in online postings.

**Research Question 5 (Participants’ Perceptions)**

What were the students’ perceptions of the issues that influenced the type of interaction in online discussion forums? Is there any apparent relationship between students’ perceptions and the results of the quantitative research?

5.1 *Which traits do students find most likely to respond to in others’ online messages in discussion forums? Which are the traits they find less likely to respond to?*

5.2 *Which traits do students perceive their own messages show the most and which the least in discussion forums?*

5.3 *Is there a perceived relationship between interpersonality and the type of interaction in participants’ messages?*

5.4 *To what extent do students’ perceptions regarding interpersonality and interaction confirm or contradict research findings?*
Regarding qualitative information, Rice (1994, p. 176) states that “self-reported measures...often disagree with comparable measures of observed (possible “actual” or “true”) behavior.” True data is understood as accurately measuring the behavioral component of CMC (Rice, 1994, p. 176). This disagreement may be due to problems of recall, biased responses, questionnaire wording, and other issues. He argues that quantitative data are “potentially more accurate than corresponding self-report data”. However, the former “may represent a different aspect of human communication that does perceived usage, so they are not necessarily more valid” (Rice, 1994, p. 176). In this study, quantitative results appear to be supported by qualitative findings.

Survey results thus indicate that participants are inclined to answer messages that exhibit many, if not all, of the categories of positive interpersonality (see Appendix I, Tables I1 and I2), as well as both engaging and true interactive characteristics. On the contrary, predominantly impersonal content and no reactive/interactive traits, as in message B, were the least appealing to online participants. Message A, exhibiting a mixture of some negative interpersonal traits (sarcasm and chastisement) and positive interpersonal content (appraisal and self-disclosure), as well as being predominantly reactive, was the second choice for nearly half of the participants. In other words, they would rather react to a message exhibiting reactive, positive/negative interpersonal content than to impersonal and active content, while only one-fifth of participants would do exactly the opposite—both groups having selected message C as their first choice.

Participants that selected message C as their first choice, and message B as their
third one (54.5%), manifest several reasons for doing so. Regarding message C, participant # (a) states that “there is an author’s interpretation” in the message. Participant # (d) states that “the message has a tone that invites conversation. It also connects with other participants’ comments and invites comments upon the author’s interpretation of facts.”

This comment is closely related with advocating, supporting, and engaging interactive categories. This is supported by participant # (e): “the writer acknowledges what the sender said, then gives a reference and in addition, requests the sender’s opinion about what s/he is replying.”

Categories of appraisal and advocacy are here recognized as valuable in a message. As participant # (h) put it:

The person makes reference to previous comments (contextualizes). Then, he/she mentions a quote of a recognized authority (article or book) that has been assigned previously to relate his/her comment to. Next, he/she gives his/her opinion and then asks for feedback.

Although this participant includes categories of true interactivity, advocacy, and inquiry as attractive in a message, she also mentions informing as a positive trait, thus signaling a balance between interpersonality and impersonality in an attractive message. Participant # (k) expresses that she selected message A as her first choice because

“The author shares her point of view in a formal manner; she supports her comments with references; and leaves the possibility of further interaction open through a question that invites discussion.” Thus, a balance between impersonal
(information) and interpersonal (inquiry) content is judged as valuable.

However, one participant found this message too informal. Participant # (a) states that this message, “even when polite, is extremely socially oriented, with little or no content at all.” Nonetheless, this same participant, when evaluating message B, mentions that “it does not invite interaction. It is like a letter written to no one in particular.”

Over 60% of participants share this view, and marked message B as the least likely for them to answer to. For example, participant # (b) thinks that “the author states an opinion without seeming to request interaction or response from anyone.” This is, advocating without inquiring. Participant # (c) states “I think this message (B) is a cold one, even when the content is interesting. However, it does not engage a continuing dialogue and it does not connect with previous conversations.”

Participant # (g) thinks that message B “does not launch a question. It seeks to demonstrate that the material assigned to work on was read. It is more oriented at fulfilling an academic objective and seeking a grade.” Participant # (h) is harsher: “I do not feel that this contribution can initiate (or continue) a discussion. Two quotes mentioned and no deep reflection or question made.” Participant # (k) even recognizes the merit of the message, but states, however, that: “Message B invites no discussion, even when I like the formality of its comments and the factual support to them.”

Participants exhibit a relatively balanced preference for message A as their second (54.5%) and third choice (36.4%). As an example of the former, participant #
(a) mentions that “the message is clear, polite, and precise. It sets the ideas in a clear fashion and invites participation.” Participant # (d) finds the message “polite, with an attitude that shares and invites the dialogue to continue” Both participants agree in finding the message polite and inviting, thus perceiving positive interpersonal overtones in it.

However, participant # (g) represents a transition to another interpretation of the message when she states that the message:

*Presents a personal experience using a certain dose of humor or irony, and has a synthetic character and an interesting question that invites participation of the person to whom the message is addressed. The rest of the group will do so inasmuch they feel identified with the opinions and tone of the message.*

Thus, she acknowledges a dual tone of the message: humor or irony, which may attract some participants and discourage others. Basically, she states that it is a message addressed to somebody in particular, thus a reactive item more than an interactive one.

As example of the latter point of view (and of a negative perception of the message), participant # (c) comments upon the “ironic tone” of the message, while participant # (k) is more explicit:

*I don’t like the irony in the message. It does not support its comments with references, and ends up by spoiling the experience due to the sarcastic overtone. It invites interaction as a first move, and then closes that possibility because the questions are answered in the message itself.*

The presence of perceived negative interpersonal issues (irony/sarcasm and advocacy), together with the perception of rhetorical questions, contributes to the unwillingness of this participant to interact. However, despite these comments from
some participants, message A is not the last choice to 63.6% of participants. The above indicate that impersonality by itself is less welcome than a mixture of negative and positive impersonal content. The former makes the message look dry and cold, not inviting reactivity or interactivity.

It is worth mentioning that over 70% of the participants agreed in both rating message C as the most likely to be answered, and message B as the least likely (54.5%). This is, more than half of the participants would react favorably to a message with a high degree of positive interpersonality and a dosage of impersonality (information) than to a message with no interpersonality and a high degree of informational content. Moreover, message A was the second most likely selection (54.5%), while message C was selected as the third choice by 0% of participants.

Thus, the results of the online survey, both quantitatively and qualitatively, seem to support the findings of purpose 3 and hypotheses Ha6_1 and Ha6_2 in this study: overall interpersonal content is significantly dependent on the amount of reactive and interactive content in online forums, while overall impersonal content is significantly dependent on active content.

Participants’ perception of the traits that their own postings posses also seems to support the above hypotheses. Participants regard their postings as unattractive to others (or probably discouraging response from others) when the content is highly impersonal or when positive interpersonal issues are absent. Regarding the former issue, participant # (c) mentions “the abuse in references” as a trait of her messages that may inhibit reactivity or interactivity from others, while participant # (d) is more
explicit when stating that she may discourage responses from others when “my message is focused on hard data and does not include what others have said. It does not invite interaction when it is mainly descriptive.”

Participant # (e) is more explicit as she states that “I feel I scare feedback when my postings are more theoretical than communicative. In other words, when they might be as impersonal as message A was to me (although they may be interesting).”

As to the latter reason for unattractiveness in message content, participant # (h) provides a good example. For her, interpersonality is an issue to be sought after, as she thinks this may promote participation from others. She declares that

*I think one of the characteristics of my own messages that do not make them attractive to others is that I try to avoid agreeing or disagreeing with anyone. I prefer to stay neutral when a discussion is going on. I do not like to express my opinion about what others think. Maybe that is something that people expect or want to hear.*

Not all positive interpersonal traits are considered favorable. The inclusion of subjectivity and personal experiences in her postings are cited by participant # (b) as possible reasons for discouraging others’ participation when she writes that “I usually relate theory specifically to my own experience, and if the person is not interested in that or we don’t share common experiences, then my messages would be too subjective and irrelevant.” Thus, some participants consider self-disclosure as a possible hindrance to online reaction and interaction.

However, over 70% of participants indicate that triggering questions and inviting other to participate (what is deemed as inquiry in this study) are traits in their messages that foster and encourage reaction and interaction. Thus, as when assessing
others’ message content, participants consider that positive interpersonality may trigger replies from others, as impersonality may discourage interaction. This also supports findings from hypotheses Ha61 and Ha62 in this study.

Moreover, there seems to be a perceived relationship between interpersonality and the type of interaction according to what they consider attractive and unattractive in both others’ and their own messages. Participant # (d) states that:

I think that what I write based upon what others write allow to weave a conversation. I then try to expand what was said by others (if it is a follow-up message), as I try to indicate that I am interested in the others’ opinion. I would include a salutation and a farewell sentence in each case.

In this case, interactivity as a response to others and as an engaging practice is present. Participant # (h) seems to support this when she states that:

I always try to relate my comment to something someone said before or something that I know others have read. Sometimes, I try to bring to their attention a quote or include something I read and found interesting for our discussion. I always include my reflection about the issue and end up with a question, which has the main intention of having them reflect and give me their opinion.

Both participants (d) and (h) thus advance a balance of advocating and inquiring as interpersonal traits that foster reactivity and interactivity.

Limitations, Conclusions, and Implications for Practice

This study suggests that there definitely is a relationship between the amount and type of interpersonal content in online academic communications and the type of interaction participants share. Therefore, although computer conferencing may facilitate or hinder interactivity for distant participants, it is not mainly a
characteristic of the medium or even the nature of the task performed, but a quality of the communication relationship established by participants in the setting (Bullen, 1997; Rafaeli & Sudweeks, 1998), and the time span allowed for the group to consolidate (Walther, 1995).

**Limitations**

Every study has limitations. In this study, they may be considered as pertaining to method and to focus. The former deal mainly about implications of group sampling, study design, the coding instrument, and generalizability, while the latter deal with issues that were not covered in this study but are somehow related to it.

**Method**

The sampling theory underlying this study argues that, for the most part, a group of participants interacting for a long period of time is to be considered as a continuing, intact social system engaged in one macroproject which is likely to extend beyond the temporal boundaries of a single meeting (McGrath & Hollingshead, 1994). Such notion implies that the group did not have multiple meetings at specific periods of time intervals divided into semesters, but a single meeting distributed over an extended period of time with distinct non-meeting intervals. Therefore, this study considered the group as having fourteen online sessions suspended by non-activity intervals, instead of different sets of interactions during three distinct semesters. The intention of analyzing the beginning, the mid-
point, and the end of a continuous interaction guided the selection of forums. To
detect overarching tendencies was privileged, not so much the identification of
recurring patterns.

Based upon this consideration, forums were considered as a continuum ranging
from 1 to 14, and thus forums 1, 9, and 14 were sampled so as to assess a zero-history
group from its inception-through its mid-life-to its demise. Both the theoretical
consideration and the sampling design may have a bearing upon the study results, as
issues (peaks and falls) regarding the behavior of variables might have gone
unnoticed. The findings, however, support other similar studies. Rice and Love’s
(1987) question is still relevant: “while it is relatively easy to capture longitudinal
data, questions for appropriate intervals for aggregation arise…How much of a time
slice is sufficient?” (p. 102).

Moreover, even when the type of task performed by participants in all forums
can be deemed as homogeneous (McGrath & Hollingshead, 1994), the slight
variation present in forums 6 to 11 introduced an extraneous factor, which may have
altered the natural development of the group. Nonetheless, this variation pointed out
the importance of the instructor’s participation in the design of the triggering
activities for online forums.

The coding instrument was basically created taking into consideration
theoretical and empirical studies dealing with both face-to-face studies and diverse
CMC synchronous scenarios (mailing lists, electronic mail, online forums, special
interest groups), and successively refined so as its categories were mutually exclusive
and collectively exhaustive. The dimensions (variables and categories) of interaction are fairly well stated in literature regarding online processes. However, dimensions of interpersonality were adopted and adapted from diverse sources to design a coding instrument that will have to be tested in similar and alternate settings. Some dimensions of this variable may have been left out, as most of the criteria for interpersonal analysis are derived from face-to-face interactions.

The coding categories and their operational definitions may well have to be verified in other studies by other coders, and probably modified and adjusted so as to increase the reliability coefficients and to suit other CMC environments. As an example of this, emoticons and acronyms were not considered in this instrument as expressions of interpersonality, due to the fact that they are not commonly used in asynchronous, academic exchanges. However, they may have to be incorporated to the coding if it is to be used to evaluate other forms of online communication. Further testing of the instrument in asynchronous as well as synchronous settings will help refine it. Moreover, the coders’ training process should be improved so as to increase intercoder agreement.

Even though this study is not experimental, some issues regarding internal and external validity may have a bearing upon the results. Out of the major threats to internal validity identified by Campbell and Stanley (1963), history (between any observations in this longitudinal study, changes in the environment, as in the type of task, may imply changes in participants’ performance) and maturation (between any observations, subjects may change in other aspects other than age, either physically or
psychologically) may be the most important for this study. However, time and type of task were duefully addressed as additional issues that may influence both interaction and interpersonality in Chapter 2. Mortality did not represent a threat factor because the two individuals that dropped out did so immediately after the first semester.

Regarding external validity of the study, both population traits (non-random selection of subjects and their specific characteristics) and ecological issues (postgraduate academic forums) may seem to be low. The results may only be representative of online academic exchange (and therefore of courses which incorporate computer conferencing) with its context-specific nature, and thus the conclusions reached, should be considered as tentative (Bullen, 1997) and atypical. Many varying issues and factors (commented in Chapter 2), and the specific hypotheses and research questions, do not allow for results and practical implications to be statistically generalized to other populations.

