

# Factors Influencing Interaction in an Online Course

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## Abstract

This study examines the nature of interaction in an online course from both teacher and student perspectives. Major components of a conceptual framework to identify interaction were identified. Data analysis suggested that the structure of the course, class size, feedback, and prior experience with computer-mediated communication all influenced interaction. Results of the study reconceptualize interaction as a theoretical construct and emphasize the importance of socially constructed meanings from the participants' perspectives.

## Introduction

Online education has captured the interest of educators at all levels. Teachers are being asked to adapt their courses for Internet delivery, while students are being promised more flexible learning formats. As a result, both teachers and learners are questioning how they can benefit from education delivered online.

One of the key components of good teaching is the intellectually stimulating exchange of ideas, those meaningful interactions that occur between teachers and students and among students themselves. What do such interactions mean for the students and teacher and what influences interaction in well-designed learning environments?

Using an interpretivist approach, this study was an attempt to gain a better understanding of the complexities of the online environment and the factors influencing interaction. Our approach was based on a symbolic interactionist framework (Blumer 1969) and Erickson's (1986) methodological ideas. The purpose of this study was to examine face-to-face and online interaction in a graduate course and to uncover the factors that influence interaction.

## Conceptual Framework for Studying Interaction

A pilot study (Vrasidas 1999) examined the conceptual framework underlying interaction in an online course. The results of that study led

to the identification of a group of interrelated contextual categories within which major factors operate to influence interaction. These factors do not stand alone. They must be viewed in the overall context of interaction. Changes in one contextual category effect the rest of the framework. The factors that emerged from the pilot study are learner control, social presence, structure, feedback, and dialogue.

The major categories of the framework were fine-tuned by conducting a review of research on interaction in distance education (Baynton 1992; Gunawardena 1995; Hillman, Willis, and Gunawardena 1994; Moore 1989; Parker 1995; Ross 1996; Saba and Shearer 1994). In this conceptual framework, all of the categories are connected via a web of interrelated relationships. Changes in one of the categories influence the other categories, and therefore, the broader context of interaction.

Learning, knowledge, and human activity can be situated within specific contexts (Brown, Collins, and Duguid 1989; Suchman 1987). In order to examine a complex construct such as interaction, researchers benefit from carefully examining the context within which interaction is taking place. Interaction in an online course may consist of institutional and departmental policies, technologies employed, teacher philosophy, course content, and the context in which the instruction takes place. The central bin of this conceptual framework is interaction. Interaction is one of the most important components of any learning experience (Dewey 1938; Vygotsky 1978), and it has been identified as one of the major constructs in distance education research (McIsaac and Gunawardena 1996; Moore 1989; Wagner 1994). Moore (1989) made the distinction between three types of interaction: learner-content, learner-teacher, and learner-learner. Hillman, Willis, and Gunawardena (1994) argued that past discussions of interaction failed to acknowledge the fact that for any of the three types of interaction to take place, the learner has to interact with the medium. Consequently, they proposed a learner-interface interaction.

Several studies have examined interaction as it relates to technology. Comeaux (1995) found that in an interactive television course awareness of technology, such as microphones and cameras, hampered interaction. Ross (1996) found that during interaction learners who do not have the skills to communicate using computers are more aware of technology than of the content of communication. Tsui and Ki (1996) found that frequency of interaction increased over time as participants became more comfortable using technology. Levin, Kim, and Riel (1990) argued that successful network communities must meet at least four of the following five criteria. First, members of the group are people that cannot meet

face-to-face because of place and time constraints; consequently, they work online on a shared task. Second, the task on which the group works is clearly defined. Third, there is easy access to technology, and participants have the skills to use it effectively. Fourth, there is a common sense of responsibility towards the assigned task and the group process. Fifth, there is good leadership, coordination, and evaluation of the completed activities.

