

Examining Interaction Patterns in Online Discussion through Multiple Lenses

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This qualitative study investigated different interaction patterns in an online discussion. The data was collected from asynchronous discussion occurred in a graduate course. The data analysis methods include inductive analysis and mapping strategy. The results of the study suggest three layers of interaction: response sequences, interaction amongst participants, and concept map of messages. The visualization of response sequences enabled the researcher to discover complex and dynamic interaction patterns amongst participants. The many-to-many communication feature of online discussion does not always enable direct one-on-one interaction between two participants. Rather, one message contributed to multiple threads in the stream of conversation. In terms of interaction amongst participants, the interaction amongst participants, as indicated in the data, the messages also bind each participant and consequently a group(s) of participants together. It appears that the contribution of one message may not only enable a response to one participant, but also connect many participants to each other. The concept map of messages proposes that response sequences and interaction amongst participants can also be viewed between concepts within messages in the discussion. On the surface, the messages posted by individuals are linked by the system in a linear fashion as they are posted. However, the interaction extends to collaborative conversation amongst participants. Ultimately, a conceptual network of interrelated ideas including multiple perspectives is built in asynchronous discussion.

Keywords: online discussion, interaction patterns, discourse analysis

Introduction

Research on online collaborative learning has focused on how interaction occurs in a social process. For example, a variety of interaction types are well elaborated in the literature (Anderson, 2003; Harasim, 2012; Hill, Wiley, Nelson, & Han, 2004; Moore, 2012), but most descriptions of the interactions exist in describing relationships (e.g., learner-learner, learner-instructor, learner-content, instructor-content, learner-interface) in various technology-mediated contexts. These descriptions enable us to better understand where interaction exists and what interaction occurs. However, there is little exploration in terms of how the interaction is situated in a variety of contexts (e. g., how learner-learner interaction is reflected in online discussion boards).

Much of the research to date has focused on human interactions, especially learner–learner interactions. Specifically, researchers have investigated the different levels of interaction amongst learner (i.e., the degree of quality and quantity of interaction) (e.g., De Wever, Schellens, Valcke, & Van Keer, 2006; Poldner, Simons, Wijngaards, & van der Schaaf, 2012; Strijbos&Stahl, 2007). The detailed descriptions of the levels of interaction have provided a descriptive analysis scheme that might assist with explicating the social process in online discussion. This does not mean the research to date successfully explored interaction as a social process. Researchers have analyzed how an individual’s message is conveyed in web-based learning; however, the research often ended with quantification of the results, such as how many messages of each level of interaction are generated (e.g., Donnelly, & Gardner, 2011; Järvelä & Häkkinen, 2002; Strijbos & Stahl, 2007). In studies to date, a set of pre-established “codes” was typically applied to the data set. This process is not sufficient to explain the social processes involved in the discussion. Further research is needed to explore how individual representation of meaning supports the group process and how each level of interaction is related to another.

One of the greatest benefits of employing social network analysis is the

visualization of the interaction. Results of studies can be depicted with different nodes (representing participants) and links (representing different patterns of relationship among participants), including the size, density, and centralization of the interactions. While social network analysis provides an opportunity to examine complex and dynamic interactions in a group context, this method does not fully support the investigation of how the social process of learning occurs in different webs of interaction. Without careful consideration of the unique attributes created by time (asynchronicity), the technology system, and students' behavior, the visualization of the interaction may not enable researchers to examine the actual relationships within the interaction. This needs to be explored in this study.

Studies using a social network analysis of WBL usually take computer logs as an input and examine how the network is centralized and/or the density of the network. Analyzing the relationship of interaction does not enable us to examine what has been said, and what has been done by saying. For example, in an asynchronous discussion, one participant may reply to multiple participants and multiple messages at the same time. Without a detailed examination of students' behavior and the content of the individual message, we cannot fully describe how or what interaction occurred.

A variety of strategies for online discourse analysis have used in different context. Other researchers have also used different strategies to demonstrate response sequence or relationships amongst participants (e.g., Fahy et. al, 2001; Hara, 2002; Jeong, 2005). While other researcher's efforts have their own value and contribute to our understanding of interaction amongst participants, what we need to focus on more in the data analysis is how interaction can be represented in a complex social context, such as the collaborative learning process.

The nature of interaction is complex in any circumstance. In online contexts, the complexity is even more pronounced. The purpose of this study was to investigate how student collaborative learning was reflected in asynchronous discussion in terms of response sequence, interaction amongst participants, and concept map.

The primary research question guiding the study was “what are the patterns of interaction in online discourse?”

Literature Review

From situative perspective, learning is situated in a specific social context (Brown, Collins, & Duguid, 1989; Henning, 2004; Wenger, 1998), and cognition is distributed across individuals, tools, and artifacts (Salomon, 1993; Pea 1993, 2004). In an online learning context, knowledge is socially constructed in primarily written formats and learning is enabled via various means of communication. Knowledge and learning occur in a gradual convergence through interactive communication and facilitated collaboration.