If comparisons between ideas and perceptions of differing groups are made, they must be based upon genuine evidence for similarities rather than on generalizing theory. McCollom (1990) states that “the central problem in the group development field has not been weak or unimaginative research: it has been the drive to generalize when theory tells us that generalization is unsupportable” (p. 154). Moreover, some authors suggest that “there should be no generic effects or outcomes of CMC: this should depend on local norms relating to a particular group identity” (Spears, Lea, & Postmes, in press, p. 15). Specific interpersonal norms of group norms are constructed along the road, become reinforced within the group through mutual
influence, and thus are developed in context.

However, although findings in this study may not be generalized to all asynchronous private electronic exchanges, and maybe not even to larger asynchronous academic groups with different types of task, they can provide a communication-centered approach of the interactions and socio-emotional dynamics of participants in academic computer conferencing so as to “transfer the results to different contexts as long as the defining characteristics of the new context resembles this case” (Bullen, 1997, p. 227). Similar contexts (small group of participants discussing academic issues related to the readings of the course in asynchronous online forums through an extended period of time) may benefit from the results, and repeating this study with different participants under similar circumstances could help minimize the pitfalls and increase the validity of the findings.

**Focus**

The focus is on asynchronous CMC in academic forums. Although diverse forms of CMC share common traits (as mentioned in Chapter 2), not all of the individual interactions through them may show the same communication patterns. This study was group-centered: individual online exchanges were not the focus. However, some authors (e.g., Losada, Sánchez, & Noble, 1990) have stated that “simple frequencies or rates of interaction may be inadequate for measuring interactive patterns” (p. 53), and suggest that patterns of interaction should be approached by using time series analysis techniques, thus focusing on patterns of
behavior among group members. Further studies may want to look at who communicates what with whom, with what frequency, and in what manner, so as to support additional and complementary information to the findings in this study.

Focusing on quantitative and qualitative asymmetries, semantic, strategic, and structural inequalities were not considered in this study.

While the present study focused on the group as a whole, structural analysis (together with network analysis) main interest is centered on individual participants and how they relate to each other. Lichtenberg & Knox-Harbour, 1988, p. 5 (in McDonald, 1997) state that “in contrast to analysis of content of a group’s social interaction and/or qualifications of that content, structural analysis of the interaction within a group focuses on the organization of the interaction among group participants.” Network analysis allows the researcher to “analyze group structure from the standpoint of each of its members simultaneously” (Scott, 1997, p. 13), thus allowing to focus on structural asymmetry presented in Chapter 2. As a theoretical perspective, an analytical construct, a methodological approach, and a pragmatic concern (Rice, 1994, p. 167), network analysis structures communication on both flow and content. On one hand, the analyses of message content “may be combined in a variety of ways to illuminate how users’ social structure both provides a context for meaning and is affected by the content exchanged within that structure” (Rice, 1994, p. 175). Patterns of meaning exchanges among group members can thus be detected. On the other hand, content comparisons in a network analyses “the relationship of the content of messages exchanges by users to the network of messages flows among the
users” (Rice, 1994, p. 175).

Both network content and content comparisons, together with measures of usage/structure and group development, could serve as the basis for future studies. They would render a more accurate picture of the online behavior of a group and its members along time. Moreover, network analysis would determine if interpersonal and interactive content is evenly spread throughout the group or if it is concentrated in few individuals, thus allowing to study issues relating to status generation and maintenance in a group. Smith (1999, p. 210) mentions the notion of “core group”. Groups may be “populated by a core of dedicated participants who contribute much of the value in the group.” Knoke and Kuklinski (1982, p. 19) state that “a structural analysis of a complete network seeks to uncover fundamental social positions, as defined by observed relations among social actors.”

Several questions were not addressed in this study, and may need to be covered by subsequent research. How do individuals in a group relate to each other through time? Can a participant style be identified? If so, how does it evolve through time? Are participants latched on roles (the leader, the critic, the nice guy that supports everyone, etc.)? Is it possible to identify patterns of communication among participants? Are interactivity and reactivity concentrated on a few individuals in a discussion group? Who initiates threads, posts most messages, and exerts more influence upon the group? What is that influence based upon (types of interpersonal content)?

Other issues were not addressed as well. Content was analyzed in messages’
different sections according to Herring (1996d, p. 87). However, data collected was
not separated into those sections, and content was dealt with as a whole for each
message. Further studies may well focus on how and to what extent different
interpersonal and interaction content categories are present in each section of the
messages, thus determining the specific contribution of each section to the whole
message. This may allow for certain recommendations of what messages should
contain in each section (epistolary conventions, introduction, body, closing) terms of
their capability of generating reactive and interactive responses.

**Conclusions**

In spite of the limitations above mentioned, the results of this study support
both the conceptual framework and the guiding hypotheses. In other words,
interpreting online relationships and attending the way an online group socializes and
takes care of its own maintenance has a direct impact upon the group’s level of
interactivity.

The study of the structure and content of online messages revealed social issues
about learners’ communicative process that may directly impact their educational
outcomes. It helped dispel the notion that academic CMC is (and must be)
fundamentally and solely impersonal, and contributed to the better understanding of
group dynamics and development in online conferencing. It also aided in supporting
the notion that many of the traits of online conferencing are not directly related to the
medium itself, but have been brought by the participants themselves (Eastmond,
1997) and by some features of the course design (Bullen, 1997). Moreover, it seemed to indicate that interactivity could be heightened or diminished entirely by the way participants craft their online contributions.

This study also found that technological issues—except for the thread-to-message ratio—have the least effect on quantitative and qualitative characteristics of participation (Bullen, 1997). It also established that interactivity, commonly attributed in literature to technology, is brought about by inner process variables, such as the interpersonal content of messages (McDonald, 1997; McGrath & Hollingshead, 1994), thus supporting the notion that online interactive participation and collaboration through computer conferencing can largely be determined by the type and degree of students’ socioaffective content in postings. Establishing a social environment, making more “human” connections while continuing with the learning process, and creating the sense that a group is working together in real time may lead to more successful conferencing experiences.

Participants’ online behavior, much more than their personal and dispositional considerations or the technological attributes of the medium, determines, to a great extent, whether computer conferencing is amplifying present social behaviors or qualitatively transforming them (Kiesler, 1997; Lawley, 1992). Interactivity is not mainly a characteristic of the medium or even the nature of the task performed, but a quality of the communication relationship established by participants in the setting (Bullen, 1997; Rafaeli & Sudweeks, 1998), and the time span allowed for the group to consolidate (Walther, 1995). However, slight modifications in the type of task to
be performed by participants online may alter both the type and amount of interpersonal behavior, either increasing or diminishing the presence of some of its categories.

An issue worth mentioning is that messages posted to the group by the tutor through time were practically absent. Research shows that tutor participation will increase if students sense the continual presence of the tutor (Bullen, 1997; Tagg & Dickinson, 1995), although there is scarce research connecting tutor’s messaging activity to participants’ type of interaction. This study had the advantage of the absence of tutor intervention, so that participants’ development through time could be observed unaltered by this issue. Other studies may probably have to deal with this factor.

**Implications for Practice**

Even when much is yet to be said about the behavior of small groups in academic online settings, the findings in this study may help inform the better use of computer conferencing towards enhancing learning. As Kindred (2000, p. 6) states, “implementing an online course should not be done hastily, but rather a solid rationale for its use is necessary if student learning outcomes are to be reached.”

This study does not fully answer the questions of how to teach people to build effective online relationships, how to produce effective messages, or how to create learning teams. However, beyond the mere acceptance or rejection of hypotheses, awareness by the tutor and the students about the theoretical and empirical basis of
the relationship of interpersonality and interactivity, about what to expect, how to participate more effectively, and how to avoid potential pitfalls in computer conferencing—such as “monologues in sequence” (Herring, 1996b, p.92)—may bring about the following (see Table 17 below):

1. **Better structuring and conducting online conferences to increase participation and expand depth of discussion.** The convenience of providing adequate preparation for both online tutors and students through mandatory noncredit courses has been demonstrated elsewhere (Bullen, 1997). Students must see online mandatory participation as integral to their success (Berge, 1996; Bullen, 1997). However, during the regular courses much can be done to ensure interactivity, aiming at knowledge building.

   Tutors can avoid decay in participation and foster its increase from initial levels by introducing slight modifications in the mid-term tasks (fostering funded opinion); increasing their participation (introducing new twists in the conversation, re-addressing topics in threads, regulating valid posting dates (keeping them around 10 to 12 days, with a weekend in the middle); modifying the grading system regarding online collaboration (increasing the weight of participation in the last forums); maintaining small and structured discussion groups (3-4 students), specifying a daily logging-on, and introducing more specific directions for participation. Some of these recommendations are derived from the hypotheses regarding participation in this study. Others are derived from literature review, and still others may be considered as hypotheses for future studies.
Eastmond (1997) states that

Perhaps the best way to assist learners to maximize their learning through heightened interactivity is to make these elements (participation frequency and the nature of online contributions) explicit in preliminary student study materials. These could contain suggestions for involvement frequency and the crafting of messages so as to further conversations and invite dialogue…Because computer conferencing fosters discussion, active participation, and perhaps reflection, interaction, and collaboration, the importance of these elements to the learning process needs to be brought up and emphasized. Students will attempt to incorporate these elements more into their own learning if they understand their importance to the learning process. Instead of assuming that collaboration is an inherent component of the medium, it needs to be explicitly fostered in course design, materials development, and instructor preparation…As with learning orientation, course materials should explicitly address the role, importance, and strategies students should take to promote collaborative experiences. (pp. 198-200)

More specific directions seem to have a positive impact upon support, appraisal, as well as negative impact upon humor and inquiry. More specific directions also seem to increase opposing and chastising content, as well as increasing information submission and reducing unsupported advocacy. Specifically grading support, appraisal, humor, inquiry, self-disclosure, supported opinion based upon personal experiences and factual information, educated adversariality and healthy, critical opposition-without endangering discussion by exclusively focusing on the specifics of a particular “netiquette”-will enhance reactivity and improve interactivity, thus aiming at collective knowledge construction. While opposition is a desired online conduct that expresses polite dissent and helps knowledge building (Herrin, 1996d; Mabry, 1997), and as such should be fostered, chastisement should be discouraged.

Moreover, peaks and dips in informing and advocating should be avoided, and a balance between them sought after, as the former is significantly related to active
content and the latter to reactive and interactive content in online postings. More task-oriented directions should then seek to capitalize support, balance appraisal and opposition, emphasize humor, and balance advocacy and inquiry.

2. **Effective moderating, tutoring, mentoring and coaching of online groups in order to, bring about the full potential of the medium and thus contributing to the development of group exchanges that support cooperative and interactive learning and knowledge building processes.** Even when students need to understand the parameters of a successful CMC discussion (Colomb & Simutis, 1996), this study does not aim at defining a prototype or model of online contribution. If Tagg and Dickinson (1995) have pointed at the improbability of finding a “single, simple recipe for an ‘ideal’ tutor style of messaging” (p. 52) when trying to encourage participation alone (quantity), this issue becomes less probable when attempting to encourage certain types of content (quality). However, this study indicates that even when interactivity is a complex online issue, there are some measures that may be taken to encourage it by previously defining and modeling substantive postings.

Bullen (1997) states that online instructors may have interpreted “too literally” (p. 205) the recommendation by Harasim et al. (1995), when they urged them “to play a facilitative, observant, but background role” (p. 174). Tutors/moderators are called upon to play a more active role. The role of the tutor/moderator in the promotion and encouragement of the quantity and quality of students’ exchanges is documented in the literature (Collins & Berge, 1996; Berge, 1996; Bullen, 1997; Espinosa, 1999; Green, 1998a; Holmberg, 1996a, 1996b; McDonald, 1997; Palloff & Pratt, 1999;
Paulsen, 1995b; Rohfeld & Hiemstra, 1995; Tagg & Dickinson, 1995). However, there is little information regarding the influence the moderator has upon the type of interaction the students have and the type of interpersonal content the students exchange among them. Only recently, some authors (e.g., Gutiérrez, Hernández, & Ramírez, 2000; Kindred, 2000; Palloff & Pratt, 1999) focus on the responsibility the online instructor has “for facilitating and making room for the personal and social aspects of an online community in order for the class to be a successful learning experience” (Palloff & Pratt, 1999, p. 76).

Some authors (e.g., Losada, Sánchez, & Noble, 1990) have noted the importance that providing group feedback on the social dynamics to participants has upon the greater awareness of the behaviors that could hamper collaboration. Not only has the tutor/moderator the duty to stimulate participation (Tagg & Dickinson, 1995), or to serve as a “gentle guide” in the educational process (Palloff & Pratt, 1999, p. 82), but also (and primarily) to assure high levels of reactivity/interactivity in online discussions through rigorously indicating the interpersonal traits online contributions must have, and “specifically articulating the quantity and quality of the requirements for posting (Kindred, 2000, p. 5) by exemplifying those traits in his/her own messages and providing meaningful feedback on message content. Thus, the establishment of communication protocols that help the building and maintenance of productive online relationships is a primary responsibility of the tutor (Eastmond, 1997).

Tutor/moderator message content should model the type of message content
desired from participants. Posting a sample message at the beginning of each forum and explicitly identifying its content and characteristics to evaluate should substitute evaluating just participation *per se*. The practical issues (both in time and complexity) of assessing the presence (or absence) of appraisal, humor, support, polite opposition, and integration of participants’ messages may difficult to implement. However, this does not constitute a reason enough to avoid addressing the activity.

Explicitly fostering interpersonal content and interactivity, together with highlighting examples of “insightful” (Kindler, 2000) online exchanges and providing detailed information about the status of online interaction, will avoid online groups to evolve according to group/individuals particular characteristics. Regulating interactions may render more controlled patterns of online behavior in small online groups aiming at collective learning.