The framework within which interaction occurs consists of many factors. Those factors that directly influence interaction within the contextual categories of the framework in our pilot study were identified as: learner control, transactional distance (composed of structure and dialogue), feedback, and social presence. Learner control is central to the notion of interaction. Garrison and Baynton (1987) argued that the concept of control consists of three major components: independence, power, and support. Therefore, control should be examined as the balancing result among these three factors. Independence is defined as the degree to which the learner is free to make choices. Power refers to the abilities and competencies of the learner to engage in a learning experience. Support indicates the resources available that will enable the learner to successfully participate in the distance education course.

Structure and dialogue are components of an online transaction that can reduce the distance between students and teachers. Moore (1973) postulated that transactional distance is the psychological and communication gap that results from the geographical separation between the learners and the teacher. Structure refers to the overall design of the course. Dialogue can be described as the learner-teacher interaction in a distance course. Saba and Shearer (1994) conducted a study to empirically verify the concepts of transactional distance, dialogue, and structure. The authors constructed a model based on mathematical formulas that would predict the amount of transactional distance, depending on a set of variables. The variables used in this formula were learner control, teacher control, dialogue, and structure. The results indicated that transactional distance depends on the rate of dialogue and structure. When dialogue increases and structure decreases, then transactional distance decreases. When structure increases, transactional distance increases and dialogue decreases.

The third factor of the interaction framework is feedback. Feedback is associated with types of responses that provide information to students about the correctness of their assignments, homework, and class contributions (Mory 1996). In face-to-face situations nonverbal gestures are

exchanged constantly, providing both the teacher and learners with feedback. However, (depending on the technology used) students at a distance usually cannot see nonverbal cues and must rely on verbal feedback. In distance education, feedback is more important than just as a mechanism for informing students of how well they did on an assignment. Stevenson, Sander, and Naylor (1996) found that timely and encouraging feedback on their assignments directly affected students' general sense of satisfaction with the course.

The last factor in the framework is social presence, which can be defined as the degree to which a medium allows the user to feel socially present in a mediated situation (Short, Williams, and Christie 1976). Gunawardena (1995) found that social presence could be promoted in a computer-mediated communication (CMC) setting by employing strategies that encourage interaction.

Taking into account the major factors mentioned above, there is a need to examine the nature of interaction in an online classroom.

## Methodology

*Theoretical Basis.* This study followed Erickson's (1986) methods of interpretive research, which are based on the three premises of symbolic interactionism posed by Blumer (1969). First, human beings act upon the world on the basis of the meanings that the world has for them. Second, the meaning of the world is socially constructed through one's interactions with members of the community. And third, the meaning of the world is processed again through interpretation. The traditional approach to research tends to ignore the importance of meaning and interpretation of the actors in shaping behavior. Interpretive research focuses on the perspectives of the actors involved and attempts to understand the multiple layers of meaning represented by human action.

For this study we define interaction as the *process consisting of the reciprocal actions of two or more actors within a given context*. Therefore, the learner-content and learner-interface interactions were not examined. The minimum interactional sequence consists of at least two reciprocal actions. Interaction always takes place in response to others' actions or in relation to others. Actors constantly fit their actions to those of their peers. How others act with regard to the world influences the meanings of the world for the individual.

*Setting.* The unit of study was a graduate online course in the use of telecommunications for instruction at a major southwestern university. There were eight students and one professor. After seven weeks, one of the students dropped the course.

The class was supported with the computer conferencing software FirstClass® and a Web site that contained information about the class assignments, schedule, and resources. For the first five weeks, the class met face-to-face in a computer lab. Afterward, the class met two weeks online, one week face-to-face, one online, one face-to-face, four online, and two face-to-face.

Students were graded on five areas: assignments, discussions, midterm, final research paper, and presentation of the paper. There were eight scheduled discussions during the course, each of which was moderated by a pair of students. Four discussions took place face-to-face and four online. The moderators of the discussions posted questions online and students were asked to respond at least once. After the asynchronous discussion, members of the class discussed the topic in a synchronous chat.