Further, there is no separation of knowing from that which is known; rather, there is an assumption that practice, meaning, and identity constitute and are constructed within context, suggesting dialectic relations among practice, meaning, and context (Barab & Duffy, 2012; Barab & Kirshner, 2001; Kirshner & Whitson, 1997). The online discourse generated by asynchronous discussion cannot be separated from the technology (i.e., online course management systems) or the social context (i.e., class). The discourse is partially controlled by technological affordances, the learner(s), and the context. The interactions are dynamic, such that the writing of one person can only be described and understood in relation to the response of the other persons, and in relation to the situational and temporal circumstances in a community of learners (Barab & Duffy, 2012; Salomon 1993, 1998).

One of the greatest potentials for technology-mediated communication is its ability to provide an infrastructure to enable group and collaborative learning (Chee-kit, 2002; Han & Hill, 2007, Harasim, 2012). Computer conferencing typically involves interaction amongst a group of participants. A user can log on

and read the contributions (i.e., messages) of other members of the group, respond to the message(s) posted or create a message for a new thread. Most current conferencing tools allow the inclusion of other media like pictures and links to web pages or other information in a message. The systems also include additional features like the ability to organize the messages by author, topic theme, keywords, or chronological order.

A threaded discussion is a simple form of hierarchically structured written-text provided by computer conferencing systems. A threaded discussion usually shows the list of all the messages with subject headings, enabling a structuring of messages by topic. A common use of the threaded discussions in learning contexts involves a participant (i.e., instructor, student) specifying a topic for discussion in advance and others posting their response messages containing opinions, comments, or questions about the topic. The individual messages are thus organized by topics that emerge in the discussion.

One aspect of online learning that seems quite different from face-to-face learning involves class discussion. Online class discussion does not evolve sequentially through time, as classroom discussion does, but rather grows over time from multiple conceptual perspectives in many dimensions all at once (Condon & Čech, 1996; Davis & Brewer, 1997). The nature of the interactions assists in enabling the evolution of the discussion; however, the affordance of the technology also plays a role. According to Pea (1993), “affordance refers to the perceived and actual properties of a thing, primarily those functional properties that determine just how the thing could possibly be used” (p. 51). Thus for example, in asynchronous discussion boards, the computer and Internet technology enables communication via the generation of discussion messages amongst participants.

In order to examine a complex construct such as interaction, researchers benefit from carefully examining the context within which the interaction is taking place. An interesting aspect of asynchronous online learning is that interaction is mainly constructed in written form. It has been suggested that asynchronous online

discourse is a new kind of language showing hybrid features of both spoken and written language (Davis & Brewer, 1997; Mann & Stewart, 2000; Yates, 1996). Language in online discourse is typed and therefore like writing and contains exchanges, which are 'often rapid and informal' and therefore like talk. Thus, "it reads like and to a certain extent acts like conversation" (Davis & Brewer, 1997, p. 2).

Language in asynchronous online discourse also differs from face-to-face communication in turn taking (Davis & Brewer, 1997; Garcia & Jacobs, 1999; Hutchby, 2001). Responses to messages may be delayed because of the asynchronous nature of the conversation. Time between the postings of messages among participants may range from several seconds to several days or longer depending on the length of time that the discussion forum or thread is available to its participants.

The technological affordances of the system used can influence the patterns of interaction. Turn-taking systems are used to organize social activities, such as interaction, in a specific context; it is beneficial to examine how the turns are distributed in a group context to understand the structure and patterns of interaction (Sacks, Schegloff, & Jefferson, 1974). In face-to face conversations, when a person asks a question, s/he expects an answer or no answer given as a response. Depending on the speakers, the size and quality of the turns are changed and varied; however, the conversation typically moves in a linear path from beginning to end in terms of time.

The turn-taking system in asynchronous discussion does not consist of the rules and procedures participants commonly use to exchange turns in face-to-face discussion. Similar to turn taking in face-to-face conversation, turns in asynchronous discussion are either guided by the previous speaker or self-selected by next speakers (Sacks et al., 1974). However, in an asynchronous online discussion, compared to face-to-face conversation where one party talks at a time (Sacks et al., 1974), one message (i.e., response) can be used in more than one

thread of a conversation. That is, one message may contribute to multiple conversations in various ways. While this can enable rich discussion, it can also contribute to confusion when one follows multi-faceted conversation.

While the turn-taking system in face-to-face interaction provides a consistent basis for speaker-change and its recurrence (Sacks et al., 1974), in asynchronous modes, the computer system makes its recurrence partially automatic. That is, options of allocation of turns are not provided by common rules of conversation; the turn-taking occurs as a result of pressing the reply button to the previous messages. Because of this, asynchronous discourse is often considered two-directional texts incorporating the activities of creating (writing) and posting (sending and receiving) the messages (Davis & Brewer, 1997). Without contextual and facial clues, in asynchronous discussion, a participant may not be able to control the exact placement of her message in the threaded discussion, as others may complete and post theirs first. Thus this text-based context may result in a different communication environment than is found in face-to-face conversation.

Most studies exploring interaction report the interaction in terms of density; that is, by the number of messages sent by participants (e.g., Beck, Fitzgerald, & Pauksztat, 2003). However, quantification of the rate of response may not provide sufficient insight in the interaction process, including the contextual factors that affect interaction (Strijbos, Kirschner, & Martens, 2004). Therefore, to understand how one message appears to be a strong contributor to, or more influential in, continuing the discussion, we should examine indications of unique linguistic behavior of participants within the system.