3. *Improving the quality of interactivity towards building, through course design, more interactive online learning communities*. Better understanding interactions and socioemotional content in an electronic environment, and better interpreting their relationship within a computer-mediated course, may allow designers and educators to develop a strong learning community. As Palloff and Pratt (1999. p. 32) mention,

Some of the desired outcomes, then, indicating that an online community has been forming are as follows:

- Active interaction involving course content and personal communication.
- Collaborative learning evidenced by comments directed primarily student to student rather than student to instructor.
- Socially constructed meaning evidenced by agreement or questioning, with the intent to achieve agreement on issues of meaning.
- Sharing of resources among students.
- Expressions of support and encouragement exchanged between students, as well as willingness to critically evaluate the work of others.

Fostering support, appraisal, interest in others’ comments, as well as sharing insights and opinions among a collection of virtual learners may help them improve the quality of interactivity to socially construct meaning and to gradually generate online relationships that develop into a cohesive group of people that accomplish their collective goal of learning with and from each other. Online interactions are a complex issue. Course design and tutoring issues, plus the right selection of software tools, together with the main issue of understanding group dynamics, may all have bearing in improving the number and quality of online exchanges.
Table 17

Summary of Purposes, Research Questions, Hypotheses, Results, Implications and Recommendations for Practice

<table>
<thead>
<tr>
<th>Purposes</th>
<th>Research Questions</th>
<th>Hypotheses</th>
<th>Results</th>
<th>Implications for practice and recommendations</th>
</tr>
</thead>
</table>
| **Purpose 1**<br>Describe the level and amount of participation in online academic discussion forums and determine the quantitative dimension of online participation through time. | **Research Question 1.1**<br>How frequently and how much did students participate in online forums? | **Ha1**<br>Number and length of messages (measured in number of sentences) will show a positive correlation (.05 level) over the span of the study. | Null rejected | • Specify maximum number and/or length of postings.  
• Specify frequency of logging-ons. |
| **Research Question 1.2**<br>How is that participation grouped through time? | **Ha2**<br>Number and length of threads (measured in number of messages) will show a negative correlation (.05 level) through time. | Null accepted | • Maintain small, structured group discussions (3-4 students).  
• Keep a thread-to-message ratio between .30 and .50. |

*Table 17 continued*
**Ha3** Null rejected

Participation will be unevenly distributed (.05 level) among days of the week over the duration of the study.

*Table 17 continues*

- Regulate valid posting dates (between 10 and 12) with a weekend in between.
- The weekend in the middle would be beneficial for participants so as to read, go over, and reflect upon what was posted during the first week. The second week would again leave them time to exchange postings within the threads opened during the first week.
- Avoid decay in participation and foster its increase from initial levels by introducing slight modifications in the mid-term tasks (fostering funded opinion); increasing their participation (introducing new twists in the conversation, re-addressing topics in threads).
Purpose 2
Assess the relationship among messages (type of interaction) posted by participants in online academic forums over time; and identify and assess the type and amount of interpersonal content in messages posted to online academic forums over time.

Research Question 2.1
Over the duration of the course, to what degree do the students’ contributions appear to reflect interactive content? Does it represent a significant amount of overall message content?

Research Question 2.2
Do levels of activity, reactivity, and interactivity change over the duration of the study?

<table>
<thead>
<tr>
<th>Ha4₁</th>
<th>Null rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial levels of active content will tend to decrease (.05 level) during the interaction.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ha4₂</th>
<th>Null rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial levels of reactive content will tend to increase (.05 level) during the interaction.</td>
<td></td>
</tr>
</tbody>
</table>

- Improve the poor interactive content in online messages.
- Consider time, type of task, software, and anticipated interaction in course design, development and delivery to augment reactive and interactive content.

Table 17 continued
same period of time.

**Ha4** Null rejected

Overall interactive content in graduate students online forums will increase (.05 level), from initial levels, over the duration of the study.

### Research Question 3.1

Over the duration of the course, to what degree do the students’ contributions appear to reflect interpersonal content? Does it represent a significant amount of overall message content?

- Maintain the high interpersonal content in online messages.

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Table 17 continues

Table 17 continued
**Research Question 3.2**

Do levels of interpersonality and impersonality change over the duration of the study?

**Hₐ₅₁**

Initial levels of negative interpersonal content and initial levels of positive interpersonal content will vary significantly (0.05 level) through time.

**Null accepted**

**Hₐ₅₂**

Initial levels of positive impersonal content and initial levels of positive interpersonal content will vary significantly (0.05 level) through time.

**Null accepted**

**Hₐ₅₃**

Initial levels of overall interpersonal content and initial levels of overall impersonal content will vary significantly (0.05 level) through time.

**Null rejected**

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*Table 17 continues*

- Consider time, type of task, software, and anticipated interaction in course design, development and delivery to augment reactive and interactive content. Task requirements should not hinder interpersonal content.
<table>
<thead>
<tr>
<th>Purpose 3</th>
<th>Research Question 4</th>
<th>Ha$_6^1$</th>
<th>Null rejected</th>
<th>Table 17 continues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine the association between interpersonal content and the type of interaction in discussion forums, as well as the behavior of that relationship through time.</td>
<td>Is there an association between the students’ amount of interpersonal content and the type of interaction in postings? Do these relationships vary through time?</td>
<td>Overall interpersonal content will be significantly related (.05 level) to the amount of reactive and interactive content in graduate students online messages, both for each particular forum and for the set of forums analyzed.</td>
<td>Null rejected</td>
<td>Specifically grade support, appraisal, humor, self-disclosure, supported opinion based upon personal experiences and factual information, educated adversariality and non-adversarial, critical opposition to enhance reactivity and improve interactivity, thus aiming at collective knowledge construction.</td>
</tr>
<tr>
<td>Ha$_6^2$</td>
<td>Overall impersonal content will be significantly related (.05 level) to active content in graduate students online messages for the set of forums analyzed.</td>
<td>Null rejected</td>
<td>Seek a balance between informing and advocating as the former is significantly related to active content and the latter to reactive and interactive content in online postings.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Seek to balance advocacy and inquiry.</td>
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</tr>
</tbody>
</table>

Table 17 continued
Purpose 4
Determine the understandings of students about interactional and interpersonal issues in online postings.

Research Question 5
What were the students’ perceptions of the issues that influence the type of interaction in online discussion forums? Is there any apparent relationship between students’ perceptions and the results of the quantitative research?

- Participants are inclined to answer messages that exhibit many, if not all, of the categories of positive interpersonality as well as both engaging and true interactive characteristics.
- Predominantly impersonal content and no reactive/interactive traits, were the least appealing to online participants.

Table 17 continues
- Recognize the importance of active content in messages.
- Specifically articulate the quantity and quality of the requirements for posting and exemplify those traits in the tutor’s own messages.
- Provide meaningful feedback on message content.
- Establish communication protocols.
5.5 Which traits do students find most appealing in others’ online messages in discussion forums? Which are the traits they find least appealing?

5.6 Which traits do students perceive their own messages show the most and which the least in discussion forums?

5.7 Is there a perceived relationship between interpersonality and the type of interaction in participants’ messages?

5.8 To what extent are students’ perceptions related to the findings in purposes 1-3?

*Table 17 continues*

- Participants regard their postings as unattractive to others when the content is highly impersonal or when positive interpersonal issues are absent.
Appendix A - Subject Release Form

Subject Release Form

INTERACTION AND INTERPERSONAL BEHAVIOR IN COMPUTER-MEDIATED ACADEMIC FORUMS

Dear participant,

Computer-mediated communication is a relatively new and unexplored field of study, especially regarding adult educational settings. This is an invitation to participate in a study I am conducting, as my doctoral dissertation proposal, regarding the improvement of online exchanges in academic computer conferences. A main concern of the study is to evaluate the possible association among the structure of online relationships (level of participation and degree of interactivity) and the degree of interpersonal content in messages exchanged in discussion forums among postgraduate students. I am a student from the Doctoral program in Education at the ITESM. This study is being backed-up by the ITESM and the University of British Columbia, which shared the databases with the online interactions required for the study after I first asked for your consent in October 1999. UBC and ITESM faculty are also involved in this research as advisors. You were selected as a member of the first class of the Doctorate Program.

The results of this study will, I assume, advance both theory in online group development and allow for the better understanding of the mechanics of computer-mediated relationships. Better understanding these issues will allow for more efficient course design and increased student satisfaction, aiming at the construction of effective learning communities. It will also allow each of you to look back at your performance, and that of the group as a whole, and relive your experience with a more informed perspective.

If you decide to accept this invitation, your participation will consist in (1) consenting to analyze the transcripts of the online postings of the doctoral group which first started this program together (which includes myself), and (2) answering an online survey which has questions about the way you perceive online communication. Answering this survey should not take more than thirty minutes. I consider there is no risk involved in your participating in this study.

Individual authorship of online messages, as well as individual responses to the survey will not be mentioned. Your name will not be used in this study. A code will
substitute for it. Thus, privacy, confidentiality, and protection will be assured. Information that could identify you will not be disclosed neither to the educational institutions involved nor to the coders involved in the study. Your participation is voluntary. If you decide to cancel your commitment later on, you may do it without any consequences for you or your relationship with the institutions above mentioned. If the study is made public, the results will only express global information about the participants.

If you have any doubt concerning the research procedure or require further information regarding the study, I will be glad to be of help. My email is abeuchot@campus.rzc.itesm.mx. If you wish to contact Dr. Mark Bullen, my advisor, upon these issues, please contact him at mark.bullen@ubc.ca. If you wish to keep a copy of this letter for your personal files, you may do so.

If you decide to participate and contribute to this study, please send an e-mail to me stating your consent including the following message as the body of your e-mail:

"I consent in participating in the above mentioned research. I understand that while the analysis may be published, all data and identities will remain confidential."

If you do not agree to be a part of this study, please state your reasons, address and telephone number, and I will get in touch with you. I thank you beforehand for your kind response.

Name of Participant         Date

Alberto Eduardo Beuchot y González de la Vega       Date
Appendix B – Online Survey Format

As stated in the Subject Release Form, my dissertation study requires qualitative information directly furnished by you in order to illustrate quantitative findings. In order to do this, the enclosed form needs to be filled out and returned to me as soon as possible via e-mail. However, do take your time to think your answers thoroughly, and do not hesitate to add another page of computer written comments if needed. Thank you beforehand for your valuable time in helping me complete this dissertation study. Again, your name on this survey will be omitted in the study report.

Question 1

Below you have three messages taken from the group discussions from the courses designed by UBC in which you participated. The names of sender and receiver have been omitted to ensure your anonymity. You are asked to evaluate each message according to the question:

When presented with these messages in an online discussion group right now, which of the following messages are you most inclined to respond to? Which is your second most likely choice? Which your third?

Please evaluate each of the three messages presented below from 1 to 3, according to your preference, 1 meaning your most likely choice and 3 your least likely. Please make sure that you are not making your choice based upon the issues or theme discussed on the messages, but upon the traits and characteristics (the content) of the message itself.

Message A:

XXX:

I find your comments very interesting. The whole experience, as you describe it, sounds very familiar, especially the part where you mention which was the criteria for selecting technology (just being ironic).

I am using the Learning Space platform in both courses I am teaching this semester, so I have a little experience (good and bad, but more of the last one) in the subject. From what you mention in the UR2000 model, I suspect that constructivist (Bates) elements are very present. The question (I think I know the answer) is, how do you relate it to the using of Learning Space? Is it the very common way of doing things in this country (first use it and then justify it)?

Greetings…

ZZZ
**Message B:**

In many institutions, the media and technology selection are limited; the end-users aren’t included in the development and implementation of the technology plans. I found that, in fact:

“The choice of media is a complex decision, influenced by a variety of factors, and therefore no quick and easy all-embracing rule is likely to be developed” (Romiszowski, p. 60).

Just because technology is placed in the classroom it does not mean that the teacher knows how to use it effectively. The teachers need adequate time and support to get fully up-to-date with the new technology:

“If you do happen to have a particular aversion to or phobia of a certain medium of instruction, then you are unlikely to use it well:” (Romiszowski, p. 58).

---

**Message C:**

Hello YYY and WWW (and everyone else, of course!):

You did a thorough and very interesting analysis of the Learning Space experience. Joining your comment with XXX’s worry about students being in front of a computer for most of their courses, reminds me of what Romiszowski (1988, p. 62) suggests when selecting media for instruction.

He speaks of essential and optional media characteristics. The former refers to the clarity of the message depending on the nature of the subject matter, whereas the latter is concerned with media traits attractive to the learners as well as the learner’s study habits and the teacher’s teaching habits.

It seems to me that Learning Space current state gets short from fulfilling Romiszowski’s suggestion.

What do you think about this?

Regards!

ZZZ

---

**Question 2:**

Now that you have taken your pick, please elaborate on the reasons upon which you based your selection, or in other words, what made you number them in that order.

Your message 1:
Your message 2:

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Your message 3:

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Question 3:

While question 1 dealt with messages written by others, this question refers to messages written by you. In the lines provided below, please describe which characteristics your own messages in online discussion groups posses that may make them very attractive for others to reply to. Try not to include physical traits such as length or issues such as theme.

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Now, please describe which characteristics your own messages in online discussion groups posses that may make them less attractive for others to reply to. Again, try not to include physical traits such as length or issues such as theme.

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Thank you for your responses to the above questions.