*Data Collection and Analysis.* The authors observed the scheduled face-to-face meetings in person. All observations were tape-recorded and transcribed. During the last three weeks of the semester, semi-structured interviews were conducted with the teacher and all the students. The main purpose of the interviews was to obtain the participants' points of view on interaction. In addition, student work and all the messages from the teacher's mailbox were collected, providing information on how often each student interacted with the teacher and how often the teacher sent messages to the students. The total number of emoticons used by each participant during the online chats were also tallied. Furthermore, the authors kept detailed memos throughout the research process to document notes and reflections on the setting.

During data analysis the authors followed the inductive and deductive stages as proposed by Erickson (1986). Assertions were generated during the inductive stage of data analysis. Assertions are propositional statements that indicate relationships and generalizations in the data (Erickson 1986). First, all the data was collected and organized. Then, the data was read three times to gain an overall understanding of what was happening in the course. Upon reading through the data, questions came to mind, which were recorded in notes and memos containing those issues and events that emerged as important. From these, assertions were generated.

Once assertions were generated from the data as a whole, the analysis entered the deductive stage. This stage involved a detailed examination of the data and the identification of evidence that supported or disconfirmed the initial assertions. These instances were carefully examined to determine whether to keep each assertion, refine it, or drop it. Assertions were warranted using a variety of methods, including interviews, observations, and collection of online messages. The goal was not to identify the convergence of data during triangulation, but rather to identify a variety of sources that would back up the claims. Some explanations and interpretations of events were stronger than others because there was more evidence to support them.

*Standards of Rigor.* For Erickson (1986), the fundamental validity criterion for interpretive research is defined by the attention paid to "the immediate and local meanings of actions, as defined from the actor's point of view" (119). After closely examining the particulars, researchers reach concrete universals and then begin to make claims about their meanings, in this case, interaction in online courses. Generalization begins with the case at hand. This study attempted to find instances that illustrated recurring themes in the setting examined. This allows the reader to compare these findings with other studies and to judge whether the results found here generalize to other similar settings.

The validity of the account depends on the comprehensiveness of the study and the description of the procedures followed. The use of a variety of sources for data collection is more likely to increase the plausibility of the account. This study should be judged for coherence and not for correspondence of the findings with the "objective" world. The Erickson approach suggests that accounts are valid to the degree that they are plausible. By presenting a detailed, comprehensive, and coherent account the reader can act as a co-analyst of the study and make judgments about the strength of the assertions presented.

## Results and Analysis

Data analysis showed that the four major factors influencing interaction in this course were structure, class size, feedback provided to the students, and participants' prior experience with CMC.

*Structure.* Careful examination of the data indicated that structure influenced interaction. Some elements of structure, such as required activities, led to more interactions, while other aspects of structure led to

fewer interactions. Interactions such as discussing the final paper outline with the teacher, collaborating on peer editing of students' papers, and participating in online discussions were required and were included in the grade. Consequently, these aspects of the course structure increased interaction among participants. Three students indicated that their desire to achieve good grades was an important factor that led to frequent participation and interaction in the course.

The evidence that structure influenced interaction is also indicated by the lack of interaction in certain aspects of the course. An example of this is the lack of interaction in the asynchronous discussions. Table 1 shows how many participants contributed to the asynchronous discussions and the total number of messages posted every week. For example, during the fourth week of the semester only three students other than the moderators participated in the discussion.

**Table 1. Messages Posted by Participants in Each Asynchronous Discussion**

Week	Students participate	Student messages	Moderator messages	Teacher messages	Total messages
4	3	4	2	-	6
5	2	2	2	1	5
6	3	3	2	1	6
7	4	4	3	-	7
8	5	5	2	-	7
10	4	6	1	-	7
11	4	4	1	1	6
12	2	2	1	-	3

From the students' perspective, participation in the asynchronous discussions was "busy work." Students felt that there was no need to participate in a discussion that dealt with a topic on which they had already written a paper and would again discuss face-to-face or in an online chat. During her interview, one of the students explained the lack of participation in the asynchronous discussions:

First of all, you are having us read all this material (uses hands to enumerate things). And then, we have to write a reaction paper on it. And then, we have to answer somebody else's questions. So . . . "What's the point of doing this, just to show that we can upload an answer to a question?" So, it was kind of frustrating.