Methodology

The Context

The focus of this study was to explore the nature of group discourse in

asynchronous online discussion. The study was a case study, a process of inquiry about the case, including the logic of research design, data generation methods, and specific data analysis strategies, as well as the product of that inquiry (Yin, 2013). This study proposed that a social process of online learning is entwined with the context and the technology with which participants collaborate and interact, making case study an appropriate research design.

This qualitative case study was conducted in a Master's level course. The implementation of the course took place in a university during a short session in the summer (four weeks). The participants consisted of the university instructor (n=1), doctoral students as facilitators (n=2), and K-12 teachers as students (n=23). At the time of the study, most students (n=21) had experience (i.e., one or more courses) learning in an online environment. The participants were dominantly female (n=22). There were six different project groups (n=3-4), with two projects groups paired as a discussion group. Consequently, there were three different discussion groups (n = 6-8 participants) using the discussion boards throughout the implementation of the course. Each group was assigned in a specific discussion forum for their group with two discussion topics per week. A single discussion topic contained multiple discussion threads.

The goal of the course was to provide an introduction to the instructional design process within a hands-on setting. The course offered sixteen class meetings within a blended technology enhanced learning environment. Students were expected to complete individual activities, with a culminating group project.

During the course, participants experienced a variety of instructional methods, such as face-to-face workshops, synchronous online chat, and asynchronous discussion. Face-to-face workshops provided logistical support, a preview of course content, and opportunities to work on group tasks within a classroom and computer lab. Synchronous online chat sessions offered opportunities to ask questions and discuss the course content. Asynchronous discussions forums allowed participants to discuss multiple topics throughout the course between face-

to-face workshops. The asynchronous discussion board enabled a variety of interactions to assist students' learning in several ways.

Data Collection

The primary data used for this study were the transcripts from the discourse captured from the asynchronous discussion board. There were 150 discussion topics, with a total of 621 messages generated across all participants during the implementation of the course. The content of the messages ranged from course topics to technological support (e.g., how do I make the link in Web page?), to more socially focused messages (i.e., sharing stress tips). The transcripts of the discussions board were collected as a compiled text file at the end of the course for analysis.

The online learning tool controlled the structure of the threaded discussion. A generic feature of most discussion tools is that the discussion is displayed as a hierarchical and linear process. By providing threading capabilities, conference discussions remain relatively structured and coherent, and users can easily track the evolution of group discussions around specific topics. One discussion group (n=8) was selected for in depth analysis of patterns and the nature of the learning process. This discussion group had a rich set of discussion in terms of number of messages posted in the forum. During the implementation of the course, the group generated 170 messages directly related to the course content, an average of 21 per participant. The total number of messages was 16 % more than the next closest group who generated 105 messages.

Data Analysis Procedure

Data analysis incorporated the 170 messages generated by the discussion group, including five discussion topics (i.e., needs assessment and learner analysis;

objectives and assessment; strategies, activities and materials; implementation and evaluation; and instructional consultation) with 17 threads in the discussion topics. Detailed analysis was implemented in individual messages, yet fundamental unit of analysis was a thread of the discussion. Individual messages were analyzed within the context of the thread, and the threads were cross-examined during the analysis. Despite the researcher analyzed all 170 messages; this paper presents one typical thread (i.e., a thread from objectives and assessment) as an example of analysis process and data representation for lack of space. The researcher analyzed what has been discussed in a specific thread of which topic was 'objective and assessment.'

To examine the different patterns of interaction, a "mapping strategy" was employed and patterns in the messages were identified (see Han, 2002; Han & Hill, 2004). The mapping strategy enabled the researcher to visualize the relationship between the messages and participants. First, the researcher analyzed to whom the specific message has sent based on addressivity and relationship between messages, if not specifically designated. The nodes in the maps are the individual messages in the thread while the links show relationships between the nodes. This informs the researchers how messages interrelated instead of simply relying on linear presentations of messages by technological affordances. Then in depth inductive analysis was implemented including meaning condensation and then meaning categorization (Coffey & Akins, 1996; Kvale, 1997). From the initial question, the researcher created the concept map representing how each category (i.e. keywords) is interrelated. The strategy enabled the researcher to draw nodes representing individual participants and then to create a different way of depicting the links and interaction between the messages (vs. the linear order generated by the system). This method supported the researcher to better understand the interdependence of each message and therefore the network between participants' messages.

Findings

Multiple lenses to view interaction were demonstrated in the data. Each view

contributes to the richness of the interaction that can occur in an online discussion. The first lens illustrates the response sequences. The second lens illustrates the interaction that occurred amongst the participants. The third lens enabled the researcher to depict the concept map of messages.

Figure 1 presents a general depiction of the interaction patterns displayed by the computer system.

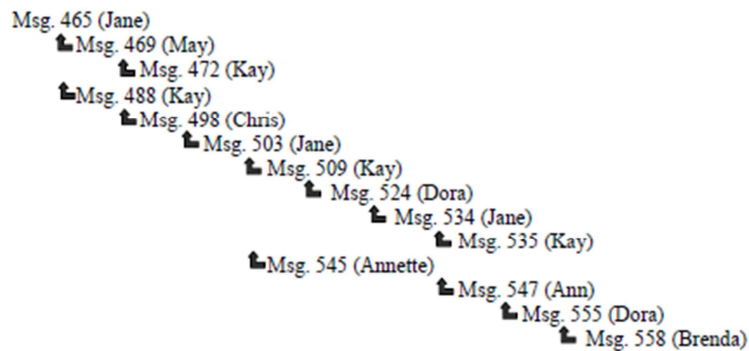


Figure 1. Interaction pattern: A thread of discussion

This expresses how the computer conferencing system organizes individual postings. The number indicates the actual sequence of the message as generated by the computer system. The lower number refers to the earlier posting in terms of time (i.e., number nine was posted before number 41). The arrow indicates a responding behavior occurred. That is a participant composed a message and clicked the reply button to a message previously posted.