Your name: _________________________________________ Date: _____________
### Appendix C - Definition, Explanation, and Indicators of Categories

**Interpersonality (INPRSN)**

<table>
<thead>
<tr>
<th>Cat #</th>
<th>Category/code or label</th>
<th>Criteria/description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SPRT (support/alignment)</td>
<td>Does the sentence contain or show: A non-critical, passive acceptance of points of view; agreement; approval; concession; compliance; friendly greetings (“hello”); friendly goodbyes; showing empathy and care; suggestion or offer to help; expression of solidarity (“I understand.”); apologies; thanks; support; sustenance; trust and confidence; esteem; prompting; showing closeness and intimacy; expressing similarities; affinity and identification with others; concern for others; sharing; inclusion; use of “us” and “we”; unity, warmth, and affection. An “I acknowledge and care about you” overtone.</td>
</tr>
<tr>
<td>2</td>
<td>DSRE (disclosure)</td>
<td>Does the sentence contain or show: Self-presentation (“I am…”); revelation of novel, ordinary or personal information other than views about the subject of discussion (interests, background, positive or negative feelings about the self) (“I feel….“); admission of some issue (other than agreement); personal comments about one’s life; recounting personal or mutual experiences; expression of likes and dislikes; expression of perceptions about self; expression of personal preferences, desires and expectations; expression of disappointment; expression of anxiety or exhilaration; the un-selfish use of personal pronouns related to self-reference (I, me, my, mine), such as “My name is...” or “I like to write a lot”; requests for help (other than factual information). An “I am open to you”, “talking about me”, or “this is how I am” overtone.</td>
</tr>
</tbody>
</table>
| 3 | APRL (appraisal) | Does the sentence contain or show:  
Admiration; commendation; praise; satisfaction with others’ ideas; positive astonishment; motivation; celebration; positive reinforcement of others’ contributions or others’ selves; recognition; appreciation; compliment; congratulating others; rewarding and praising; positively pointing out other contributions, such as “I liked your comment on...”  
An “I feel you are significant and competent” overtone. |
| 4 | HMR (humor) | Does the sentence contain or show (even if only an attempt of):  
Punch or end lines; explicit joking statements; display of wit; positive irony; tension relieving comments (other than self-disclosure or sarcasm); use of puns and humorous language.  
An “I am having a good time together with you” overtone. |
| 5 | INQR (inquiry) | Does the sentence contain or show:  
Asking expansive questions; asking for others’ opinion about an issue; appeal to or invite other participants to engage further in the discussion; interviewing others; requesting elaboration; opening spaces so others can speak; inviting others to express their points of view; encouraging participation (“Tell me more”); questions directed at others ideas and selves; questions so others can reveal themselves; welcoming new ideas; requesting beliefs and perspectives.  
A “what do you think?” or “tell me more” or “I am interested in your ideas” overtone. |
| 6 | INFM (inform/offer) | Does the sentence contain or show:  
Forwarding factual information, either spontaneously offered or as an answer to a question or request; report of simple events (past or present); announcements, summaries; citing |
or quoting other participants or books and rephrasing others earlier statements (without expressing agreement or disagreement); citing bibliographical references; provision of examples and illustrations for an idea (as in advocating); provision of data and facts to support an advocating statement; reporting past events; stand-alone name(s) of recipient of message in heading (singular or plural); submission of URLs.

No overtone. Neutral or impersonal. Nonevaluative references to others. Do not specify the nature of a deep involvement a.

<table>
<thead>
<tr>
<th>7</th>
<th>OPPTN (opposition/adversariality)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>RSVE (reserve)</td>
</tr>
</tbody>
</table>

7 OPPTN (opposition/adversariality) Does the sentence contain or show:

A direct opposition, intellectual conflict or disagreement; a critical view, judgment, or assessment; objection; defensiveness; manifest denial of others’ opinion; taking a stance directly opposed to the views of the addressee; disapproval; manifest doubts about previous comments; express skepticism; indicating omissions; controversy, arguments or disputes; denial; a statement of warning and caution (no offense); firm but polite adversariality; subtle disagreement; negative evaluation, idea rejection; antagonism; dissention.

An “I acknowledge you and do not agree” overtone

8 RSVE (reserve) Does the sentence contain or show:

An appeal to end the discussion or no attempt to further pursuing it; explicitly cutting off or inhibiting the interaction or the development of an idea; expression of coldness without being rude; any reference to hesitancy, separation or isolation; any reference to avoidance or desertion.

An “I do not want to participate” overtone.
<table>
<thead>
<tr>
<th>9</th>
<th>CHMT (chastisement)</th>
<th>Does the sentence contain or show: Anger, open hostility; personal attacks; insults; swearing; disliking; hostile adversariality; unfriendly and destructive comments; rudeness, provocation; open challenge, threat, dare, warn, or bet; mocking or trivializing others’ contributions; disqualifying; deprecating, reproaching, complaining, and invalidating behavior; vulgarity; negative desinhibition; personally derogatory <em>ad hominem</em> attacks; abusive and coarse language; obscenity; being an “intellectual bully.” An “I feel you are not significant nor competent” overtone.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>SRSM (sarcasm)</td>
<td>Does the sentence contain or show: Derision; making fun of somebody (or oneself) <em>ad hominem</em> or someone’s ideas; cruel forms of humor; hostile wit. An “I am having a good time at your expense” overtone.</td>
</tr>
<tr>
<td>11</td>
<td>ADVC (advocacy)</td>
<td>Does the sentence contain or show: Forwarding opinions; self-centered use of personal pronouns (I, me, my, mine), such as “I think”, “I guess”, “It seems to me”, “My opinion is…”, “I feel that…”. Self-promotion; strong and forcefully-worded assertions; expressing views, understandings or open or embedded judgments and likes-dislikes about the subject at hand (may be posed in question format); assumptions; propositions; giving reasons; developing a position; stating personal views related to the problem at hand; providing opinions; advancement of personal beliefs; affirmation, confirmation, clarification, elaboration, exposition, explanation, persuasion, or presentation; indicating omissions; making inferences; rephrasing own earlier statements; formulating hypotheses; showing polite leadership, dominance, or status; exerting</td>
</tr>
</tbody>
</table>
pressure, influence, or authority; responding an inquiry from others (other than a factual question); persuasion; new directions in conversation; stand-alone (without additional remarks) name or signature of author of message in closing.

A “This is what I think”, “This is the way things are”, or “Let me interest you in my ideas” overtone.

| 12 | RQST (ask/request) | Does the sentence contain or show:  
|    |                  | Asking for factual information (other than opinion); questions seeking or eliciting orientation or information (requesting opinions and explanations is coded as inquiry); requesting repetition, clarification, or confirmation; requesting for data or asking for examples; any forceless request or petition due to personal concern (“Could you give examples or references?”, “I need the bibliography that supports your ideas”); asking to satisfy personal needs.  
|    |                  | No overtone. Neutral or impersonal. Nonevaluative references to others. Do not specify the nature of a deep involvement. |

| 13 | OTHR (other)     | When the sentence does not contain any of the above-specified describing issues.  
|    |                  | Use of rhetorical questions and questions to self (active inquiry); questions you do not expect an answer; questions not for others to express themselves; “tag” and “yes-no” questions. Questions that begin with “I wonder…”

b Bullen, personal interview, November 7, 1999).
c Rhetorical, tag, and yes-no questions either attach questions to a statement or constitute unanswerable questions (questions made not expecting an answer). They are different from questions expecting an answer: questions requesting information (RQST) or questions inviting others to express points of view (INQR). Their pragmatic purpose is difficult to determine.
Rhetorical questions are tricky, because though they are in question form, and call for an answer, they establish a different set of roles for the speaker/questioner and the responder…Our impression is that students seldom spoke rhetorical questions unless presenting some sort of set piece designed to sway the opinion of others, to intimidate or challenge, or to maintain control of a discourse…We think that the use and frequency of rhetorical questions in the conferences was a major way for students to present affect and to establish their own credibility. (Davis & Brewer, 1997, p. 141-142)

**Interaction (INACTN)**

<table>
<thead>
<tr>
<th>Cat #</th>
<th>Category/code or label</th>
<th>Criteria/description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>ACTV (active)</td>
<td>Does the sentence contain or show: Independence from other sentences; no reference, direct or indirect, to previous messages; not an answer to any previous idea; introduction of a new topic.</td>
</tr>
<tr>
<td>B</td>
<td>EXRTV (explicit reactive)</td>
<td>Does the sentence contain or show: Explicit reference to another sentence (even one’s own within the same message), message, person, or group. Explicitly answers a question, using a direct reference by name, general subject, or author (“I agree with X”); explicitly responds to a request for help (“this is what you asked for”); rephrasing others’ earlier statements; taking up, pursuing, expanding, or following a previously expressed idea; using direct reference (“I agree with x opinion”; “Thanks for sharing the last comment”).</td>
</tr>
<tr>
<td>C</td>
<td>IMRTV (*) (implicit reactive)</td>
<td>Does the sentence contain or show: Implicit reference to another sentence (even one’s own within the same message), message, person or group. Implicitly answers a question, without referring to it by name (“I believe the answer is”); implicitly responds to a request for help (“here it is”); taking up, pursuing, expanding, or following a previously expressed idea, without referring to the original message (“The solution is…”).</td>
</tr>
</tbody>
</table>
| D | EGINTV (engaging interactive) | Does the sentence contain or show:
Obvious attempts at reaching out and engaging others in conversation, such as asking questions, asking for comments, suggestions, or help; directly or indirectly inviting others to participate (“I would like to hear your opinion”, “What do you think about…?”). Oriented to the future, at building further contributions by others. Does not include rhetorical questions (Anyhow, what are we then to do?”), which are coded as active. |
|---|---|---|
| E | INTV (true interactive) | Does the sentence contain or show:
Any reference, directly or indirectly, to the manner in which a previous sentence(s) related to those preceding it(them) (i.e. is there any reference to how or whether earlier sentences were humorous, supportive, argumentative, chastising, stupid, informative, etc.). Sentences should express something about how two or more earlier messages related to each other; show the extent to which sentence(s) recount(s) the relatedness of earlier messages (“I think the comments of X regarding Y are interesting”, “In response to X comments, Y stated that…However, I…”, or “Up to now, ideas have built around…”). Referring to, rephrasing or quoting someone’s ideas when reacting to another’s propositions; when C answers a question posed by B upon a posting by A; posting a quote within a quote; openings addressed to more than one recipient. |

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\[d\] As McDonald (1997, p. 49) states, “these messages are difficult, if not impossible, to understand in isolation. It usually requires knowledge of the previous discussions to identify implicit responses.”

\[e\] Rafaeli and Sudweeks (1993, p. 7); Rafaeli and Sudweeks (1998, p. 175).
### Appendix D - Examples of Separate Categories

**Interpersonality (INPRSN)**

<table>
<thead>
<tr>
<th>Cat #</th>
<th>Category/code or label</th>
<th>Criteria/description</th>
</tr>
</thead>
</table>
| 1     | SPRT (support/alignment) | “Thanks for your comment about my class.”  
“I agree with you that subjectivism is not a synonym for constructivism…”  
“As for the market being king, I do not doubt it.” (agreement).  
“I do not see anything wrong with it.” (agreement).  
“The whole experience, as you mention it, sounds very familiar.”  
“Your friend, X.”  
“Hi, X.”  
“It’s a good fight to engage in.” (showing identification with others).  
“I am with you in that I deplore it.” (showing solidarity)  
“You know, X, I had a very similar reaction to the book.” (sharing; showing closeness).  
“However, I share your concern.”  
“Maybe you’ll find the next information interesting.” |
| 2     | DSRE (disclosure) | “During some part of my undergraduate years…I considered myself to have a behaviorist approach to learning.”  
“I wanted to get objective results, but I was also interested in the subjective process.”  
“The results I found among my students…led me to believe that my expectations…were a chimera.”  
“In fact, my current theoretical inclination evolved from previous knowledge and experience, which in itself is a constructivist
“principle.”
“I wonder sometime how we have allowed the world to come about.” (expression of disappointment)
“It’s a shame women cannot have positions of power.”
“I feel uncomfortable about this situation.”

| 3 | APR (appraisal) | “By the way, I must tell you that…I used to enjoy your lecture and classes.”
|   |               | “Your experience with the subject and your readings reveal good insight.”
|   |               | “You make a very powerful assertion at the beginning of your comment.”
|   |               | “It’s wonderful that there are idealistic thinkers such as you…” (admiration).
|   |               | “I think you’ve hit the right spot.” (recognition; appreciation).
|   |               | “This is indeed an issue to be analyzed in detail.” (positive reinforcement of other’s contributions).

| 4 | HMR (humor) | “Especially when you mention it…(Just being ironic).”
|   |           | “…knowledge…is not floating around for somebody to grab it and make others salivate or recoil when exposed to it.”
|   |           | “More to come…!”

| 5 | INQR (inquiry) | “Tell me what do you think about this.”
|   |              | “I would like to hear some comments.”
|   |              | “…but I would like to know which is your point of view on that specific matter.”
|   |              | “Tell me what do you think about this.”

| 6 | INFM (inform/offer) | “Later on, I took some courses about the origins of intellect based on Piaget’s theory.”
|   |               | “Constructivism means ‘building knowledge structures’ (in Harel & Papert) and it may
involve a ‘learn-by-making approach.’”
“You list fifteen arguments that were considered by the institution.”
“I have been in meetings where I’ve heard all the issues that you X mention.”
“X:” (salutation)
“This is similar as to have designer clothing.” (illustrating an idea).

| 7 | OPPTN (opposition/adversariality) | “I do not agree with the last part (presenting information in a neutral manner).” |
|   |   | “I totally disagree with you.” (firm but polite adversariality). |
|   |   | “It is not very clear to me how behavioral results and constructive ones can coexist in the experience you describe.” |
|   |   | “Which, by the way, I do not think is a synonym of subjectivism.” |
|   |   | “What you state is, in my opinion, far away from reality.” (idea rejection). |

| 8 | RSVE (reserve) | “I will not comment more on this point.” |
|   |   | “I don’t want to talk about that issue.” |

| 9 | CHMT (chastisement) | “Things could have been done better right from the beginning.” |
|   |   | “So use it, then justify it, and after that, evaluate if it is useful or not.” |

| 10 | SRSM (sarcasm) | “Intellectually, I do not buy epistemological cocktails.” |
|    |   | “Can you imagine pausing and rewinding every time a student wishes to do so…Come on!” |
|    |   | “If teachers have not recognized education as big business, we’re probably the only ones!” |

| 11 | ADVC (advocacy) | “Their view of human nature and of the way men perceive and organize knowledge are somehow antagonistic.” |
“Probably that has been the main problem.”
“Sometimes teachers have to understand that change is mandatory, not an eligible issue.”
“However, I think there is still a more important issue in planning media selection: student support.”
“X.” (signature)
“There is a confusion.” (clarification)
“Search the Web for more information about corporate universities.” (suggestion, advice, or call for action)
“Please check the following URL regarding Project RED in Guanajuato.” (propositions, suggestion).
“I wonder if we need to ask a different question about credentialization.” (new directions in conversation).
“How can a government of an underdeveloped country decide to invest in technology for education when there are other social needs? How can a government invest in costly infrastructure and equipment for technological advancement without risking the jobs of employees of the largest union in the country?” (developing a position).
“I feel that distance education is not expensive.”