Expression of disappointment and frustration with the workload was a typical response pattern. Six students attributed the lack of participation in the asynchronous discussions to the courses' heavy workload. Students were required to write a one-thousand word essay for each topic and contribute at least one message in the asynchronous weekly discussions. In addition, students had to collaborate with a peer to moderate one face-to-face and one online discussion. They were also required to complete a midterm examination, write an annotated bibliography, submit a research paper outline, peer-edit one of their classmates' final papers, write a ten-page research paper, and give a presentation of the paper on the last day of class.

The teacher admitted that the workload might have been one of the reasons that students did not engage in the asynchronous discussions. In his own words: ". . . I think that it was a lot of work. It seemed to overwhelm some of them and it ended up turning out to be, I think, something like busy work rather than thoughtful experiences for them." There was only one student who did not complain about the amount of work. She had prior experience with CMC and online courses and was very interested in the course topic. Overall, however, the data suggested that the demanding amount of coursework led to fewer interactions in the asynchronous discussions.

Another possible explanation for the lack of interaction in the asynchronous discussions is the fact that the course was based on a combination of face-to-face and online meetings. Students viewed the online meetings as a break instead of as an opportunity to engage in online discussion. Meeting interchangeably between face-to-face and online platforms seemed to influence the online discussions. It may be that the students' needs for socializing, learning, and discussing were met during the face-to-face meetings. Consequently, participants did not feel the need to engage in the asynchronous online component of the course. As one student admitted during the interview, "the online discussions seemed less important than the face-to-face meetings." Another student indicated that if the course had been completely online, there would have been much more online interaction because "there would be no other option."

*Class Size.* The small class size also influenced interaction. Of the seven students that remained registered in the course, two of these took on the role of moderator, leaving five students to participate in the discussion. One of the students never participated in the asynchronous discussions because, according to her, the only reason she was enrolled

in the class was to acquire the three credits she needed for graduation. Participants felt that four students were not enough to engage in a productive asynchronous discussion. One of the students explained it in the following way: "Let's say you have five people, and two are not in the mood; then you have only three left. That's all, nothing else. If you have fifteen, if three are not in the mood, you still have twelve." The teacher agreed that class size might have been a reason for the lack of interaction in the asynchronous discussions. During the interview he commented on the lack of participation, saying that, "It may have something to do with the size of the class in general . . . The community was never built because it was too small; a bunch of people doing their own thing."

When asked to comment on the class-size issue, two students disagreed and felt that it was not the class size, but rather the workload. One of them commented:

I don't think that was it [a little reluctantly]. I think that we were tabbed. I mean . . . we only had that much time for the class, and because we were doing the paper every week, we were concentrating on that.

However, by examining the data carefully, it became apparent that had there been more students enrolled in the course there would have been more interactions during the asynchronous online discussions. The issue of critical mass for such conferences is something that needs to be examined in further research.

*Feedback.* Another issue that influenced interaction was feedback. Several indicators suggested that students did not receive adequate feedback either from the teacher or their peers in the online portion of the course. A typical comment from a student regarding feedback on class assignments follows:

I think I would've liked more feedback on each individual paper . . . . Each week . . . I really spent a lot of time on that . . . so, it would've been nice to get more individualized feedback on that.

Another student mentioned that, "We wrote quite a few essays, but we didn't get much response on those." By the sixth week of class, during the second online chat, students had not received feedback on any of their assignments. The teacher admitted that due to time constraints he did not provide much feedback in the online portion of the course.