Following the links between messages may not be readily discernible by a visual examination of the threaded discussion. The automatic display of the data by the online discussion board simply provides a hierarchical, linear representation of the conversation. A more detailed analysis of the transcripts of the discussion board enabled the researcher to further explore the actual relationships between messages. By examining the transcripts of the discussion, the researchers were able to demonstrate the response sequences.

Response Sequences

While the interaction is partially controlled by the system, generating a linear pattern, examining the participants' linguistic behavior in the messages enables observation of more complex patterns. In Figure 2, the arrows are used to indicate connections between message and the dotted line indicates an actual interaction reflected within the text.

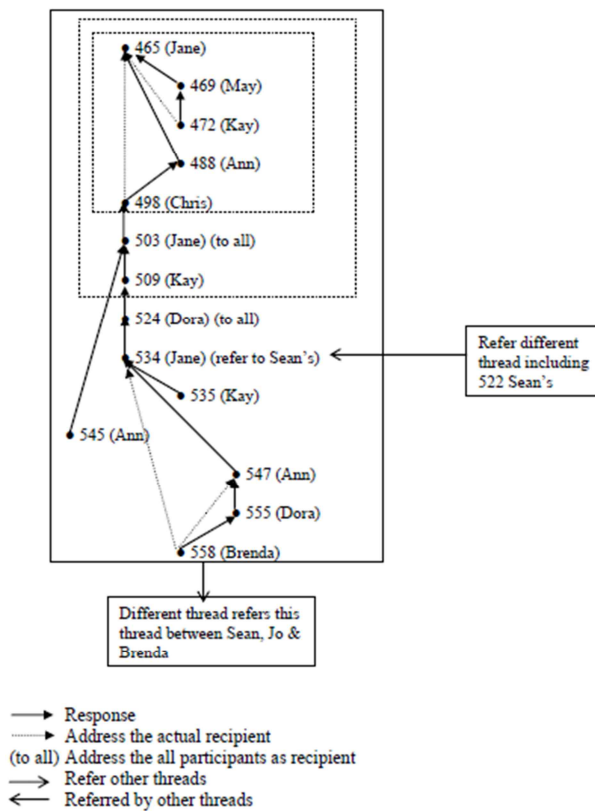


Figure 2. Response sequences

One element that enabled a more robust exploration of the messages was addressivity (i.e., who is named as the recipient in the text of the message). For example, Chris (498) responded to Ann (498), but she also responded to message

created by Jane (465) and Kay (472) at the same time by addressing their name in her messages. For another example, Jane (503) responded to Chris (498), but she intended to respond to all participants in the thread (e.g., “to all” was in her message).

A number of properties of interaction in technology-mediated communication are the result of attempts to avoid ambiguity and discontinuity in structures of turn-taking, which in face-to-face conversation encounters would typically be negotiated by paralinguistic cues such as intonation, pauses, gesture and eye-gaze. As shown in the data (see Figure 2), the participants worked to organize the disparate elements of the discourse controlled by the system. For example, it has become more conventional for participants of online discussion to indicate the intended addressee by putting that person’s name at the start of a message (Hutchby, 2001; Werry, 1996).

Interaction Amongst Participants

Asynchronous discussion is often described as a many-to-many communication tool that structures information exchanges and interactions between participants. In asynchronous discussion, multiple participants engage at different times, therefore explicit interactions between two participants (i.e., one-on-one) are not always observed. In order to reveal the different layers of the discussion, the researchers found a new representation of the data was needed. Therefore, the messages in the thread were organized by the interaction amongst participants. Figure 3 indicates how the multilateral communications were demonstrated in this asynchronous discussion.

Figure 3 helps to illustrate how participants are connected to and interact with each other during the discussion by restructuring the messages by participants (as opposed to the linear display generated by the conferencing system). For example, Jane asked a question (465), and Ann directly responded to Jane (488). Jane (465)