12 RQST (ask/request)
“I wonder if any follow-up studies have been made regarding the use of Learning Space?”
“Is it the same to use the term constructivism and subjectivism?”
“Why then do professors feel that the technology is ‘overriding’?”
“Perhaps you can explain a question I have from the article you quoted.”

13 OTHR (other)
“How can you justify it if you don’t use it?”
“…is it not so?”
“The egg and then the hen?”
“However, what about practices and feedback?”
“Which one was the correct view? The answer…”
“Are objectivism and subjectivism incompatible? They are complementary…”
“I wonder, how can we save proficiency in education despite the emphasis on profit?”

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**Interaction (INACTN) * **

<table>
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<tr>
<th>Cat #</th>
<th>Category/code or label</th>
<th>Criteria/description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>ACTV (active)</td>
<td>“But when we see theories that endorse their views, as the above mentioned, they become incompatible.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Hi, everyone.”</td>
</tr>
<tr>
<td>B</td>
<td>EXRTV (explicit reactive)</td>
<td>“Hi, X.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Thanks for your comment about my class.”</td>
</tr>
<tr>
<td>C</td>
<td>IMRTV (implicit reactive)</td>
<td>“I find a lot of similarity between our cases.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“It reminds me of a story by Orson Wells called ‘The War of the Worlds.’”</td>
</tr>
<tr>
<td>D</td>
<td>EGINTV (engaging interactive)</td>
<td>“…but I would like to know which is your point of view on this specific matter.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“I am sure somebody knows about the constructivism-subjectivism theoretical struggle between the two authors.”</td>
</tr>
<tr>
<td>E</td>
<td>INTV (true interactive)</td>
<td>“X: I think the underlying idea Y expressed in her title is something we should give second thoughts when selecting a media.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Joining your comment with X’s worries about students being in front of a computer for most courses, reminds me of what Y suggested when selecting media.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Hi, X, Y, and Z.”</td>
</tr>
</tbody>
</table>
“…‘isolated anecdotes of people who had their dreams come true ‘…and the Vietnamese young woman who had to learn English…(p. 87)”.

“X: it is my impression that a contact-hour is a traditional course face to face, or so I seem to read in the following quote from the site Maria Rosa sent us.”

“I consider that Dr. Jones comment, mentioned by X, hit right on the spot.”

* It is extremely difficult, if not impossible, to code a sentence as EGINTV if it is not analyzed in context. The same can be said about all interaction categories. The examples cited here must be taken as part of the online interaction and not as isolated pieces of information.

Notes.

1. When there is a “but”, “or”, “although” or another connective that naturally splits the first sentence into two distinct coding categories, the sentence will be considered as two.

Example 1.
“I agree with you that subjectivism is not a synonym for constructivism, but I would like to know which is your point of view on this specific matter.”

a. “I agree with you that subjectivism is not a synonym for constructivism (SPRT)

b. “…but I would like to know which is your point of view on this specific matter.” (INQR).

Example 2.
“By the way, I must tell you that, although I was not your formal student in the Master’s Program, I used to enjoy your lecture and classes.”

a. “By the way, I must tell you that…, I used to enjoy your lecture and classes.” (APRL)

b. “…, although I was not your formal student in the Master’s Program…” (INFM)

Example 3.
“My evaluation of this process is a subjective one, however, I still long for measurable outcomes of my work.”
a. “My evaluation of this process is a subjective one…” (ADVC)
b. “…however, I still long for measurable outcomes of my work.” (DSRE)

Example 4.
“I admit that I prefer to study cognitivism because I think human beings are more complex to understand.”

Example 5.
“What do you, my dear colleagues, think about this?”

Example 6.
“I found your comments very interesting, but I do not agree with the last part (presenting information in a neutral manner).”

Example 7.
“I prefer to use the term constructivism instead of subjectivism, because human beings construct their knowledge.”

Please note that segment b. is NOT to be coded as INFM. It is not a report on a past event, but an advancing of one’s own ideas.
Example 8.
“I do not like to be faced with this kind of choices, because they imply fragmentation and reality is not fragmented; knowledge, as X states, is not floating around for somebody to grab it and make others salivate or recoil when exposed to it.”

a. “I do not like to be faced with this kind of choices,…” (DSRE).
b. “…, because they imply fragmentation and reality is not fragmented;” (ADVC)
c. “…knowledge…is not floating around for somebody to grab it and make others salivate or recoil when exposed to it.” (HMR).
d. “, as X states,…” (INFM).

Notice that some people tend to create long sentences with many subordinate clauses. Check the connectors and see if the sentence expresses diverse ideas and can be coded as separate chunks of information.

Example 9.
“I know that excuses should be avoided, but I was not able to give my contributions before; I broke my toe in a very stupid house accident, but here I am.”

a. “I know that excuses should be avoided, but I was not able to give my contributions before;” (SPRT) (apologies).
b. “I broke my toe in a very stupid house accident, but here I am.” (DSRE).

Example 10.
“I wanted to get objective results, but I was also interested in the subjective process.”

In this case, the whole sentence is coded as DSRE, as the connective “but” reinforces the main idea.

Example 11.
“Have a nice day and thanks a lot for having sent me the copies.”

This case is similar to the one mentioned in Example 10. The connective reinforces the main idea, so the sentence is coded as SPRT.

Example 12.
“Support has to do with emotions (here I go again!), and to keep up an emotional drive letting your students know that you are there can even make up for
inconsistencies in media selection.”

a. “Support has to do with emotions,…” (ADVC).
b. “…and to keep up an emotional drive letting your students know that you are there can even make up for inconsistencies in media selection.” (ADVC).
c. “…(here I go again!)…” (HMR) (positive irony and tension relieving comments)

Example 13.
“So it is very difficult to incorporate new proposals; the use of the video is an example of this.”

Example 14.
“At ITESM a big amount of money has been devoted to technology per se: more than 15 million dollars have been spent so far and another 50 million will be spent in the near future; a balance between human resources and technology has to be reached.”

Example 15.
“First of all, I would like to tell you I liked your example, as it is so different from what we are accustomed to analyze.”

Notice that even when b. and c. are both coded as SPRT, they are two different sentences. SPRT is coded for different reasons. Although there is no connective
separating sentence a. from sentence b., the former is coded as a separate unit as it states what follows (INFM).

Example 16.
“I do not know much about the SEP’s programs you describe, but I agree with you when you say that it makes you feel happy to know that our government is investing in education.”

a. “I do not know much about the SEP’s programs you describe,…” (DSRE) (expressions of perceptions about self).
b. “…, but I agree with you t…” (SPRT) (agreement).
c. “…when you say that it makes you feel happy to know that our government is investing in education.” (INFM) (rephrasing other’s earlier statements).

Example 17.
“You also mentioned the fear that some teachers have of using the program in small towns: why is this? Could you extend your comments on this issue? If the program is being considered for primary schools, I think its benefits are huge, don’t you think so?

a. “You also mentioned the fear that some teachers have of using the program in small towns:…” (INFM-EXRTV) (rephrasing other’s earlier statements).
b. “…:why is this?” (RQST-EXRTV) (asking for explicit information).
c. “Could you extend your comments on this issue?” (INQR-EXRTV) (requesting elaboration).
d. “If the program is being considered for primary schools, I think its benefits are huge,…” (ADVC-EXRTV) (stating personal views related to the problem at hand).
e. “…don’t you think so?” (INQR-EGINTV) (opening spaces so others can speak).

Example 18.
“I don’t have technophobia, so I don’t mind LS as an addition to my course, but many teachers are scared to death!”

a. “I don’t have technophobia,…” (DSRE) (personal comments about oneself).
b. “…so I don’t mind LS as an addition to my course,…” (DSRE) (expression of personal preferences).
c. “…, but many teachers are scared to death!” (ADVC) (providing opinions).
Example 19.
“Granted that high tech industry is very expensive and very aggressive, but they are not the only ones who have a vested interest in education.”

a. “Granted that high tech industry is very expensive and very aggressive,…” (SPRT)
b. “, but they are not the only ones who have a vested interest in education.” (OPPTN).

Example 20.
“Long controlled by public schools and relatively change-resistant colleges and universities, the education ‘industry’, estimated to be as large as $600 billion a year, seems ripe for capture by business leaders who hate to see all that perfectly good money invested in ways they do not control.”

a. “Long controlled by public schools and relatively change-resistant colleges and universities, the education ‘industry’, …, seems ripe for capture by business leaders who hate to see all that perfectly good money invested in ways they do not control.” (ADVC)
b. “…estimated to be as large as $600 billion a year…” (INFM).

Example 21.
“But anyway, it is not a question of being idealistic or not: it is a question of being able to negotiate with vendors a good commercial deal.”

a. “But anyway, it is not a question of being idealistic or not:…” (OPPTN) (disagreement or objection).
b. “…: it is a question of being able to negotiate with vendors a good commercial deal.” (ADVC) (advancement of personal beliefs).

Example 22.
“Most of the courses in this areas are already on-line courses with four satellite sessions during the term, which by the way could be eliminated.”

a. “Most of the courses in this areas are already on-line courses with four satellite sessions during the term,…” (INFM) (factual information).
b. “…which by the way could be eliminated.” (ADVC) (stating personal views related to the problem at hand).
Example 23.
“In relationship to the other idea you presented, don’t you think is could be useful to have these sessions? Could you tell me more about those studies you mentioned?”

a. “In relationship to the other idea you presented,…” (INFM) (report of a past event).
b. “…don’t you think is could be useful to have these sessions?” (RQST) (asking for confirmation)
c. “Could you tell me more about those studies you mentioned?” (INQR) (encouraging participation; requesting perspectives).

Example 24.
“I agree with you that there is no direct relationship between cost and worth in education; however, to become cost-effective, distance education—as we in emerging countries need to understand it—increases its class sizes, which might hurt the attention provided to the quality of the process and the outcomes of it.”

a. “I agree with you that there is no direct relationship between cost and worth in education;…” (SPRT) (approval, agreement).
b. “…however, to become cost-effective, distance education…must increase its class sizes,…” (ADVC) (forwarding a proposition; developing a position).
c. “…as we in emerging countries need to understand it…” (ADVC) (strong assertion).
d. “…which might hurt the attention provided to the quality of the process and the outcomes of it.” (ADVC) (forwarding opinions).

Example 25.
“While I basically agree with you, I believe that hardware and software producers are focused at creating different needs in learners that the pedagogic ends foreseen by educators.”

a. “While I basically agree with you,…” (SPRT) (agreement).
b. “I believe that hardware and software producers are focused at creating different needs in learners that the pedagogic ends foreseen by educators.” (OPPTN) (opposition; controversy).

Example 26.
“Also, lower prices could perhaps be accomplished through modular instruction, through the establishment of support computer laboratories that service students, through seeking better deals with vendors due to high volume of equipment purchase or leasing, and through seeking alliances with other universities where strengths are
maximized and costs are shared.”

a. “Also, lower prices could perhaps be accomplished through modular instruction,…” (ADVC) (presentation of ideas; suggestions).
b. “…. through the establishment of support computer laboratories that service students,…” (ADVC) (presentation of ideas; suggestions).
c. “…. through seeking better deals with vendors due to high volume of equipment purchase or leasing,…” (ADVC) (presentation of ideas; suggestions).
d. “…. and through seeking alliances with other universities where strengths are maximized and costs are shared.” (ADVC) (presentation of ideas; suggestions).

Each of the clauses introduced by that is coded as an independent sentence as it is an independent argument.

Example 27.
“This is indeed an issue to be analyzed in detail. Thanks for your assertive comment.”

a. “This is indeed an issue to be analyzed in detail.” (APR) (positive reinforcement of others’ contributions).
b. “Thanks for your assertive comment.” (SPRT) (thanks).

Example 28.
“We might call it visual pollution (as X mentioned, Monterrey has become a billboard), others call it reality.”

a. “We might call it visual pollution,… others call it reality.” (SRSM) (hostile wit)
b. “…. (as X mentioned, Monterrey has become a billboard),…” (INFM) (rephrasing others’ earlier statements).

Example 29.
“As well as advertising, violence is ALSO part of our reality. I am sorry to tell you I will NOT get used to any of them. I think that IBM can donate 200 or more computers and NOT transform the campus into malls.”

a. “As well as advertising, violence is ALSO part of our reality.” (SRSM) (open hostility).
b. “. I am sorry to tell you…” (SRSM) (hostile wit).
c. “…I will NOT get used to any of them.” (OPPTN) (defensiveness).
d. “I think that IBM can donate 200 or more computers…” (ADVC) (developing a position).
e. “…and NOT transform the campus into malls.” (OPPTN) (direct opposition).