Students also felt that their peers were not providing them with enough input and feedback in the discussions. One student stated: "I would've liked more asynchronous conversation amongst my peers about the topic. Feedback from them, bringing in their expertise." The moderators rarely commented on their peers' contributions in the asynchronous discussions. In addition, it was rare that participants in the discussions commented on another participant's contribution. Students felt that responses to the moderators' questions were just postings that met the requirement.

*Prior Experience.* Experience with CMC was the final factor influencing participation in the online discussions. Students who were new to CMC were not comfortable participating in the online synchronous chats. They felt more comfortable with the asynchronous communication because there they could take time to think and reflect on their ideas. One of the novice students stated that the online chats were "nerve-racking" and it was hard for her to keep up. She was reluctant to post messages. Students who had more than eight years of CMC experience enjoyed participating in chats and asynchronous online discussions. One such student argued that practice is crucial for succeeding in online courses. The importance of prior experience with computers, proficiency in using the conferencing system, participating in chats, and moderating online discussions, were all issues that emerged from the data.

In addition, participants who were experienced in the medium used emoticons more frequently. When a student communicates online, there is no body language or voice intonation that indicates humor or sarcasm. Experienced users used emoticons to compensate for the lack of those contextual cues. For example, a smiley face, " : )", might indicate a student who was joking or being sarcastic. Continuous dots ". . ." were used to indicate an interruption in speech and signal that something else would follow. The letter "k" was used as an abbreviation for "okay," and "lol" as an abbreviation for "laughing-out-loud."

In this course, four students and the teacher were experienced users who frequently used emoticons in their online interactions. Three students never used emoticons during their interactions in the synchronous chats. Non-experienced users felt overwhelmed and ignorant for not knowing what emoticons meant and how to use them appropriately in their interactions.

Another indication that the more experienced students benefited from previous CMC experience was in the number of asynchronous messages exchanged between each student and the teacher. One more experienced

student sent a total of eleven messages to the teacher and received seven. In her interview she stated that she also engaged in four private chats with the teacher in which they discussed course issues and her final project. A less experienced student sent only five messages to the teacher and received four throughout the semester. She never engaged in a private chat with the teacher or with any of her peers.

### Discussion and Implications for Practice

The suggestions included in this section are neither prescriptions nor a practice manual. The findings of this study do not attempt to dictate how online courses should be structured, nor do they attempt to explain everything that might have influenced interaction in the course. Rather, they are suggestions based on detailed observation and analysis of this particular course. Researchers and practitioners should judge whether the findings relate and are applicable to their cases.

Careful examination of the data and the interactions identified in the study indicated that structure influenced interaction. Elements of structure such as required activities led to more interactions and increased dialogue among the participants. This finding contradicts the hypothesis that increasing structure decreases dialogue and increases transactional distance (Moore 1991; Saba and Shearer, 1994). Several of the interactions identified in this course were a class requirement and part of structure. For example, the participation and moderation of discussions was required and included in the grade. Requiring students to engage in discussions and collaborate on projects increased interaction in the course. Therefore, increased structure led to more dialogue and interaction. Perhaps the development of more seamless conferencing systems in the last six years has eliminated some of the earlier restrictions that technology placed on the delicate structure-dialogue balance. Current conferencing systems allow synchronous chats and asynchronous threaded discussions that were not common previously. This issue is an important one and should be investigated further.

Moore's (1973) original definition of transactional distance was based on the idea that dialogue and transactional distance were primarily influenced by the teacher-learner interaction. New media such as computer conferencing now allow for increased collaboration and learner-learner interaction, which may influence transactional distance in the online classroom. Saba and Shearer (1994) worked to empirically verify transactional distance by following a systems model that did not take into

consideration the reciprocal nature of interaction and the importance of context. Cookson and Chang (1995) also suggested that Saba and Shearer's analysis of interaction was incomplete because they focused more on the teacher and ignored learner-learner and group interactions.