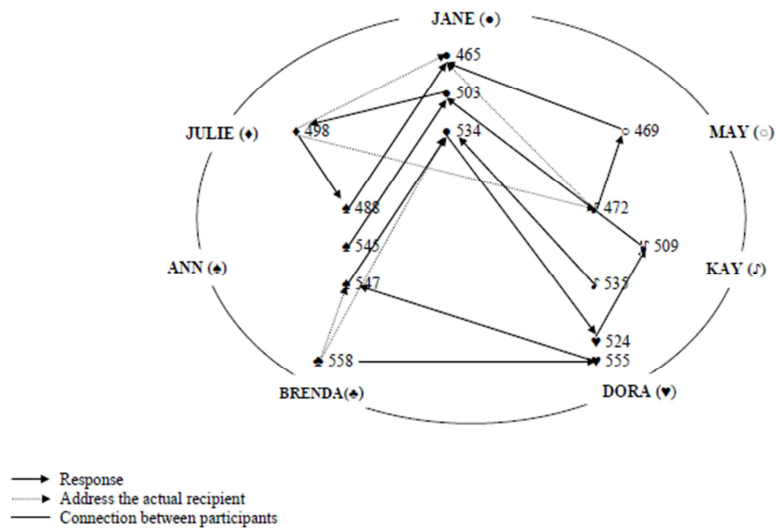


Figure 3. Interaction amongst participant

and Ann (488)’s interaction comprised of question and answer. And Jane did not respond to Ann’s answer (488). However, interaction between Jane and Ann did not stop here. Jane responded to other participants who answered her question (503) including Ann, by using addressivity (i.e., strategy; e.g., ‘to all’) and by responding to Chris’s post (498) (i.e., technological affordance; e.g., threaded by computer). Here, Jane responded Ann (488) explicitly (address Ann’s name in Jane’s message) as well as implicitly (through Chris’s message responded to Ann). This example indicates how Jane, Chris, and Ann are connected in the threaded discussion.

For another example, Ann (547) responded to Jane (534), and then Dora (555) responded to Ann (547), finally Brenda (558) replied to Dora (555). Similar to the previous example, here, Brenda also replied to Ann and Jane by addressing their name in the text of the message (558). The interaction amongst participants is complex and multiple: four participants are connected through interaction between the messages (see Figure 4). As a result, it appears that all participants are linked in the discussion, not directly and/or explicitly, but each participant contribution

enables the dialogue to connect together by responding to others' messages.

Concept Map of Messages

Meaning from the context (i.e., the line of thought) in individual messages also allowed the researchers to observe different interaction patterns. The interaction appeared to be centered around the content of the messages; therefore, a concept map of the discussion was created. Figure 4 includes interactions between Jane, Chris, and Ann for further examination. The concept map is based on categories and themes that emerged in the messages generated by three participants.

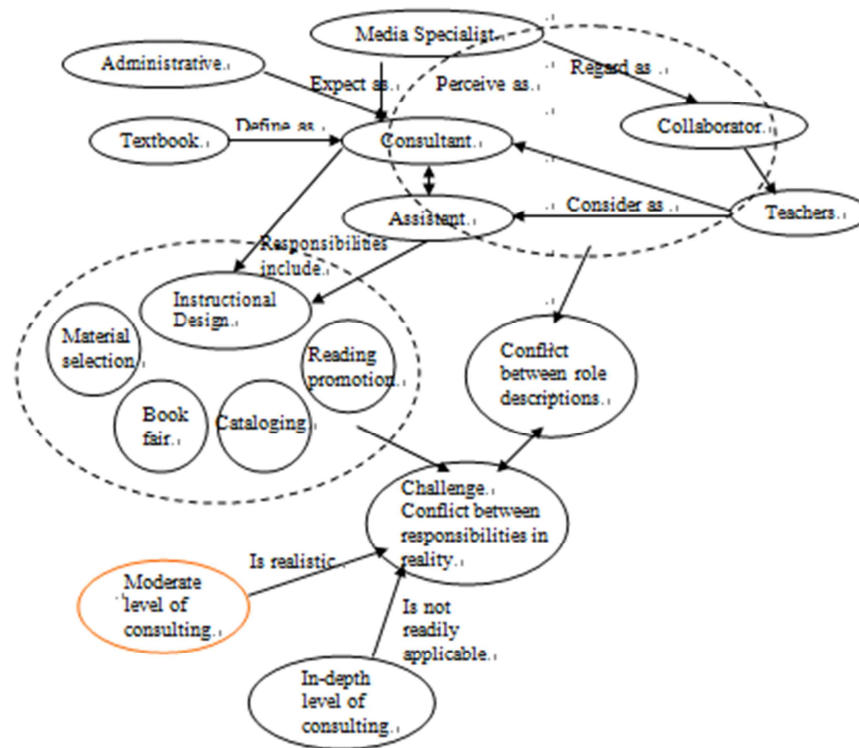


Figure 4. Concept map of messages

The map proposes that interaction is also enabled by the relatedness of the content (e.g., concepts) of the messages posted by each participant. First, Jane, Chris, and Ann's messages are condensed as themes and these themes are categorized as shown in Figure 4. In this example, individual participants' names or number of message are not specified, rather the focus is on describing the integration of content of the messages. By representing how participants shared the meanings, Figure 4 illustrates how participants cross-examined the concepts during the discussion. Investigation of the meaning from the text demonstrates the addressivity is not the only indication that can explain how participants actually interacted.

In summary, the interaction enabled by the asynchronous discussion was depicted through three different lenses: response sequences, interaction amongst participants, and concept map of messages. These could only be discerned when the researchers moved beyond the linear presentation features enabled by the tool to the multilateral communication (i.e., many-to-many) capabilities taking place in the messages. Within this technological environment, participants' linguistic behavior (e.g., addressivity) created unique interaction patterns. Further, concept mapping the discussion enabled the researchers to observe content connections between the messages. We now turn to the social dimensions in the asynchronous discussion, for insight into how this interaction is supported in terms of the use of different types of discourse.