**Example 30.**
“I was so fascinated by your conversation that I was becoming a lurker, a passive learner, and so on; however, I want to tell you some things that were prompted by your ideas.”

a. “I was so fascinated by your conversation…” (APR) (positive astonishment).
b. “…that I was becoming a lurker, a passive learner, and so on;…” (DSRE) (admission of some issue, other than agreement).
c. “…however, I want to tell you some things that were prompted by your ideas.” (INFM) (announcement).

**Example 31.**
“I just had the privilege of listening to Diane Oblinger’s conference, which was excellent, and made me take abundant notes. As a pragmatically-oriented adult learner (except when I have tantrums, of course!), I tried to relate what she said to our questions for his block.”

a. “I just had the privilege of listening to Diane Oblinger’s conference…” (INFM) (factual information).
   b. “…which was excellent…” (APRL) (celebration).
   c. “…and made me take abundant notes.” (INFM) (report of simple events).
   d. “As a pragmatically-oriented adult learner…” (DSRE) (expression of perceptions about self).
   e. “…(except when I have tantrums, of course!)…” (HMR) (tension relieving comments).
   f. “…I tried to relate what she said to our questions for his block.” (INFM) (report of past events).

**Example 32.**
“I must recognize though that the SEP is opening up into joint ventures with Mexican and foreign universities for teacher training; this feeds my trust and hope in the government wanting to invest in education as a driver of change.”

a. “I must recognize though that the SEP is opening up into joint ventures with Mexican and foreign universities for teacher training;…” (INFM) (forwarding factual information).
b. “…this feeds my trust and hope in the government wanting to invest in education as a driver of change.” (DSRE) (expression of expectations).
Example 33.
“This is what worries me when it is mentioned that higher education could be regulated by the government. I am aware that there are excellent schools within public institutions, but this is a status that is earned by the dedication and devotion of the school’s administrators and professors, not by the a State as a regulating organism.”

a. “This is what worries me…” (DSRE) (admission of some issue other that agreement).
b. “…when it is mentioned that higher education could be regulated by the government.” (INFM) (rephrasing others’ earlier statements).
c. “I am aware that there are excellent schools within public institutions,…” (SPRT) (concession, approval).
d. “….but this is a status that is earned by the dedication and devotion of the school’s administrators and professors,…” (ADVC) (forwarding opinions).
e. “….not by the a State as a regulating organism.” (OPPTN taking a stance in direct opposition to the views of the addressee).

Notice that c. is not coded as DSRE. Although it is an admission of some issue, it is closer to an agreement with somebody else’s comment.

Example 34.
“I agree with you that subjectivism is not a synonym for constructivism…” (coded as EXPRTV, this second sentence in a message must be coded as follows: 2(16/1/1/1).

Example 35.
“Did you know that 66% of profits related to books goes to publishing houses?”
### Appendix E - Examples of Combined Categories

<table>
<thead>
<tr>
<th>INACTN</th>
<th>ACTV</th>
<th>EXRTV</th>
<th>IMRTV&lt;sup&gt;a&lt;/sup&gt;</th>
<th>EGINTV</th>
<th>INTV</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPRS Qty</td>
<td>“Howdy!”</td>
<td>“Hi, everyone.”&lt;sup&gt;b&lt;/sup&gt;</td>
<td>“Just a brief comment.”&lt;sup&gt;b&lt;/sup&gt;</td>
<td>“Hi, everyone.”&lt;sup&gt;b&lt;/sup&gt;</td>
<td>“Hi, everyone.”&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>“Have a nice day and thanks a lot for having sent me the copies.”&lt;sup&gt;b&lt;/sup&gt;</td>
<td>“Thanks for your comment about my class.”</td>
<td>“This may turn out to be not a bad decision after all.”</td>
<td>“Thank you beforehand for your attention to my inquiry.”</td>
<td>“Hello, X and Y.”</td>
</tr>
<tr>
<td></td>
<td>“I know that excuses should be avoided, but I was not able to give my contributions before.”</td>
<td>“I agree with you that subjectivism is not a synonym for constructivism.”</td>
<td>“That seems to be the key issue.”</td>
<td>“I am curious to know how did you manage your course after all.”</td>
<td>“Reading your comments, X and Y, has been very interesting.”</td>
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<tr>
<td></td>
<td>“Best wishes.”</td>
<td>“Hi, X.”</td>
<td>“However, I share your concern.”</td>
<td>(warmth and affection).</td>
<td>“Congratulations everyone!”</td>
</tr>
<tr>
<td></td>
<td>“I am sure you will enjoy reading about my feelings as a teacher, right?”&lt;sup&gt;b&lt;/sup&gt;</td>
<td>“…but you are right: professors use other media.”</td>
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</tbody>
</table>

<sup>a</sup> Identification

<sup>b</sup> When it is in the middle of a thread
with others).
“Things will shape up and improve with time.”
“your friend, Alma.”
“Maybe you’ll find the next information interesting.”
format of my last contribution.”
“Nice reading you.”
“The whole experience, as you mention it, sounds very familiar.”
“I feel too much in the same way as X.”
(closeness, identification with others).
“I believe that what you say is correct.”
“I suppose if we are all doing this, there is a light at the end of the tunnel!”
(showing closeness and identification with others).
DSRE  |  “During some part of my undergraduate years… I considered myself to have a behaviorist approach to learning.”
|  “I wanted to get objective results, but I was also interested in the subjective process.”
|  “The results I found among my students… led me to believe that my expectations… were a chimera.”
|  “In fact, my current theoretical

That shifted my perspective enormously.”
|  “I was surprised to hear that you are also using LS.”
|  “That, as you mention, may best suit individual needs.”
|  “Regarding my class, I haven’t managed all the problems yet.”
|  “The news makes me happy.”
|  “I don’t know much about the SEP programs you describe.”
|  “Regarding the World Bank,

“I admit that I prefer to study cognitivism.”
|  “I determined my epistemological view could only be a combination of both traditions.”
|  “I am open to other ideas later on as we interact further.”
|  “I would like to do research on the feelings of learners.” (likes and dislikes)
|  “I guess I realize I am a slow learner after reading X’s ideas about Y’s notion of constructivism.”
|  “Let me tell you that I, as X, was also surprised that you are using LS.”
inclination evolved from previous knowledge and experience, which in itself is a constructivist principle.”

“I do not like to be faced with this kind of choices.”

“I would like to ask several questions.” (likes and dislikes)

“I prefer that the government uses our taxes in education.”

“I do not know about all the series, but…” (admission of
some issue other than agreement).

<table>
<thead>
<tr>
<th>APRL</th>
<th>“By the way, I must tell you that…I used to enjoy your lecture and classes.”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“I liked your story about the elephant.”</td>
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<td></td>
<td>“I found your comments very interesting.”</td>
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<td>“…which, by the way, I consider very complete.”</td>
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<td>“I believe you draw our attention to a critical aspect of media selection.”</td>
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<td></td>
<td>“You posed two great ideas that stroke a chord in both my brain and my heart.”</td>
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<td>“You make a very powerful”</td>
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<td></td>
<td>“Very interesting, indeed!”</td>
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<td></td>
<td>“You highlight a very important point.”</td>
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<td>“Your experience with the subject and your readings reveal good insight.”</td>
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<td></td>
<td>“You practically wrote our papers for us!”</td>
</tr>
</tbody>
</table>
assertion at the beginning of your comment.”
“This is indeed an issue to be analyzed in detail.”

HMR
“…knowledge is not floating around for somebody to grab it and make others salivate or recoil when exposed to it.”
“Excuse my ‘highly scientific’ terminology.”
“How will we ever evaluate its impact on learning?”
“This is my comment from

“Especially when you mention it…(Just being ironic).”

“Ask the government (just joking)!”
“Please don’t make me do another cost analysis!”
"Do you consider that the teaching-learning experience is worthwhile?"

"What do you think is necessary to establish a non-artificial construct?"

"I would like to hear some comments." (invite others to participate)

"Tell me what you think about this." (results they do not answer)

"Tell me if their use would force the people involved in the project to adapt to whatever results they render?"

"I would like to know which is your point of view on that specific matter."

"Tell me what do you think about this." (results they do not answer)

"I wonder how this technology has been working in your campus."

"I would like to hear your comments." (results they do not answer)

"Don't you think so?"

"I would be glad to read your answers."
INFM

“The SEP produced 195 programs organized in 13 series to support the high school curriculum.”

“I am using LS in two courses I am teaching this semester.”

“Later on, I took some courses about the origins of intellect based on Puget’s theory.”

“Constructivism means ‘building knowledge’.”

“You asked in your message if we are referring to constructivism in the Piagetan sense.”

“I was told that the institution had exclusive rights to that software.”

“You list fifteen arguments that were considered by the institution.”

“I have been in meetings where I’ve heard all the issues that you X mention.”

“I want to

“Whereas Piaget does not deny the influence of social factors, Vygotsky places the origin of human higher mental processes in human social experiences.”

“It reminds me of a story by Orson Wells called ‘The War of the Worlds.’”

“This information is for all of those that commented on distance education policies.”

“X: I would like to go back to some of the ideas mentioned by Y.”

“As someone in the group has mentioned…”

“It is interesting to see how your initial comment caused that our following messages had so many questions.”

“I would like to include the messages of X, Y, and Z in a single comment.”

“Taking X’s ideas, student support can be provided through interaction but
structures’ (in Harel & Papert) and it may involve a ‘learn-by-making approach.’"

“Teamwork vs. Learning Communities”

(introduction)

“Video in the classroom case.”

(introduction)

comment on several aspects of your contribution.”

“X:"

(salutation)

“in regard to your question of being able to negotiate with vendors a good commercial deal regarding IT:”

also through the training and follow-up in the use of resources.”

“Joining your comment with X’s worries about students being in front of a computer for most courses, reminds me of what Y suggested when selecting media.”

“X, Y, and Z:”

<table>
<thead>
<tr>
<th>OPPTN</th>
<th>“What is going to happen?” (a statement of warning and caution)</th>
<th>“I do not agree with the last part (presenting information in a neutral manner).”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“It is not very clear to me how behavioral results and constructive”</td>
<td>“No, I did not mess it up.”</td>
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<tr>
<td></td>
<td></td>
<td>“Am I wrong? No, I don’t think so.”</td>
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<td>“I am not sure if this is a good option.”</td>
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<td>“It seems it is not that”</td>
</tr>
</tbody>
</table>
ones can coexist in the experience you describe.”
“Which, by the way, I do not think is a synonym of subjectivism.”
“Just think how much money they need!”
“You don’t mention whether your target population gets feedback.”
“You forgot to include in your comment the following:…”

RSVE
“I will not comment more on this point.”

CHMT
“Things could have been
“So use it, then justify it, and
done better right from the beginning.”

“Why produce anxiety and frustration in both teachers and students?”

“This could have been avoided with a better way of implementing change!”

SRSM “Knowledge of fact, fine for behaviorists… Learning of values and attitudes, tough time for them.” “Is it the very common way of doing things in this country: first use it, then justify after that, evaluate if it is useful or not.”

“Answering myself before somebody else asks…” “(As for the market being king, I don’t doubt it): So was Louis XBI in France until 1789…” “Intellectually I do not buy epistemological cocktails.” “Can you imagine pausing and rewinding every time a student wishes to do so…Come on!” “…but he surely did not follow any of the prescribed or known approaches to media selection.”
ADVC

“When we see theories that endorse their views, as the above mentioned, they become incompatible.”

“Probably that has been the main problem.”

“Sometimes teachers have to understand that change is mandatory, not an eligible issue.”

“However, I think there is still a more important issue in

“Which, by the way, I do not think is a synonym of subjectivism.”

“…because they imply fragmentation and reality is not fragmented.”

“As you have described it, I can assume that there is a small group of students using it.”

“From what you mention, I suspect that constructivists elements are very present.”

“I also believe that there is not only one theory that can provide all the information about…”

“I think both could be creative and effective.”

“As long as the teacher is substantially involved, no problem.”

“There is a confusion.”

“Maybe there could be a point where they intersect.”

“I am sure somebody knows about the constructivism-subjectivism theoretical struggle between the two authors.”

“This information dilemma has to be illustrated by someone in the group.”

“X: I think the underlying idea Y expressed in her title is something we should give second thoughts when selecting a media.”

“X: it is my impression that a contact-hour is a traditional course face to face, or so I seem to read in the following quote from the site X sent us.”

“When X mentions corporate universities, he is making a point that should be considered by
<table>
<thead>
<tr>
<th>RQST&lt;sup&gt;b&lt;/sup&gt;</th>
<th>“Do students take the course from their home?”</th>
<th>“What part of the desired outcomes will be better suited by those three approaches?”</th>
<th>“I wonder if any follow-up studies have been made regarding the use of LS?”</th>
<th>“Is it the same to use the term constructivism and subjectivism?”</th>
</tr>
</thead>
<tbody>
<tr>
<td>“What was the rationale for using LS?”</td>
<td>“Why then do professors feel that the technology is ‘overriding’?”</td>
<td>“How does the project you describe deals transforming universities.”</td>
<td>“I consider that Dr. Jones comment, mentioned by X, hit right on the spot.”</td>
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<tr>
<td>“Are we going to stay with the Web pages during our learning experience?”</td>
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</table>
“with it if it does at all?”

“Perhaps you can explain a question I have from the article you quoted.”

| OTHER | “Which one was the correct view?” “The answer…” “Are objectivism and subjectivism incompatible? They are complements.” “How can you justify it if you don’t use it?” “The egg and then the hen?” “However, what about practices and feedback?” | “Are they incompatible?” (I do not think so.)” | “Fantasy?: Sure, at the basic level.” |
a. It is extremely difficult, if not impossible, to code a sentence as IMRTV if it is not analyzed in context. The same can be said about all interaction categories. The examples cited here must be taken as part of the online interaction and not as isolated pieces of information.

b. A request (RQST) can be active (ACTV). However, for this to happen, a request has to be coded first as either explicit reactive, implicit reactive, engaging interactive, or interactive. Only if the participants did not answer the request either explicitly or implicitly in subsequent messages, it can (and should) be coded as active.
Appendix F - Data Entry Forms

Sample data entry sheet

Semester #______ Discussion group #________ Sentence #________________
Total # of sentences in message______ Message date_______ Day____________
Coder name_________ Participant’s name_________ Coding date____________

Read each message once. Then, code each sentence within the message twice. Once, for interpersonality category and a second time for type of interaction. Thus, each sentence must have two references. Identify each coded sentence by its number within a message (e.g. 1, 2, …34) and place that number in a selected box.