The present study suggests that educators can structure for dialogue and interaction and that learner-learner interaction is an important component of dialogue. Other aspects of structure such as workload and the schedule of face-to-face and online meetings led to fewer interactions. The fact that students met interchangeably between face-to-face and online platforms influenced their degree of interaction. Perhaps students met their need for socializing, learning, and discussing during the face-to-face meetings and the synchronous chats. Consequently, participants may not have felt the need to engage in the asynchronous online component of the course. This corroborates Levin, Kim, and Riel's (1990) finding that successful network communities consist of participants who cannot meet face-to-face because of place and time constraints. When students cannot meet face-to-face, they are more likely to participate in the online portion of the course since that is their only option.

Prior experience with CMC also influenced interaction. Participants with limited prior experience used CMC less frequently and felt intimidated when others used emoticons during their interactions. These findings are in agreement with several other studies (Anderson and Lee, 1995; Comeaux 1995; Ritchie 1993). Training students early in the course to use emoticons, to use the conferencing system, and to employ appropriate etiquette should be mandatory in all online courses. A simple survey or a needs assessment at the beginning of the course can help determine which students need training. The teacher can provide remedial work to those students and help them successfully use the conferencing software. Another suggestion is to assign students pairs with a mixed range of skills. For example, pairing an experienced CMC user with one less experienced can ensure that students with limited skills receive help from their partners.

The other issue that seemed to influence interaction in the course is feedback. Students felt that the lack of immediate feedback in the online portion of the course was discouraging and contributed to their limited participation in the online discussions. When students do not receive feedback, they do not continue to post messages. Unless students receive immediate feedback, they feel they are posting to the network without any response. The teacher should provide timely feedback to students'

contributions in all aspects of the course. Furthermore, the teacher should emphasize the necessity for moderators to provide feedback and encourage their peers' participation.

## Conclusion

The findings of the study indicated that the structure of the course, class size, feedback, and prior experience with CMC all influenced interaction. This study presents the perspectives of the students and teacher of one class regarding what it is like to participate in an online course. An interesting aspect of online interaction is that it is solely constructed through language. Further analysis of the data transcripts, following a discourse analysis approach, could shed light on how the ideas of power and control operate in online and face-to-face encounters. It would be useful to explore what discourse says about power and to examine how interaction shapes power in an online environment. In addition, there is a need to further examine the other categories of the conceptual framework developed here to determine ways in which these factors may influence each other and the overall construct of interaction. This study has only scratched the surface of the complex construct we call interaction. Further detailed exploration of factors within multiple contexts may allow researchers to revisit concepts we take for granted and gain an understanding of the meanings of interaction found in the everyday life of online environments.

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# Perceptions and Effects of Image Transmissions during Internet-Based Training

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## Abstract

This article reports on a study that examined the influence of a student's visual access to the instructor during Internet-based audiographics training. A four-day factual course on information operations was taught through lecture and slides over the Internet to  $n = 110$  students situated at seven remote sites. The availability of instructor video was manipulated. For two instructional modules, the transmission of the instructor video was disabled for half of the students while the other half could view the instructor; this procedure was reversed for two other modules. The results showed that increasing the video capability of an Internet-based course does not necessarily improve the learning of factual information.

## Introduction

According to the International Data Corporation (1999), the market for training over the Internet or intranets is expected to grow to over \$5 billion by 2003. Internet tools available in the training marketplace include Internet relay chat, application sharing, computer telephony, and multi-user simulation environments. More recently, the development of video streaming via the Internet, which can display the image of an instructor to a student on a time-buffered basis, has sparked interest in offering low-cost video teletraining over the desktop, further tempting developers to imitate the traditional classroom. A prominent question for Internet learning environments, then, is what training value does a video image of the instructor offer? A secondary question is, what effects do lags in the transmission of static instructional images over the Internet, such as graphics, have on student learning?

The purpose of the present research is to explore these issues empirically. This study examines the effect of manipulating (on vs. off) the video image of an instructor on students' perceptions of both their ability to learn and the instructor's effectiveness. These perceptions were then compared to multi-source evaluation data that included an objective final