Discussion and Implications

Participants in online discussion, in the absence of vocal and nonverbal cues, employed a variety of strategies to organize the interaction. Organizing strategies have been identified by other researchers who indicate that the use of verbal immediacy indicators (e.g., addressivity) also reduces the perceived psychological

distance between participants. The research also indicates that students often perceive online discussions as highly interactive and social (Gunawardena & Zittle, 1997; Richardson & Swan, 2003).

The linear presentation of messages by the system challenged the researcher in observing the interaction in the asynchronous discussion. Different mapping strategies allowed for a more thorough examination of various patterns of interaction in the asynchronous discussion, enabling the discovery of distinctive behaviors in the interactions. This calls attention to the need to reexamine how interaction is determined in online environments.

The use of a different mapping strategy also enabled the revelation that participants cross-referred the messages in different threads. As shown in [Figure 3], Jane (message 534) referred Sean's message (522) from a different thread and made connection between two messages. In addition, the discussion of this thread was referred in different thread. This phenomenon indicates that interactions can be viewed through multiple lenses if we look beyond the default structure created by the system (e.g., across-thread) (Levin, 1999; Turoff, Hiltz, Bieber, Fjermestad, & Rana, 1999). Future study should further examine this phenomenon, how participants organize ideas across discussion threads (or topics), and how this might can be support to learning.

The visualization of response sequences also enabled the researchers to discover complex and dynamic interaction patterns amongst participants. As shown in the data, the many-to-many communication feature offered by the online learning system does not always enable direct one-on-one interaction between two participants. Rather, in many instances, one message contributed to multiple threads in the stream of conversation. In these complex relationships, we were able to observe that many individual messages are connected in the larger threaded discussion.

The interaction amongst participants has implications for the current conceptual frameworks on collaborative learning (e.g., Harasim, 2012). Current conceptual

frameworks propose how participants make links between ideas. However, as indicated in the data from this study, the messages also bind each participant and consequently a group(s) of participants together. It appears that the contribution of one message may not only enable a response to one participant, but also connect many participants to each other (c.f., Romiszowski, 1997; Salomon, 1998).

The concept map of messages proposes that response sequences and interaction amongst participants can also be viewed between concepts within messages in an asynchronous discussion. On the surface, the messages posted by individuals are linked by the system in a linear fashion as they are posted. However, by exploring the specific content of and context in which the messages are posted, the data indicated that the interaction extends to collaborative conversation amongst participants. Ultimately, a conceptual network of interrelated ideas including multiple perspectives is built in asynchronous discussion.

Physical access to data for interaction analysis is relatively easy. Transcripts of online discussions are readily accessible since the written data is compiled as text during and after the discussion. However, given the rich and complex nature of the data, conceptual access may not be so easy. One single method of examining the data does not appear to be sufficient; rather multiple methods appear to be useful in gaining a richer understanding of the interactions that occur in online discussions.

Grounded in the data, the goal of using a variety of strategies was to visualize the interaction patterns to seek a different way of looking at the social process of learning.

Another challenge comes from the nature of data. Due to the asynchronicity, it is not simple to analyze the activities that occurred during the reading, writing, and posting messages outside as well as within the discussion board. If we examine the evolution of a discussion over time, how might we conceptualize 'distributed' time – asynchronous participation – by the growth of discussion threads or particular themes? Or do we consider its evolution over time across participants? Future research is needed that will enable extensive data collection methods to substantiate

the findings (e.g., in-depth recall interview, participant's self-reflection during and after the session, post-group discussion).

One area in need of further examination is the participants' ability to recognize different layers in the discourse. As mentioned earlier in the paper, the turn-taking strategy in an asynchronous discussion does not incorporate the same procedures a participant uses to take turns in a face-to-face discussion (Sacks et al., 1974). Participants cannot control the exact placement of their messages in the threaded discussion systems as they currently are configured. This phenomenon is often described as a 'conflict of discourse' and as one of the challenges in online discussion (Kemery, 2000; Wegerif, 1998). Research questions related to the different layers of interaction (e.g., do the participants perceive complex interaction patterns, or do they simply see the linear pattern of the interaction as depicted by the system?) should be addressed in the future research.

Related to the multiple layers of interaction, identification of linguistic behaviors and how these are interrelated to technological affordances should be further examined. One of the indicators, addressivity, was identified and described in this study; other researchers have also identified different behaviors in online contexts (e.g., Erkens, Andriessen, & Peters, 2003). For instance, in the data, participants often replied to their own messages (e.g., "This feels a little silly, replying to my own post! But I want to say some things...about that long statement...", Ann). When we examine this phenomenon, do we consider this as learning strategies or linguistic behaviors in online context? Other qualifiers that might contribute to the structure of the interaction should be thoroughly explored to enable researchers to investigate how we interpret size, centrality, and density of interaction from different perspectives.

The other area considered for implementation is the design of the system. For example, in this study, the concept map was used as an analysis tool. The strategy indicates interaction occurs around the messages created by multiple participants, consequently, what was shared between participants can be explained. The use of a

concept map was originally intended to enable learners to generate and communicate ideas, to support learning by explicitly integrating new and old knowledge, and to assess understanding or diagnose misunderstanding (see Jonassen, Beissner, & Yacci, 1993; Lawson, 1994). This study suggests incorporated concept mapping tools in current online discussion systems, so as to assist participants with understanding and monitoring their own cognitive development process in individual and collaborative learning contexts. This may also contribute to overcoming the conflicts of discourse in an online environment.