For clarification on coding refer to the long description of variables. If you consider there is a sentence that does not fit into the specified interpersonality categories, use the “OTHR” (other) category for this drastic measure.

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Coding Example (Per sentence/Per Message)

Semester #2 Discussion group #9 Sentence #18/5/9/2

Total # of sentences in message 25 Message date M/D/Y Day Mon

Coder name X Participant’s name Y Coding date M/D/Y

Read each message once. Then, code each sentence within the message twice. Once, for interpersonality category and a second time for type of interaction. Thus, each sentence must have two references. Identify each coded sentence by its number within a message (e.g. 1, 2, …34) and place that number in a selected box.

For clarification on coding refer to the long description of variables. If you consider there is a sentence that does not fit into the specified interpersonality categories, use the “OTHR” (other) category for this drastic measure.

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## Data Summary (Per Message)

Semester # ___ 2 ___ Discussion group # ___ 9 ___ Message # ___ 18/5/9/2 ___

Total # of sentences in message ___ 23 ___ Message date _M/D/Y_ ___ Day ___ Mon ___

Coder name ____ X ____ Participant’s name ____ Y ____ Coding date _M/D/Y___

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Coder name___X___Coding date___M/D/Y___ Total # of sentences in group__339__

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Appendix G – Intercoder Reliability Data

Table G1

*Specific Intercoder Reliability for Forum 1 (Interpersonality) with Coding Values*

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<th>Category</th>
<th>Coder 1</th>
<th>Coder 2</th>
<th>Coder 3</th>
<th>Total (#/%)</th>
<th>K (kappa)</th>
<th>Rating</th>
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<td>2</td>
<td>8 (0.74)</td>
<td>0.59</td>
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<td>0 (0.00)</td>
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*Note.* Li and Lautenschlager (1997) state that “for practical or clinical uses, an index value smaller than 0.40 is unacceptable. An index value falling between 0.40 and 0.59 is borderline. An index value between 0.60 and 0.75 is good, and values exceeding 0.75 are deemed excellent” (p. 818).
Table G2

Specific Intercoder Reliability for Forum 1 (Interactivity) with Coding Values

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| Overall kappa | 0.65 | good |
Table G3

**Overall Intercoder Reliability for Forum 1 (Interpersonality)**

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| Total    | 83   | 157  | 8    | 14   | 15   | 308  | 9     | 0    | 0    | 30   | 421  | 4    | 22   | 1071 |

P = 0.077 0.147 0.007 0.013 0.014 0.288 0.008 0.000 0.000 0.028 0.393 0.004 0.021
Q = 0.923 0.853 0.993 0.987 0.986 0.712 0.992 1.000 1.000 0.972 0.607 0.996 0.979
Kappa = 0.81 0.53 0.59 0.34 0.79 0.65 0.76 1.00 1.00 0.51 0.69 0.29 0.63 (overall) 0.64
### Table G4

**Overall Intercoder Reliability for Forum 1 (Interactivity)**

<table>
<thead>
<tr>
<th>Sentence</th>
<th>ACTV</th>
<th>EXRTV</th>
<th>IMRTV</th>
<th>EGINTV</th>
<th>INTV</th>
<th>Óx2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>5</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
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<tr>
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<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>12</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
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<td>15</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
</tbody>
</table>

(Table break)

| 350      | 3    | 0     | 0     | 0      | 0    | 9   |
| 351      | 3    | 0     | 0     | 0      | 0    | 9   |
| 352      | 1    | 1     | 1     | 0      | 0    | 3   |
| 353      | 1    | 1     | 1     | 0      | 0    | 3   |
| 354      | 1    | 1     | 1     | 0      | 0    | 3   |
| 355      | 3    | 0     | 0     | 0      | 0    | 9   |
| 356      | 3    | 0     | 0     | 0      | 0    | 9   |
| 357      | 3    | 0     | 0     | 0      | 0    | 9   |

---

| Total    | 817  | 170  | 53   | 26    | 5    | 1071 |

\[
P = \begin{bmatrix}
0.763 & 0.159 & 0.049 & 0.024 & 0.005 \\
0.237 & 0.841 & 0.951 & 0.976 & 0.995
\end{bmatrix}
\]

\[
Q = \begin{bmatrix}
0.72 & 0.67 & 0.29 & 0.56 & 0.62
\end{bmatrix}
\]

Kappa = (overall) 0.65

358
Table G5

*Expected Mean Squares, Variance Components, and G Coefficient for Interpersonality*

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>$\hat{\sigma}^2$</th>
<th>% of total variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentence (S)</td>
<td>299.65</td>
<td>356</td>
<td>0.84</td>
<td>$(MS_s,MS_e)/3 = 0.26$</td>
<td>83.34</td>
</tr>
<tr>
<td>Rater (R)</td>
<td>0.49</td>
<td>2</td>
<td>0.24</td>
<td>$(MS_s,MS_e)/3 = 0$</td>
<td>0.17</td>
</tr>
<tr>
<td>Residual (E)</td>
<td>92.68</td>
<td>1780</td>
<td>0.05</td>
<td>$MS_e = 0.05$</td>
<td>16.49</td>
</tr>
</tbody>
</table>

$\hat{\sigma} = 0.83$

Table G6

*Expected Mean Squares, Variance Components and G Coefficient for Interactivity*

<table>
<thead>
<tr>
<th>Sources of variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>$\hat{\sigma}^2$</th>
<th>% of total variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentence (S)</td>
<td>159.42</td>
<td>356</td>
<td>0.45</td>
<td>$(MS_s,MS_e)/3 = 0.14$</td>
<td>83.37</td>
</tr>
<tr>
<td>Rater (R)</td>
<td>0.35</td>
<td>2</td>
<td>0.18</td>
<td>$(MS_s,MS_e)/3 = 0$</td>
<td>0.25</td>
</tr>
<tr>
<td>Residual (E)</td>
<td>48.98</td>
<td>1780</td>
<td>0.03</td>
<td>$MS_e = 0.03$</td>
<td>16.38</td>
</tr>
</tbody>
</table>

$\hat{\sigma} = 0.83$

*Note.* G (coefficient of generalizability) is defined as $\hat{G} = \hat{\sigma}^2/(\hat{\sigma}^2_r + \hat{\sigma}^2_s + \hat{\sigma}^2_e)$
Table G7

*Overall Inter-coder Agreement (Between Coders) for Variables and Categories*

<table>
<thead>
<tr>
<th>Sub-table 1 (Interpersonality)</th>
<th>Coder 1 vs Coder 2 (frequencies)</th>
<th>Coder 2 vs Coder 3 (frequencies)</th>
<th>Coder 1 vs Coder 3 (frequencies)</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTPRL (+)</td>
<td>86-107</td>
<td>107-84</td>
<td>86-84</td>
</tr>
<tr>
<td>INTPRL (-)</td>
<td>158-148</td>
<td>148-154</td>
<td>158-154</td>
</tr>
<tr>
<td>IMPRL (+/-)</td>
<td>106-97</td>
<td>97-109</td>
<td>106-109</td>
</tr>
<tr>
<td>OTHR</td>
<td>7-5</td>
<td>5-10</td>
<td>7-10</td>
</tr>
<tr>
<td>(X^2 (p))</td>
<td>3.34 ((p = .34))</td>
<td>5.24 ((p = .15))</td>
<td>0.90 ((p = .82))</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sub-table 2 (Interaction)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTV</td>
<td>263-274</td>
<td>274-280</td>
<td>263-280</td>
</tr>
<tr>
<td>RCTV</td>
<td>80-74</td>
<td>4-69</td>
<td>80-69</td>
</tr>
<tr>
<td>INTRCTV</td>
<td>14-9</td>
<td>9-8</td>
<td>14-8</td>
</tr>
<tr>
<td>(X^2 (p))</td>
<td>1.54 ((p = .46))</td>
<td>0.76 ((p = .68))</td>
<td>2.98 ((p = .22))</td>
</tr>
</tbody>
</table>

Total \(X^2\) \((Sub-tables 1-2)\)
| 4.88 \((p = .56)\) | 6.00 \((p = .42)\) | 3.61 \((p = .73)\) |

*Note.* For paired columns in sub-table 1, \(df = 3\); for paired columns in sub-table 2, \(df = 2\). For paired columns in sub-tables 1-2, \(df = 6\).
Table H1

Quantitative Indicators of Online Participation: Sentences, Messages, Threads, and Posting Dates.

<table>
<thead>
<tr>
<th>Participation indicators</th>
<th>Forum 1</th>
<th>Forum 9</th>
<th>Forum 14</th>
<th>Total</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentences</td>
<td>357\textsuperscript{a}</td>
<td>792</td>
<td>947</td>
<td>2096</td>
<td>698.67</td>
<td>249.74</td>
</tr>
<tr>
<td></td>
<td>17.03</td>
<td>37.79</td>
<td>45.18</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Messages</td>
<td>29</td>
<td>56</td>
<td>75</td>
<td>160</td>
<td>53.33</td>
<td>18.87</td>
</tr>
<tr>
<td></td>
<td>18.13</td>
<td>35.00</td>
<td>46.88</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First-level threads</td>
<td>14</td>
<td>7</td>
<td>17</td>
<td>38</td>
<td>12.66</td>
<td>4.19</td>
</tr>
<tr>
<td></td>
<td>36.84</td>
<td>18.42</td>
<td>44.73</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valid posting dates</td>
<td>8</td>
<td>12</td>
<td>22</td>
<td>42</td>
<td>14</td>
<td>5.88</td>
</tr>
<tr>
<td></td>
<td>19.04</td>
<td>28.57</td>
<td>52.38</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sentences per message</td>
<td>12.31\textsuperscript{b}</td>
<td>14.14</td>
<td>12.63</td>
<td>--</td>
<td>13.11</td>
<td>0.79</td>
</tr>
<tr>
<td>Sentences per day</td>
<td>44.63</td>
<td>66.00</td>
<td>43.05</td>
<td>--</td>
<td>51.22</td>
<td>10.46</td>
</tr>
<tr>
<td>Messages per day</td>
<td>3.63</td>
<td>4.67</td>
<td>3.41</td>
<td>--</td>
<td>3.90</td>
<td>0.54</td>
</tr>
<tr>
<td>Threads per day</td>
<td>1.8</td>
<td>0.6</td>
<td>0.8</td>
<td>--</td>
<td>1.06</td>
<td>0.52</td>
</tr>
<tr>
<td>Messages per thread</td>
<td>2.07</td>
<td>8.00</td>
<td>4.41</td>
<td>--</td>
<td>4.82</td>
<td>2.43</td>
</tr>
<tr>
<td>Sentences per thread</td>
<td>25.5</td>
<td>113.14</td>
<td>55.70</td>
<td>--</td>
<td>64.79</td>
<td>67.29</td>
</tr>
<tr>
<td>Thread-to-message ratio\textsuperscript{c}</td>
<td>0.48</td>
<td>0.12</td>
<td>0.22</td>
<td>--</td>
<td>0.27</td>
<td>0.15</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Cell values are \textit{absolute numbers} and \textit{percentages}.

\textsuperscript{b} Cell values are \textit{mean per forum}.

\textsuperscript{c} Smith (1999, p. 210).
Table H2

*Mean Levels of Messages and Sentences per Day of the Week for all Forums*

<table>
<thead>
<tr>
<th>Day of the week</th>
<th>Number of messages</th>
<th>Number of sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Sunday</td>
<td>4.67</td>
<td>4.73</td>
</tr>
<tr>
<td>Monday</td>
<td>10.67</td>
<td>8.02</td>
</tr>
<tr>
<td>Tuesday</td>
<td>12.67</td>
<td>17.01</td>
</tr>
<tr>
<td>Wednesday</td>
<td>6.67</td>
<td>5.03</td>
</tr>
<tr>
<td>Thursday</td>
<td>8.33</td>
<td>8.50</td>
</tr>
<tr>
<td>Friday</td>
<td>7.00</td>
<td>3.46</td>
</tr>
<tr>
<td>Saturday</td>
<td>3.33</td>
<td>2.52</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table H3

*Mean Levels of Threads and Sentences per Semester for all Forums*

<table>
<thead>
<tr>
<th>Semesters</th>
<th>Number of threads</th>
<th>Number of sentences</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 1 (forums 1-4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>17</td>
<td>43.25</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>2.94</td>
<td>27.40</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>68</td>
<td>173</td>
<td>2.54</td>
</tr>
<tr>
<td>Semester 2 (forums 6-11)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>8</td>
<td>61.75</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>1.82</td>
<td>9.21</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>32</td>
<td>247</td>
<td>7.71</td>
</tr>
<tr>
<td>Semester 3 (forums 12-14)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>18.33</td>
<td>91.66</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>1.15</td>
<td>16.04</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>55</td>
<td>275</td>
<td>5.00</td>
</tr>
<tr>
<td>All semesters (forums 1-14)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>14.09</td>
<td>63.18</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>5.21</td>
<td>25.59</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>155</td>
<td>695</td>
<td>4.48</td>
</tr>
</tbody>
</table>
Table H4

Quantitative Indicators of Online Participation: Number of Sentences and Number of Messages per Day of the Week per Forum and for all Forums Combined

<table>
<thead>
<tr>
<th>Day</th>
<th>Forum 1</th>
<th>Forum 9</th>
<th>Forum 14</th>
<th>All Forums</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M^a</td>
<td>S^b</td>
<td>S/M^c</td>
<td>M</td>
</tr>
<tr>
<td>Sunday</td>
<td>3</td>
<td>42</td>
<td>14.00</td>
<td>10</td>
</tr>
<tr>
<td>Monday</td>
<td>3</td>
<td>40</td>
<td>13.33</td>
<td>10</td>
</tr>
<tr>
<td>Tuesday</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
<td>32</td>
</tr>
<tr>
<td>Wednesday</td>
<td>6</td>
<td>97</td>
<td>16.17</td>
<td>2</td>
</tr>
<tr>
<td>Thursday</td>
<td>5</td>
<td>48</td>
<td>9.60</td>
<td>2</td>
</tr>
<tr>
<td>Friday</td>
<td>9</td>
<td>92</td>
<td>10.22</td>
<td>3</td>
</tr>
<tr>
<td>Saturday</td>
<td>3</td>
<td>38</td>
<td>12.67</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>357</td>
<td>12.31</td>
<td>56</td>
</tr>
</tbody>
</table>

a. Cell values are absolute number of messages per day of the week.
b. Cell values are absolute number of sentences per message per day of the week.
c. Cell values are mean sentences per message per day of the week.
Table H5

Quantitative Indicators of Online Participation: Number of Threads and Number of Messages per Forum per Semester and for all Forums for all Semesters Combined

<table>
<thead>
<tr>
<th>Source</th>
<th>Sem. 1</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Sem. 2</th>
<th></th>
<th></th>
<th></th>
<th>Sem. 3</th>
<th></th>
<th></th>
<th></th>
<th>All semesters</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F. 1</td>
<td>F. 2</td>
<td>F. 3</td>
<td>F. 4</td>
<td>M</td>
<td>SD</td>
<td>n</td>
<td>F. 1</td>
<td>F. 2</td>
<td>F. 3</td>
<td>F. 4</td>
<td>M</td>
<td>SD</td>
<td>n</td>
<td>M</td>
<td>SD</td>
<td>n</td>
</tr>
<tr>
<td>Number of threads.</td>
<td>14</td>
<td>16</td>
<td>21</td>
<td>17</td>
<td>17</td>
<td>2.94</td>
<td>68</td>
<td>6</td>
<td>10</td>
<td>7</td>
<td>9</td>
<td>8</td>
<td>1.82</td>
<td>32</td>
<td>19</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td>Number of messages</td>
<td>29</td>
<td>22</td>
<td>83</td>
<td>39</td>
<td>43.25</td>
<td>27.40</td>
<td>173</td>
<td>75</td>
<td>61</td>
<td>56</td>
<td>55</td>
<td>61.75</td>
<td>9.21</td>
<td>247</td>
<td>93</td>
<td>107</td>
<td>75</td>
</tr>
<tr>
<td>Mean</td>
<td>2.07</td>
<td>1.37</td>
<td>3.95</td>
<td>2.29</td>
<td>2.54</td>
<td>2.54</td>
<td>12.5</td>
<td>6.1</td>
<td>8</td>
<td>6.11</td>
<td>7.71</td>
<td>7.71</td>
<td>4.89</td>
<td>5.63</td>
<td>1.59</td>
<td>5.00</td>
<td>5.00</td>
</tr>
</tbody>
</table>

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Table H6

*Interaction: Active/Reactive/Interactive Content of Sentences (Proportions of Relationships)*

<table>
<thead>
<tr>
<th>Category</th>
<th>Forum 1a</th>
<th>Forum 9</th>
<th>Forum 14</th>
<th>Total</th>
<th>Mb</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACTV</td>
<td>263</td>
<td>537</td>
<td>580</td>
<td>1380</td>
<td>67.57</td>
</tr>
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<td><strong>Reactive</strong></td>
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*a Cell values are absolute numbers and percentages per forum.

*b Cell values are percentages.*
Table H7

**Interpersonality: Interpersonal/Impersonal/Others Content of Sentences (Proportions of Relationships)**

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a Cell values are *absolute numbers* and *percentages* per forum.
b Cell values are *percentages*.
Table H8

Interaction: Active/Reactive/Interactive Content of Sentences in % Per Forum, % Per Total Number of Sentences, and % Per Specific Category.

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*a Cell values are percentages of sentences per forum.

*b Cell values are percentages of sentences per total of forums.

*c Cell values are percentages of sentences per specific category.
Table H9

**Interpersonality: Interpersonal/Impersonal/Others Content of Sentences in % Per Forum, % Per Total Number of Sentences, and % Per Specific Category.**

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<th>Forum 9 (%(^c))</th>
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<th>Forum 11 (%(^b))</th>
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\(^a\) Cell values are percentages of sentences per forum.

\(^b\) Cell values are percentages of sentences per total of forums.

\(^c\) Cell values are percentages of sentences per specific category.
## Overall Interpersonality and Interaction Content of Sentences in Forum 1

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- **a.** Cell values are absolute number of sentences per forum.
- **b.** Cell values are percentages of sentences per forum.
- **c.** Cell values are percentages of sentences per total of forums.
- **d.** Cell values are percentages of sentences per specific category.

370
### Table H11

**Overall Interpersonality and Interaction Content of Sentences in Forum 9**

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- **a.** Cell values are absolute number of sentences per forum.
- **b.** Cell values are percentages of sentences per forum.
- **c.** Cell values are percentages of sentences per total of forums.
- **d.** Cell values are percentages of sentences per specific category.
### Table H12

**Overall Interpersonality and Interaction Content of Sentences in Forum 14**

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<td>%</td>
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| Inp (-)    |       |       |       |        |      |       |        |
| OPPTN      | 0     | 0.00  | 0.00  | 0.00   | 11   | 1.16  | 0.52  | 2.11   | 0     | 0.00  | 0.00  | 0.00  | 0     | 0.00  | 0.00  | 0.00   | 0     | 0.00  | 0.00  | 0.00  | 0     | 1.16  | 0.52  | 2.11  |
| RSVE       | 0     | 0.00  | 0.00  | 0.00   | 0    | 0.00  | 0.00  | 0.00   | 0     | 0.00  | 0.00  | 0.00  | 0     | 0.00  | 0.00  | 0.00   | 0     | 0.00  | 0.00  | 0.00  | 0     | 0.00  | 0.00  | 0.00  |
| CHMT       | 0     | 0.00  | 0.00  | 0.00   | 1    | 0.11  | 0.05  | 0.19   | 1     | 0.11  | 0.05  | 1.09  | 0     | 0.00  | 0.00  | 0.00   | 0     | 0.00  | 0.00  | 0.00  | 0     | 0.21  | 0.10  | 1.28  |
| SRSM       | 0     | 0.00  | 0.00  | 0.00   | 7    | 0.74  | 0.33  | 1.34   | 0     | 0.00  | 0.00  | 0.00  | 0     | 0.00  | 0.00  | 0.00   | 0     | 0.00  | 0.00  | 0.00  | 0     | 0.74  | 0.33  | 1.34  |
| ADVC       | 300   | 31.68 | 14.31 | 21.74  | 75   | 7.92  | 3.58  | 14.37  | 21    | 2.22  | 1.00  | 22.83 | 0     | 0.00  | 0.00  | 0.00   | 5     | 0.53  | 0.24  | 11.11 | 401   | 42.34 | 19.13 | 70.04 |
| **Sum**    | 300   | 31.68 | 14.31 | 21.74  | 94   | 9.93  | 4.48  | 18.01  | 22    | 2.32  | 1.05  | 23.01 | 0     | 0.00  | 0.00  | 0.00   | 5     | 0.53  | 0.24  | 11.11 | 421   | 44.46 | 20.09 | 74.77 |

| Inp (+/-)  |       |       |       |        |      |       |        |
| INFM       | 183   | 19.32 | 8.73  | 13.26  | 90   | 9.50  | 4.29  | 17.24  | 12    | 1.27  | 0.57  | 13.04 | 0     | 0.00  | 0.00  | 0.00   | 11    | 1.16  | 0.52  | 24.44 | 296   | 31.26 | 14.12 | 67.99 |
| Imp (-)    | 3     | 0.32  | 0.14  | 0.22   | 3    | 0.32  | 0.14  | 0.57   | 0     | 0.00  | 0.00  | 0.00  | 0     | 0.00  | 0.00  | 0.00   | 0     | 0.00  | 0.00  | 0.00  | 0     | 0.63  | 0.29  | 0.79  |
| Imp (+/-)  | 186   | 19.64 | 8.87  | 13.48  | 93   | 9.82  | 4.44  | 17.82  | 12    | 1.27  | 0.57  | 13.04 | 0     | 0.00  | 0.00  | 0.00   | 11    | 1.16  | 0.52  | 24.44 | 302   | 31.89 | 14.41 | 68.78 |

| OTHR       | 10    | 1.06  | 0.48  | 0.72   | 4    | 0.42  | 0.19  | 0.77   | 0     | 0.00  | 0.00  | 0.00  | 0     | 0.00  | 0.00  | 0.00   | 0     | 0.00  | 0.00  | 0.00  | 0     | 1.48  | 0.67  | 1.49  |

| **Total**  | 580   | 61.25 | 27.67 | 42.03  | 264  | 27.88 | 12.60 | 50.57  | 47    | 4.96  | 2.24  | 51.09 | 30    | 3.17  | 1.43  | 52.63  | 26    | 2.75  | 1.24  | 57.78 | 947   | 100.00| 45.18 | 254.10|

a. Cell values are absolute number of sentences per forum.
b. Cell values are percentages of sentences per forum.
c. Cell values are percentages of sentences per specific category.

372
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a. Cell values are absolute number of sentences per forum.
b. Cell values are percentages of sentences per forum.
c. Cell values are percentages of sentences per total of forums.
d. Cell values are percentages of sentences per specific category.
Table H14

Interaction and Interpersonality: Total Number of Sentences and Percentages for Specific Categories per Forum and for all Forums

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Sub-total = 1,352  64.50  609  29.06  101  4.82  2,062  98.38

OTHBR = 28  1.34  5  0.24  1  0.05  34  1.62

Total = 1,380  65.84  614  29.29  102  4.87  2,096  100.00

a. Cell values are absolute numbers.
b. Cell values are percentages.
**Appendix I – Survey Messages Data**

*Frequencies and Percentages in Coding Categories for Message A*

Semester #2    Discussion group #forum 9    Message #7

Total # of sentences in message 13    Message date Feb/09/98 Day Monday

Coder name Beuchot    Participant’s name # (a)    Coding date Aug/12/2000

<table>
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<th>ACTV</th>
<th>EXRTV</th>
<th>IMRTV</th>
<th>EGINTV</th>
<th>INTV</th>
<th>TOTAL # (%)</th>
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<td>3 (23)</td>
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<tr>
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<tr>
<td>HMR</td>
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</tr>
<tr>
<td>INFM</td>
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<td>2 (15.4)</td>
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<tr>
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<td></td>
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<td>5 (38.5)</td>
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**Frequencies and Percentages in Coding Categories for Message B**

Semester #2  Discussion group #forum 9  Message #16

Total # of sentences in message 7 Message date Feb/09/98 Day Monday

Coder name Beuchot Participant’s name # (d) Coding date Aug/12/2000

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<th>EGINTV</th>
<th>INTV</th>
<th>TOTAL # (%)</th>
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<td>7 (100)</td>
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**Frequencies and Percentages in Coding Categories for Message C**

Semester #2  Discussion group #forum 9  Message #55

Total # of sentences in message 9 Message date Feb/10/98 Day Tuesday

Coder name Beuchot Participant’s name (e) Coding date Aug/12/2000

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<th>EXRTV</th>
<th>IMRTV</th>
<th>EGINTV</th>
<th>INTV</th>
<th>TOTAL # (%)</th>
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<td>1 (11.1)</td>
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<td>2 (22.2)</td>
<td>1 (11.1)</td>
<td>2 (22.2)</td>
<td>7 (77.7)</td>
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| OPPTN  |      |      |       |        |      |             |
| RSVE   |      |      |       |        |      |             |
| CHMT   |      |      |       |        |      |             |
| SRSM   |      |      |       |        |      |             |
| ADVC   | 9    | 7    |       |        | 2 (22.2) |             |
| RQST   |      |      |       |        |      |             |
| SUM    | 1 (11.1) | 1 (11.1) |      |        | 2 (22.2) |             |

| OTHER  |      |      |       |        |      |             |
| TOTAL  | 3 (33.3) | 3 (33.3) | 1 (11.1) | 2 (22.2) | 9 (100) |             |
Table I1

*Frequencies and Percentages in Coding Categories for Messages in Survey*

<table>
<thead>
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<th>Categories</th>
<th>Message A</th>
<th>Message B</th>
<th>Message C</th>
</tr>
</thead>
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<tr>
<td>INTPRL (+)</td>
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<td>0 (0)</td>
<td>4 (44.4)</td>
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<tr>
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<td>3 (43)</td>
<td>2 (22.2)</td>
</tr>
<tr>
<td>IMPRL (+)</td>
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<td>4 (57)</td>
<td>3 (33.3)</td>
</tr>
<tr>
<td>IMPRL (-)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>OTHR</td>
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<td>0 (0)</td>
<td>0 (0)</td>
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<tr>
<td>Total # of sentences</td>
<td>13 (100)</td>
<td>7 (100)</td>
<td>9 (100)</td>
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*Note.* Cell values are *absolute numbers* and *percentages.*

Table I2

*Message Ranking by Participants in Online Survey*

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<td>3</td>
<td>1</td>
</tr>
<tr>
<td>c</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>d</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>e</td>
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<td>1</td>
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<td>3</td>
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<td>3</td>
<td>1</td>
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<td>1</td>
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