One may observe that the “interaction” displayed by a computer network is merely a technological device used to link the messages. However, the examination of different layers in the interaction empowered the researcher to view the connections amongst participants into a collaborative conversational structure, where the messages are connected with ideas. Furthermore, the investigation of the meaning-making from the context supported to represent the conceptual structure of the interrelated ideas amongst participants.

Online discourse is situated in different layers of interaction: multilateral (i.e., many-to-many) communication, linear presentation of the asynchronous discussion, and a learner’s strategy to organize the interaction. In the unique and multi-faceted interaction created via asynchronous discussion, individual messages are intertwined and shared in a group. Both the process and result of the discussion are situated in the specific context. The individual’s effort is related to the group, and the group relies on individual effort. That is, the responsibility is distributed amongst participants, yet the control is shared in the community.

References

- Anderson, T. (2003). Modes of interaction in distance education: Recent developments and research questions. In M. G. Moore, & W. G. Anderson (Eds.), *Handbook of distance education* (pp.129-144). Mahwah, NJ: Lawrence Erlbaum.
- Barab, S. A., & Duffy, T. (2012). From practice field to communities of practice. In D. Jonnassen & S. Land (Eds.), *Theoretical foundations of learning environments* (pp. 29-65). New York: Routledge.
- Barab, S. A., & Kirshner, D. (2001). Guest editor's introduction: Rethinking methodology in the learning sciences. *The Journal of the Learning Sciences*, 10(1&2), 5-15.
- Beck, R. J., Fitzgerald, W. J., & Paukszta, B. (2003). Individual behaviors and social structure in the development of communication networks of self-organization online discussion groups. In B. Wasson, S. Ludvigsen, & U. Hoppe (Eds.), *Designing for change* (313-322). Netherlands: Kluwer Academic.
- Brown, J. S., Collins, A. & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), 32-42.
- Chee-Kit, L. (2002). Communication techniques. In H. H. Aderlsberger, B. Collis, & J. M. Pawlowski (Eds.), *Handbook of information technologies for education and training*(pp.45-56). Berlin: Springer-Verlag.
- Condon, S. L., & Čech, C. G. (1996). Functional comparisons of face-to-face and computer-mediated decision making interactions. In S. C. Herring (Ed.), *Computer-mediated communication: Linguistic, social and cross-cultural perspectives* (pp.65-80). Philadelphia, PA: John Benjamins.
- Coffey, A., & Akins, P. (1996). *Making sense of qualitative data: Complementary research strategies*. Thousand Oaks, CA: Sage.
- Davis, B. H., & Brewer, J. P. (1997). *Electronic discourse: Linguistic individuals in virtual space*. Albany, NY: SUNY Press.

- De Wever, B., Schellens, T., Valcke, M., & Van Keer, H. (2006). Content analysis schemes to analyze transcripts of online asynchronous discussion groups: A review. *Computers & Education, 46*(1), 6-28.
- Donnelly, R., & Gardner, J. (2011). Content analysis of computer conferencing transcripts. *Journal of Interactive Learning Environments, 19*(4), 303-315.
- Erkens, G., Andriessen, J., & Peters, N. (2003). Interaction and performance in computer-supported collaborative tasks. In H. van Oostendorp (Ed.), *Cognition in a digital world* (pp.225-254). Mahwah, NJ: Lawrence Erlbaum.
- Fahy, P. J., Crawford, G., & Ally, M. (2001, July). Patterns of interaction in a computer conference transcript. *International Review of Research in Open and Distance Learning*. Retrieved July 31, 2012, from <http://www.irrodl.org/content/v2.1/fahy.html>
- Garcia, A. C., & Jacobs, J. B. (1999). The eyes of the beholder: Understanding the turn-taking system in quasi-synchronous computer-mediated communication. *Research on language and social interaction, 32*(4), 337-368.
- Gunawardena, C. N., & Zittle, F. (1997). Social presence as a predictor of satisfaction within a computer mediated conferencing environment. *American Journal of Distance Education, 11*(3),8-26.
- Han, S., & Hill, J. (2004, October). Qualitative inquiry on computer-mediated communication. Paper presented at the AECT Annual Meeting, Chicago, IL.
- Han, S. (2002, December). Collaborating to learn on the web: A qualitative inquiry to examine the nature of online discourse. The Interdisciplinary Qualitative Studies Advanced Seminar Mini-Conference, Athens, GA.
- Han, S., & Hill, J. R. (2007). Collaborate to learn, learn to collaborate: Examining the roles of context, community, and cognition in asynchronous discussion. *Journal of Educational Computing Research, 36*(1), 89-123.
- Hara, N. (2002). Analysis of computer-mediated communication: Using formal concept analysis as a visualizing methodology. *Journal of Educational Computing Research, 26*(1), 25-49.

- Harasim, L. (2012). *Learning theory and online technologies*. New York: Routledge.
- Henning, P. H. (2004). Everyday cognition and situated learning. In D. H. Jonassen (Ed.), *Handbook of Research on Educational Communications and Technology* (2nd ed.)(pp.143-168). Mahwah, NJ: Lawrence Erlbaum.
- Hill, J. R., Wiley, D., Nelson, L. M., & Han, S. (2004). Exploring research on Internet-based learning: From infrastructure to interactions. In D. H. Jonassen (Ed.), *Handbook of Research on Educational Communications and Technology*(2nd ed.)(pp.433-460). Mahwah, NJ: Lawrence Erlbaum.
- Hutchby, I. (2001). *Conversation and technology: From the telephone to the Internet*. Cambridge, UK: Polity.
- Järvelä, S., & Häkkinen, P. (2002). Web-based cases in teaching and learning - The quality of discussions and a stage of perspective taking in asynchronous communication. *Interactive Learning Environments*, 10(1), 1-22.
- Jeong, A. (2005). A guide to analyzing message-response sequence and group interaction patterns in computer-mediated communication. *Distance Education*, 26(3). 367-283.
- Jonassen, D. H., Beissner, K., & Yacci, M.A. (1993). *Structural knowledge: Techniques for conveying, assessing, and acquiring structural knowledge*. Hillsdale, NJ: Lawrence Erlbaum.
- Kemery, E. R. (2000). Developing on-line collaboration. In A. Aggarwal (Ed.), *Web-based learning and teaching technologies: Opportunities and challenges* (pp.227-245). Hershey, PA: Idea Group.
- Kirshner, D., & Whitson, J. A. (1997). Editors' introduction to situated cognition. In D. Kirshner & J. A. Whitson (Eds.). *Situated cognition: Social, semiotic, and psychological perspectives* (pp.1-16). Mahwah, NJ: Lawrence Erlbaum.
- Kvale, S. (1996). *InterViews: An introduction to qualitative research interviewing*. Thousand Oaks, CA: Sage.
- Lawson, M. J. (1994). Concept mapping. In T. Husén & T. N. Postlethwaite (Eds.), *The international encyclopedia of education* (2nd ed., Vol. 2.)(pp.1026-1031). Oxford: Elsevier Science.

- Mann, C., & Stewart, F. (2000). *Internet communication and qualitative research: A handbook for researching online*. Thousand Oaks, CA: Sage.
- Moore, M. G., (2012). The theory of transactional distance. In M. G., Moore(Ed.), *The Handbook of Distance Education*(3rd ed.) (pp.66-85). Routledge.
- Pea, R. D. (1993). Practices of distributed intelligence and designs for education. In G. Salomon (Ed.), *Distributed cognitions: Psychological and educational considerations* (pp.47-87). New York: Cambridge University.
- Pea, R. D. (2004). The social and technological dimensions of scaffolding and related theoretical concepts for learning, education, and human activity. *The Journal of the Learning Sciences*, 13(3), 423-451.
- Poldner, E., Simons, P. R. J., Wijngaards, G., & van der Schaaf, M. F. (2012). Quantitative contentanalysis procedures to analyze students' reflective essays: A methodological review of psychometricand edumetric aspects. *Educational Research Review*, 7(1), 19-37.
- Richardson, J., & Swan, K. (2003). An examination of social presence in online learning: Students perceived learning and satisfaction. *Journal of Asynchronous Learning Network*, 7(1). Retrieved December 14, 2012, from http://www.aln.org/publications/jaln/v7n1/v7n1_richardson.asp
- Romiszowski, A. J. (1997). Web-based distance learning and teaching: Revolutionary invention or reaction to necessity? In B. H. Khan (Ed.), *Web-based instruction* (pp.25-40). Englewood Cliffs, NJ: Educational Technology.
- Sacks, H., Schegloff, E., & Jefferson, G. (1974). A simplest systematic for the organization of turn-taking in conversation. *Language*, 50(4), 696-735.
- Salomon, G. (1993). No distribution without individuals' cognition: A dynamic interactional view. In G. Salomon; (Ed.), *Distributed cognition: Psychological and educational consideration* (pp.111-138). New York: Cambridge University.
- Salomon, G. (1998). Technology's promises and dangers in a psychological and educational context. *Theory into Practice*, 37(1), 3-10.
- Strijbos, J. W., Kirschner, P. A., & Martens, R. L. (2004). What we know about CSCL: and what we do not (but need to) know about CSCL. In J. W. Strijbos,

- P. A. Kirschner, & R. L. Martens (Eds.), *What we know about CSCL: And implementing it in higher education* (pp.254-259). Kluwer Academic.
- Strijbos, J. W., & Stahl, G. (2007). Methodological issues in developing a multi-dimensional coding procedure for small-group chat communication. *Learning & Instruction, 17*(4), 394-404.
- Wegerif, R. (1998). The social dimension of asynchronous learning networks. *Journal of Asynchronous Learning Network, 2*(1). Retrieved July15, 2012, from http://www.aln.org/alnweb/journal/vol2_issue1/wegerif.htm
- Wenger, E. (1998). *Communities of practices: Learning, meaning, and identity*. New York: Cambridge University.
- Werry, C. C. (1996). Linguistic and interactional features of Internet Relay Chat. In S. C. Herring (Ed.), *Computer-mediated communication: Linguistic, social and cross-cultural perspectives* (pp.47-64). Philadelphia, PA: John Benjamins.
- Yates, S. (1996). Oral and written linguistic aspects of computer conferencing: A corpus based study. In S. C. Herring (Ed.), *Computer-mediated communication: Linguistic, social and cross-cultural perspectives* (pp.29-46). Philadelphia, PA: John Benjamins.
- Yin, R. K. (2013). *Case study research: Design and methods* (5th ed.). Thousand Oaks, CA: Sage.



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